

**SYSTEMATIC REVIEW OF
LITERATURE OF
CONSERVATIVE
INTERVENTIONS FOR
WHIPLASH ASSOCIATED
DISORDERS: A CONSUMER
ORIENTED REPORT**

Report prepared for

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Medical Interventions

Botulinum Toxin

Our rating



What is it?

Botulinum toxin is a neurotoxin protein which is produced by the bacterium *Clostridium Botulinum*. It is one of the most poisonous naturally occurring substances in the world and is considered to be the most toxic protein. Although this is a highly toxic substance, it is used to treat muscle spasms and for cosmetic reasons. It is commonly referred to as Botox and Dysport in the cosmetic industry.

How does it work?

Botulinum toxin is used to treat a variety of neurological disorders which are caused by pathological increase in muscle tone. When injected in minute quantities into the overactive muscles, Botulinum toxin type A decreases muscle activity by blocking the release of acetylcholine (a neurotransmitter) from the nerve which normally signals the muscle to contract. This ensures that the muscle is unable to contract for a period of up to six months.

Is it effective?

A systematic review and meta-analysis analyzed the effect of intramuscular Botulinum toxin injections in adults with sub-acute and chronic WAD. This review found moderate evidence that Botulinum toxin injections were no more effective than saline injections in terms of pain, disability and quality of life. A high quality study undertaken in the Netherlands investigated the effectiveness of Botulinum toxin compared to saline solution injections for patients suffering from chronic whiplash. The findings indicated that there was no difference between Botulinum toxin and saline solution for pain, range of movement and number of pain tablets taken. This was the case for both short term and long term outcomes.

Some studies have shown that Botulinum toxin might be successful in treating chronic neck pain after whiplash. However, these studies were limited by small sample sizes and lack of long-term follow up. A recent systematic review and meta-analysis concur with the above findings. This review did find a small analgesic effect associated with Botox A, however the authors recommend collecting more evidence before definitive conclusions can be drawn.

Are there any disadvantages?

There can be potential side effects as a result of Botulinum toxin injections. This could be in the form of paralysis of wrong muscle group leading to loss of muscle function and allergic reaction to the toxin. It has also been noted that bruising at the site of injection can also occur if inappropriately administered.

Where do you get it?

Botulinum toxin for whiplash patients can only be administered by registered health professional, most likely a medical specialist (i.e. Neurologist). As this is an emerging area of intervention, it may not be widely available.

Recommendations

Based on current evidence, Botulinum toxin cannot be recommended as routine treatment for patients with acute or chronic whiplash who are suffering from neck pain and other associated symptoms. While it may be useful in some instances, more research is required to establish this practice as one which produces consistent and sustainable positive outcomes.

Key references

Braker, C, Yariv, S, Adler, R, Badarney, S & Eisenburg, E 2008, 'The analgesic effect of botulinum-toxin A on post whiplash neck pain, *The Clinical Journal of Pain*, vol. 24, pp. 5-10.

Carroll, A, Barnes, M & Comiskey, C 2008, 'A prospective randomised controlled study of the role of botulinum toxin in whiplash-associated disorder', *Clinical Rehabilitation*, vol. 22, no. 6, pp. 513-519.

Freund, B & Schwartz, M 2000, 'Treatment of Whiplash Associated with Neck Pain with Botulinum Toxin-A: A Pilot Study', *The Journal of Rheumatology*, vol. 27, no. 2, pp. 481-484.

Freund, B & Schwartz, M 2002, 'Use of Botulinum Toxin in Chronic Whiplash-Associated Disorder', *The Clinical Journal of Pain*, vol. 18, pp. S163-S168.

Freund, B & Schwartz, M 2004, 'Whiplash Associated Disorders: A Review of Recent Advances in Treatment', *Journal of Whiplash & Related Disorders*, vol. 3, no. 1, pp. 49-58.

Freund, B & Schwartz, M 2006, 'The Role of Botulinum Toxin in Whiplash Injuries', *Current Pain and Headache Reports*, vol.10, no.5, pp. 355-359.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D, & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions, results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no 1, pp. 123-152.

Juan, FJ 2003, 'Treatment of neck pain after whiplash injuries with Botulinum toxin-A injections', *Journal of Musculoskeletal Research*, vol.7, no. 3&4, pp.221-226.

Langevin, P, Lowcock, J, Weber, J, Nolan, M, Gross, A, R, Peloso, P, M, Roberts, J, Graham, N, Goldsmith, C, Burnie, S, J & Haines, T 2010, 'Botulinum toxin intramuscular injections for neck pain: a systematic review and meta-analysis', *The Journal of Rheumatology*, published online, Dec 2010

Padberg, M, de Bruijn, SFTM & Tavy, DLJ 2007, 'Neck pain in chronic whiplash syndrome treated with Botulinum toxin. A double blind, placebo-controlled clinical trial', *Journal of Neurology*, vol. 254, pp. 290-295.

Pelso, P, Gross, A, Haines, T, Trinh, K, Goldsmith, CH, Burnie, S, Cervical Overview Group 2007, 'Medicinal and injection therapies for mechanical neck disorders', *Cochrane Database of Systematic Reviews*, Issue 3, Art.No.: CD000319. DOI:10.1002/14651858.CD000319.pub4.

Suijlekom, HV, Mekhail, N, Patel, N, Zundert, JV, Kleef, MV & Patijn, J 2010, ' Whiplash-associated disorders', *Pain Practice*, vol. 10, no. 2, pp. 131–136.

Zhang, T, Adata, A, Zarin, W, Moitri, M, Vijenthria, A, Chu, R, Thabane, L & Kean, W 2011, 'The efficacy of botulinum toxin type A in managing chronic musculoskeletal pain: a systematic review and meta-analysis', *Inflammopharmacology*, vol. 19, pp. 21–34.

Nerve Root Blocks

Our rating



What is it?

A selective nerve root block is a procedure performed to determine if a specific spinal nerve is the source of pain and reduce inflammation around the nerve root. By reducing inflammation around the nerve root, the patient may experience a decrease in pain. This procedure is done under a local anaesthetic. The health professional locates the spinal nerve root, usually with the help of fluoroscopy (an imaging technique which obtains real time images of body structures using a fluoroscope). A needle is introduced through the skin into the area adjacent to the nerve root. Medication is then injected into the area which ensures that the nerve root is immersed in medication. Traditionally, the medications injected include an anaesthetic and a steroid.

How does it work?

Injecting anaesthetic and steroids around the nerve root can help with pain relief and controlling any inflammation that may occur as a result of whiplash. Some anaesthetics, such as lidocaine, have also been shown to improve blood flow and reduce dysfunction of the neural system. Ultimately this might help in the healing of the injured nerve.

Is it effective?

There is very little high level, high quality evidence to support selective nerve root blocks as an effective treatment method for patients suffering from whiplash. One study used selective nerve root blocks in conjunction with physiotherapy for patients suffering from long term symptoms of whiplash. The findings indicated that while nearly half of the patients experienced short term benefit (especially in terms of pain and other symptom relief), only 14% received good and excellent outcomes. For those who benefit from nerve root blocks in the short term, there is no evidence for the effectiveness of *repeated* nerve root blocks (more than three). There is also no evidence that nerve root blocks reduce the incidence of surgery. Therefore, the overall quality of evidence for using selective nerve root blocks for whiplash patients is poor.

Are there any disadvantages?

There might be increased pain after the procedure. There may also be feeling of weakness and numbness of arm(s), chest wall or leg(s) after the procedure. These symptoms are common after selective nerve root blocks. Other potential side effects include facial flushing, occasional low-grade fevers, hiccups, insomnia, headaches, water retention, increased appetite, increasing heart rate, abdominal cramping and bloating. These side effects occur in about 5% of people and usually resolve within 1-3 days of the injection. It is important to regularly inform health professionals regarding recovery after the nerve block.

Where do you get it?

This procedure can only be undertaken by a medical practitioner and most likely by a specialist (a radiologist) in this field.

Recommendations

Based on very limited available evidence, it is unclear how useful selective nerve root blocks are for treating patients with whiplash. It is likely to be reserved for people that have not responded to more conservative treatments and have chronic pain. More research is needed before concrete recommendations can be made.

Key references

Carragee, E, Hurwitz, E, Cheng, I, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Hogg-Johnson, S, Van der Velde, G, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: injections and surgical interventions: results of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, pp.153-169.

Pelso, P, Gross, A, Haines, T, Trinh, K, Goldsmith, CH, Burnie, S, Cervical Overview Group 2007, 'Medicinal and injection therapies for mechanical neck disorders', *Cochrane Database of Systematic Reviews*, Issue 3, Art.No.: CD000319. DOI:10.1002/14651858.CD000319.pub4.

Schofferman, J, Bogduk, N & Slosar, P 2007, 'Chronic whiplash and whiplash associated disorders: an evidence based approach', *Journal of the American Academy of Orthopaedic Surgeons*, vol. 15, no. 10, pp. 596-606.

Slipman, CW, Lipetz JS, Jackson, HB, Plastaras, CT, Vresilovic, EJ 2001, 'Outcomes of Therapeutic Selective Nerve Root Blocks for Whiplash Induced Cervical Radicular Pain', *Pain Physician*, vol.4, no. 2, pp. 167-174.

Prolotherapy

Our rating	?
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What is it?

Prolotherapy is an injection treatment to strengthen weakened ligaments and muscular attachment points, and is used most commonly to treat musculoskeletal complaints.

How does it work?

Prolotherapy involves the injection of glucose or other irritating solution into the effected ligaments or tendons, which may lead to local inflammation. The localised inflammation triggers a wound healing cascade, resulting in the laying down of new collagen, the material that ligaments and tendons are comprised of. New collagen shrinks as it matures and this shrinking tightens the structure that was injected, making it stronger and stabilising the surrounding structures.

Is it effective?

There is a case report examining the effect of prolotherapy on pain and function in one person. A benefit was reported, however the study did not compare prolotherapy either with no treatment or placebo treatment. Prolotherapy has been mainly researched in relation to low back pain and sacroiliac joint pain.

Are there any disadvantages?

Prolotherapy is an invasive procedure and can involve some risk. Minor adverse effects may include some bruising, pain, stiffness and swelling in the area after treatment.

Where do you get it?

Many different practitioners may provide prolotherapy including doctors, specialists, chiropractors, physiotherapists, as long as they are appropriately qualified to provide prolotherapy.

Recommendations

The use of prolotherapy for whiplash cannot be recommended based on the limited current research evidence. More research is required.

Key references

Hooper, RA, Sherman, ST & Frizzell, JB 2006, 'Case report of whiplash related chronic neck pain treated with intraarticular prolotherapy', *Journal of Whiplash & Related Disorders*, vol. 4, no. 2, pp. 23-27.

Radiofrequency Neurotomy

Our rating



What is it?

Radiofrequency neurotomy is a procedure which aims to disrupt the nerve supply to the joints in the spinal column. These joints are called facet joints. The disruption of the nerve supply is called denervation. In this process an electrode or a probe is inserted via a needle under local anaesthetic and using X-rays. When the probe is close to the nerve, heat is generated which interrupts the nerve conduction. Therefore the nerve supply to the facet joint is interrupted.

How does it work?

Radiofrequency neurotomy works on the premise of disrupting the conduction of pain signals from the facet joints by interrupting its nerve supply. By interrupting the nerve supply, the pain signals are not carried to the brain and hence the perception of pain is reduced.

Is it effective?

This is an emerging area of practice and as such the evidence is limited. There are some high quality publications which support the use of radiofrequency neurotomy for patients suffering from long term whiplash injuries. The reported benefits include pain relief, range of motion, muscle strength and psychological well being. In some instances the benefit lasted up to a year. These findings however seem to be specific to patients with whiplash whose symptoms primarily arise from facet joints.

Are there any disadvantages?

During the procedure, it is possible that patients may receive a number of medications. These can have side effects such as drowsiness, temporary numbness, weakness and soreness. The area where the needle placement occurred can also be painful. These and other symptoms must be reported to the health professional for regular monitoring.

Where do you get it?

Radiofrequency neurotomy can only be undertaken by a registered medical health professional who is a specialist in this field (such as a radiologist).

Recommendations

There is emerging body of evidence to suggest that radiofrequency neurotomy may be beneficial for patients with whiplash injuries whose signs and symptoms are as a result of facet joint problems and of a longstanding nature. Radiofrequency neurotomy is usually considered after two nerve root blocks (see nerve root block) have been performed, and only if both nerve root blocks resulted in significant pain relief. Radiofrequency neurotomy may be repeated if required. More research is required to identify if this treatment will be beneficial for all patients suffering from long term whiplash symptoms.

Key references

Carragee, E, Hurwitz, E, Cheng, I, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Hogg-Johnson, S, Van der Velde, G, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: injections and surgical interventions: results of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, pp.153-169.

Prushansky, T, Pevzner, E, Gordon, C & Dvir, Z 2006, 'Cervical radiofrequency neurotomy in patients with chronic whiplash: a study of multiple outcome measures', *Journal of Neurosurgical Spine*, vol. 4, pp. 365-373.

Sapir, DA, Gorup, JM, 2001, "Radiofrequency Medial Branch Neurotomy in Litigant and Nonlitigant Patients with Cervical Whiplash", *Spine*, vol.26, no.12, pp E268-E273.


Schofferman, J, Bogduk, N & Slosar, P 2007, 'Chronic whiplash and whiplash associated disorders: an evidence based approach', *Journal of the American Academy of Orthopaedic Surgeons*, vol. 15, no. 10, pp. 596-606.

Seferiadis, A, Rosenfeld, M, Gunnarsson, R, 2004, "A review of treatment interventions in whiplash-associated disorders", *European Spine Journal*, vol. 13, pp. 387-397.

Suijlekom, HV, Mekhail, N, Patel, N, Zundert, JV, Kleef, MV & Patijn, J 2010, ' Whiplash-associated disorders', *Pain Practice*, vol. 10, no. 2, pp. 131–136.

Yadla, S, Ratliff, J & Harrop, J 2008, 'Whiplash: diagnosis, treatment, and associated injuries', *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68.

Time Off Work

Our rating	
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What is it?

Whiplash and the ensuing shock and subsequent symptoms means that some people may need time off from work to recover. Time off from work is usually prescribed by a medical doctor upon consultation with the person suffering from whiplash.

How does it work?

It is thought that time off from work, especially in the early stages of whiplash, provides person with whiplash the time and space required to recover from the accident without any additional pressures or stresses from work and/or other professional duties.

Is it effective?

It is widely acknowledged that staying active and maintaining an active lifestyle, within pain limits, is important following whiplash. In one study conducted in Norway, a group of people suffering from whiplash were advised to wear a collar for 14 days and also have time off work for 14 days. While this group of people did improve over a period of six months, people who stayed active and continued their normal life after whiplash responded much better compared to this group. It is thought that people who don't move (within pain limits) and have time off work may focus more attention on the accident and their symptoms, which may end up resulting in worries about long-lasting problems.

Are there any disadvantages?

It is thought that having time off work may place the focus on the accident and injuries, rather than on recovery and healing, thus delaying recovery.

Where do you get it?

Time off from work can only be prescribed by registered health professional, usually a medical doctor.

Recommendations

Based on available evidence, time off from work is not recommended as a treatment for whiplash injuries, especially in the long term. On the contrary, there is strong evidence supporting return to work as soon as possible following whiplash. The decision of having time off from work should be made by the health professional (a doctor) in consultation with the person with whiplash.

Key references

Borchgrevink, GE, Kaasa, A, McDonagh, D, Stiles, T, Haraldseth, O & Lereim, I 1998, 'Acute Treatment of Whiplash Neck Sprain Injuries: A Randomized Trial of Treatment During the First 14 Days After a Car Accident', *Spine*, vol. 1, no. 23, pp. 25-31.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D, & Haldeman, S 2008, 'Treatment of neck

pain: noninvasive interventions, results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders’, *European Spine Journal*, vol. 17, no 1, pp. 123-152.

Mercer, C, Jackson, A & Moore, A 2007, ‘Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)’, *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Yadla, S, Ratliff, J & Harrop, J 2008, ‘Whiplash: diagnosis, treatment, and associated injuries’, *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68.

Injections

Our rating	
Intramuscular injection of local anaesthetic	😊
Intravenous glucocorticoid	😊
Epidural injections	?
Subcutaneous injections	😐
Intra-cutaneous injections	😐
Intra-articular corticosteroid injections	😐
Melatonin	😐

What is it?

An injection is a means of putting liquid into the human body using a hollow syringe which is pierced through the skin to a sufficient depth for the material to be forced into the body. There are different forms of injections and often relate to the role they intend to play. These include intradermal (within the skin), subcutaneous (just under the skin), intramuscular (into the muscle), intravenous (into the vein), intraosseous (into the bone marrow) and epidural (space between the spinal cord and sheath which covers it called the Duramater) injections.

How does it work?

The injection inserts the required amount of liquid into the host's body. By doing so, the effect of the substance contained in the fluid travels all over the body and thus has a systemic effect. This is an effective and quick manner of administering chemical substances as the effect is not local but also generalised throughout the body.

A local anaesthetic is a drug that reversibly diminishes the feeling of pain by inhibiting pain signals travelling in through local nerves. A glucocorticoid is a form of steroid which, among other uses, has anti-inflammatory effects. Melatonin is a naturally occurring hormone found in our bodies and it is thought to play a role in biological clock, as an anti-oxidant, interact with the immune system and even affect dreaming.

Is it effective?

The evidence to support injections for whiplash is poor. A high quality systematic review synthesised a large amount of information on various types of injections for people who suffer neck pain. While this review did not limit its research to just whiplash sufferers, it included people who were suffering short and long term whiplash complaints.

There was moderate evidence for local anaesthetic (lidocaine) injections for patients with chronic neck pain. These injections were used in combination with other treatments (such as neck stretches, ultrasound) or in comparison to other treatments (such as dry needling). Similarly moderate positive effects were also identified for intravenous glucocorticoid. The research showed that patients who were suffering from pain immediately after whiplash

responded well to intravenous methylprednisolone, administered within eight hours of the injury. However, this effect was not sustained at six months.

There is very limited and poor quality evidence to suggest that epidural injections provided better pain relief and improved function compared to intramuscular injections in patients with long term neck problems with radiating symptoms. These patients were injected with methylprednisolone (a steroid) and lidocaine (an anaesthetic).

There was no evidence to support the use of subcutaneous injections (carbon dioxide used in conjunction with Physiotherapy) for patients with long term neck pain. This study included people with neck pain and was not restricted to just whiplash. Similarly, in a study with patients with neck problem and headache, intra-cutaneous injection of sterile water produced no benefit at all for pain and range of movement. When these patients were compared to other patients, who were in turn were injected with saline solution, there was again no benefit for pain and range of movement. These effects however were only measured up to 13 days and so we are unsure what the long term effects from these injections are.

A study, which investigated the effect of intra-articular corticosteroid injections in the facet joints of the neck in patients with long term neck pain, found no differences in pain or range of movement

In a study of people with long term neck pain, including whiplash, injected melatonin provided no benefit in pain, sleep or general health. These effects were only measured up to four weeks and hence we are unsure as to what the long term effects are.

Are there any disadvantages?

While there are some disadvantages to these injections, they were minor and transient. These include facial flushing, worsening of pain, dryness of mouth, dizziness, drowsiness, nausea, headache, malaise, vomiting, ulcer, allergic reaction, flu like symptoms, indigestion etc. Depending on the medicinal substance injected, there may be other side effects.

Injection itself may cause additional disadvantages. These include pain and redness of the skin at the site of injection.

Where do you get it?

Injections can only be provided by a registered health professional, most likely a Doctor or a specialist in this field.

Recommendations

While there is some evidence to suggest that certain injections (such as intravenous methylprednisolone and lidocaine) can work in some instances, there is just not enough research evidence to confidently say that these injections work for all patients with whiplash consistently.

Key references

Pelso, P, Gross, A, Haines, T, Trinh, K, Goldsmith, CH, Burnie, S, Cervical Overview Group 2007, 'Medicinal and injection therapies for mechanical neck disorders', *Cochrane Database of Systematic Reviews*, Issue 3, Art.No.: CD000319. DOI:10.1002/14651858.CD000319.pub4.

Seferiadis A, Rosenfeld M & Gunnarsson R 2004, 'A review of treatment interventions in whiplash-associated disorders', *European Spine Journal*, vol. 13, pp. 387–397.



Carragee, E, Hurwitz, E, Cheng, I, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Hogg-Johnson, S, Van der Velde, G, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: injections and surgical interventions: results of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, pp.153-169.

Carragee, EJ, Hurwitz, EL, Cheng, I, Carroll, LJ, Nordin, M, Guzman, J, Peloso, P, Holm, LW, Côté, P, Hogg-Johnson, S, Velde, G, Cassidy, JD & Haldeman, S 2009, 'Interventions for Neck Pain', *Surgical Journal of Manipulative and Physiological Therapeutics*, vol. 32, no.2, pp. 176-193.

Suijlekom, HV, Mekhail, N, Patel, N, Zundert, JV, Kleef, MV & Patijn, J 2010, 'Whiplash-associated disorders', *Pain Practice*, vol. 10, no. 2, pp. 131–136.

Yadla, S, Ratliff, J & Harrop, J 2008, 'Whiplash: diagnosis, treatment, and associated injuries', *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68.

Medication

Our rating	
Analgesia	
Anti-inflammatories	

What is it?

A medication, alternatively a medicine or a drug, is a substance or a combination of substances administered to a human being to cure/prevent a disease or alternatively manage symptoms of a disease/injury. For people with whiplash, common medications prescribed include pain-relieving medications called analgesics and anti-inflammatory medications to control local inflammation.

How does it work?

Analgesics and anti-inflammatory medications are thought to act at the central nervous system (Brain and Spinal Cord) and peripheral nervous system (any nerves beyond Brain and Spinal Cord). Some of the anti-inflammatory medications (such as Aspirin) stop the production of certain enzymes which in turn decrease production of substances which produce pain and inflammation.

Is it effective?

A high quality review looked at the effect of various medications on a range of neck problems, including whiplash. This review found that the evidence to support use of oral analgesics and anti-inflammatory medications was unclear. However, in clinical practice it is widely acknowledged that for people with whiplash, especially in the early stages, pain relieving medications such as paracetamol can be prescribed. Similarly in severe cases, some anti-inflammatory medications may be prescribed for short term use as means of controlling pain and swelling. Another review found analgesic medication to be effective for short term relief in patients with neck pain without signs of major pathology or trauma. A combination of remifentanyl, a low dose opioid (analgesic) and ketamine (an analgesic in low doses) have been shown to be effective in the short term in the reduction of pain associated with whiplash injury.

Are there any disadvantages?

Some of these medications, especially anti-inflammatory medications, may have side effects. These include nausea, vomiting, stomach pain, heart burn, gastritis, abdominal burning, gastrointestinal bleeding, liver toxicity, stomach ulcers and bleeding, ringing in the ears, rash, kidney problems and dizziness or light-headedness. Some of these pain relieving medications can be addictive if taken regularly.

Where do you get it?

Some of these medications are available as over-the-counter medications in supermarkets and pharmacies without a prescription. Others, especially those with higher dosages, require a prescription from a medical doctor.

Recommendations

The evidence to support these medications is unclear. While it seems that pain relieving medication and anti-inflammatory medications may help in symptom management, especially in the short term after whiplash, more research is needed on long term effects. Usage of medications, especially in combination, should be monitored regularly by a qualified and registered health professional such as medical doctor and/or a pharmacist.

Key references

Guzman, J, Haldeman, S, Carroll, LJ, Carragee, EJ, Hurwitz, EL, Peloso, P, Nordin, M, Cassidy, JD, Holm, LW, Côté, P, Velde, G & Hogg-Johnson, S 2009, 'Task force on neck pain and its associated disorders', *Journal of Manipulative and Physiological Therapeutics*, vol. 32, pp. 227-243.

Lemming, D, Sorensen, J, Graven-Neilson, T, Lauber, W, Arendt-Nielsen, L & Gerdle, B 2007, 'Managing chronic whiplash associated pain with a combination of low-dose opioid (remifentanyl) and NMDA-antagonist (ketamine)', *European Journal of Pain*, vol. 11, no. 7, pp. 719-732.

Motor Accidents Authority 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, MAA, Sydney, Australia.

Pelso, P, Gross, A, Haines, T, Trinh, K, Goldsmith, CH, Burnie, S, Cervical Overview Group 2007, 'Medicinal and injection therapies for mechanical neck disorders', *Cochrane Database of Systematic Reviews*, Issue 3, Art.No.: CD000319. DOI:10.1002/14651858.CD000319.pub4.

Allied Health Interventions

Collar

Our rating



What is it?

A soft or semi-rigid collar placed around the neck to provide support and restrict movement, usually in the early stages after an injury. It may be worn either continuously or for prescribed periods throughout the day and/or night.

How does it work?

The collar immobilises the neck, allowing the injured structures of the neck to rest and thus may potentially aid in recovery.

Is it effective?

Several studies have compared the use of various types of collars to either early mobilisation or exercise programmes or advice to act as usual within the first 2-3 weeks after whiplash. Four studies found that immobilisation with a collar was inferior in terms of reducing pain, stiffness and disability associated with whiplash. Three other studies found no difference between the use of a collar and the other treatments in terms of pain, range of motion and disability. Two studies reported that people wearing a collar took on average longer to return to work than those who did not, whereas another 2 studies found no difference. One study found that commencing neck range of motion exercises soon after injury lead to improved range of motion at 3 years post-injury when compared to resting and wearing a collar. Overall the research does not support the use of a collar following whiplash injury.

Are there any disadvantages?

It is possible that wearing a collar may increase neck stiffness by preventing movement, therefore potentially delaying recovery and increasing the amount of time it takes to return to work after a whiplash injury.

Where do you get it?

Collars may be provided by the hospital, or by your treating therapist. Collars are available to purchase at most pharmacies/chemists.

Recommendations

The use of a collar is not recommended as it may unnecessarily slow recovery.

Key references

Bonk, AD, Ferrari, R, Giebel, GD, Edelmann, M & Huser, R 2000, 'Prospective, randomized, controlled study of activity versus collar, and the natural history for whiplash injury, in Germany', *Journal of Musculoskeletal Pain*, vol. 8, no. 1-2, pp. 123-132.

Borchgrevink, GE, Kaasa, A, McDonagh, D, Stiles, TC, Haraldseth, O & Lereim, I 1998, 'Acute treatment of whiplash neck sprain injuries: a randomized trial of treatment during the first 14 days after a car accident', *Spine*, vol. 23, no. 1, pp. 25-31.

Crawford, JR, Khan, RJK & Varley, GW 2004, 'Early management and outcome following soft tissue injuries of the neck-a randomised controlled trial', *Injury, International Journal of the Care of the Injured*, vol. 35, pp. 891-895.

Dehner, C, Hartwig, E, Strobel, P, Scheich, M, Schneider, F, Elbel, M, Kinzl, L & Kramer, M 2006, 'Comparison of the relative benefits of 2 versus 10 days of soft collar cervical immobilization after acute whiplash injury', *Archives of Physical Medicine and Rehabilitation*, vol. 87, no. 11, pp. 1423-1427.

Guzman, J, Haldeman, S, Carroll, L, Carragee, E, Hurwitz, E, Peloso, P, Nordin, M, Cassidy, D, Holm, L, Co'te, P, Van der Velde, G & Hogg-Johnson, S 2008, 'Clinical practice implications of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders; from concepts and findings to recommendations', *European Spine Journal*, vol. 17, no. 1, pp. 199-213.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Kongstead, A, Qerama, E, Kasch, H, Bendix, T, Winther, F, Korsholm, L & Jensen, TS 2007, 'Neck collar, "act-as-usual" or active mobilization for whiplash injury', *Spine*, vol. 32, no. 6, pp. 618-626.

Leach, J 2007, 'Editorial comment on 'developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)' by C. Mercer, A. Jackson and A. Moore', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 55.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Motor Accidents Authority 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, MAA, Sydney, Australia.

Schnabel, M, Ferrari, R, Vassiliou, T & Kaluza, G 2004, 'Randomized controlled outcome study of active mobilization compared with collar therapy for whiplash injury', *Emergency Medicine Journal*, vol. 21, pp. 306-310.

Vassiliou T, Kaluza, G, Putzke, C, Wulf, H & Schnabel, M 2006, 'Physical therapy and active exercises – An adequate treatment for prevention of late whiplash syndrome? Randomized controlled trial in 200 patients', *Pain*, vol. 124, pp. 69-76.

Verhagen, A, Scholten-Peters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Yadla, S, Ratliff, J & Harrop, J 2008, 'Whiplash: diagnosis, treatment, and associated injuries', *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68.

Education

Our rating



What is it?

Education may include the provision of information about any of the following: the mechanisms involved in whiplash, the nature of whiplash injuries, prognosis, recovery processes, advice to return to normal activities as soon as possible, how best to manage pain and reduce disability, and the potential treatments available. Information may be provided verbally and/or you may be provided additional written information or a video to take home.

How does it work?

It is thought that appropriate education can minimise anxiety and distress, both of which may delay recovery from whiplash. Distinguishing between activities that hurt and those that are harmful may help to reduce unnecessary fear and avoidance of normal movement. Fear and avoidance of normal movement may impair recovery. Education may also provide information on the most effective methods of rehabilitation, meaning that you are more likely to be aware of treatments that work.

Is it effective?

Educational *videos* appeared to be more effective than usual emergency department care in reducing pain after whiplash in two studies; however an educational *pamphlet* was no better than usual emergency department care in another study. A study showed no difference in outcomes when comparing education and advice delivered orally to education and advice in a pamphlet. A review of 11 scientific studies concluded that there was strong evidence to support the use of education regarding self management in the first two weeks following whiplash injury. The person providing the education and advice does not seem to matter. According to one study there was no difference in pain or work activity between people receiving education and advice by their GP, and people receiving education, advice and exercises by their physiotherapist. However for some outcomes (level of function and coping) advice from the GP was better in the longer term. A study showed that “The Whiplash Book” was effective in changing the beliefs about the consequences of whiplash for the better among a group of professionals. Optimistic beliefs may help to reduce stress and anxiety and improve compliance with management. A systematic review investigated the effectiveness of educational interventions for various neck disorders, including whiplash, at various stages of the healing process. The authors of this review concluded that, on its own, there is no strong evidence for the effectiveness of educational interventions.

A paper reviewing 163 scientific articles summarised its findings in ‘The Whiplash Book’ which included the following recommendations:

1. There has been no serious damage. After a whiplash injury the neck is simply not moving and working properly. The muscles and joints have been affected but they have a natural ability to repair and restore, which is helped by activity.

2. It should improve rapidly with an active approach; there is no reason why long term disability should ensue. Although symptoms may persist for a while, the acute pain will improve within a few days or weeks, certainly enough to get on with life.
3. Headache, arm pain, jaw pain, and dizziness are common and not a reason for concern.
4. Use simple analgesia; it's an aid to increasing early activity. Try to find a way to relax and don't worry.
5. Avoiding daily activities slows recovery. Some activities may involve some pain, but hurt is not the same as harm.
6. Keep moving, don't stay in one position too long, move about before you stiffen up, and don't completely avoid things. Most daily activities and early return to work are helpful.
7. Simple neck and shoulder exercises are safe and effective—stretching, strengthening and coordination exercises should be done regularly each day; initial soreness is not a reason for concern.
8. Don't worry and don't be frightened of movement or pain—activity and a positive approach are the keys to avoiding long term problems. Don't be an avoider.

A recent systematic review concluded that it is appropriate for a pain physician to provide education as part of a biopsychosocial approach of patients with whiplash. The authors of this review explain that such education should target removing therapy barriers, enhancing therapy compliance and preventing and treating chronicity of the condition. The results of a large randomised controlled trial suggest that enhanced psychoeducational interventions in emergency departments are no more effective than usual care advice in reducing the burden of acute whiplash injuries. The authors of this study also found that when dealing with patients who have persisting symptoms within the first six weeks of injury, a six session physiotherapy treatment package provided more benefit than a single physiotherapy advice session in reducing short term neck related disability. Due to the number of treatments provided, the authors conclude that the physiotherapy care package was not a cost effective method of management.

A recent study investigated the role of education (through an information booklet and didactic discussion) and imaginal and direct exposure desensitization on reducing fear of movement in patients with WAD. The authors of this study found that reduction in fear of movement was the most important predictor of improvement in neck disability and pain. The authors highlight that addressing this fear with educational interventions or via exposure therapy could improve function and recovery.

Are there any disadvantages?

There do not appear to be any disadvantages associated with education or the provision of information.

Where do you get it?

You may receive educational material in hospital, from your GP, or any other health professional involved in assisting your recovery following whiplash injury.

Recommendations

It seems that you are more likely to make a speedy recovery and reduce your fear of avoidance of movement if you are provided with the appropriate information, in a timely manner. However there is no clear evidence on the one 'best' way this information should be provided.

Key references

Brisson, RJ, Hartling, L, Dostaler, S, Leger, A, Rowe, BH, Stiell, I & Pickett, W 2005, 'A randomized controlled trial of an educational intervention to prevent chronic pain of associated disorders following rear-end vehicle collisions', *Spine*, vol. 30, no. 16, pp. 1799-1807.

Coudeyrea, E, Demaille-Wlodykab, S, Poizata, S, Burtonc, K, Hamonetd, M, Reveld, M, & Poiraudeaud, S 2007, 'Could a simple educational intervention modify beliefs about whiplash; a preliminary study among professionals working in a rehabilitation ward', *Annales de réadaptation et de médecine physique*, vol. 50, no. 7, pp. 552-557.

Ferrari, R, Rower, BH, Majumdar, SR, Cassidy, JD, Blitz, S, Wright, SC & Russell, AS 2005, 'Simple education intervention to improve the recovery from acute whiplash: results of a randomised, controlled trial', *Academic Emergency Medicine*, vol. 12, pp. 699-706.

Haines T, Gross A, Burnie SJ, Goldsmith CH & Perry L 2009, 'Patient education for neck pain with or without radiculopathy', *Cochrane Database of Systematic Reviews*, issue: 1, art. No.: CD005106, doi: 10.1002/14651858.CD005106.pub3.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Lamb, SE, Gates, S, Williams, MA, Williamson, EM, Mt-Isa, S, Withers, EJ, Castelnovo, E, Smith, J, Ashby, D, Cooke, MW, Petrou, S & Underwood, MR 2013, 'Emergency department treatments and physiotherapy for acute whiplash: a pragmatic, two-step, randomised controlled trial', *Lancet*, vol. 381, pp. 546-56.

Meeus, M, Nijs, J, Hamers, V, Ickmans, K & Oosterwijk, JV 2012, 'The efficacy of patient education in whiplash associated disorders: a systematic review', *Pain Physician*, vol. 15, pp. 351-361.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

McClune, T, Burton, AK & Waddell, G 2002, 'Whiplash associated disorders: a review of the literature to guide patient information and advice', *Emergency Medicine Journal*, vol. 19, no. 6, pp. 499-506.

Oliveria, A, Gervirtz, R & Hubbard, D 2006, 'A Psycho-Educational Video used in the Emergency Department provides effective treatment for whiplash injuries', *Spine*, vol. 31, no. 15, pp. 1652-1657.

Poorbaugh, K, Brismée, J, Phelps, V & Sizer, P 2008, 'Late whiplash syndrome: a clinical science approach to evidence-based diagnosis and management', *Pain Practice*, vol. 8, no. 1, pp. 65-89.

Robinson, JP, Theodore, BR, Dansie, EJ, Wilson, HD & Turk, DC 2013, 'The role of fear of movement in subacute whiplash-associated disorders grades I and II', *Pain*, vol. 154, pp.393–401.

Schofferman, J, Bogduk, N & Slosar, P 2007, 'Chronic whiplash and whiplash associated disorders: an evidence based approach', *Journal of the American Academy of Orthopaedic Surgeons*, vol. 15, no. 10, pp. 596-606.

Scholten-Peeters, GGM, Neeleman-van der Steen, CWM, van der Windt, DAWM, Hendriks, EJM, Verhagen, AP & Oostendorp, RAB 2006, 'Education by General Practitioners or education and exercises by physiotherapists for Whiplash-Associated Disorders? A Randomized Clinical Trial', *Spine*, vol. 31, no. 7, pp. 723-731.

Kongsted, A, Qerama, E, Kasch, H, Winther Bach, F, Korsholm, L, Staehelin Jensen, T & Bendix, T 2008, 'Education of patients after whiplash injury; is oral advice any better than a pamphlet?', *Spine*, vol. 33, no. 22, pp. 843-848.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Electrical Muscle Stimulation (EMS)

Our rating	?
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What is it?

Similar to electrical nerve stimulation, in which an alternating electrical current (AC) or modulated direct current (DC) is passed through the tissues for pain relief, however the intensity is higher, leading to additional muscle contractions. EMS is applied using an electrical device and should only be provided by qualified practitioners. The current stimulates muscles to contract through electrodes placed on the skin. It can be used to prevent muscle wasting when muscles are not able to work by themselves, especially when it is expected that the muscles will begin working at a later stage.

How does it work?

The current may inhibit pain in the tissues surrounding the electrodes by inhibiting pain impulses (the so-called 'pain gate theory'). The higher intensity can also stimulate rhythmic muscle contractions which may improve joint range of movement, re-educate muscles, retard muscle atrophy, and increase muscle strength. Circulation can be increased and muscle tension decreased, which may lead to secondary pain relief.

Is it effective?

There is limited evidence from one study that a single treatment of EMS does not reduce tenderness in people with chronic neck pain, however there is no research on people with whiplash.

Are there any disadvantages?

There has been no research on the disadvantages associated with EMS. The treatment is only available through a qualified health professional, and it may not be suitable for everyone.

Where do you get it?

Electrical muscle stimulation may be provided by therapists involved in facilitating recovery from whiplash.

Recommendations

The use of EMS for whiplash is not recommended due to limited current research evidence. More research is required.

Key references

Kroeling, P, Gross, A, Goldsmith, CH, Cervical Overview Group, 'Electrotherapy for neck disorders', *Cochrane Database of Systematic Reviews* 2005, Issue 2. Art. No.: CD004251. DOI: 10.1002/14651858.CD004251.pub3.

Electrical Nerve Stimulation/TENS

Our rating	?
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What is it?

An alternating electrical current (AC) or modulated direct current (DC) underpins all stimulating forms of electrotherapy. The electrical current, rectified to a safe, low-voltage level is applied to the body via electrodes placed on the skin. Transcutaneous electrical nerve stimulation (TENS) is one form of electrical nerve stimulation. TENS machines come in various sizes but most are small enough to clip onto your belt and wear whilst walking around.

How does it work?

The current may inhibit pain in the tissues surrounding the electrodes by inhibiting pain impulses (the so-called 'pain gate theory'). It works by distracting your nerves and brain from the pain sensations.

Is it effective?

A systematic review has been conducted on the use of electrotherapy (including electrical nerve stimulation) for people with neck pain, however only one of the included studies looked at people with whiplash of less than 2 months duration. This study included various other treatments so it was not possible to determine the effect of TENS on these patients. Another systematic review found there was insufficient evidence to support or refute the use of TENS.

Are there any disadvantages?

There has been no research on the disadvantages associated with electrical nerve stimulation. TENS machines are available to purchase however they may be costly, and may not be suitable for everyone.

Where do you get it?

TENS units are available to purchase from various sources (i.e. internet, medical suppliers, pharmacies/chemists) or through your treating therapist.

Recommendations

The use of TENS for whiplash is not recommended due to limited current research evidence. More research is required.

Key references

Guzman, J, Haldeman, S, Carroll, LJ, Carragee, EJ, Hurwitz, EL, Peloso, P, Nordin, M, Cassidy, JD, Holm, LW, Côté, P, Velde, G & Hogg-Johnson, S 2009, 'Task force on neck pain and its associated disorders', *Journal of Manipulative and Physiological Therapeutics*, vol. 32, pp. 227-243.

Kroeling, P, Gross, A, Goldsmith, CH, Cervical Overview Group, 'Electrotherapy for neck disorders', *Cochrane Database of Systematic Reviews* 2005, Issue 2. Art. No.: CD004251. DOI: 10.1002/14651858.CD004251.pub3.

Leaver, AM, Refshauge, KM, Maher, CG & McAuley, JH 2010, 'Conservative interventions provide short-term relief for non-specific neck pain: a systematic review', *Journal of Physiotherapy*, vol. 56, pp. 73–85.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Electromyography (EMG)

Our rating	?
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What is it?

Electromyography (EMG) is a technique for evaluating and recording the physiologic properties of muscles at rest and while contracting. EMG is performed using an instrument called an electromyograph, to produce a record called an electromyogram. An intramuscular EMG is performed using a needle electrode that is inserted through the skin into the muscle tissue. A trained medical professional (i.e. a musculoskeletal doctor, neurologist, or physiotherapist) observes the electrical activity while inserting the electrode. Intramuscular EMG may be considered too invasive or too specific in some cases. A surface electrode may be used instead to monitor the general picture of muscle activation, as opposed to the activity of only a few fibres as observed using a needle. Muscle activation is monitored using surface EMG and an auditory or visual stimulus is used to help people know that they are activating the muscle. This type of treatment, called biofeedback, is useful for re-educating muscles that are not contracting in the correct manner due to a variety of reasons. Following whiplash, biofeedback is commonly used to re-educate the flexor muscles at the front of the neck as these muscles are important for posture and pain reduction.

How does it work?

An electromyograph detects the electrical potential generated by muscle cells when these cells contract, and also when the cells are at rest. Biofeedback provides information to the user on which muscles they are contracting, and whether the muscles are performing the contraction correctly.

Is it effective?

A systematic review concluded that there is currently no evidence to support the use of EMG in the management of whiplash. A randomised controlled trial found that EMG training was not effective as a supplementary treatment to standard inter-disciplinary education.

Are there any disadvantages?

Intramuscular EMG may cause some discomfort due to the needle being inserted in the muscle, but this is mostly used during research. Surface EMG is more commonly used clinically for rehabilitation and this should not cause any discomfort. EMG should be applied by a qualified professional.

Where do you get it?

EMG may be used in a number of settings; for example, in the physiotherapy or neurology clinic. It should be applied by a qualified professional.

Recommendations

The use of EMG cannot be recommended following whiplash due to lack of research evidence. More research is required.

Key references

Ehrenborg, C & Archenholtz, B 2010, 'Is surface EMG biofeedback an effective training method for persons with neck and shoulder complaints after whiplash-associated disorders concerning activities of daily living and pain—a randomized controlled trial', *Clinical Rehabilitation*, vol. 24, pp. 715–726.

Guzman, J, Haldeman, S, Carroll, L, Carragee, E, Hurwitz, E, Peloso, P, Nordin, M, Cassidy, D, Holm, L, Co`te, P, Van der Velde, G & Hogg-Johnson, S 2008, 'Clinical practice implications of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders; from concepts and findings to recommendations', *European Spine Journal*, vol. 17, no. 1, pp. 199–213.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50–54.

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Exercise

Our rating



What is it?

Exercise or physical activity is the activity of exerting your muscles in various ways to improve or maintain physical fitness. Exercises for whiplash or neck pain may include specific neck exercises, shoulder exercises, active exercise, stretching, strengthening, postural, functional, kinaesthetic, eye-fixation and proprioception exercises (the last two exercises help with balance and control of movement). Exercises may be performed in a structured supervised format, or may involve unsupervised sessions in a variety of settings. Exercise can also be performed individually or in a group setting. Exercise typically has effects on the cardiovascular, musculoskeletal and neurological systems of our body.

How does it work?

It is thought that exercise can help improve pain, range of movement/flexibility, function, physical fitness, reduce/maintain body weight, increase/maintain muscle strength and endurance, coordination, balance, control, improve patient satisfaction and quality of life via its effect on the musculoskeletal, cardiovascular and neurological systems. Exercise is also thought to promote the production of endorphins, naturally occurring opioid hormones, by the brain that can help with pain control.

Is it effective?

The short answer is that doing some form of exercise is probably more effective than not doing any exercise following a whiplash injury. What is not known is the *type* of exercise that is most beneficial, or whether exercise is better than any other form of treatment. A systematic review looked at the evidence for various types of exercise and made the following conclusions:

- There is limited evidence of benefit that active range of motion exercises may reduce pain following whiplash in the short term
- The evidence for strengthening exercises for chronic neck pain (none were specific to whiplash) for pain relief in the short and long term is unclear
 - Strengthening exercise focused on neck muscles was more promising than strengthening of the shoulder/thoracic region
- A 'multimodal care approach' of exercise combined with mobilisations or manipulations was effective in improving short term and chronic neck pain (not specifically whiplash related)
- There was benefit from a stretching and strengthening program in the neck or neck and shoulder/trunk region on pain in people with chronic neck pain (not specifically whiplash related) in the short and long term
- Shoulder strengthening and stretching exercises did not appear to be effective
- It is not clear whether stretching and strengthening exercises are any better than other treatments such as manual therapy, education, medication and home exercises
- The relative benefit of different exercise approaches appear similar

- In patients with subacute neck pain, motor control and endurance/strength training of the neck muscles were associated with similar improvement in disability and pain.
- A program of eye-fixation/proprioception exercises within a more complete programme improved pain and function following whiplash in the long term
- There was some evidence that a mobilisation program combined with other treatments was better for pain in the short term over a program of rest then gradual mobilisation in the early stages following whiplash injury
- There does not seem to be any benefit of home exercises over other treatments in the short term and long term
- Individualised instruction may be more effective than written information alone for people with neck pain (not specifically whiplash related)

Two studies published after the systematic review have both found that different types of exercise (a rehabilitation programme containing eye, head and neck coordination exercises, and an individualised, progressive combined type of exercise programme) were beneficial in the short term. Another new study published in 2007 found that a new 'sling' exercise therapy was not any better than traditional strengthening and endurance exercises.

Another study demonstrated that a personalized exercise program was more effective than advice alone and this was not affected by the patient or the therapist's preference for a particular type of treatment. A systematic review found strong evidence to support the use of active range of motion exercises commenced within four days of injury.

A recent experimental study found lessened natural brain-driven pain inhibition during exercise in people with chronic WAD. This finding indicates that one should be cautious when evaluating and recommending exercises for people with chronic WAD. Therefore, the authors recommend that when prescribing exercises for people with longstanding WAD, the use of individualised, targeted exercise therapies may be more suitable when compared to generic exercise programs which do not take into account individual needs and requirements.

Are there any disadvantages?

In a systematic review, 12% of studies found side effects as a result of exercise however they were not severe and didn't last very long. Side effects have been reported as headache, arm pain, pins and needles, dizziness and worsening of symptoms.

A review found that exercise provides some degree of short term pain relief in neck pain after a motor vehicle accident or without the history of trauma. They also found that exercise may cause a temporary increase in symptoms but have a long term benefit.

Usually exercise is quite safe, but you should always seek advice from your doctor or health professional regarding exercise following a whiplash injury.

Where do you get it?

Specific exercises may be prescribed to you by your doctor or treating therapist. You may perform exercises under their direct supervision, or at home, or in a class. You may also join an exercise group with other people in the wider community. Exercises can be performed just about anywhere – gyms, clinics, home, outdoors, pools etc.

Recommendations

Following a whiplash injury you are likely to be better off if you perform some type of exercise, rather than avoiding exercise. Although there does not appear to be one type of exercise more beneficial than another, it is best to seek advice from your doctor or health provider before performing exercises.

Key references

Ask, T, Strand, LI & Skouen, JS 2009, 'The effect of two exercise regimes; motor control versus endurance/strength training for patients with whiplash associated disorders: a randomized controlled pilot study', *Clinical Rehabilitation*, vol. 23, pp. 812-823.

Dehner, C, Elbel, M, Strobel, P, Scheich, M, Schneider, F, Krischak, G & Kramer, M 2009, 'Grade II whiplash injuries to the neck: what is the benefit for patients treated by different physical therapy modalities?', *Patient Safety in Surgery*, vol. 3, no. 2, doi: 10.1186/1754-9493-3-2.

Guzman, J, Haldeman, S, Carroll, L, Carragee, E, Hurwitz, E, Peloso, P, Nordin, M, Cassidy, D, Holm, L, Co'te, P, Van der Velde, G & Hogg-Johnson, S 2008, 'Clinical practice implications of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders; from concepts and findings to recommendations', *European Spine Journal*, vol. 17, no. 1, pp. 199-213.

Guzman, J, Haldeman, S, Carroll, LJ, Carragee, EJ, Hurwitz, EL, Peloso, P, Nordin, M, Cassidy, JD, Holm, LW, Côté, P, Velde, G & Hogg-Johnson, S 2009, 'Task force on neck pain and its associated disorders', *Journal of Manipulative and Physiological Therapeutics*, vol. 32, pp. 227-243.

Humphreys, BK & Irgens, PM 2002, 'The effect of a rehabilitation exercise program on head-repositioning accuracy and reported levels of pain in chronic neck pain subjects', *Journal of Whiplash Related Disorders*, vol. 1, pp. 99-112.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Kay, TM, Gross, A, Goldsmith, C, Santaguida, PL, Hoving, J, Bronfort, G, Cervical Overview Group, 'Exercises for mechanical neck disorders', *Cochrane Database of Systematic Reviews* 2005, Issue 3. Art. No.: CD004250. DOI: 10.1002/14651858.CD004250.pub3.

Leaver, AM, Refshauge, KM, Maher, CG & McAuley, JH 2010, 'Conservative interventions provide short-term relief for non-specific neck pain: a systematic review', *Journal of Physiotherapy*, vol. 56, pp. 73–85.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Miller, J, Gross, A, D'Sylva, J, Burnie, SJ, Goldsmith, CH, Graham, N, Haines, T, Brønfort, G & Hoving, JL 2010, 'Manual therapy and exercise for neck pain: A systematic review', *Manual Therapy*, vol. 15, pp. 334-354.

Oosterwijk, JV, Nijs, N, Meeus, M, Loo MV & Paul, L 2012, 'Lack of endogenous pain inhibition during exercise in people with chronic whiplash associated disorders: an experimental study', *The Journal of Pain*, vol. 13, no. 3, pp 242-254.

Poorbaugh, K, Brismée, J, Phelps, V & Sizer, P 2008, 'Late whiplash syndrome: a clinical science approach to evidence-based diagnosis and management', *Pain Practice*, vol. 8, no. 1, pp. 65-89.

Stewart, MJ, Maher, CG, Refshauge, KM, Herbert, RD, Bogduk, N & Nicholas, M 2007, 'Randomized controlled trial of exercise for chronic whiplash-associated disorders', *Pain*, vol. 128, no. 1-2, pp. 59-68.

Schofferman, J, Bogduk, N & Slosar, P 2007, 'Chronic whiplash and whiplash associated disorders: an evidence based approach', *Journal of the American Academy of Orthopaedic Surgeons*, vol. 15, no. 10, pp. 596-606.

Stewart, M, Maher a, C, Refshauge, K, Herbert, R & Nicholas, M 2007 'Patient and clinician treatment preferences do not moderate the effect of exercise treatment in chronic whiplash-associated disorders', *European Journal of Pain*, b doi:10.1016/j.ejpain.2007.12.009.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Vikne, J, Oedegaard, A, Laerum, E, Ihleback, C & Kirkesola, G 2007, 'A randomized study of new sling exercise treatment vs traditional physiotherapy for patients with chronic whiplash-associated disorders with unsettled compensation claims', *Journal of Rehabilitation Medicine*, vol. 39, no. 3, pp. 252-259.

Yadla, S, Ratliff, J & Harrop, J 2008, 'Whiplash: diagnosis, treatment, and associated injuries', *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68.

Galvanic Current

Our rating

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What is it?

Galvanic, or direct current is a form of electrotherapy treatment. The electrical current, rectified to a safe, low-voltage level is applied to the body via electrodes placed on the skin. Galvanic current is usually only applied by a qualified professional, via a machine in their clinic.

How does it work?

The flow of current through a painful region may reduce pain by inhibiting pain receptors. As it is also thought to enhance the transport of ionized substances through the skin, it can also be used to promote the resorption of topical drugs such as anti-inflammatory creams (this process is called iontophoresis). It works by distracting nerves and brain from the pain sensations.

Is it effective?

The current evidence for galvanic current is lacking in that the small number of studies examining its effectiveness for whiplash do not clearly separate the effect of the current from other treatments given.

Are there any disadvantages?

There has been no research on the disadvantages associated with galvanic current. The machine is not routinely used at home, therefore you must have a professionally trained therapist apply it, and it may not be suitable for everyone.

Where do you get it?

Galvanic current may be provided by therapists involved in facilitating recovery from whiplash.

Recommendations

The use of galvanic current for whiplash cannot be recommended based on the current research evidence. More research is required.

Key references

Kroeling, P, Gross, A, Goldsmith, CH, Cervical Overview Group, 'Electrotherapy for neck disorders', *Cochrane Database of Systematic Reviews* 2005, Issue 2. Art. No.: CD004251. DOI: 10.1002/14651858.CD004251.pub3.

Laser

Our rating



What is it?

Laser therapy involves the administration of red through to infra-red light to the tissues for the purpose enhancing the healing process and providing pain relief. It is provided by a small hand held device that makes contact with the skin. There are usually no sensations involved with the treatment, other than the light pressure of the device against the skin.

How does it work?

Laser therapy is believed to work on the principle of inducing a biological response through energy transfer, in that the photonic energy delivered into the tissue by the laser modulates the biological processes within that tissue, and those within the biological system of which that tissue is a part. Low dosages of photonic energy may stimulate those biological processes, and higher dosages may inhibit them. Low level laser therapy (LLLT) may be used to enhance wound healing and pain relief. The effect of LLLT is such that it is thought to accelerate remodeling of scar tissue.

Is it effective?

A synthesis of evidence showed that laser therapy was an effective intervention for general neck pain. It must be noted that this synthesis was not peer reviewed, as per routine process, and hence its findings should be considered with some caution.

Literature has shown that LLLT is effective in reducing pain in mechanical neck pain in the short term. However, long term benefits have not been reported. One good quality review showed that LLLT reduces pain immediately after treatment in acute neck pain and up to 22 weeks after completion of treatment in patients with chronic neck pain. However there is no consensus in the literature on the parameters of dosage for LLLT that are effective.

A recent prospective randomised trial suggests that multi wave High Power Laser Therapy may be an effective treatment for pain reduction and earlier return to work, in patients with whiplash injury (Grade 1 & 2), when compared to conventional simple segmental physical rehabilitation.

Are there any disadvantages?

Laser therapy should not be used near the eyes. The treatment may not be suitable for everyone, therefore an appropriate assessment should be carried out prior to its application by a qualified professional.

Where do you get it?

Medical, dental, podiatric, physiotherapy, chiropractic, osteopathic, and acupuncture practitioners may provide laser therapy. The portability and diversity of battery and mains-powered diode laser systems allows treatment to be carried out in various clinical, hospital, and field locations.

Recommendations

The use of laser therapy following whiplash may be considered for short term pain relief. More research is required to determine the parameters that can be useful and the long term effectiveness of laser therapy.

Key references

Chow, RT, Johnson, MI, Lopes-Martins, RAb & Bjordal, RM 2009, 'Efficacy of low-level laser therapy in the management of neck pain: a systematic review and meta-analysis of randomised placebo or active-treatment controlled trials', *Lancet*, vol. 374, pp. 1897-1908.

Conforti, M & Fachinetti, GP 2013, 'High power laser therapy treatment compared to simple segmental physical rehabilitation in whiplash injuries (1° and 2° grade of the Quebec Task Force classification) involving muscles and ligaments', *Muscles, Ligaments and Tendons Journal*, vol. 3, no. 2, pp. 106-111.

Guzman, J, Haldeman, S, Carroll, LJ, Carragee, EJ, Hurwitz, EL, Peloso, P, Nordin, M, Cassidy, JD, Holm, LW, Côté, P, Velde, G & Hogg-Johnson, S 2009, 'Task force on neck pain and its associated disorders', *Journal of Manipulative and Physiological Therapeutics*, vol. 32, pp. 227-243.

Guzman, J, Haldeman, S, Carroll, L, Carragee, E, Hurwitz, E Peloso, P, Nordin, M, Cassidy, D, Holm, L, Co^te, P, Van der Velde, G & Hogg-Johnson, S 2008, 'Clinical practice implications of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders; from concepts and findings to recommendations', *European Spine Journal*, vol. 17, no. 1, pp. 199-213.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co^te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Leaver, AM, Refshauge, KM, Maher, CG & McAuley, JH 2010, 'Conservative interventions provide short-term relief for non-specific neck pain: a systematic review', *Journal of Physiotherapy*, vol. 56, pp. 73–85.

Ultrasound

Our rating	?
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What is it?

Therapeutic ultrasound is a machine that administers high-frequency sound waves (ultrasound) to connective tissues such as muscles, ligaments and tendons. It is different from diagnostic ultrasound that is used to 'see inside' the body. The frequency of therapeutic ultrasound is typically 1-3 MHz. The sound waves pass through tissue with high water or low protein content, and tend to bounce off cartilage and bone. It is used to speed up the healing process and assist in pain relief. Ultrasound is administered via direct contact of the ultrasound head with the skin, and the use of a gel to help conduct the sound waves. Ultrasound may also be provided in a water bath (ideal for small body parts such as fingers/toes), and in this situation the ultrasound head does not have to be in direct contact with the skin to work, the water acts as the conductor. Ultrasound is usually only administered by a qualified professional in their clinic; however there are some portable units available for home or non-clinic use.

How does it work?

Therapeutic ultrasound is thought to have two types of benefits: thermal and non-thermal. Thermal effects are brought about by energy absorbed from the sound waves heating the tissue. If the tissue is heated to 40-45°C (104-113°F), it can enter a state of hyperaemia (increased blood flow), which speeds healing and reduces chronic inflammation. Heating may also increase the extensibility or elasticity of connective and scar tissues. Non-thermal or cavitation effects may result from the vibration of the tissue causing microscopic air bubbles to form, which transmit the vibrations in a way that directly stimulates cell membranes. This physical stimulation may enhance the ability of cells to repair themselves.

Is it effective?

There is no direct evidence that ultrasound is effective for the treatment of whiplash related symptoms. Several guidelines for the management of whiplash state that either ultrasound is unlikely to be effective in short or long term, or that it may be used as an optional adjunct to manual and physical therapies and exercise during the first 3 weeks (i.e. multimodal care).

Are there any disadvantages?

If the ultrasound device is held still for prolonged periods whilst in contact with the skin it can cause damage to the underlying tissues, therefore the ultrasound head must be moved continuously. Ultrasound should therefore only be applied by a qualified professional. It should be applied on a pulsed setting if an injury is less than 3 days old so that it does not cause any heating in the tissues as this can increase swelling in the area.

Where do you get it?

Ultrasound is typically applied in a clinical setting by a physiotherapist or other health professional such as a doctor, chiropractor or osteopath. There may be some situations where portable ultrasound machines are available to hire or purchase for personal use.

Recommendations

Currently there is no evidence to support the use of ultrasound following whiplash. However it may be used as an adjunct to manual therapy and exercise (i.e. multimodal care) in the first three weeks.

Key references

Moore, A, Jackson, A, Jordon, J, Hammersley, S, Hill, J, Mercer, C, Smith, C, Thompson, J, Woby, S & Hudson, A 2005, *Clinical guidelines for the physiotherapy management of Whiplash Associated Disorder*, The Chartered Society of Physiotherapy, London.

Motor Accidents Authority 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, MAA, Sydney, Australia.

Spitzer, W 1995, Chapter 8.2.2: *QTF Recommendations for Clinical Practice*, viewed 30 October, 2007, <<http://www.health-sciences.ubc.ca/whiplash.bc/appendix2/appendix2.html>>.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Vestibular Rehabilitation

Our rating



What is it?

One of the symptoms of whiplash is dizziness. As a result of the injury, the receptors in the neck can be damaged which result in dizziness and disturbances in control of posture and balance. One of the means of addressing these balance problems is Vestibular Rehabilitation. This is a specific form of physiotherapy that helps to develop compensatory strategies for various balance problems. Once the cause and source of the problem is correctly diagnosed, a variety of exercises are undertaken. These include head and neck exercises, eye exercises, balance exercises and walking exercises. During these exercises patients may be instructed to keep their eyes open or closed. Usually, depending on the patient requirement, exercises are tailored to suit their injury and subsequent symptoms.

How does it work?

The goals of Vestibular Rehabilitation are to improve balance, minimise falls, and decrease feelings of dizziness. This is achieved by improving the function of the vestibular system and also addressing central (brain) adaptation and compensation. By tapping into alternate strategies within the nervous system, compensation can occur for deficits in the vestibular system. The nervous system uses the control of eye, head and body movements to ensure that people's posture and position is adequately maintained.

Is it effective?

There are two published studies on the effectiveness of Vestibular Rehabilitation of people suffering from whiplash. While both studies only included a small number of patients, the results from both studies indicated that when treated with Vestibular Rehabilitation patients suffering from whiplash reported better balance, reduced disability, returned to work and improvement in activities of daily living. In some instances this positive effect lasted up to three months after the treatment. A systematic review concluded that Vestibular Rehabilitation should be recommended to patients suffering from dizziness following a whiplash injury but further research is required to ascertain why it is effective.

Are there any disadvantages?

Provision of vestibular rehabilitation should be based on appropriate assessment and diagnostic standards. Not all patients with dizziness subsequent to whiplash are eligible for Vestibular Rehabilitation.

Where do you get it?

As Vestibular Rehabilitation is a specific form of physiotherapy, Physiotherapists who are specifically trained in the provision of Vestibular Rehabilitation can perform these treatment techniques. Contact the Australian Physiotherapy Association for Physiotherapists trained in Vestibular Rehabilitation.

Recommendations

While the evidence base for this treatment is limited, the results are promising. More research is needed to strengthen current evidence and also identify if Vestibular Rehabilitation is useful as a stand alone therapy or used in conjunction with other physiotherapy treatments.

Key references

Australian Physiotherapy Association 2006, *The Australian Physiotherapy Association*, viewed 30 October 2007, <[http:// www.physiotherapy.asn.au](http://www.physiotherapy.asn.au)>.

Hansson, E 2007, 'Vestibular rehabilitation; for whom and how; a systematic review' *Advances in Physiotherapy*, vol.9, no 3, pp. 106-116.

Hansson, E, Mansson N, Ringsberg, K & Hakansson, A 2006, 'Dizziness Among Patients With Whiplash-Associated Disorder: A Randomised Controlled Trial', *Journal of Rehabilitation Medicine*, vol. 38, no.6, pp. 387-390.

Tuo, K, Cheng, Y & Kao, C 2006, 'Vestibular Rehabilitation in a Patient with Whiplash-associated Disorders', *Journal of Chinese Medical Association*, vol. 69, no. 12, pp. 591-595.

Manipulation

Our rating



What is it?

Technically, manipulation is defined as a localised force of high velocity and low amplitude thrust directed at a spinal joint. Manipulation is also known as ‘adjustment’ or ‘cracking’. It involves a qualified professional (i.e. chiropractor, physiotherapist) positioning your body and then applying a small, fast movement, resulting commonly in a cracking sound in a spinal joint. The force may be applied with the therapists hands, or using a tool or piece of equipment. It is different from soft tissue manipulation/massage and mobilization, both of which are covered in separate pages.

How does it work?

It is thought that manipulation of a spinal joint may provide a temporary increase in joint range of movement by acting on the soft tissues around the joint itself. It may also correct spinal alignment and give relief from musculoskeletal pain. Manipulation may also have physiological effect on the nervous system, and provide pain relief via this means.

Is it effective?

The evidence suggests that manipulation is not effective for improving neck pain (not just after whiplash) if it is the only treatment that is provided, regardless of who provides it. It may be effective however if it is used in conjunction with other treatments (i.e. multimodal treatment), especially exercise. This evidence comes from a large review of all the systematic reviews of manipulation for any spinal condition, including 2 systematic reviews on neck pain.

A lower quality literature review concluded that neck manipulation may provide short term benefit to some patients with neck pain and headache (not specifically whiplash related). Two studies have also found that manipulation (either of the thoracic spine or neck) in conjunction with other techniques was better than conventional therapy without manipulation.

Are there any disadvantages?

Some of the disadvantages of manipulation may be local discomfort, increased neck pain, headache, thoracic pain, altered sensation, dizziness, tiredness, or radiating discomfort. Infrequent, but potentially serious side effects, may include: vertebrobasilar accidents (VBA)*, strokes, spinal disc herniation, vertebral and rib fractures, and cauda equina syndrome. Therefore appropriate assessment and tests should be carried out by the therapist prior to manipulation.

* A vertebrobasilar accident results in vertebrobasilar insufficiency, which is an obstruction or blockage of an important group of blood vessels called vertebral-basilar system. Blockage of these blood vessels result in problems with consciousness, headache, dizziness, paralysis of legs and/or arms, difficulty speaking and paralysis of face muscles

Where do you get it?

Spinal manipulation (including the neck) must be provided only by qualified professionals such as chiropractors, physiotherapists, osteopaths and doctors.

Recommendations

Manipulation may be a useful adjunct to other therapies, provided it is performed in a safe manner by a qualified professional. It does not appear to be effective as a sole treatment.

Key references

Coulter, I 1996, 'Manipulation and mobilization of the cervical spine: the results of a literature survey and consensus panel', *Journal of Musculoskeletal Pain*, vol. 4, no. 4, pp. 113-123.

Dehner, C, Elbel, M, Strobel, P, Scheich, M, Schneider, F, Krischak, G & Kramer, M 2009, 'Grade II whiplash injuries to the neck: what is the benefit for patients treated by different physical therapy modalities?', *Patient Safety in Surgery*, vol. 3, no. 2, doi: 10.1186/1754-9493-3-2.

Ernst, E & Canter, PH 2006, 'A systematic review of systematic reviews of spinal manipulation', *Journal of the Royal Society of Medicine*, vol. 99, pp. 192-196.

Fernandez-de-las-Penas, C, Fernandez-Carnero, J, Fernandez, AP, Lomas-Vega, R & Miangolarra-Page JC 2004, 'Dorsal manipulation in whiplash injury treatment: a Randomized Controlled Trial', *Journal of Whiplash & Related Disorders*, vol. 3, no. 2, pp. 55-72.

Fernandez-de-las-Penas, C, Fernandez-Carnero, J, Palomeque Del Cerro, L & Miangolarra-Page, JC 2004, 'Manipulative treatment vs conventional physiotherapy treatment in whiplash injury: A Randomized Controlled Trial', *Journal of Whiplash & Related Disorders*, vol. 3, no. 2, pp.73-90.

Guzman, J, Haldeman, S, Carroll, LJ, Carragee, EJ, Hurwitz, EL, Peloso, P, Nordin, M, Cassidy, JD, Holm, LW, Côté, P, Velde, G & Hogg-Johnson, S 2009, 'Task force on neck pain and its associated disorders', *Journal of Manipulative and Physiological Therapeutics*, vol. 32, pp. 227-243.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Leaver, AM, Refshauge, KM, Maher, CG & McAuley, JH 2010, 'Conservative interventions provide short-term relief for non-specific neck pain: a systematic review', *Journal of Physiotherapy*, vol. 56, pp. 73-85.

Poorbaugh, K, Brismée, J, Phelps, V & Sizer, P 2008, 'Late whiplash syndrome: a clinical science approach to evidence-based diagnosis and management', *Pain Practice*, vol. 8, no. 1, pp. 65-89.

Schofferman, J, Bogduk, N & Slosar, P 2007, 'Chronic whiplash and whiplash associated disorders: an evidence based approach', *Journal of the American Academy of Orthopaedic Surgeons*, vol. 15, no. 10, pp. 596-606.

Mobilisation

Our rating



What is it?

Mobilisation is defined as low-grade/velocity, small or large amplitude passive movement techniques or 'neuro-muscular' technique within the patient's range of neck motion and control. They are gentle, controlled movements of the joints affected, and differ from manipulation, with the aim of increasing movement and relieving pain. They are used by physiotherapists to treat joints that have become stiff from lack of movement, and/or are causing pain, such as neck pain resulting from stiff/inflamed joints of the cervical spine.

How does it work?

Spinal mobilisation is thought to work by improving mobility in areas of the spine that are restricted. Such restriction may be found in joints, connective tissues or muscles. Mobilisation may remove or reduce the restriction, thereby removing the source of pain and providing symptomatic relief. Restoration of spinal mobility, both in physiological movement and in spinal segmental mobility, often results in a reduction in a patient's pain and muscle spasm. There is also a theory that mobilisation can reduce pain by moving swelling containing neurotransmitters such as substance P and histamine. In addition, the threshold which stimulates pain nerves may be increased by the gentle oscillations, therefore making it less likely that pain will be detected.

Is it effective?

There has been a systematic review on the effectiveness of mobilisation for mechanical neck disorders (including but not exclusively, whiplash related disorder). Mobilisation was no better at improving pain or function than cold packs, collar, TENS (transcutaneous electrical nerve stimulation), acupuncture and ultrasound in the short or long term. Mobilisation, in conjunction with manipulation showed some potential as being better than no treatment for people with chronic neck disorders and headaches, however most of the evidence suggests that adding mobilisation to manipulation or other soft tissue techniques does not make much difference to outcomes. Another synthesis of evidence on mechanical neck disorders (not specific to whiplash related disorder) found that mobilisation was more effective than soft collars and general advice. It must be noted that this synthesis was not peer reviewed, as per routine process, and hence its findings should be considered with some caution. It should be noted that none of the research compared mobilisation on its own to no treatment, thus it is not possible to say that mobilisation is not effective. A published clinical guidelines for the Physiotherapy management of whiplash associated disorder based on a systematic review of literature found moderately strong evidence for mobilisations in the acute stage (0-2 weeks after injury) but not for the chronic stage.

Are there any disadvantages?

The systematic review reported benign, transient side effects (related to either/both mobilisation and manipulation) such as headache, radicular pain, thoracic pain, increased neck pain, distal paraesthesia, dizziness, and ear symptoms. Serious side effects were not reported, however mobilisation is generally regarded as being safe. You may experience

some discomfort/soreness during the treatment and over the following day or so, however this should not be severe and should settle quickly.

Where do you get it?

Spinal mobilisation is commonly provided by physiotherapists, and other health professionals such as chiropractors and osteopaths. Treatment should be provided by a qualified professional.

Recommendations

Spinal mobilisation may be useful as an adjunct to other treatments (see multimodal care), however its use as an isolated treatment is not warranted based on the current research evidence.

Key references

Dehner, C, Elbel, M, Strobel, P, Scheich, M, Schneider, F, Krischak, G & Kramer, M 2009, 'Grade II whiplash injuries to the neck: what is the benefit for patients treated by different physical therapy modalities?', *Patient Safety in Surgery*, vol. 3, no. 2, doi: 10.1186/1754-9493-3-2.

Gross, AR, Hoving, JL, Haines, TA, Goldsmith, CH, Kay, T, Aker, P, Bronfort, G, Cervical overview group, 'Manipulation and mobilization for mechanical neck disorders', *Cochrane Database of Systematic Reviews* 2004, Issue 1. Art. No.: CD004249. DOI:10.1002/14651858.CD004249.pub2.

Guzman, J, Haldeman, S, Carroll, LJ, Carragee, EJ, Hurwitz, EL, Peloso, P, Nordin, M, Cassidy, JD, Holm, LW, Côté, P, Velde, G & Hogg-Johnson, S 2009, 'Task force on neck pain and its associated disorders', *Journal of Manipulative and Physiological Therapeutics*, vol. 32, pp. 227-243.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Côté, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Leaver, AM, Refshauge, KM, Maher, CG & McAuley, JH 2010, 'Conservative interventions provide short-term relief for non-specific neck pain: a systematic review', *Journal of Physiotherapy*, vol. 56, pp. 73-85.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Miller, J, Gross, A, D'Sylva, J, Burnie, SJ, Goldsmith, CH, Graham, N, Haines, T, Brønfort, G & Hoving, JL 2010, 'Manual therapy and exercise for neck pain: A systematic review', *Manual Therapy*, vol. 15, pp. 334-354.

Poorbaugh, K, Brismée, J, Phelps, V & Sizer, P 2008, 'Late whiplash syndrome: a clinical science approach to evidence-based diagnosis and management', *Pain Practice*, vol. 8, no. 1, pp. 65-89.

Multimodal / Physiotherapy Treatment

Our rating



What is it?

Multimodal treatment involves the combination of several different types of treatment, usually within the one treatment session. Physiotherapy is commonly provided as multimodal treatments or packages of care, rather than as single treatments in isolation. In relation to whiplash, multimodal treatment may include any of the following: active movement; strengthening exercises; muscle re-education; kinaesthetic exercises, posture correction; functional exercises; manual therapy such as manipulation, mobilisation and massage; electrotherapy; advice; education; home exercise programme; medication; and soft collar. Therefore multimodal treatment is a combination of more than one of these types of treatment.

How does it work?

It is thought that there are various factors that can potentially influence the development and continuation of symptoms after whiplash. Aside from the physical forces involved in causing a whiplash injury, other related factors may include, but are not limited to: physical; psychological and socio-demographic factors. Therefore the aim of a multimodal treatment programme is to address as many of these potential underlying factors as possible in order to achieve the best outcome. There may also be an increased benefit from providing multiple treatments in conjunction with each other over providing those treatments individually.

Is it effective?

There is some evidence to suggest that multimodal treatment is likely to be more effective than providing individual treatments in isolation.

A systematic review found that 'multimodal care' consisting of manipulation and mobilisation was not more effective than a placebo at improving pain and function in people with chronic neck pain, but may be marginally more effective than no treatment for people with chronic neck pain and headaches. Manipulation and/or mobilisation in conjunction with other physical medicine agents was not found to be any better than various other treatments including no treatment, placebo tablets, exercise, combined treatments, collar, electrotherapy, and massage. There is strong evidence for multimodal treatment programmes that include manipulation, mobilisation and an exercise focus. The programmes may also have included medication, heat/cold therapy, and education. It is not clear if exercise is the most important 'ingredient'. A systematic review of 11 scientific studies found strong evidence supporting the use of multimodal programs in the period between 2 and 12 weeks following whiplash injury. Two studies have compared different combinations of treatments to either 'standard care' (wearing a collar and taking anti-inflammatory medication) or an education booklet and home exercise programme, with both these studies finding the multimodal treatment was the most effective up to a few months after a whiplash injury.

A systematic review and meta-analysis of randomised controlled trials, which included 21 studies, found that for patients with an acute/subacute whiplash injury (Grade 2), active physiotherapy was more effective in the short term at reducing pain and increasing range of

motion of the neck when compared with standard intervention such as a collar or routine GP care. It also found that specific physiotherapy interventions such as manipulation, kinesiotaping, magnetic therapy led to a short term decrease in pain.

The results of a large randomised controlled trial suggest that when dealing with patients who have persisting symptoms within the first six weeks of injury, a six session physiotherapy treatment package provided more benefit than a single physiotherapy advice session in reducing short term neck related disability. Due to the number of treatments provided, the authors conclude that the physiotherapy care package was not a cost effective method of management. Another randomised controlled trial found evidence that an individualised multidisciplinary treatment plan does not help reduce the incidence of chronicity in patients with acute whiplash (less than four weeks following injury) when compared with usual care.

Are there any disadvantages?

There is no evidence to suggest that there are disadvantages associated with multimodal treatment, however potential side effects of each individual treatment should be considered. It is important that the treatment is provided by a qualified professional and that an appropriate assessment is carried out prior to treatment.

Where do you get it?

Multimodal treatment is commonly provided by physiotherapists. Doctors, chiropractors and osteopaths may also provide multimodal treatment.

Recommendations

Treatment consisting of more than one approach, i.e. multimodal, may be more effective than individual treatments provided in isolation. It should consist of at least manipulation and/or mobilisation and some form of exercise. Multimodal treatment should be based on an individual assessment and provided by a qualified professional.

Key references

Gross, AR, Hoving, JL, Haines, TA, Goldsmith, CH, Kay, T, Aker, P, Bronfort, G, Cervical overview group, 'Manipulation and mobilization for mechanical neck disorders', *Cochrane Database of Systematic Reviews* 2004, Issue 1. Art. No.: CD004249. DOI:10.1002/14651858.CD004249.pub2.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: non invasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Jull G, Kenardy, J, Hendrikz J, Cohen M & Sterling, M 2013, 'Management of acute whiplash: A randomized controlled trial of multidisciplinary stratified treatments', *Pain*, vol. 154, pp. 1798–1806.

Jull, G, Sterling, M, Kenardy, J & Beller, E 2007, 'Does the presence of sensory hypersensitivity influence outcomes of physical rehabilitation for chronic whiplash? A preliminary randomized controlled trial', *Pain*, vol. 129, no. 1-2, pp. 28-34.

Lamb, SE, Gates, S, Williams, MA, Williamson, EM, Mt-Isa, S, Withers, EJ, Castelnovo, E, Smith, J, Ashby, D, Cooke, MW, Petrou, S & Underwood, MR 2013, 'Emergency department treatments and physiotherapy for acute whiplash: a pragmatic, two-step, randomised controlled trial', *Lancet*, vol. 381, pp. 546–56.

Leaver, AM, Refshauge, KM, Maher, CG & McAuley, JH 2010, 'Conservative interventions provide short-term relief for non-specific neck pain: a systematic review', *Journal of Physiotherapy*, vol. 56, pp. 73-85.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Miller, J, Gross, A, D'Sylva, J, Burnie, SJ, Goldsmith, CH, Graham, N, Haines, T, Brønfort, G & Hoving, JL 2010, 'Manual therapy and exercise for neck pain: A systematic review', *Manual Therapy*, vol. 15, pp. 334-354.

Poorbaugh, K, Brismée, J, Phelps, V & Sizer, P 2008, 'Late whiplash syndrome: a clinical science approach to evidence-based diagnosis and management', *Pain Practice*, vol. 8, no. 1, pp. 65-89.

Rushton, A, Wright, C, Heneghan, N, Eveleigh, G, Calvert, M & Freemantle, N 2011, 'Physiotherapy rehabilitation for whiplash associated disorder II: a systematic review and meta-analysis of randomised controlled trials', *British Medical Journal*, vol. 1, pp. 1-13.

Vassiliou, T, Kaluza, G, Putzke, C, Wulf, H & Schnabel, M 2006, 'Physical therapy and active exercises – An adequate treatment for prevention of late whiplash syndrome? Randomized controlled trial in 200 patients', *Pain*, vol. 124, no. 69-76.

Yadla, S, Ratliff, J & Harrop, J 2008, 'Whiplash: diagnosis, treatment, and associated injuries', *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68.

Pilates

Our rating

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What is it?

Pilates exercise teaches awareness of breath and alignment of the spine, and strengthens the deep torso muscles. These muscles help to keep the body balanced, and are essential for providing support to the spine. The overall aim of the exercises is to create a stable pelvis and trunk, and the ability to monitor one's self kinaesthetically so that movement becomes effortless. A balance of eccentric and concentric muscle contractions promotes strengthening with minimal increase in bulk. The individual is taught to breath in relation to the movement to promote greater efficiency. Initially, exercises are taught to increase awareness that the body works as a whole and that an injured are is part of that whole. As the patient develops strong pelvic and thoracic core, increased resistance and dynamic activities are added. Pilates is used in relation to athletic training, rehabilitation and conditioning.

How does it work?

Pilates aims to selectively increase the strength and endurance of the deep, core muscles of the torso. Initially, the participant must learn which muscles to use, how to use them correctly, and then use them whilst performing movements. By targeting the deep postural muscles of the torso, this may increase the stability and balance of the body, improve posture and reduce the amount of work required by the superficial muscles and therefore reduce the pressure placed on the spine. By reducing the amount of work required by the superficial muscles, this may also help release tight muscles and reduce pain.

Is it effective?

Pilates may be used in rehabilitation programmes to assist with musculoskeletal problems and conditions. There are no studies assessing the effectiveness of Pilates for whiplash in the short or long term. Guidelines do not recommend Pilates as a management option in the first 12 weeks after whiplash injury as there is no evidence of effect.

Are there any disadvantages?

There have been no reports of disadvantages associated with Pilates, however it is likely to be more effective if individual one-on-one instruction is provided, which can be costly.

Where do you get it?

Pilates instruction should be given by a fully trained instructor. Physiotherapists can provide Pilates therapy also. There are some studios/gyms set up exclusively for Pilates. A listing of instructors can be found in the Yellow Pages.

Recommendations

Pilates cannot be recommended as an effective treatment for whiplash, either in the short or long term, due to the lack of scientific evidence. More research is required.

Key references

Cotter, AC, Memmo, P & Kim, N 2002, 'Complementary and Alternative Medicine in the Treatment of Whiplash Disorders', in *Whiplash*, eds GA Malanga & S Nadler, Hanley and Belfus Inc., Philadelphia, pp. 373-391.

Motor Accidents Authority 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, MAA, Sydney, Australia.

Posture Correction

Our rating	?
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What is it?

Clinical biomechanics of posture (CBP) rehabilitation involves specific chiropractic adjustments including: mirror-image drop table adjustments, mirror-image handheld instrument adjustments, mirror-image isometric exercise, and mirror-image extension-compression traction techniques. Posture correction may also include analysis of posture to check the alignment of your spine, advice and/or exercises to help correct any deviations from ideal posture. It may also involve devices to remind you to check and adjust your posture throughout the day (i.e. mirror, back braces, alarms/reminders).

How does it work?

The aim of posture correction is to place the spine in its correct anatomical alignment in order to reduce the stress on the muscles and joints of the body. Often neck pain (after whiplash and in general) is associated with a forward position of the head (where the chin pokes forward). This posture may place a great deal of strain on the muscles at the back of the neck, which can cause a lot of pain. Thus correction or reduction of this poor posture can help reduce pain levels.

Is it effective?

A CBP rehabilitation protocol has been examined in a single patient case study. In conjunction with exercise and traction, five months of treatment improved one patients' neck posture, pain, and disability. The patient in this case study was treated initially by a chiropractor using spinal manipulative therapy with no improvement in symptoms. The patient was then treated for an additional 3 months at a medical rehabilitation clinic with focus on functional rehabilitation (range of movement exercises, stretching), electrical muscle stimulation, high-voltage galvanism, ultrasound, deep tissue massage therapy, anti-inflammatory medication, and pain medication. The patient again demonstrated no permanent improvement and continued to display chronic symptoms for 8 months before being treated with the Clinical Biomechanics of Posture (CBP) technique as the primary treatment method.

Guidelines published in 2007 recommended that advice about posture (sitting and standing) may be helpful in addition to maintaining usual activities and exercising, especially if there has been no improvement already. A systematic review of high quality scientific studies concluded that in the sub-acute stage (between 2 and 12 weeks) following whiplash injury there is *strong* evidence to support the use of 'postural training'.

Are there any disadvantages?

There were no disadvantages to treatment according to the single patient case study. This type of treatment is only provided by qualified professionals, thus there may be considerable costs involved, especially if multiple treatments are required.

Where do you get it?

Chiropractors provide this specific type of posture correction. Other professionals that may provide advice and exercises in relation to posture correction may include doctors, physiotherapists, osteopaths, ergonomists and exercise/rehabilitation providers.

Recommendations

Although a small study on one patient found CBP to be effective, its routine use cannot be recommended based on this study alone. Learning how to sit and stand correctly may be useful in conjunction with other treatments, especially if there has been no improvement already. Postural advice and/or postural exercises are recommended in the sub-acute stage (between 2 and 12 weeks) following whiplash injury.

Key references

Dehner, C, Heym, B, Maier a, D, Sander, S, Arand, M, Elbel, M, Hartwig, E & Kramer, M 2008, 'Postural control deficit in acute QTF grade II whiplash injuries', *Gait and Posture*, vol. 28, no. 1, pp. 113–119.

Dehner, C, Elbel, M, Strobel, P, Scheich, M, Schneider, F, Krischak, G & Kramer, M 2009, 'Grade II whiplash injuries to the neck: what is the benefit for patients treated by different physical therapy modalities?', *Patient Safety in Surgery*, vol. 3, no. 2, doi: 10.1186/1754-9493-3-2.

Ferrantelli, JR, Harrison, DE, Harrison, DD & Stewart, D 2005, 'Conservative treatment of a patient with previously unresponsive whiplash associated disorders using clinical biomechanics of posture rehabilitation methods', *Journal of Manipulative and Physiological Therapeutics*, vol. 28, no. 3, pp. e1-e8.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Motor Accidents Authority 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, MAA, Sydney, Australia.

Pulsed Electromagnetic Fields (PEMF)

Our rating



What is it?

An alternating or pulsed electromagnetic field passed through the tissue (i.e. muscle) between electrodes placed on or near the skin. It must be applied by a qualified professional using a machine based in their clinic.

How does it work?

Alternating or pulsed electromagnetic fields (PEMF) induce electric current within the tissue. Even though these currents are extremely small, their main therapeutic purpose is thought to enhance bone and/or tissue healing. Human tissue contains charged molecules that can respond to the charge of magnetic fields. It is thought that magnetic field passes through the skin into the underlying tissue (i.e. muscle) and may relax capillary walls, thereby boosting blood flow to the painful area. They can also help prevent the muscle spasms that underlie many forms of pain apparently by interfering with muscle contractions. Also, they may interfere with the electrochemical reactions that take place within nerve cells, impeding their ability to transmit pain messages to the brain.

Is it effective?

There is limited evidence from two studies on people with chronic neck pain or osteoarthritis that PEMF may reduce pain in the short term. Two additional studies have examined the effect of PEMF on people with whiplash. The first study (reported within a review) provided PEMF in conjunction with other treatments (iontophoresis, TENS and ultrasound) hence it was difficult to determine whether PEMF contributed to any of the observed effects. In this study, the comparison group receiving relaxation training, neck school, psychological and manual treatment had better improvement in pain, return to work and self-rated outcome. The other study on whiplash patients found that PEMF combined with usual medication therapy was more beneficial for pain reduction and improved mobility than usual medication therapy on its own. A systematic review concluded that PEMF may be effective in the short term but not in the long term.

Are there any disadvantages?

There has been no research on the disadvantages associated with PEMF. It must be applied by a trained professional therefore there may be considerable costs involved, especially if multiple treatments are required. The treatment may not be suitable for everyone.

Where do you get it?

PEMF may be provided by therapists (i.e. physiotherapist) involved in facilitating recovery from whiplash.

Recommendations

PEMF may be beneficial following whiplash; however more high quality research is required to substantiate current evidence.

Key references

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Kroeling, P, Gross, A, Goldsmith, CH, Cervical Overview Group, 'Electrotherapy for neck disorders', *Cochrane Database of Systematic Reviews* 2005, Issue 2. Art. No.: CD004251. DOI: 10.1002/14651858.CD004251.pub3.

Thuile, C & Walzl, M 2002, 'Evaluation of electromagnetic fields in the treatment of pain in patients with lumbar radiculopathy or the whiplash syndrome', *Neurorehabilitation*, vol. 17, no. 1, pp. 63-7.

Verhagen, A, Scholten-Peeters, G, Van Wijnngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Psychology (in combination with other rehabilitation treatments)

Our rating



What is it?

There are many treatment techniques which are used as part of psychological management. Cognitive behaviour therapy, or CBT, was the technique most commonly used in relation to whiplash injury. CBT involves learning from a therapist how to overcome the distorted, negative thinking patterns that can accompany chronic whiplash injuries. Cognitive behaviour therapists may also use other techniques, to encourage the person to do more things that give them pleasure, helping them to solve problems in their life, and learning better social skills. CBT and other psychological and psychosocial treatments may also be used in combination with other conservative treatments such as Physiotherapy.

How does it work?

People with whiplash often complain of impaired cognitive function, such as memory, attention problems, anxiety and even depression. Inappropriate thought processes about pain may lead to pain catastrophizing (increased pain response), reduced physical activity and ultimately lead to a development of prolonged pain and disability. Consequently stress may result from disruption to work and social life activities and lead to sleep and ongoing depressive problems and inappropriate coping behaviour. In cognitive behaviour therapy, distorted thinking is challenged by the therapist who teaches the person how to change their thinking patterns in everyday life. Other forms of psychosocial interventions also aim to increase daily involvement in goal-directed activity and minimize psychosocial barriers to other treatments.

Is it effective?

There are studies which show that people with long term whiplash get benefit from psychological/psychosocial interventions when used in combination with other treatments such as Physiotherapy. These findings are based on good quality evidence which suggests that interventions such as CBT and Progressive Goal Attainment Program (PGAP), when used in conjunction with Physiotherapy and rehabilitation improves cognitive function, reduces pain and sick leave and also helped people return to work. A systematic review concluded that referral to Psychology is indicated if a patient is showing no signs of improving at 3-4 weeks following whiplash injury. Another systematic review found strong evidence supporting the use of a multimodal treatment approach which included Psychology in the management of acute and chronic whiplash.

A study looked at the effect of CBT as an adjunct to infiltration (local anaesthetic injection), medication, or physiotherapy in the management of whiplash (6-12 months post-injury) and found that CBT improved pain intensity and working ability in these patients. A recent randomised controlled trial investigated the effects of CBT in the management of post-traumatic stress disorder (PTSD) associated with chronic WAD. The findings from this study indicate that CBT may be effective to target PTSD symptoms in people with chronic WAD. This study also found that treatment of PTSD resulted in improvements in neck disability and quality of life and changes in cold pain thresholds. The findings from this study highlight the complex and interrelating mechanisms that may underlie both WAD and PTSD.

and show that CBT can translate into improving the physical and mental impairments associated with whiplash.

Are there any disadvantages?

Psychological/psychosocial treatments will involve seeing therapists weekly for several months. It can be expensive, although in Australia, Medicare now provides rebates for visits to clinical psychologists, Physiotherapists and Occupational Therapists.

Where do you get it?

Psychological/psychosocial treatments are generally provided by a specially trained clinical psychologist or counsellor. These days many Physiotherapists and Occupational Therapists work with psychologists, or have some specific training in this field. In Australia, Medicare now provides rebates for visits to clinical psychologists, physiotherapists and occupational therapists, under the Better Access to Mental Health Care scheme. Some of these treatments may also be covered by some private health insurance funds and is sometimes available from therapists employed in hospitals or government-funded clinics.

Recommendations

There is some evidence that psychological/psychosocial treatments in conjunction with other rehabilitation treatments are useful for people with chronic whiplash, but more high quality research is needed.

Key references

Dunne, RL, Kenardy, J & Sterling, M 2012, 'A randomized controlled trial of cognitive-behavioral therapy for the treatment of PTSD in the context of chronic whiplash', *Clinical Journal of Pain*, vol. 28, pp. 755–765.

Leach, J 2007, 'Editorial comment on 'developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)' by C. Mercer, A. Jackson and A. Moore', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 55.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Pato, U, Stefano, GD, Fravi, N, Arnold, M, Curatolo, M, Radanov, BP, Ballinari, P & Sturzenegger, M 2010, 'Comparison of randomized treatments for late whiplash', *Neurology*, vol. 74, pp. 1223–1230.

Seferiadis A, Rosenfeld M & Gunnarsson R 2004, 'A review of treatment interventions in whiplash-associated disorders', *European Spine Journal*, vol. 13, pp. 387–397.

Sterling, M & Kenardy, J 2008, 'Physical and psychological aspects of whiplash: important considerations for primary care assessment', *Manual Therapy*, vol. 13, no. 2, pp. 93–102.

Sullivan, MJL, Adams, H, Rhodenizer, T & Stanish WD 2006, 'A Psychosocial Risk Factor – Targeted Intervention for the Prevention of Chronic Pain and Disability Following Whiplash Injury', *Physical Therapy*, vol. 86, no. 1, pp. 8-18.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Traction

Our rating



What is it?

Traction of the neck involves a stretching force applied to the neck via a mechanical system. The traction device consists of a head halter and pulley system operated either manually using weights or mechanically using an electrical device. The patient is positioned in sitting, reclining or lying on their back and the halter is worn on the head. Various factors are taken into consideration (such as extent of the injury, pain levels, other symptoms, injury severity, injury irritability, diagnosis, patient size, patients tolerance level etc) when making decision about the weights attached to the pulley. Once it is attached, the spine is gently stretched and distracted. This can be applied continuously or intermittently. A variation of this is manual traction, where the health professional uses their hands to create the distraction force.

How does it work?

Traction aims to stretch and mobilise the spine. Specifically, traction may widen the spaces between the vertebral bones, stretch the joints in the spine, widen the spaces in the spine, tense ligaments, straighten spinal curves and stretch out tight spinal muscles. Traction is also thought to provide muscle relaxation by minimising muscle guarding which may ultimately result in reduced pain.

Is it effective?

A review of the literature investigated effectiveness of traction for patients suffering from a variety of neck problems, including whiplash. This high level, high quality research found that there was inconclusive evidence for both continuous and intermittent traction because of low quality of available literature. They did find that intermittent traction was beneficial in reducing pain; however this finding was not specifically focussed on patients with whiplash and included all patients suffering from chronic neck pain. They also found that continuous traction did not provide any benefit at all. Another two systematic reviews which were specific to whiplash found no evidence to support the use of traction following whiplash injury. One systematic review found traction to be effective in reducing pain and improving function following whiplash injury, when the pain was caused by compression of the nerve roots in the neck (radiculopathy). However the authors did not specify whether these changes were maintained in the long term.

Are there any disadvantages?

Traction is not for everyone. Patients whose spinal structural integrity is compromised (such as osteoporosis, tumour, infection, rheumatoid arthritis, fracture) and those with some physical conditions (such as jaw problems) cannot receive traction. People with anxiety problems may not be able tolerate the treatment. Some patients may have headaches after traction. You should be provided with a stop button that will release the tension on your neck should you need to. All symptoms during and after traction should be reported to the health professional.

Where do you get it?

Traction is usually performed as part of treatment by a registered health professional. This can include Physiotherapists, Chiropractors and Osteopaths. Some health professionals might provide a home kit where by the patient can utilise home based traction. However, the suitability of this should be determined by the relevant health professional, and instructions for use should be provided.

Recommendations

Based on available evidence, there is inconclusive evidence to suggest that traction is a viable treatment option for patients suffering from whiplash injuries. While there is emerging evidence to suggest that intermittent traction may be beneficial for patients suffering from neck pain, more research is needed to guarantee this produces consistent positive benefits for patients suffering from whiplash injuries.

Key references

Graham, N, Gross, AR, Goldsmith, C & The Cervical Overview Group 2006, 'Mechanical Traction for Mechanical Neck Disorders: A Systematic Review', *Journal of Rehabilitation Medicine*, vol.38, no.3, pp. 145-152.

Poorbaugh, K, Brismée, J, Phelps, V & Sizer, P 2008, 'Late whiplash syndrome: a clinical science approach to evidence-based diagnosis and management', *Pain Practice*, vol. 8, no. 1, pp. 65-89.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Yadla, S, Ratliff, J & Harrop, J 2008, 'Whiplash: diagnosis, treatment, and associated injuries', *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68.

Ultra-Reiz Current

Our rating	?
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What is it?

Ultra-reiz, also called ultra-stimulation current, is an interrupted direct current of low frequency (143 Hz) applied via medium sized electrodes supported on a thick moist viscose sponge. These electrodes are placed near the spinal column along the neck and upper back region. The electrodes are separated from each other by a distance of 3-4 cms.

How does it work?

The current is passed through electrodes placed on the body. The intensity of the current is gradually increased short of pain. The feeling should be a pronounced but a comfortable 'tingling' sensation ('comfortably strong'). By doing this, the optimum current strength specific to the patient is found. The intensity of the current is slowly increased in the first few minutes as patients get used to the sensation. It is thought that this current provides pain relief, reduces muscle spasm and increases blood flow. All these ensure patients get relief from pain and help in the healing of injured tissues.

Is it effective?

There is only one study which investigated ultra-reiz current. In this small study ultra-reiz current was used in addition to ice, home exercise program and advice for whiplash patients. The findings from this study indicate that after receiving this treatment, patients who were suffering from short term whiplash had good pain relief and increased neck movement. However, this effect was not sustained at six months after the treatment.

Are there any disadvantages?

This type of treatment may not be applicable for everyone. Some people may not tolerate the sensation of the current. While not serious, some people may also report tiredness after the treatment.

Where do you get it?

This type of treatment is usually provided by a registered health professional, usually a Physiotherapist.

Recommendations

As there is very little evidence to support the effectiveness of this treatment, it cannot be recommended for all patients suffering from whiplash. More research is needed to identify its full effects, either on its own or when provided in conjunction with other treatments.

Key references

Hendriks, O & Horgan, A 1996, 'Ultra-Reiz Current as an Adjunct to Standard Physiotherapy Treatment of the Acute Whiplash Patient', *Physiotherapy Ireland*, vol. 17, no. 1, pp. 3-7.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S
2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2,
Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Act As Usual

Our rating



What is it?

Act as usual is a strategy which encourages people with whiplash, especially in the early stages, to continue staying as active as possible within tolerable levels. Encouraging people to stay active and continue with their normal lives is seen as a means of facilitating normality and participation in activities of daily living during the recovery period. This may be undertaken in a structured manner (check-list based information covering various aspects about whiplash) or in an unstructured conversational manner with a health professional.

How does it work?

It is thought that by encouraging normal activities the emphasis is taken away from the injury itself. Physiologically, it is thought that normal movement patterns may have a positive effect on symptoms of whiplash such as muscle spasm and pain. Educating people with whiplash about pain behaviours (such as focussing on pain which can enhance pain perception) also helps in prevent the development 'fear avoidance' behaviours in the future.

Is it effective?

There is some high level evidence to suggest that acting as usual, subsequent to whiplash, does lead to certain positive outcomes. Based on the results of a systematic review the authors recommended that people in the early stages following whiplash should be prescribed advice to "act as usual" and early, controlled, physical activity to tolerance level. Two randomised controlled trials have compared acting as usual to other forms of treatments (such as collars and active interventions). Both studies included patients immediately after their whiplash injuries and reported on short term and long term outcomes. The results from both these studies indicate that all patients got better over time. However, in one of the studies, which measured results for six months after whiplash, people who acted as usual were much better compared to people who wore collars and had time off work. This was particularly noticeable for pain, headaches, stiffness movement, concentration and memory. In a study at the one year mark, there was no difference in outcomes for any of these treatments. However a systematic review found strong evidence supporting the practice of encouraging people to act as usual as soon as possible following whiplash injury. A study investigating the recommendation "act as usual", in combination with an adapted pain treatment in the form of non-steroidal anti-inflammatory (NSAIDS), medications found that this combination was sufficient for management of patients without a functional disorder, based on the classification system of the Quebec Task Force (QFT I^o) post whiplash. Based on these findings, the authors of this study state that for patients presenting after whiplash, who do not have functional disorders, there may be no need for any physical therapy and any therapy should only be increased for those patients with complicated healing processes.

Are there any disadvantages?

While there were no reported disadvantages or side effects from act as usual, this treatment should be prescribed and monitored by a health professional at regular intervals. If patients'

symptoms are not improving with this approach, health professionals need to review their management plan.

Where do you get it?

Advice to act as usual can be provided by any appropriately qualified health professional including doctors, nurses, physiotherapists and chiropractors.

Recommendations

While there is some evidence to support advice to act as usual within tolerable levels, especially in the early stages, more research is needed to describe its effect in the long term.

Key references

Borchgrevink, GE, Kaasa, A, McDonagh, D, Stiles, T, Haraldseth, O & Lereim, I 1998, 'Acute Treatment of Whiplash Neck Sprain Injuries: A Randomized Trial of Treatment During the First 14 Days After a Car Accident', *Spine*, vol. 1, no. 23, pp. 25-31.

Dehner, C, Elbel, M, Strobel, P, Scheich, M, Schneider, F, Krischak, G & Kramer, M 2009, 'Grade II whiplash injuries to the neck: what is the benefit for patients treated by different physical therapy modalities?', *Patient Safety in Surgery*, vol. 3, no. 2, doi: 10.1186/1754-9493-3-2.

Dehner C, Kraus, M, Schöll, H, Schneider, F, Richter, P & Kramer M 2012, 'Therapy recommendation "act as usual" in patients with whiplash injuries QTFI', *Global Journal of Health Science*, vol. 4, no. 6, pp. 36-42.

Guzman, J, Haldeman, S, Carroll, L, Carragee, E, Hurwitz, E, Peloso, P, Nordin, M, Cassidy, D, Holm, L, Co'te, P, Van der Velde, G & Hogg-Johnson, S 2008, 'Clinical practice implications of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders; from concepts and findings to recommendations', *European Spine Journal*, vol. 17, no. 1, pp. 199-213.

Kongsted, A, Qerama, E, Kasch, H, Bendix, T, Winther, F, Korsholm, L & Jensen TS 2007, 'Neck Collar, "Act-as-Usual" or Active Mobilisation for Whiplash Injury? A Randomised Parallel-Group Trial', *Spine*, vol. 32, no. 6, pp. 618-626.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Seferiadis A, Rosenfeld M & Gunnarsson R 2004, 'A review of treatment interventions in whiplash-associated disorders', *European Spine Journal*, vol. 13, pp. 387–397.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Active Treatments

Our rating



What is it?

Active treatments are based on the principles that early and repeated movements of neck within the pain free range ensure that normality is maintained and encouraged. These active treatments can be in the form of light, repetitive exercises of the neck, posture advice and education, and may even include specific philosophies of management (such as McKenzie). These strategies can be undertaken under supervision of a health professional and/or at home.

How does it work?

Active treatments aim to maintain, and enhance available movements in the spine and thereby minimise pain, stiffness and loss of movement which can occur if spine is immobilised for long periods of time. By encouraging regular movement of the spine in the initial stages and gradually increasing movements of the spine with active exercises, while still respecting pain, ensures that normal movement in the spine is maintained during the recovery period.

Is it effective?

There are some high level research studies which have investigated the effectiveness of active treatments. The findings from these studies are mixed. In the acute stage of whiplash, active treatments seem to provide positive benefits in terms of pain, range of movement, sick leave and activities of daily living, especially in the short term.

In a study undertaken in Denmark, which investigated long term (1 year) outcomes, whiplash patients who received active interventions were no better off than patients who just continued with their normal life and those who wore a neck collar for two weeks. However, an older study reported that active intervention when compared to standard treatment (pamphlet, education and collar), when provided early (within 96 hours of injury), helped to reduce pain. The same study, reported in another paper, reported that when it came to range of movement alone, even in the long term (3 years), active intervention was better than wearing a collar. Similar findings have also been reported by research from Canada which showed that exercising the affected areas helped to reduce pain and disability when compared to just wearing collar and not moving. A systematic review of scientific studies concluded that there was strong evidence to support the use of 'active exercise' in the management of acute whiplash. The same review found there was consensus opinion among clinicians that *functional* neck movements (based on the patient's specific requirements) were an effective treatment for chronic whiplash (more than 12 weeks following injury). A separate systematic review found that simple *neck rotation* (turning side to side) lead to reduced pain levels at 6 months and reduced sick leave at 3 years following whiplash injury.

Are there any disadvantages?

While there were no reported disadvantages or side effects from active treatments, these treatments should be prescribed and monitored by a health professional at regular intervals.

If patients' symptoms are not improving with these treatments, health professionals need to review their management regime.

Where do you get it?

Active treatments can be provided by any qualified health professionals. This may include doctors, physiotherapists and chiropractors.

Recommendations

While there is some evidence to support the use of active treatments especially in the early stages, more research is needed to describe its effect in the long term.

Key references

Bonk, AD, Ferrari R, Giebel GD, Edelmann M & Huser R 2000, 'Prospective, randomized, controlled study of activity versus collar, and the natural history for whiplash injury, in Germany', *Journal of Musculoskeletal Pain*, vol. 1, no. 1, pp 123-132.

Crawford, JR, Khan, RJK & Varley GW 2004, 'Early management and outcome following soft tissue injuries of the neck – a randomised controlled trail', *Injury*, vol. 35, pp 891-895.

Dehner, C, Elbel, M, Strobel, P, Scheich, M, Schneider, F, Krischak, G & Kramer, M 2009, 'Grade II whiplash injuries to the neck: what is the benefit for patients treated by different physical therapy modalities?', *Patient Safety in Surgery*, vol. 3, no. 2, doi: 10.1186/1754-9493-3-2.

Guzman, J, Haldeman, S, Carroll, L, Carragee, E, Hurwitz, E, Peloso, P, Nordin, M, Cassidy, D, Holm, L, Co'te, P, Van der Velde, G & Hogg-Johnson, S 2008, 'Clinical practice implications of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders; from concepts and findings to recommendations', *European Spine Journal*, vol. 17, no. 1, pp. 199-213.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Kongsted, A, Qerama, E, Kasch, H, Bendix, T, Winther, F, Korsholm, L & Jensen TS 2007, 'Neck Collar, "Act-as-Usual" or Active Mobilisation for Whiplash Injury? A Randomised Parallel-Group Trial', *Spine*, vol. 32, no. 6, pp. 618-626.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Poorbaugh, K, Brismée, J, Phelps, V & Sizer, P 2008, 'Late whiplash syndrome: a clinical science approach to evidence-based diagnosis and management', *Pain Practice*, vol. 8, no. 1, pp. 65-89.

Rosenfeld, M, Gunnarsson, R & Borenstein, P 2000, 'Early Intervention in Whiplash-Associated Disorders A Comparison of Two Treatment Protocols', *Spine*, vol. 25, no. 14, pp. 1782-1787.

Rosenfeld, M, Seferiadis, A, Carlson J & Gunnarsson, R, 2003, 'Active Interventions in Patients with Whiplash-Associated Disorders Improves Long-Term Prognosis', *Spine*, vol. 28, no. 22, pp. 2491-2498.

Schnabel, M, Ferrari, R, Vassiliou, T & Kaluza, G 2004, 'Randomised, controlled outcome study of active mobilisation compared with collar therapy for whiplash injury', *Emergency Medicine Journal*, vol. 21, pp. 306-310.

Seferiadis A, Rosenfeld M & Gunnarsson R 2004, 'A review of treatment interventions in whiplash-associated disorders', *European Spine Journal*, vol. 13, pp. 387–397.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Yadla, S, Ratliff, J & Harrop, J 2008, 'Whiplash: diagnosis, treatment, and associated injuries', *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68

Work Alteration

Our rating

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What is it?

Work alteration relates to changes made to the working environment and/or arrangements, which may have an impact on symptoms and recovery after whiplash. Sometimes this may include work ergonomics, the science of arranging the working environment to fit the person in it. Using ergonomic principles may help to reduce stress and other disorders caused by overuse of muscles, bad posture and repeated tasks.

How does it work?

Applying ergonomic principles at work such as designing new tasks, modifying work spaces, controls, displays, tools, lightning, and equipment to fit the worker's capabilities and limitations may help to avoid new, or aggravate existing, injuries or disorders.

Is it effective?

There is currently no scientific evidence on the use of work alteration for whiplash disorders. A synthesis of evidence focusing on 'non-specific' neck pain found that computer software programs which prompted workers to take regular breaks did not change the frequency or intensity of neck pain in workers. On the other hand the software programs did improve work productivity and make workers more likely to report positively on their injury. It must be noted that this synthesis was not peer reviewed, as per routine process, and hence its findings should be considered with some caution.

Are there any disadvantages?

None known.

Where do you get it?

Work alteration using ergonomic principles can be provided in isolation or as part of other rehabilitation treatments. Ergonomists' are specialists in this field and they can be found in your local Yellow Pages. Other health care practitioners such as Physiotherapists and Occupational Therapists may also provide work ergonomic treatments as part of overall rehabilitation. Physiotherapist and occupational therapists can be found in yellow pages and online via their professional organisations.

Recommendations

Due to the absence of rigorous high quality scientific evidence, work alteration cannot be recommended for whiplash. More research is needed in this area.

Key references

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Mark Dohrmann and Partners Pty Ltd 2007, *Ergonomics in Australia*, viewed 30 October 2007, <<http://www.ergonomics.com.au/>>.

Rest

Our rating



What is it?

Subsequent to whiplash, some people might want to rest and recover from the injury. This is based on the common notion that rest will help in the recovery of any injury.

How does it work?

It is thought that by resting, it provides the opportunity for people with whiplash injuries to recovery from their injuries. Resting may help in relaxation, avoid aggravating activities (such as poor, sustained posture at work) and minimise any stress that may result from extraneous circumstances.

Is it effective?

It is widely acknowledged that staying active within pain limits, rather than resting, is important for people with whiplash, especially in the early stages. While no high quality study explicitly investigating rest as a treatment option, many studies used rest as a dummy (control or placebo) treatment or part of a large number of other treatments (such as collar, ultrasound), when comparing common treatment options. Several high quality reviews report on these studies. Generally, they all agree that resting after whiplash is not preferable. Clinically, however, it is important to take into account pain and other symptoms reported by persons with whiplash. By and large it thought that resting, such as staying in bed, should not be encouraged for whiplash injuries which are classified as Grade I. In case of whiplash injuries which are classified as Grade II and III, if persons with whiplash prefer to stay in bed, this should be limited to a handful of days.

Are there any disadvantages?

There is some thought that staying in bed might place the focus on the accident and injuries rather than recovery and healing.

Where do you get it?

While rest can be self prescribed, it is important this is done so in consultation with and advice from a qualified health professional such as doctor, physiotherapist, chiropractor etc.

Recommendations

Based on available evidence, rest is not recommended as a treatment for whiplash injuries, especially in the long term. The decision of having rest should be made by the health professional (such as a doctor) in consultation with the person with whiplash.

Key references

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Motor Accidents Authority 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, MAA, Sydney, Australia.

Seferiadis A, Rosenfeld M & Gunnarsson R 2004, 'A review of treatment interventions in whiplash-associated disorders', *European Spine Journal*, vol. 13, pp. 387–397.

Verhagen AP, Schoten-Peeters GGGM, van Wijngaarden S, de Bie RA, Bierma-Zeinstra SMA, 'Conservative treatments for whiplash', Cochrane Database of Systematic Review, Issue 2, Art. No: CD003338. DOI:10.1002/14651858.pub3.

Yadla, S, Ratliff, J & Harrop, J 2008, 'Whiplash: diagnosis, treatment, and associated injuries', *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68.

Complementary & Alternative Therapy Interventions

Acupuncture

Our rating



What is it?

Acupuncture is a treatment modality of Traditional Chinese Medicine (TCM) which dates back thousands of years in China. Acupuncture treatment involves the insertion of fine, sterile needles into specific sites (acupuncture points) along the body's meridians (a network of invisible channels through the body), which purport to clear energy blockages and encourage the normal flow of *qi* or "life energy" through the individual. The practitioner may also stimulate the acupuncture points using other methods, including moxibustion, cupping, laser therapy, electro-stimulation and massage, in order to re-establish the flow of *qi*.

How does it work?

Animal and human studies have demonstrated that acupuncture may cause multiple biological responses. These proposed changes include influencing the nervous system, neurotransmitters and endogenous substances which respond to needling stimulation and electro-acupuncture that influence pain relief, and regulation of the nervous system.

From a TCM perspective, it is believed that when the person is in good health, an abundant supply of *qi* flows through the body's meridians. If the flow of *qi* in the meridians becomes blocked or there is an inadequate supply of *qi*, then the body fails to maintain harmony, balance and order, and disease or illness follows. Thus acupuncture is thought to restore the flow of *qi* through the body.

Is it effective?

There have been three small studies of the effectiveness of acupuncture following whiplash. Two studies examined the effect of acupuncture on balance following whiplash injury and found that acupuncture helped to improve balance. One low quality study of laser acupuncture, found that it had no effect on symptoms or range of motion in the early and late stages following whiplash injury. A synthesis of evidence found that acupuncture was more effective than no treatment or placebo treatments in reducing pain in the short term. It must be noted that this synthesis was not peer reviewed, as per routine process, and hence its findings should be considered with some caution. In contrast, a systematic review found that there was not enough evidence to support the use of acupuncture following whiplash injury. Two reviews have found that acupuncture had a considerable short term effect on pain and disability in mechanical neck pain.

A randomised controlled trial investigated the effectiveness of acupuncture for treatment of patients with subacute and chronic WAD. The findings from this study indicated that acupuncture treatment was associated with a significant reduction in pain intensity over a period of at least six months. While this was a significant finding, the reduction in pain was not clinically significant. Furthermore, the acupuncture treatment had no effect on disability or quality of life measures. Another randomised crossover trial found that one session of acupuncture resulted in improvements in pain pressure sensitivity in the neck and calf of patients with chronic WAD. This study also found that acupuncture was well-tolerated

treatment in this group of patients. The authors of this study suggest that acupuncture treatment may activate natural brain-driven pain relief in patients with chronic WAD.

Are there any disadvantages?

Serious adverse reactions to acupuncture treatment are rare. Infrequent minor side effects may include bruising or some discomfort around the site of needling. Acupuncture is safe in the hands of a competent practitioner.

Where do you get it?

Acupuncture should be provided only by an acupuncturist belonging to a professional association. Acupuncturists can be found listed by their professional association in the Yellow Pages.

Recommendations

The use of acupuncture as an adjunct to other therapy, in treating mechanical neck pain, may be considered for short term relief of pain and disability. However more research is required in order to recommend its use as a sole intervention and to determine its long term effects.

Key references

Aigner, N, Fialka, C, Radda, C & Vecsei, V 2006, 'Adjuvant laser acupuncture in the treatment of whiplash injuries: a prospective, randomized placebo-controlled trial', *Wien Klin Wochenschr*, vol. 118, no. 3-4, pp. 95-99.

Cameron, ID, Wang, E & Sindhusake, D 2011, 'A randomized trial comparing acupuncture and simulated acupuncture for subacute and chronic whiplash', *Spine*, vol. 36, no. 26, pp. E1659-E1665.

Fattori, B, Borsari, C, Vannucci, G, Casani, A, Cristofani, R, Bonucelli, L & Ghilardi, PL 1996, 'Acupuncture Treatment For Balance Disorders Followign Whiplash Injury', *Acupuncture and Electro-Therapeutics Research International Journal*, vol. 21, pp. 207-217.

Fattori, B, Ursino, F, Cingolani, C, Bruschini, L, Dallan, I & Nacci, A 2004, 'Acupuncture treatment of whiplash injury', *International Tinnitus Journal*, vol. 10, pp. 156-60.

Guzman, J, Haldeman, S, Carroll, L, Carragee, E, Hurwitz, E, Peloso, P, Nordin, M, Cassidy, D, Holm, L, Co'te, P, Van der Velde, G & Hogg-Johnson, S 2008, 'Clinical practice implications of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders; from concepts and findings to recommendations', *European Spine Journal*, vol. 17, no. 1, pp. 199-213.

Guzman, J, Haldeman, S, Carroll, LJ, Carragee, EJ, Hurwitz, EL, Peloso, P, Nordin, M, Cassidy, JD, Holm, LW, Côté, P, Velde, G & Hogg-Johnson, S 2009, 'Task force on neck pain and its associated disorders', *Journal of Manipulative and Physiological Therapeutics*, vol. 32, pp. 227-243.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, Treatment of neck

pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Leaver, AM, Refshauge, KM, Maher, CG & McAuley, JH 2010, 'Conservative interventions provide short-term relief for non-specific neck pain: a systematic review', *Journal of Physiotherapy*, vol. 56, pp. 73-85.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Tobbackx, Y, Meeus, M, Wauters, L, De Vilder, P, Roose, J, Verhaeghe, T & Nijs, J 2012, 'Does acupuncture activate endogenous analgesia in chronic whiplash-associated disorders? A randomized crossover trial', *European Journal of Pain*, vol. 17, pp. 279–289.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Alexander Technique

Our rating	?
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What is it?

The Alexander Technique is a form of education that enables the individual to recognise and overcome harmful tension in their body. It aims to change (movement) habits in our normal day to day lives. Alexander technique involves a simple and practical method for improving ease and freedom of movement, balance, support and coordination.

The instructor guides and teaches you the appropriate amount of effort for a particular activity, giving you more energy for all your activities. It is not a series of treatments or exercises, but rather a re-education of the mind and body. The Alexander Technique is a method which helps a person discover a new balance in the body by releasing unnecessary tension.

How does it work?

The technique is believed to work on the basis that the mind and body are in unity. The teacher's hands work gently to encourage the release of over-tight muscles, the strengthening of those that have been under-used and to restore the correct relationship between the head, neck and back. The pupil reinforces this process by a sequence of directed thought.

Is it effective?

This technique may be used to assist with neck and back pain. There are no studies directly assessing the effectiveness of Alexander technique and whiplash.

Are there any disadvantages?

There has been no research on the adverse effects of Alexander Technique. Most teachers consider twenty to forty lessons are generally required; therefore it may be an expensive treatment option.

Where do you get it?

A listing of teachers in your area can be found at the website for The Australian Society of Teachers of the Alexander Technique. Consult the Yellow Pages for a listing of teachers.

Recommendations

The use of the Alexander technique cannot be recommended following whiplash due to lack of research evidence. More research is required.

Key references

AUSTAT 2006, *The Australian Society of Teachers of the Alexander Technique*, viewed 30 October 2007, <<http://www.austat.org.au>>.

Chiropractic

Our rating



What is it?

Chiropractic is concerned with the diagnosis, treatment and prevention of mechanical disorders of the musculoskeletal system, and the effects of these disorders on the function of the nervous system and general health. There is an emphasis on manual treatments including spinal manipulation or adjustment, and this is often combined with physical therapy modalities, exercise programs, nutritional advice, orthotics, lifestyle modification and other patient education.

How does it work?

It is thought that poor, inadequate or incorrect function in the spine may cause irritation of the nerves that control our posture and movement. This spinal nerve stress can lead to discomfort, pain and disease. Chiropractors use their hands to adjust the spinal joints and extremities where signs of restriction in movement are found, improving mobility and relieving pain. This treatment is known as 'adjustment' or 'manipulation'. By manipulating joints, chiropractors believe that treatments stimulate the joint movement receptors - your body's position sensors which provide feedback to the brain on where the joint is in space, and this can affect the way your nervous system works. It is thought that Chiropractic treatment may stimulate the body's own healing processes.

Is it effective?

There is limited research investigating Chiropractic treatment. There are several case reports and one study of 28 subjects with whiplash who received Chiropractic treatment. When data was collected before and after Chiropractic treatment, there was an improvement in one to two symptoms among 93% of subjects. Unfortunately, the study did not compare Chiropractic with either standard care or placebo (dummy) treatment.

In some case studies subjects suffering from chronic symptoms of whiplash injuries were treated using Chiropractic interventions. Chiropractic treatments consisting of spinal manipulative therapy, manual traction of cervical spine and range of different types of exercises were provided. Findings indicate that subjects reported improvements in pain, range of movement, headaches and other activities of daily living.

Are there any disadvantages?

The general conclusion is that Chiropractic treatment is safe when administered with the appropriate care and caution by a registered Chiropractor. However, there are some disadvantages specific to manipulation which needs to be considered as well. These include local discomfort, increased neck pain, headache, thoracic pain, altered sensation, dizziness, tiredness, or radiating discomfort. Infrequent, but potentially serious side effects, may include: vertebrobasilar accidents (VBA)[†], strokes, spinal disc herniation, vertebral and rib

[†] A vertebrobasilar accident results in vertebrobasilar insufficiency, which is an obstruction or blockage of an important group of blood vessels called vertebral-basilar system. Blockage of these blood vessels result in problems with consciousness, headache, dizziness, paralysis of legs and/or arms, difficulty speaking and paralysis of face muscles

fractures, and cauda equina syndrome. Therefore appropriate assessment and tests should be carried out by the Chiropractor prior to manipulation.

Where do you get it?

Chiropractors should belong to a professional association. Chiropractors can be found listed by their professional association in the Yellow Pages.

Recommendations

There is (limited) evidence to indicate that Chiropractic treatments may be beneficial for whiplash injuries. More research is required to demonstrate its consistent effectiveness for people suffering from whiplash injuries.

Key references

Alpass, L 2004, 'Chiropractic management of "intractable" chronic whiplash syndrome', *Clinical Chiropractic*, vol. 7, pp. 16-23.

DeCarlo, A 2006, 'Rehabilitation Approach to Treatment of Whiplash-Associated Disorder', *Journal of American Chiropractic Association*, vol. August, pp. 6-12.

Gosnold, JM 2003, 'The impact of rehabilitation on chronic whiplash', *Clinical Chiropractic*, vol. 6, pp. 129-136.

Shaw, L, Descarreaux, M, Bryans, R, Duranleau, M, Marcoux, H, Potter, B, Ruegg, R, Watkin, R & White, E 2010, 'A systematic review of chiropractic management of adults with whiplash- associated disorders: Recommendations for advancing evidence-based practice and research', *Work*, vol. 35, pp. 369-394, doi:10.3233/WOR-2010-0996.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Woodward, MN, Cook, JCH, Gargan, MF & Bannister, GC 1996, 'Chiropractic treatment of chronic "whiplash" injuries', *Injury*, vol. 27, no. 9, pp. 643-645.

Feldenkrais

Our rating	?
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What is it?

The Feldenkrais Method® facilitates learning about movement, posture and breathing to ultimately increase the ease and range of movement, improve flexibility and coordination. Through gentle movement lessons, clients are taught to become more aware of how our habits may restrict our moving through life easily and pleasurably. Clients are taught easier options for movement. This form of movement therapy used to enhance the functional rehabilitation of patients with impairment from chronic pain.

How does it work?

The Feldenkrais method was created by Moshe Feldenkrais, who believed the human mind to have the ability to understand, learn and perform new activities. Using the Feldenkrais technique patients are guided to understand and identify their dysfunctional movement pattern and discover alternative options to perform a task without experiencing pain. The approach involves:

Classes called “Awareness Through Movement” (ATM)

ATM lessons are usually taught in groups on a weekly basis. A Feldenkrais practitioner guides the participant through a planned sequence of movement explorations. Attention is drawn to the process of each movement pattern. Through observing their movements, participants learn easier ways of moving in everyday activities. Exploration of movement in these classes is designed to improve overall wellbeing.

Individual lessons called “Functional Integration” (FI)

This is a hands-on process which addresses particular individual problems therefore lessons are tailored to each person’s needs. The Feldenkrais practitioner guides movements through precise touch. The client lies or sits, comfortably clothed, on a low padded table. The practitioner brings present habits into focus and offers new movement options. The learning is then applied to everyday activities such as reaching, sitting, standing and walking.

Is it effective?

Feldenkrais may be used as a treatment for whiplash after the initial stage of healing. There are no studies assessing the effectiveness of Feldenkrais for whiplash. Feldenkrais has been used successfully in chronic neck and back conditions.

Are there any disadvantages?

The disadvantages associated with Feldenkrais have not been researched. Given that several classes/sessions may be required it may be an expensive treatment option.

Where do you get it?

Qualified therapists teach the Feldenkrais method. They are listed in the appropriate section of the Yellow Pages, and can be found at The Australian Feldenkrais Guild.

Recommendations

The use of Feldenkrais following whiplash cannot be recommended due to lack of research evidence. More research is required.

Key references

Cotter, AC, Memmo, P & Kim, N 2002, 'Complementary and Alternative Medicine in the Treatment of Whiplash Disorders', in *Whiplash*, eds GA Malanga & S Nadler, Hanley and Belfus Inc., Philadelphia, pp. 373-391.

The Australian Feldenkrais Guild 2003, *The Feldenkrais Method*, viewed 30 October 2007, <<http://www.feldenkrais.org.au/>>.

Hypnosis

Our rating	?
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What is it?

Hypnosis is derived from the Greek word *hypnos*, meaning "sleep". Hypnosis involves the use of an 'exercise' to bring about deep relaxation and an altered state of consciousness, also known as a trance. A person in a trance or deeply focused state is unusually responsive to an idea or image, and hypnosis can teach people how to master their own state of awareness. By doing this they can affect their own bodily functions and psychological responses.

How does it work?

During hypnosis, a person's body is thought to relax while his or her thoughts become more focused and attentive. The effect of being hypnotised may reduce blood pressure and heart rate, and alters certain types of brain wave activity. In this relaxed state, a person may feel at ease physically yet fully awake mentally. In this state of deep concentration people are thought to be highly responsive to suggestion. There are several stages of hypnosis. The process begins with reframing the problem; becoming relaxed, then absorbed (deeply engaged in the words or images presented by a hypnotherapist); dissociating (letting go of critical thoughts); responding (complying whole-heartedly to a hypnotherapist's suggestions); returning to usual awareness; and reflecting on the experience.

Is it effective?

There are no studies examining the effect of hypnosis compared to a control group for whiplash.

Are there any disadvantages?

Some people can enter a hypnotic state more easily than others, therefore the treatment may not be suitable for everyone. Generally, hypnotherapists are not medical practitioners, and if this is the case the treatment will not be covered by Medicare.

Where do you get it?

Hypnotherapists provide hypnotherapy, and they should be suitably qualified to practice. Hypnotherapists are listed in the Yellow Pages.

Recommendations

The use of hypnotherapy following whiplash cannot be recommended due to lack of research evidence. More research is required.

Key references

Cotter, AC, Memmo, P & Kim, N 2002, 'Complementary and Alternative Medicine in the Treatment of Whiplash Disorders', in *Whiplash*, eds GA Malanga & S Nadler, Hanley and Belfus Inc., Philadelphia, pp. 373-391.

Dry needling

Our rating

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What is it?

Intra-muscular injection, or dry needling involve the insertion of fine acupuncture needles into myofascial trigger points, with the aim of deactivating trigger points. Trigger points are thought to be hyperirritable spots in skeletal muscle that are associated with 'knots' in tight bands of muscle fibers. The palpable nodules are said to be small contraction knots and a common cause of pain. Compression of a trigger point may elicit local tenderness, referred pain, or local twitch response. Dry needling uses western based anatomy and physiology to select the myofascial trigger points found in muscles throughout the body. Many of these points correspond with those used in Traditional Chinese Medicine during acupuncture. Commonly following whiplash, the muscles at the back of the neck become shortened, tight and painful, and these muscles may form the target of intra-muscular injection.

How does it work?

Trigger points are painful on compression and can give rise to characteristic referred pain, referred tenderness, motor dysfunction and "autonomic" responses such as temperature and skin changes over the site of pathology. Dry needling of the 'shortened' muscle band may cause an immediate relaxation in the muscle. A sense of release and increased range of motion may also be experienced by the patient.

Is it effective?

There is only one study examining the effect of intra-muscular injection on whiplash. In this study subjects reported an improvement following a course of dry needling. Unfortunately, the study did not compare dry needling either with no treatment or placebo (dummy) treatment.

Are there any disadvantages?

There should be few side effects when practiced by a qualified health practitioner. However, you may experience some discomfort associated with the insertion of the needle, and/or movement of the needle within the muscle. If it is painful you should inform the practitioner.

Where do you get it?

Acupuncturists, physiotherapists and other health professionals who have all undertaken courses in dry needling can provide intra-muscular injection. They can be found in the Yellow Pages.

Recommendations

The effects of dry needling have not been fully evaluated and hence cannot be recommended for whiplash. Further research is needed.

Key references

Gunn, CC, Byrne, D, Lam, A, Leung, MK, McBrinn, J, Nixon, A & Wong, K 2001, 'Treating whiplash associated disorders', *Journal of Musculoskeletal Pain*, vol. 9, pp. 68-89.

Pelso, P, Gross, A, Haines, T, Trinh, K, Goldsmith, CH, Burnie, S, Cervical Overview Group 2007, 'Medicinal and injection therapies for mechanical neck disorders', *Cochrane Database of Systematic Reviews*, Issue 3, Art.No.: CD000319. DOI:10.1002/14651858.CD000319.pub4.

Massage

Our rating



What is it?

Therapeutic massage is the manipulation of the soft tissue of whole body areas to bring about generalised improvements in health, such as relaxation or improved sleep, or specific physical benefits, such as relief of muscular aches and pains. There are many different types of massage such as relaxation, therapeutic, remedial, soft tissue, deep connective tissue, effleurage, petrissage, kneading, myofascial to name a few.

How does it work?

Massage is thought to work through a mechanical action and a reflex action. A mechanical action is created by moving the muscles and soft tissues of the body using pressure and stretching movement. This mechanical action is purported to break up fibrous tissue and loosens stiff joints.

A reflex is created when treatment of one part of the body affects another part of the body, via the nervous system. It may help heal damaged muscle, stimulate circulation, clear waste products via the lymphatic system, boost the activity of the immune system, reduce pain and tension, and induce a calming effect. Massage may also enhance a general sense of well-being by stimulating the release of endorphins (natural pain-killers and mood elevators) and reducing levels of certain stress hormones.

Is it effective?

Data from six trials of massage on its own have been summarised in a high quality review. Some of these studies refer to whiplash and other to neck pain in general. The studies all compared massage to a control treatment, however the results are inconclusive at present as to whether massage reduces pain, improves function and improves patient satisfaction. It is also unclear as to how many sessions are required, how long each session should be and the most effective style of massage. A systematic review found there was insufficient evidence to support the use of massage following whiplash injury.

Given the lack consistent research, two guidelines offer slightly different advice regarding massage. One suggests that passive treatments such as massage could be used as a treatment option alongside other manual and physical therapies, and exercise in the first three weeks following injury. The other guideline states that there is insufficient evidence to support or refute the use of massage in the first two weeks and more than 12 weeks after injury, however massage may be considered for the reduction of pain between two and twelve weeks after injury.

Are there any disadvantages?

Most massage techniques have a low risk of adverse effects. Cases reported in the literature are extremely rare and have usually involved techniques that are unusual, such as extremely vigorous massage. If you have other underlying health issues massage may not be suitable. Generally, massage should be avoided if you suffer from congestive heart failure, kidney failure, infection of the superficial veins (called phlebitis) or soft tissue (called cellulitis) in the legs or elsewhere, blood clots in the legs, bleeding disorders, or contagious skin conditions.

If you have cancer, you must check with your doctor before considering massage because you should not receive such treatments under certain circumstances. People with rheumatoid arthritis, a goiter (a thyroid disorder characterized by an enlarged thyroid), eczema and other skin lesions should not receive massage therapy during flare-ups. Experts also advise that people with osteoporosis, high fever, few platelets or white blood cells, and mental impairment, as well as those recovering from surgery may be better off avoiding massage. Massage involves close physical contact. To minimise the risks of unprofessional behaviour in this situation, patients should ensure that practitioners are registered with an appropriate regulatory body.

Where do you get it?

Massage therapists are listed in the Yellow Pages. Other professionals such as physiotherapists and chiropractors may use massage as a component of their treatment. Qualified massage therapists should belong to a relevant professional association.

Recommendations

The current research evidence does not support the use of massage on its own for the management of whiplash. It may be used as an adjunct to other therapies (i.e. multimodal care) in the short term for pain relief.

Key references

Haraldsson, BG, Gross, AR, Myers, CD, Ezzo, JM, Morien, A, Goldsmith, C, Peloso, PM, Bronfort, G, Cervical Overview Group, 'Massage for mechanical neck disorders', *Cochrane Database Systematic Reviews* 2006, Issue 3. Art. No.: CD004871. DOI:10.1002/14651858.CD004871.pub3.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Moore, A, Jackson, A, Jordon, J, Hammersley, S, Hill, J, Mercer, C, Smith, C, Thompson, J, Woby, S & Hudson, A 2005, *Clinical guidelines for the physiotherapy management of Whiplash Associated Disorder*, The Chartered Society of Physiotherapy, London.

Motor Accidents Authority 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, MAA, Sydney, Australia.

National Institute of Health 2006, *Massage Therapy as CAM*, National Centre for Complementary and Alternative Medicine, viewed 23 October, 2007, <<http://nccam.nih.gov/health/massage/D327.pdf>>

Sherman, KJ, Cherkin, DC, Hawkes, RJ, Miglioretti, DL & Deyo RA 2009, 'Randomized trial of therapeutic massage for chronic neck pain', *Clinical Journal of Pain*, vol. 25, no. 3, pp. 233–238, doi:10.1097/AJP.0b013e31818b7912.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Rolfing

Our rating	?
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What is it?

Rolfing® Structural Integration is named after Dr Ida P Rolf who began using this technique more than 50 years ago to create a holistic system of soft tissue manipulation and movement education that organized the whole body in gravity. It is said to incorporate three steps: palpation, discrimination and integration. The tissues are palpated, or touched, to feel for imbalances in tissue texture, quality and temperature. Fascial (connective tissue) layers that adhere to muscles are discriminated, or separated. Finally, integration involves relating the body segments in an improved relationship, bringing physical balance in the gravitational field. Rolfing also involves education to increase awareness and understanding of the body. It is often used by people who have a history of injury or trauma and notice that the effects of their often minor injuries are beginning to interfere with their everyday lives.

How does it work?

There is no clear evidence on how exactly Rolfing works. There are, however, several theories. Firstly there is the thixotropic or gel-sol-gel theory. Basically, this theory states that touch/pressure is thought to generate heat and that this heat softens or liquefies connective tissue and turns it from a gelatinous to a liquid substance. Once the tissue is softened, it may become more malleable and can be more easily reorganized and manipulated. While in this plastic state it may form a new relationship to the surrounding muscular and bony structures. Pressure of the type applied by Rolfers may also activate sensory receptors (neurological theory). These receptors are thought to send signals to the brain which in turn allows the affected tissue to change its tensile strength and make it easier to manipulate. Other Rolfers have argued for a hybrid theory which incorporates elements of both the neurological and thixotropic models. Another way of answering this is to state that Rolfing is thought to balance the body in all directions: front to back; side to side; and inside to outside. It purports to integrate all layers and types of connective tissue.

Is it effective?

There is no evidence on the use of Rolfing in the management of whiplash.

Are there any disadvantages?

As a general guide the intensity experienced is transitory, moving quickly from brief intensity to a decrease in sensation, thus Rolfing may cause temporary discomfort but should not be a painful experience. The therapist should continuously ask you about the intensity and pace of the treatment. Given the nature of the treatment, it is likely that at least 10 treatments will be necessary to achieve any outcomes, therefore treatment can be quite costly.

Where do you get it?

The Australian Rolfing Association has a website of certified practitioners contact details, otherwise consult the yellow pages for a therapist in your area.

Recommendations

The use of Rolfing cannot be recommended following whiplash due to lack of high quality rigorous research evidence. More research is required.

Key references

Australian Rolfing Association 2007, *The Australian Rolfing Association*, viewed 30 October 2007, <<http://www.rolfing.org.au/home/>>.

Shiatsu

Our rating	?
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What is it?

The word Shiatsu means 'finger pressure'. Shiatsu therapy is a traditional Japanese manual therapy used for better health and well-being. It is based on the theory of acupuncture and incorporates principles of anatomy, physiology and pathology. Shiatsu evolved out of 3,500 years of oriental medical wisdom and is founded upon the same principles as acupuncture, although no needles are used. Shiatsu therapy involves applying pressure with fingers, palms, elbows and feet along the pressure points. It is used for reducing stress, and alleviating symptoms such as neck pain. Some therapists will use the traditional diagnostic methods of tongue, pulse and hara. Each Shiatsu is designed specifically for an individual's needs. The treatment usually takes place on a soft futon on the floor but may be given in a sitting position or on a massage table. The aim of Shiatsu is to promote the health and well being of the mind, body and spirit. Progress and changes are recorded at each subsequent visit and recommendations such as exercise and dietary advice may be made.

How does it work?

It is thought that Shiatsu uses the pressure of the fingers, thumbs, palms of the hand, elbows or feet to activate and support the body's natural energy flow, clearing blocked pathways and enhancing circulation. By stimulating circulation it may alleviate pain and discomfort. The traditional theory of acupuncture proposes that energy, known as "Chi" (or "Ki") moves through the body along well defined passageways called meridians. Balance of these energy flows is considered to be essential for health and well-being and a Shiatsu treatment is typically designed with the balancing of these energy flows in mind. Shiatsu is thought to support the body back to its natural balance.

Is it effective?

There is no evidence on the use of Shiatsu in the management of whiplash.

Are there any disadvantages?

There may be some discomfort associated with the treatment, however it should not be painful. Several treatments may be required to achieve a positive outcome, therefore the treatment may be quite costly.

Where do you get it?

The Shiatsu Therapy Association of Australia has a list of therapists in each state, alternatively consult the yellow pages to locate a therapist in your area.

Recommendations

The use of Shiatsu cannot be recommended following whiplash due to lack of research evidence. More research is required.

Key references

The Shiatsu Therapy Association of Australia 2007, *Shiatsu Therapy*, viewed 30 October 2007,
<<http://www.staa.org.au/index.html>>

Myofascial Release

Our rating

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What is it?

Myofascial release is a hands-on treatment technique that provides sustained pressures into areas where there are myofascial restrictions. This is considered to be part of a general manual massage technique whereby the fascia (structure located between skin and muscles and bones) are stretched. The goal of this treatment is to eliminate pain, increase range of movement and generally balance the human body.

How does it work?

Fascia is a seamless web of connective tissue that covers and connects muscles, organs, and skeletal tissue all over the body. Injuries, such as whiplash, may cause restriction to the fascia. As fascias are interconnected, restriction and tightness at one place, with time may spread to other places in the body. Myofascial release is purported to work on the premise of identifying areas of tightness and restriction, release the fascia and restoring health and vitality to the tissue.

There are two schools of thought when it comes to myofascial release treatment method. The direct method involves practitioners working on the areas of restriction using direct local pressure initially and stretching the fascia after. This method relies on stretching and loosening tight fascia. The indirect method involves gentle stretch, light pressure and holding the pressure and letting the restricted fascia unwind by itself. Indirect myofascial release relies on generating heat in the local tissues which result in increasing local blood flow. This promotes local healing thereby eliminating pain and restoring optimum body function.

Is it effective?

A recent randomised controlled trial was conducted on subjects with cervical whiplash to assess the effect of suboccipital muscle inhibition (SMI) technique on neck pain, elbow extension range of motion during the upper limb neurodynamic test of the median nerve (ULNT-1), and grip strength. SMI works similar to myofascial therapy by relaxing muscular excitability in the upper neck muscles, which may be linked to the continuation of the pain cycle in cervical whiplash. The authors found that this technique produced an immediate positive effect on elbow extension in the ULNT-1. However the differences in grip strength or cervical pain were not significant.

Are there any disadvantages?

As with any manual therapy treatments, there might be increased sensation which should gradually ease. The practitioner should initially undertake a thorough assessment and plan his/her treatment accordingly. During the treatment, the practitioner should continually check with you how you are feeling and the intensity of any symptoms. His/her treatment should then be modified accordingly. Given the nature of the treatment, it is likely that at least 10 treatments will be necessary to achieve any outcomes, therefore treatment can be quite costly.

Where do you get it?

The Natural Therapy Pages has an extensive list of practitioners with their contact details. Alternatively, consulting the Yellow Pages should provide details of a practitioner in your local area.

Recommendations

Due to the absence of rigorous high quality scientific evidence, myofascial release cannot be recommended for whiplash. More research is needed in this area.

Key references

Antolinos-Campilloa, PJ, Oliva-Pascual-Vacab, A, Rodríguez-Blancob, C, Heredia-Rizob, AM, Espí-López, GV & RicardaaMadrid F 2014, 'Short-term changes in median nerve neural tension after a suboccipital muscle inhibition technique in subjects with cervical whiplash: a randomised controlled trial', *Physiotherapy*, in press
<http://dx.doi.org/10.1016/j.physio.2013.09.005>

Freeman, MD, Nystrom, A & Centeno, C 2009, 'Chronic whiplash and central sensitization; an evaluation of the role of a myofascial trigger points in pain modulation', *Journal of Brachial Plexus and Peripheral Nerve Injury*, vol. 4, no. 2, doi:10.1186/1749-7221-4-2.

Natural Therapies Pages 2007, *Myofascial Release Therapy*, viewed 30 October, <http://www.naturaltherapypages.com.au/therapy/Myofascial_Release_Therapy>.

Life Style Interventions

Cervical Pillow

Our rating	?
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What is it?

A cervical pillow, also known as an orthopaedic pillow, is a pillow designed to correct the positioning of the body in bed or while lying down. They are designed to ensure the right placement and support of the neck to provide safe and healthy rest to the sleeper. They have been traditionally made of foam and fibre, but other types now exist, such as pillows made of memory foam, a heat sensitive material that can acquire the shape of the body lying upon it.

How does it work?

It is proposed that cervical pillows help maintain the neck in a neutral position, thus preventing any stress on the spine whilst you sleep. Thus they may help prevent neck symptoms, and help a person with whiplash in getting a good night's sleep. They may also help circulation and breathing and conditions such as sleep apnoea.

Is it effective?

A synthesis of evidence which focussed on neck pain, not specifically whiplash, found that water pillows were effective in reducing the intensity of headaches originating from the neck. It must be noted that this synthesis was not peer reviewed, as per routine process, and hence its findings should be considered with some caution. There is no evidence on the use of cervical pillows in the management of whiplash.

Are there any disadvantages?

It may take you a few nights to get used to the cervical pillow but it should not be uncomfortable, or prevent you sleeping. If the pillow is not comfortable within a week it should no longer be used.

Where do you get it?

There are many different brands and types of pillows on the market. They can be found on the internet, and at department or bedding stores.

Recommendations

The use of cervical pillows cannot be recommended following whiplash based on the lack of research evidence. More research is required.

Key references

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Co'te, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152

Motor Accidents Authority, 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, 2nd ed. MAA, Sydney, Australia.

Cold Therapy

Our rating

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What is it?

Cold therapy involves the application of a cold pack, or ice to the body. An ice bath is also another form of cold therapy. Cold therapy is usually best applied for 10 minutes, several times a day, especially in the initial 48-72 hours after a whiplash injury.

How does it work?

Cold therapy is thought to work by reducing the blood flow to the area via constriction of the blood vessels in response to the cold sensation. This may help to reduce the amount of fluid being released from the blood into the surrounding tissues following an injury, thereby reducing the amount of tissue swelling. By reducing swelling, cold therapy may also assist in pain reduction. The sensation of cold within the tissues may also distract the brain from pain sensations that might be coming from the same region (the so-called pain gate theory), thereby also providing pain relief.

Is it effective?

There is no clear evidence on the use of cold therapy in the management of whiplash.

Are there any disadvantages?

Some people may find cold therapy uncomfortable and are not able to apply it for the recommended time. Care needs to be taken to ensure that the ice pack is wrapped in a cloth to avoid direct contact with the skin.

Where do you get it?

Ice packs range from several blocks of ice, wrapped in a cloth to a frozen bag of peas, to commercially produced gel packs. Ice/gel packs are generally available at pharmacies/chemists and medical suppliers.

Recommendations

Although there is no direct evidence relating to the effectiveness of cold therapy, guidelines suggest that it may be used in conjunction with other manual and physical forms of therapy (i.e. multimodal care) in the first three weeks after whiplash injury.

Key references

Motor Accidents Authority, 2001, *Guidelines for the management of whiplash-associated disorders*, MAA, Sydney, Australia.

Motor Accidents Authority, 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, 2nd ed. MAA, Sydney, Australia.

Spitzer, W 1995, Chapter 8.2.2: *QTF Recommendations for Clinical Practice*, viewed 30 October, 2007, <<http://www.health-sciences.ubc.ca/whiplash.bc/appendix2/appendix2.html>>.

Heat Therapy

Our rating

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What is it?

Heat therapy involves the application of a heat causing agent to the body. Heat may be applied to the tissues directly by a heat pack or cream, or indirectly by a ray lamp, for example. Tissue heating may also be caused by other forms of electrotherapy, but these are discussed separately.

How does it work?

The application of heat to a tissue such as muscle is thought to increase the blood flow to that area, possibly facilitating the healing process by delivering the required cells and nutrients. Heat may also increase the elasticity/extensibility of connective tissues, thus reducing muscle tightness and/or spasm. The sensation of heat within the tissues may distract the brain from pain sensations that might be coming from the same region (the so-called pain gate theory), thereby providing pain relief.

Is it effective?

There is no clear evidence on the use of heat therapy in the management of whiplash.

Are there any disadvantages?

Care should always be used when applying heat to the body, so that the tissues do not get overheated as this may cause a burn or tissue damage. You should never lie directly on a heat pack, rather the heat pack should be placed on your body. Heat therapy should not be used in the first 48-72 hours after an injury as it can increase the amount of swelling in the area and exacerbate symptoms. People with altered sensation should not use heat therapy, and there are certain other conditions where heat therapy is not advisable. Seek advice from your doctor or treating therapist if unsure.

Where do you get it?

Heat therapy can come in various forms, and there are many different brands. Heat packs, creams and lamps may be available via numerous retail outlets such as department stores, medical suppliers, pharmacies/chemists, or over the internet.

Recommendations

Although there is no direct evidence relating to the effectiveness of heat therapy, guidelines suggest that it may be used in conjunction with other manual and physical forms of therapy (i.e. multimodal care) in the first three weeks after whiplash injury (but avoided for the first 48-72 hours).

Key references

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Coˆte, P, Hogg-Johnson, S, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions; results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no. 1, pp. 123-152.

Motor Accidents Authority, 2001, *Guidelines for the management of whiplash-associated disorders*. MAA, Sydney, Australia.

Motor Accidents Authority, 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, 2nd ed. MAA, Sydney, Australia.

Spitzer, W 1995, Chapter 8.2.2: *QTF Recommendations for Clinical Practice*, viewed 30 October, 2007, <<http://www.health-sciences.ubc.ca/whiplash.bc/appendix2/appendix2.html>>.

Verhagen, A, Scholten-Peeters, G, Van Wijngaarden, S, De Bie, R & Bierma-Zeinstra, S 2007, 'Conservative treatments for whiplash', *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD003338. DOI: 10.1002/14651858.CD003338.pub3.

Magnetic Necklace

Our rating	?
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What is it?

A magnetic necklace is a necklace that contains magnets, or magnetically charged beads. They are worn around the neck, either continuously, or for periods throughout the day and/or the night.

How does it work?

Electricity is always connected with both electrical and magnetic forces. Even though their forces are small, the main therapeutic purpose of magnets is purported to enhance bone and/or tissue healing. Human tissue contains charged molecules that may respond to the charge of magnets. When held against the skin, magnets may relax capillary walls, thereby boosting blood flow to the painful area. They may also help prevent the muscle spasms that underlie many forms of pain apparently by interfering with muscle contractions. Also, they may interfere with the electrochemical reactions that take place within nerve cells, impeding their ability to transmit pain messages to the brain.

Is it effective?

There is limited evidence from one study on people with chronic neck and shoulder pain that magnetic necklaces are no more effective than placebo (dummy) necklaces in reducing pain. There have been no studies of the effect of magnetic necklaces following whiplash.

Are there any disadvantages?

There has been no research on the disadvantages associated with magnetic necklaces. There is a cost associated with purchasing the necklace.

Where do you get it?

Magnetic necklaces are available via many sources including the internet, medical suppliers and pharmacies/chemists.

Recommendations

The use of magnetic necklaces for whiplash cannot be recommended based on the current research evidence. More research is required.

Key references

Kroeling, P, Gross, A, Goldsmith, CH, Cervical Overview Group, 'Electrotherapy for neck disorders', *Cochrane Database of Systematic Reviews* 2005, Issue 2. Art. No.: CD004251. DOI: 10.1002/14651858.CD004251.pub3.

Meditation

Our rating

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What is it?

The term meditation refers to a variety of techniques or practices intended to focus or control attention. Generally, a person who is meditating uses certain techniques, such as focusing attention on the breath, or a specific posture, with an open attitude toward distracting thoughts and emotions.

How does it work?

Practicing meditation has been shown to induce some changes in the body, such as changes in the body's 'fight or flight' response. The system responsible for this response is the autonomic nervous system (sometimes called the involuntary nervous system). It regulates many organs and muscles, including functions such as the heartbeat, sweating, breathing, and digestion, and does so automatically. The autonomic nervous system is divided into two major parts: the sympathetic nervous system, and the parasympathetic nervous system. Meditation may reduce the activity of the sympathetic nervous system and increase activity in the parasympathetic nervous system.

Is it effective?

There are no studies assessing the effectiveness of meditation on reducing symptoms from whiplash. Meditation has been shown to help with reducing low back pain.

Are there any disadvantages?

Meditation is generally safe. If you are interested in learning meditation, ask about the training and experience of the instructor.

Where do you get it?

Community groups and instructors may run meditation classes. There are also therapists who teach meditation, and these are listed in the appropriate section of the Yellow Pages.

Recommendations

There is presently no evidence that meditation can help with reducing whiplash symptoms, therefore its use cannot be recommended. More research is required.

Key references

Morone, NE, Greco, CM & Weiner, DK 2007, 'Mindfulness meditation for the treatment of chronic low back pain in older adults: A randomized controlled pilot study', *Pain*, in press.

Relaxation Techniques

Our rating	?
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What is it?

Relaxation techniques are tools for coping with stress and promoting long-term health by slowing down the body and quieting the mind. Such techniques generally entail: refocusing attention (by, for example, noticing areas of tension); increasing body awareness; and exercises (such as meditation) to connect the body and mind together. Used daily, these practices may over time lead to a healthier perspective on stressful circumstances and coping with pain.

How does it work?

A 'relaxation response' refers to changes that occur in the body when it is in a deep state of relaxation. These changes may include decreased blood pressure, heart rate, muscle tension, and rate of breathing, as well as feelings of being calm and in control. Learning the relaxation response may help to counter the ill effects of the fight or flight response and, over time, allow the development of a greater state of alertness. The relaxation response may be developed through a number of techniques, including progressive muscle relaxation.

Is it effective?

There are no studies assessing the effectiveness of relaxation therapies on reducing whiplash symptoms. Studies show that relaxation techniques can help to reduce low back pain. Guidelines published in the United Kingdom suggest that relaxation may be considered for reducing pain in the first two weeks after injury. A study used relaxation as a part of a physical treatment in the form of *flotation*. Six patients with chronic whiplash (symptoms persisting more than 3 months following whiplash injury) were involved in this study which involved floating in warm water and relaxing the whole body. Subjects involved in this study reported improvement to their symptoms in the short term, however more evidence is required regarding the effectiveness of relaxation techniques as an isolated treatment in the management of whiplash.

Are there any disadvantages?

There are no reported disadvantages associated with relaxation.

Where do you get it?

Community groups often run relaxation classes. There are also therapists who teach relaxation. These are listed in the Relaxation Therapy section of the Yellow Pages.

Recommendations

The use of relaxation for whiplash cannot be recommended due to the lack of scientific evidence. More research is required.

Key references

American College of Physicians 2007, 'Non-pharmacologic Therapies for Acute and Chronic Low Back Pain: A Review of the Evidence for an American Pain Society', *Annals of Internal Medicine*, vol. 147, pp. 492-504.

Cotter, AC, Memmo, P & Kim, N 2002, 'Complementary and Alternative Medicine in the Treatment of Whiplash Disorders', in *Whiplash*, eds GA Malanga & S Nadler, Hanley and Belfus Inc., Philadelphia, pp. 373-391.

Edebol, H, Bood, S & Norlander, T 2008, 'Chronic whiplash-associated disorders and their treatment using flotation-rest (restricted environmental stimulation technique)', *Qualitative Health Research*, vol 18, no. 4, pp. 480-488.

Leaver, AM, Refshauge, KM, Maher, CG & McAuley, JH 2010, 'Conservative interventions provide short-term relief for non-specific neck pain: a systematic review', *Journal of Physiotherapy*, vol. 56, pp. 73-85.

Moore, A, Jackson, A, Jordon, J, Hammersley, S, Hill, J, Mercer, C, Smith, C, Thompson, J, Woby, S & Hudson, A 2005, *Clinical guidelines for the physiotherapy management of Whiplash Associated Disorder*, The Chartered Society of Physiotherapy, London.

Yoga

Our rating	?
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What is it?

Yoga originated in India over 2000 years ago. Yoga usually involves holding the body in a sequence of postures or asanas for a certain period of time, breathing exercises and meditation. The yoga postures are done sequentially with the aim of increasing flexibility and strength. The breathing and meditation exercises are intended to calm and focus the mind and to develop greater awareness.

How does it work?

It is unclear exactly how yoga produces its healthful effects. Research suggests it may work like other mind-body therapies to reduce stress, and others believe that yoga promotes the release of endorphins (natural painkillers and mood elevators) from the brain. Studies show yoga may lower heart rate and blood pressure, increase muscle relaxation, and increase breathing capacity. It may also promote muscle lengthening and strengthening and good posture.

Is it effective?

There are no studies assessing the effectiveness of yoga for whiplash. In a review of yoga research for low back pain and carpal tunnel syndrome, yoga was found to be safe and to significantly reduce pain in older adults.

Are there any disadvantages?

Some people may experience stiffness following yoga sessions, as their bodies adapt to different postures. Yoga may also lead to an injury if not practiced properly. It is important to practice yoga under the guidance of a trained professional, and seek advice from your treating practitioner prior to commencement.

Where do you get it?

Yoga teachers/classes are listed in the Yellow Pages.

Recommendations

The use of yoga following whiplash cannot be recommended due to the lack of scientific evidence. More research is required.

Key references

Morone, NE & Greco, CM 2007, 'Mind-Body Interventions for Chronic Pain in Older Adults: A Structured Review', *Pain Medicine*, vol. 8, no. 4, pp. 359–375.

Riley, D 2004, 'Hatha yoga and the treatment of illness', *Alternative Therapies in Health & Medicine*, vol. 10, no. 2, pp. 20–21.

Herbs/Supplements

Our rating	?
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What is it?

Herbal medicine has been used for centuries across a wide variety of cultures in the treatment of various illnesses and ailments. Herbal medicine involves the ingestion or application of herbs or plant extracts that have been specifically prepared for medicinal use. Supplements are vitamins or minerals which have been prepared in tablet or liquid form designed to supplement deficiencies in dietary intake.

How does it work?

Herbs or supplements are thought to improve the overall health of the body to improve its healing capacity following whiplash injury. Several herbs are thought to have anti-inflammatory properties. These herbs are potentially useful in the early stages following injury when there is more likely to be an inflammatory component to the pain. They may be of use to people who cannot tolerate anti-inflammatory medication for some reason. These herbs include devil's claw, celery seed, meadowsweet, white willow, wild yam, guaiacum, angelica, and silver birch. Other herbs like chamomile are thought to improve the relaxation of muscles.

Is it effective?

There are currently no studies supporting the use of herbs or supplements for whiplash.

Are there any disadvantages?

There do not appear to be any disadvantages of using herbs or supplements in the treatment of whiplash. Allergies or intolerances to herbs or supplements are possible.

Where do you get it?

Herbs are often prescribed by Naturopaths or Chinese medicine practitioners, who can be found in the Yellow Pages.

Recommendations

The use of herbs or supplements following whiplash injury cannot be recommended due to a lack of scientific evidence. More research is required.

Key references

Natural herbs and herbal medicine 2008, viewed 8th December 2008, < <http://www.naturalherbalism.com> >.

MedEx

Our rating	?
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What is it?

MedEx is a brand name for a type of exercise machine designed to strengthen the muscles of the neck, in particular the extensor muscles (muscles that lift the head up).

How does it work?

After any injury it is normal for wasting of muscles to occur (decrease in bulk or cross sectional area) which can lead to weakness. It is thought that this weakness may lead to poor control of movements of the small joints in the neck which may cause pain or hinder recovery from whiplash injury. It is proposed that strengthening the muscles of the neck may address this weakness and help expedite recovery from whiplash injury.

Is it effective?

There are no studies assessing the effectiveness of MedEx for whiplash. A systematic review of high quality scientific studies concluded that there was strong evidence to support the use of postural exercises but found no evidence to support the use of an overall neck strengthening program.

Are there any disadvantages?

Strengthening the neck muscles can lead to soreness in the short term as the neck muscles adapt to the exercise. These exercise programs initially require supervision of a health professional and may then require the purchase or hire of equipment which can be expensive.

Where do you get it?

Therapists who specialise in the use of these machines can be found in the Yellow pages.

Recommendations

The use of MedEx for whiplash cannot be recommended due to a lack of scientific evidence. More research is required.

Key references

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Schofferman, J, Bogduk, N & Slosar, P 2007, 'Chronic whiplash and whiplash associated disorders: an evidence based approach', *Journal of the American Academy of Orthopaedic Surgeons*, vol. 15, no. 10, pp. 596-606.

MedEx systems 2008, viewed 8th December 2008, <<http://www.medxonline.com>>.

References

Aigner, N, Fialka, C, Radda, C & Vecsei, V 2006, 'Adjuvant laser acupuncture in the treatment of whiplash injuries: a prospective, randomized placebo-controlled trial', *Wien Klin Wochenschr*, vol. 118, no. 3-4, pp. 95-99.

Alpass, L 2004, 'Chiropractic management of "intractable" chronic whiplash syndrome', *Clinical Chiropractic*, vol. 7, pp. 16-23.

American College of Physicians 2007, 'Non-pharmacologic Therapies for Acute and Chronic Low Back Pain: A Review of the Evidence for an American Pain Society', *Annals of Internal Medicine*, vol. 147, pp. 492-504.

Antolinos-Campilloa, PJ, Oliva-Pascual-Vacab, A, Rodríguez-Blancob, C, Heredia-Rizob, AM, Espí-López, GV & RicardaaMadrid F 2014, 'Short-term changes in median nerve neural tension after a suboccipital muscle inhibition technique in subjects with cervical whiplash: a randomised controlled trial', *Physiotherapy*, in press.

Ask, T, Strand, LI & Skouen, JS 2009, 'The effect of two exercise regimes; motor control versus endurance/strength training for patients with whiplash associated disorders: a randomized controlled pilot study', *Clinical Rehabilitation*, vol. 23, pp. 812-823.

AUSTAT 2006, *The Australian Society of Teachers of the Alexander Technique*, viewed 30 October 2007, <<http://www.austat.org.au>>.

Australian Physiotherapy Association 2006, *The Australian Physiotherapy Association*, viewed 30 October 2007, <<http://www.physiotherapy.asn.au>>.

Australian Rolfing Association 2007, *The Australian Rolfing Association*, viewed 30 October 2007, <<http://www.rolfing.org.au/home/>>.

Bonk, AD, Ferrari, R, Giebel, GD, Edelmann, M & Huser, R 2000, 'Prospective, randomized, controlled study of activity versus collar, and the natural history for whiplash injury, in Germany', *Journal of Musculoskeletal Pain*, vol. 8, no. 1-2, pp. 123-132.

Borchgrevink, GE, Kaasa, A, McDonagh, D, Stiles, T, Haraldseth, O & Lereim, I 1998, 'Acute Treatment of Whiplash Neck Sprain Injuries: A Randomized Trial of Treatment During the First 14 Days After a Car Accident', *Spine*, vol. 1, no. 23, pp. 25-31.

Braker, C, Yariv, S, Adler, R, Badarney, S & Eisenburg, E 2008, 'The analgesic effect of botulinum-toxin A on post whiplash neck pain', *The Clinical Journal of Pain*, vol. 24, pp. 5-10.

Brisson, RJ, Hartling, L, Dostaler, S, Leger, A, Rowe, BH, Stiell, I & Pickett, W 2005, 'A randomized controlled trial of an educational intervention to prevent chronic pain of associated disorders following rear-end vehicle collisions', *Spine*, vol. 30, no. 16, pp. 1799-1807.

Cameron, ID, Wang, E & Sindhusake, D 2011, 'A randomized trial comparing acupuncture and simulated acupuncture for subacute and chronic whiplash', *Spine*, vol. 36, no. 26, pp. E1659–E1665.

Carragee, E, Hurwitz, E, Cheng, I, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Hogg-Johnson, S, Van der Velde, G, Cassidy, D & Haldeman, S 2008, 'Treatment of neck pain: injections and surgical interventions: results of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, pp.153-169.

Carroll, A, Barnes, M & Comiskey, C 2008, 'A prospective randomised controlled study of the role of botulinum toxin in whiplash-associated disorder', *Clinical Rehabilitation*, vol. 22, no. 6, pp. 513-519.

Chow, RT, Johnson, MI, Lopes-Martins, RA & Bjordal, RM 2009, 'Efficacy of low-level laser therapy in the management of neck pain: a systematic review and meta-analysis of randomised placebo or active-treatment controlled trials', *Lancet*, vol. 374, pp. 1897–1908.

Conforti, M & Fachinetti GP 2013, 'High power laser therapy treatment compared to simple segmental physical rehabilitation in whiplash injuries (1° and 2° grade of the Quebec Task Force classification) involving muscles and ligaments', *Muscles, Ligaments and Tendons Journal*, vol. 3, no. 2, pp. 106-111.

Cotter, AC, Memmo, P & Kim, N 2002, 'Complementary and Alternative Medicine in the Treatment of Whiplash Disorders', in *Whiplash*, eds GA Malanga & S Nadler, Hanley and Belfus Inc., Philadelphia, pp. 373-391.

Coudeyrea, E, Demaille-Wlodyka, S, Poizata, S, Burtonc, K, Hamonetd, M, Reveld, M, & Poiraudaud, S 2007, 'Could a simple educational intervention modify beliefs about whiplash; a preliminary study among professionals working in a rehabilitation ward', *Annales de réadaptation et de médecine physique*, vol. 50, no. 7, pp. 552–557.

Coulter, I 1996, 'Manipulation and mobilization of the cervical spine: the results of a literature survey and consensus panel', *Journal of Musculoskeletal Pain*, vol. 4, no. 4, pp. 113-123.

Crawford, JR, Khan, RJK & Varley, GW 2004, 'Early management and outcome following soft tissue injuries of the neck-a randomised controlled trial', *Injury, International Journal of the Care of the Injured*, vol. 35, pp. 891-895.

DeCarlo, A 2006, 'Rehabilitation Approach to Treatment of Whiplash-Associated Disorder', *Journal of American Chiropractic Association*, vol. August, pp. 6-12.

Dehner, C, Elbel, M, Strobel, P, Scheich, M, Schneider, F, Krischak, G & Kramer, M 2009, 'Grade II whiplash injuries to the neck: what is the benefit for patients treated by different physical therapy modalities?', *Patient Safety in Surgery*, vol. 3, no. 2, doi: 10.1186/1754-9493-3-2.

Dehner, C, Hartwig, E, Strobel, P, Scheich, M, Schneider, F, Elbel, M, Kinzl, L & Kramer, M 2006, 'Comparison of the relative benefits of 2 versus 10 days of soft collar cervical immobilization after acute whiplash injury', *Archives of Physical Medicine and Rehabilitation*, vol. 87, no. 11, pp. 1423-1427.

Dehner, C, Heym, B, Maier, D, Sander, S, Arand, M, Elbel, M, Hartwig, E & Kramer, M 2008, 'Postural control deficit in acute QTF grade II whiplash injuries', *Gait and Posture*, vol. 28, no. 1, pp. 113-119.

Dehner C, Kraus, M, Schöll, H, Schneider, F, Richter, P & Kramer M 2012, 'Therapy recommendation "act as usual" in patients with whiplash injuries QTFI^o', *Global Journal of Health Science*, vol. 4, no. 6, pp. 36-42.

Dunne, RL, Kenardy, J & Sterling, M 2012, 'A randomized controlled trial of cognitive-behavioral therapy for the treatment of PTSD in the context of chronic whiplash', *Clinical Journal of Pain*, vol. 28, pp. 755-765.

Edebol, H, Bood, S & Norlander, T 2008, 'Chronic whiplash-associated disorders and their treatment using flotation-rest (restricted environmental stimulation technique)', *Qualitative Health Research*, vol 18, no. 4, pp. 480-488.

Ehrenborg, C & Archenholtz, B 2010, 'Is surface EMG biofeedback an effective training method for persons with neck and shoulder complaints after whiplash-associated disorders concerning activities of daily living and pain—a randomized controlled trial', *Clinical Rehabilitation*, vol. 24, pp. 715-726.

Ernst, E & Canter, PH 2006, 'A systematic review of systematic reviews of spinal manipulation', *Journal of the Royal Society of Medicine*, vol. 99, pp. 192-196.

Fattori, B, Borsari, C, Vannucci, G, Casani, A, Cristofani, R, Bonucelli, L & Ghilardi, PL 1996, 'Acupuncture Treatment For Balance Disorders Followign Whiplash Injury', *Acupuncture and Electro-Therapeutics Research International Journal*, vol. 21, pp. 207-217.

Fattori, B, Ursino, F, Cingolani, C, Bruschini, L, Dallan, I & Nacci, A 2004, 'Acupuncture treatment of whiplash injury', *International Tinnitus Journal*, vol. 10, pp. 156-60.

Fernandez-de-las-Penas, C, Fernandez-Carnero, J, Fernandez, AP, Lomas-Vega, R & Miangolarra-Page JC 2004, 'Dorsal manipulation in whiplash injury treatment: a Randomized Controlled Trial', *Journal of Whiplash & Related Disorders*, vol. 3, no. 2, pp. 55-72.

Fernandez-de-las-Penas, C, Fernandez-Carnero, J, Palomeque Del Cerro, L & Miangolarra-Page, JC 2004, 'Manipulative treatment vs conventional physiotherapy treatment in whiplash injury: A Randomized Controlled Trial', *Journal of Whiplash & Related Disorders*, vol. 3, no. 2, pp.73-90.

- Ferrantelli, JR, Harrison, DE, Harrison, DD & Stewart, D 2005, 'Conservative treatment of a patient with previously unresponsive whiplash associated disorders using clinical biomechanics of posture rehabilitation methods', *Journal of Manipulative and Physiological Therapeutics*, vol. 28, no. 3, pp. e1-e8.
- Ferrari, R, Rower, BH, Majumdar, SR, Cassidy, JD, Blitz, S, Wright, SC & Russell, AS 2005, 'Simple education intervention to improve the recovery from acute whiplash: results of a randomised, controlled trial', *Academic Emergency Medicine*, vol. 12, pp. 699-706.
- Freeman, MD, Nystrom, A & Centeno, C 2009, 'Chronic whiplash and central sensitization; an evaluation of the role of a myofascial trigger points in pain modulation', *Journal of Brachial Plexus and Peripheral Nerve Injury*, vol. 4, no. 2, doi:10.1186/1749-7221-4-2.
- Freund, B & Schwartz, M 2000, 'Treatment of Whiplash Associated with Neck Pain with Botulinum Toxin-A: A Pilot Study', *The Journal of Rheumatology*, vol. 27, no. 2, pp. 481-484.
- Freund, B & Schwartz, M 2002, 'Use of Botulinum Toxin in Chronic Whiplash-Associated Disorder', *The Clinical Journal of Pain*, vol. 18, pp. S163-S168.
- Freund, B & Schwartz, M 2004, 'Whiplash Associated Disorders: A Review of Recent Advances in Treatment', *Journal of Whiplash & Related Disorders*, vol. 3, no. 1, pp. 49-58.
- Freund, B & Schwartz, M 2006, 'The Role of Botulinum Toxin in Whiplash Injuries', *Current Pain and Headache Reports*, vol.10, no.5, pp. 355-359.
- Gosnold, JM 2003, 'The impact of rehabilitation on chronic whiplash', *Clinical Chiropractic*, vol. 6, pp. 129-136.
- Graham, N, Gross, AR, Goldsmith, C & The Cervical Overview Group 2006, 'Mechanical Traction for Mechanical Neck Disorders: A Systematic Review', *Journal of Rehabilitation Medicine*, vol.38, no.3, pp. 145-152.
- Gross, AR, Hoving, JL, Haines, TA, Goldsmith, CH, Kay, T, Aker, P, Bronfort, G, Cervical overview group, 'Manipulation and mobilization for mechanical neck disorders', *Cochrane Database of Systematic Reviews* 2004, Issue 1. Art. No.: CD004249. DOI:10.1002/14651858.CD004249.pub2.
- Gunn, CC, Byrne, D, Lam, A, Leung, MK, McBrinn, J, Nixon, A & Wong, K 2001, 'Treating whiplash associated disorders', *Journal of Musculoskeletal Pain*, vol. 9, pp. 68-89.
- Guzman, J, Haldeman, S, Carroll, LJ, Carragee, EJ, Hurwitz, EL, Peloso, P, Nordin, M, Cassidy, JD, Holm, LW, Côté, P, Velde, G & Hogg-Johnson, S 2009, 'Task force on neck pain and its associated disorders', *Journal of Manipulative and Physiological Therapeutics*, vol. 32, pp. 227-243.

Guzman, J, Haldeman, S, Carroll, L, Carragee, E, Hurwitz, E, Peloso, P, Nordin, M, Cassidy, D, Holm, L, Coˆte, P, Van der Velde, G & Hogg-Johnson, S 2008, 'Clinical practice implications of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders; from concepts and findings to recommendations', *European Spine Journal*, vol. 17, no. 1, pp. 199-213.

Haines T, Gross A, Burnie SJ, Goldsmith CH & Perry L 2009, 'Patient education for neck pain with or without radiculopathy', *Cochrane Database of Systematic Reviews*, issue: 1, art. No.: CD005106, doi: 10.1002/14651858.CD005106.pub3.

Hansson, E 2007, 'Vestibular rehabilitation; for whom and how; a systematic review' *Advances in Physiotherapy*, vol.9, no 3, pp. 106-116.

Hansson, EE, Mansson NO, Ringsberg, KAM & Hakansson, A 2006, 'Dizziness Among Patients With Whiplash-Associated Disorder: A Randomised Controlled Trial', *Journal of Rehabilitation Medicine*, vol. 38, no.6, pp. 387-390.

Haraldsson, BG, Gross, AR, Myers, CD, Ezzo, JM, Morien, A, Goldsmith, C, Peloso, PM, Bronfort, G, Cervical Overview Group, 'Massage for mechanical neck disorders', *Cochrane Database Systematic Reviews* 2006, Issue 3. Art. No.: CD004871. DOI:10.1002/14651858.CD004871.pub3.

Hendriks, O & Horgan, A 1996, 'Ultra-Reiz Current as an Adjunct to Standard Physiotherapy Treatment of the Acute Whiplash Patient', *Physiotherapy Ireland*, vol. 17, no. 1, pp. 3-7.

Hooper, RA, Sherman, ST & Frizzell, JB 2006, 'Case report of whiplash related chronic neck pain treated with intraarticular prolotherapy', *Journal of Whiplash & Related Disorders*, vol. 4, no. 2, pp. 23-27.

Humphreys, BK & Irgens, PM 2002, 'The effect of a rehabilitation exercise program on head-repositioning accuracy and reported levels of pain in chronic neck pain subjects', *Journal of Whiplash Related Disorders*, vol. 1, pp. 99-112.

Hurwitz, E, Carragee, E, Van der Velde, G, Carroll, L, Nordin, M, Guzman, J, Peloso, P, Holm, L, Coˆte, P, Hogg-Johnson, S, Cassidy, D, & Haldeman, S 2008, 'Treatment of neck pain: noninvasive interventions, results of the bone and joint decade 2000–2010 task force on neck pain and its associated disorders', *European Spine Journal*, vol. 17, no 1, pp. 123-152.

Juan, FJ 2003, 'Treatment of neck pain after whiplash injuries with Botulinum toxin-A injections', *Journal of Musculoskeletal Research*, vol.7, no. 3&4, pp.221-226.

Jull G, Kenardy, J, Hendrikz J, Cohen M & Sterling, M 2013, 'Management of acute whiplash: A randomized controlled trial of multidisciplinary stratified treatments', *Pain*, vol. 154, pp. 1798–1806.

Jull, G, Sterling, M, Kenardy, J & Beller, E 2007, 'Does the presence of sensory hypersensitivity influence outcomes of physical rehabilitation for chronic whiplash? A preliminary randomized controlled trial', *Pain*, vol. 129, no. 1-2, pp. 28-34.

Kay, TM, Gross, A, Goldsmith, C, Santaguida, PL, Hoving, J, Bronfort, G, Cervical Overview Group, 'Exercises for mechanical neck disorders', *Cochrane Database of Systematic Reviews* 2005, Issue 3. Art. No.: CD004250. DOI: 10.1002/14651858.CD004250.pub3.

Kongstead, A, Qerama, E, Kasch, H, Bendix, T, Winther, F, Korsholm, L & Jensen, TS 2007, 'Neck collar, "act-as-usual" or active mobilization for whiplash injury', *Spine*, vol. 32, no. 6, pp. 618-626.

Kongsted, A, Qerama, E, Kasch, H, Winther Bach, F, Korsholm, L, Staehelin Jensen, T & Bendix, T 2008, 'Education of patients after whiplash injury; is oral advice any better than a pamphlet?', *Spine*, vol. 33, no. 22, pp. 843-848.

Kroeling, P, Gross, A, Goldsmith, CH, Cervical Overview Group, 'Electrotherapy for neck disorders', *Cochrane Database of Systematic Reviews* 2005, Issue 2. Art. No.: CD004251. DOI: 10.1002/14651858.CD004251.pub3.

Lamb, SE, Gates, S, Williams, MA, Williamson, EM, Mt-Isa, S, Withers, EJ, Castelnovo, E, Smith, J, Ashby, D, Cooke, MW, Petrou, S & Underwood, MR 2013, 'Emergency department treatments and physiotherapy for acute whiplash: a pragmatic, two-step, randomised controlled trial', *Lancet*, vol. 381, pp. 546-56.

Langevin, P, Lowcock, J, Weber, J, Nolan, M, Gross, A, R, Peloso, P, M, Roberts, J, Graham, N, Goldsmith, C, Burnie, S, J & Haines, T 2010, 'Botulinum toxin intramuscular injections for neck pain: a systematic review and meta-analysis', *The Journal of Rheumatology*, published online, Dec 2010.

Leach, J 2007, 'Editorial comment on 'developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)' by C. Mercer, A. Jackson and A. Moore', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 55.

Leaver, AM, Refshauge, KM, Maher, CG & McAuley, JH 2010, 'Conservative interventions provide short-term relief for non-specific neck pain: a systematic review', *Journal of Physiotherapy*, vol. 56, pp. 73-85.

Lemming, D, Sorensen, J, Graven-Neilson, T, Lauber, W, Arendt-Nielsen, L & Gerdle, B 2007, 'Managing chronic whiplash associated pain with a combination of low-dose opioid (remifentanyl) and NMDA-antagonist (ketamine)', *European Journal of Pain*, vol. 11, no. 7, pp. 719-732.

Mark Dohrmann and Partners Pty Ltd 2007, *Ergonomics in Australia*, viewed 30 October 2007, <<http://www.ergonomics.com.au/>>.

McClune, T, Burton, AK & Waddell, G 2002, 'Whiplash associated disorders: a review of the literature to guide patient information and advice', *Emergency Medicine Journal*, vol. 19, no. 6, pp. 499-506.

MedEx systems 2008, viewed 8th December 2008, <<http://www.medxonline.com>>.

Mercer, C, Jackson, A & Moore, A 2007, 'Developing clinical guidelines for the physiotherapy management of whiplash associated disorder (WAD)', *International Journal of Osteopathic Medicine*, vol. 10, no. 2-3, pp. 50-54.

Meeus, M, Nijs, J, Hamers, V, Ickmans, K & Van Oosterwijck J 2012, 'The efficacy of patient education in whiplash associated disorders: a systematic review', *Pain Physician*, vol. 15, pp. 351-361.

Miller, J, Gross, A, D'Sylva, J, Burnie, SJ, Goldsmith, CH, Graham, N, Haines, T, Brønfort, G & Hoving, JL 2010, 'Manual therapy and exercise for neck pain: A systematic review', *Manual Therapy*, vol. 15, pp. 334-354.

Moore, A, Jackson, A, Jordon, J, Hammersley, S, Hill, J, Mercer, C, Smith, C, Thompson, J, Woby, S & Hudson, A 2005, *Clinical guidelines for the physiotherapy management of Whiplash Associated Disorder*, The Chartered Society of Physiotherapy, London.

Morone, NE & Greco, CM 2007, 'Mind-Body Interventions for Chronic Pain in Older Adults: A Structured Review', *Pain Medicine*, vol. 8, no. 4, pp. 359-375.

Morone, NE, Greco, CM & Weiner, DK 2007, 'Mindfulness meditation for the treatment of chronic low back pain in older adults: A randomized controlled pilot study', *Pain*, in press.

Motor Accidents Authority, 2001, *Guidelines for the management of whiplash-associated disorders*, MAA, Sydney, Australia.

Motor Accidents Authority 2007, *Your guide to whiplash recovery in the first 12 weeks after the accident*, MAA, Sydney, Australia.

National Institute of Health 2006, *Massage Therapy as CAM*, National Centre for Complementary and Alternative Medicine, viewed 23 October, 2007, <<http://nccam.nih.gov/health/massage/D327.pdf>>

Natural herbs and herbal medicine 2008, viewed 8th December 2008, <<http://www.naturalherbalism.com>>.

Natural Therapies Pages 2007, *Myofascial Release Therapy*, viewed 30 October, <http://www.naturaltherapypages.com.au/therapy/Myofascial_Release_Therapy>.

Oliveria, A, Gervirtz, R & Hubbard, D 2006, 'A Psycho-Educational Video used in the Emergency Department provides effective treatment for whiplash injuries', *Spine*, vol. 31, no. 15, pp. 1652-1657.

Oosterwijk Van, J, Nijs, J, Meeus, M, Van Loo, M & Paul, L 2012, 'Lack of endogenous pain inhibition during exercise in people with chronic whiplash associated disorders: an experimental study', *The Journal of Pain*, vol. 13, no. 3, pp. 242-254.

Padberg, M, de Bruijn, SFTM & Tavy, DLJ 2007, 'Neck pain in chronic whiplash syndrome treated with Botulinum toxin. A double blind, placebo-controlled clinical trial', *Journal of Neurology*, vol. 254, pp. 290-295.

Pato, U, Stefano, GD, Fravi, N, Arnold, M, Curatolo, M, Radanov, BP, Ballinari, P & Sturzenegger, M 2010, 'Comparison of randomized treatments for late whiplash', *Neurology*, vol. 74, pp. 1223-1230.

Pelso, P, Gross, A, Haines, T, Trinh, K, Goldsmith, CH, Burnie, S, Cervical Overview Group 2007, 'Medicinal and injection therapies for mechanical neck disorders', *Cochrane Database of Systematic Reviews*, Issue 3, Art.No.: CD000319. DOI:10.1002/14651858.CD000319.pub4.

Poorbaugh, K, Brismée, J, Phelps, V & Sizer, P 2008, 'Late whiplash syndrome: a clinical science approach to evidence-based diagnosis and management', *Pain Practice*, vol. 8, no. 1, pp. 65-89.

Prushansky, T, Pevzner, E, Gordon, C & Dvir, Z 2006, 'Cervical radiofrequency neurotomy in patients with chronic whiplash: a study of multiple outcome measures', *Journal of Neurosurgical Spine*, vol. 4, pp. 365-373.

Riley, D 2004, 'Hatha yoga and the treatment of illness', *Alternative Therapies in Health & Medicine*, vol. 10, no. 2, pp. 20-21.

Robinson, JP, Theodore, BR, Dansie, EJ, Wilson, HD & Turk, DC 2013, 'The role of fear of movement in subacute whiplash-associated disorders grades I and II', *Pain*, vol. 154, pp.393-401.

Rosenfeld, M, Gunnarsson, R & Borenstein, P 2000, 'Early Intervention in Whiplash-Associated Disorders A Comparison of Two Treatment Protocols', *Spine*, vol. 25, no. 14, pp. 1782-1787.

Rosenfeld, M, Seferiadis, A, Carlson J & Gunnarsson, R, 2003, 'Active Interventions in Patients with Whiplash-Associated Disorders Improves Long-Term Prognosis', *Spine*, vol. 28, no. 22, pp. 2491-2498.

Rushton, A, Wright, C, Heneghan, N, Eveleigh, G, Calvert, M & Freemantle, N 2011, 'Physiotherapy rehabilitation for whiplash associated disorder II: a systematic review and meta-analysis of randomised controlled trials', *British Medical Journal*, vol. 1, pp. 1-13.

Sapir, DA, Gorup, JM, 2001, "Radiofrequency Medial Branch Neurotomy in Litigant and Nonlitigant Patients with Cervical Whiplash", *Spine*, vol.26, no.12, pp E268-E273.

Schnabel, M, Ferrari, R, Vassiliou, T & Kaluza, G 2004, 'Randomized controlled outcome study of active mobilization compared with collar therapy for whiplash injury', *Emergency Medicine Journal*, vol. 21, pp. 306-310.

Schofferman, J, Bogduk, N & Slosar, P 2007, 'Chronic whiplash and whiplash associated disorders: an evidence based approach', *Journal of the American Academy of Orthopaedic Surgeons*, vol. 15, no. 10, pp. 596-606.

Scholten-Peeters, GGM, Neeleman-van der Steen, CWM, van der Windt, DAWM, Hendriks, EJM, Verhagen, AP & Oostendorp, RAB 2006, 'Education by General Practitioners or education and exercises by physiotherapists for Whiplash-Associated Disorders? A Randomized Clinical Trial', *Spine*, vol. 31, no. 7, pp. 723-731.

Seferiadis, A, Rosenfeld, M, Gunnarsson, R, 2004, 'A review of treatment interventions in whiplash-associated disorders', *European Spine Journal*, vol. 13, pp. 387-397.

Shaw, L, Descarreaux, M, Bryans, R, Duranleau, M, Marcoux, H, Potter, B, Ruegg, R, Watkin, R & White, E 2010, 'A systematic review of chiropractic management of adults with whiplash- associated disorders: Recommendations for advancing evidence-based practice and research', *Work*, vol. 35, pp. 369-394, doi:10.3233/WOR-2010-0996.

Sherman, KJ, Cherkin, DC, Hawkes, RJ, Miglioretti, DL & Deyo RA 2009, 'Randomized trial of therapeutic massage for chronic neck pain', *Clinical Journal of Pain*, vol. 25, no. 3, pp. 233-238, doi:10.1097/AJP.0b013e31818b7912.

Slipman, CW, Lipetz JS, Jackson, HB, Plastaras, CT, Vresilovic, EJ 2001, 'Outcomes of Therapeutic Selective Nerve Root Blocks for Whiplash Induced Cervical Radicular Pain', *Pain Physician*, vol.4, no. 2, pp. 167-174.

Spitzer, W 1995, Chapter 8.2.2: *QTF Recommendations for Clinical Practice*, viewed 30 October, 2007, <<http://www.health-sciences.ubc.ca/whiplash.bc/appendix2/appendix2.html>>.

Sterling, M & Kenardy, J 2008, 'Physical and psychological aspects of whiplash: important considerations for primary care assessment', *Manual Therapy*, vol. 13, no. 2, pp. 93-102.

Stewart, M, Maher, C, Refshauge, K, Herbert, R & Nicholas, M 2007, 'Patient and clinician treatment preferences do not moderate the effect of exercise treatment in chronic whiplash-associated disorders', *European Journal of Pain*, b doi:10.1016/j.ejpain.2007.12.009.

Stewart, MJ, Maher, CG, Refshauge, KM, Herbert, RD, Bogduk, N & Nicholas, M 2007, 'Randomized controlled trial of exercise for chronic whiplash-associated disorders', *Pain*, vol. 128, no. 1-2, pp. 59-68.

Sullivan, MJL, Adams, H, Rhodenizer, T & Stanish WD 2006, 'A Psychosocial Risk Factor – Targeted Intervention for the Prevention of Chronic Pain and Disability Following Whiplash Injury', *Physical Therapy*, vol. 86, no. 1, pp. 8-18.

The Australian Feldenkrais Guild 2003, *The Feldenkrais Method*, viewed 30 October 2007, <<http://www.feldenkrais.org.au/>>.

The Shiatsu Therapy Association of Australia 2007, *Shiatsu Therapy*, viewed 30 October 2007, <<http://www.staa.org.au/index.html>>

Thuile, C & Walzl, M 2002, 'Evaluation of electromagnetic fields in the treatment of pain in patients with lumbar radiculopathy or the whiplash syndrome', *Neurorehabilitation*, vol. 17, no. 1, pp. 63-7.

Tobbackx, Y, Meeus, M, Wauters, L, De Vilder, P, Roose, J, Verhaeghe, T & Nijs, J 2012, 'Does acupuncture activate endogenous analgesia in chronic whiplash-associated disorders? A randomized crossover trial', *European Journal of Pain*, vol. 17, pp. 279-289.

Tuo, KS, Cheng, YY & Kao, CL 2006, 'Vestibular Rehabilitation in a Patient with Whiplash-associated Disorders', *Journal of Chinese Medical Association*, vol. 69, no. 12, pp. 591-595.

Vassiliou T, Kaluza, G, Putzke, C, Wulf, H & Schnabel, M 2006, 'Physical therapy and active exercises – An adequate treatment for prevention of late whiplash syndrome? Randomized controlled trial in 200 patients', *Pain*, vol. 124, pp. 69-76.

Verhagen AP, Schoten-Peeters GGM, van Wijngaarden S, de Bie RA, Bierma-Zeinstra SMA, 'Conservative treatments for whiplash', Cochrane Database of Systematic Review, Issue 2, Art. No: CD003338. DOI:10.1002/14651858.pub3.

Vikne, J, Oedegaard, A, Laerum, E, Ihlebaek, C & Kirkesola, G 2007, 'A randomized study of new sling exercise treatment vs traditional physiotherapy for patients with chronic whiplash-associated disorders with unsettled compensation claims', *Journal of Rehabilitation Medicine*, vol. 39, no. 3, pp. 252-259.

Woodward, MN, Cook, JCH, Gargan, MF & Bannister, GC 1996, 'Chiropractic treatment of chronic "whiplash" injuries', *Injury*, vol. 27, no. 9, pp. 643-645.

Yadla, S, Ratliff, J & Harrop, J 2008, 'Whiplash: diagnosis, treatment, and associated injuries', *Current Reviews in Musculoskeletal Medicine*, vol. 1, pp. 65-68.

Zhang, T, Adatia, A, Zarin, W, Moitri, M, Vijenthira, A, Chu, R, Thabane, I & Kean, W 2011, 'The efficacy of botulinum toxin type A in managing chronic musculoskeletal pain: a systematic review and meta-analysis', *Inflammopharmacology*, vol. 19, pp. 21-34.

Appendix I

The methodology for a proposed systematic review of literature of conservative interventions for Whiplash Associated Disorders (WAD, Grade II and III)

Purpose of this review	The purpose of review is to determine the best available evidence for conservative interventions specific to WAD, Grade II and III.
Objectives of this review	To determine effectiveness of conservative interventions for patients with WAD (Grade II and III) across a range of outcomes
Methodology	A systematic review of the literature was undertaken utilising an iterative, step-by-step approach to ensure transparency and rigour in the methodological process.
Criteria for considering research for this review	In agreement with the stakeholders of this review, specific criteria for research relevant to this review will be considered and identified.
Types of Studies	Quantitative publications identified from peer-reviewed literature.
Types of participants	Adults (>18 years of age) with WAD (Grade II and III) <ul style="list-style-type: none"> • This will include acute (< 3 months) and chronic (> 3 months) conditions
Types of exposure	All conservative interventions (including medical, allied and complementary and alternate therapies)
Types of comparators	Control, usual or no care
Types of outcomes	A range of outcomes relevant to all stakeholders including but not limited to, <ul style="list-style-type: none"> • Providers – Pain, ROM, Strength, QoL etc • Patients – Functional ability, ADL, Cost etc
Timelines	Short term (>3 months) and long term (> months)
Search strategy for identification of studies	Independent reviewers will undertake investigation of all data sources to maximise the scope of the search, and to reduce errors/bias in accessing peer reviewed and non peer reviewed published evidence. Publications from 1995 – current date available in each database will be searched to evaluate the amount of research undertaken in this area, and to highlight trends and changes in direction, over the years of publications. Restriction was placed on the publications reported in English language and research undertaken in Humans.

Peer reviewed databases	<ul style="list-style-type: none"> ○ Ageline ○ Academic search elite ○ AMED ○ AUST health ○ Biomed Central Gateway ○ CINAHL database ○ CAM on Pubmed ○ Cochrane Library ○ Current contents connect ○ EMBASE ○ Health source nursing/academic edition. ○ Informit e-library ○ Infosearch ○ Journal citation reports ○ Joanna Briggs Institute ○ Meditext ○ MEDLINE ○ PubMed ○ PubMed central ○ Psych Info ○ Science citation index expanded ○ ScienceDirect ○ Scopus ○ Web of knowledge ○ Web of science
Specialist databases	<ul style="list-style-type: none"> ○ OT seeker ○ PEDro
Websites	<ul style="list-style-type: none"> ○ Websites of organisations which have been known to produce literature on interventions for WAD such as Motor Accident Authority of NSW and TracSA of SA will be also be interrogated. ○ This process is to ensure all available data on interventions for WAD are sourced. This is also an validity step in literature searching.
Truncation symbols and Boolean operators Pearling	<ul style="list-style-type: none"> ○ Appropriate truncation symbols and Boolean operators will be used for relevant databases. ○ Searching the reference lists of retrieved articles will also conducted to maximise identification of relevant publications.

Key words	The following search strategy was applied in the same manner to all the aforementioned databases. All publications were retrieved from a combination of keyword 1 with keyword 2.																																																
	<table> <tr> <th>Keyword 1</th><th>AND</th><th>Keyword 2</th></tr> <tr> <td>Whiplash*</td><td></td><td>Conservative</td></tr> <tr> <td>Neck pain*</td><td></td><td>Physiotherapy or Physical therapy</td></tr> <tr> <td>Neck muscle*</td><td></td><td>Chiropractic* or osteopath*</td></tr> <tr> <td>Neck disorder*</td><td></td><td>Acupunctur*</td></tr> <tr> <td>Neck strain*</td><td></td><td>Exercise*</td></tr> <tr> <td>Neck sprain*</td><td></td><td>Manipulation*</td></tr> <tr> <td>Neck injur*</td><td></td><td>Mobilisa\$tion*</td></tr> <tr> <td>Headache*</td><td></td><td>Hydrotherapy or water therapy</td></tr> <tr> <td>Weak*</td><td></td><td>Patient education*</td></tr> <tr> <td>Numb*</td><td></td><td>Cognitive behavioural therapy*</td></tr> <tr> <td>Pins and needles</td><td></td><td>Medication*</td></tr> <tr> <td>Tingling or tingles</td><td></td><td>Laser*</td></tr> <tr> <td>“Whiplash Associated Disorders”</td><td></td><td>Manual Therapy*</td></tr> <tr> <td></td><td></td><td>Collar*</td></tr> <tr> <td></td><td></td><td>Botulinium Toxin</td></tr> </table>	Keyword 1	AND	Keyword 2	Whiplash*		Conservative	Neck pain*		Physiotherapy or Physical therapy	Neck muscle*		Chiropractic* or osteopath*	Neck disorder*		Acupunctur*	Neck strain*		Exercise*	Neck sprain*		Manipulation*	Neck injur*		Mobilisa\$tion*	Headache*		Hydrotherapy or water therapy	Weak*		Patient education*	Numb*		Cognitive behavioural therapy*	Pins and needles		Medication*	Tingling or tingles		Laser*	“Whiplash Associated Disorders”		Manual Therapy*			Collar*			Botulinium Toxin
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Database searching steps	<p>These search terms will form the initial sweep of the databases. The search parameters may be subsequently expanded to incorporate additional search terms. This may occur following preliminary investigations by the review team collaborative in discussions with the key members representing CONRAD.</p> <p>This formative phase of the search strategy will be an integral part of the three-step search process. This approach is based on a rigorous methodological process as described by Joanna Briggs Institute with the primary aim to identify published research literature existing in the domains of mainstream research journals during the interrogation of major electronic databases highlighted above.</p> <p>The second phase of the search process will involve the analysis of text words contained in the title and abstract of retrieved citations and of the index terms used to describe identified publications. The third step therefore formally involves an integrated validation search using all identified key words and index terms, through the same electronic databases.</p>																																																

Literature extraction

Publications identified during the searches will be assessed for relevance to the review by consideration of the title, abstract and descriptors of the study.

As this review aims to cover as many interventions as possible, literature sourced will also aim to do so. For example, if a systematic review or meta-analysis for an intervention has been identified and published recently, then no further searches for primary research studies will be undertaken for that intervention (using the best available evidence approach).

However, in the absence of high level, high quality evidence, the best available evidence will be sourced for identify and report the research evidence base underpinning that intervention.

Evidence grading system

The evidence grading will utilise an existing framework as evidenced in BluePages Depression Information WebPages (http://www.bluepages.anu.edu.au/treatments/rating_system/).

Our Rating System

How useful are treatments?

😊😊😊	These treatments are very useful. They are strongly supported as effective by scientific evidence.
😊😊	These treatments are useful. They are supported by scientific evidence as effective, but the evidence is not as strong.
😊	These treatments are promising and may be useful. They have some evidence to support them, but more evidence is needed to be sure they work.
😐	On the available evidence, these treatments do not seem to be effective.
?	These treatments have not been properly researched. It is not possible to say whether they are useful or not.

The evidence grading system will utilise a customised framework of evidence grading which will use a composite of hierarchy of evidence and key constructs of methodological quality of the study.

Evidence hierarchy will be based on existing framework developed in BluePages Depression Information WebPages.

Randomised controlled trials (RCTs): the best evidence

The randomised controlled trial is the Rolls Royce of scientific evidence. In an RCT, the people who volunteer to test out the treatment are randomly placed either in a treatment group (eg, given antidepressants) or a no treatment group (eg, given a sugar pill). A systematic review is a special unbiased method of identifying all relevant trials of a treatment and combining the results. The best possible evidence comes from a systematic review of all RCTs of a treatment.

Controlled trial, not randomised: the next best evidence

Sometimes scientists use controlled trials where volunteers are not randomly placed in groups. Suppose we give all the patients from a depression clinic in Melbourne a secret depression buster formula. At the same time we give all the patients from a depression clinic in Sydney sugar pills. We find that the Melbourne patients recover more quickly than the Sydney patients. We might conclude that the depression buster formula works. We could well be right. However, we can't be sure. The difference between the two groups might reflect a difference in the clinics, a difference in the type of people who attend the clinics, or something different about the two cities. The non-randomised controlled trial is good evidence but not as good as the RCT.

Before and after group study

Another type of evidence involves measuring health before and after treatment. If there is an improvement, we might conclude that a treatment works. The problem with this type of study is that we can't be sure that an improvement is due to the treatment. The volunteers might have improved anyway. This type of study is not as good as a study with a control group.

Little or no evidence

Sometimes people claim that a treatment works on the basis of their personal or professional experience. For example, Mary Downtheroad tells her friends that pulling her ears three times each morning has changed her life. Now life is wonderful and she no longer becomes depressed. Mary believes that ear pulling has helped her but she cannot provide any scientific evidence to support her belief. Maybe trials in the future will prove her correct and perhaps they won't. This anecdotal information is the Roller Skates of scientific evidence - you can't tell if and when you will crash.

The methodological quality of studies will also be based on existing framework developed in BluePages Depression Information WebPages.

Studies should involve enough people that we can be confident of the findings

The larger a study, the more likely we are to find an effect of treatment if it exists.

The best studies are 'blind'

A blind study means that the people involved in the study do not know

<p>Data synthesis</p>	<p>who is receiving the treatment and who is not. (In a single blind study, the patients do not know if they have been given the active treatment or the placebo. In a double blind study, neither the volunteers nor the people treating or assessing them know who is receiving the actual treatment). The advantage of a blind study is that the volunteers and researchers cannot consciously or unconsciously bias the results of the study.</p> <p>Findings should be tested for statistical significance</p> <p>Sometimes differences occur by chance. There are special statistical methods for deciding if a difference between two groups (eg, one that receives a treatment and one that doesn't) is real. All good studies should report whether a finding is statistically significant.</p> <p>Findings should be meaningful</p> <p>Sometimes a treatment can produce a real (statistical) effect but the effect is not very large. All other things being equal, a treatment that makes a large difference is better than a treatment that makes a small difference.</p> <p>Data extraction and synthesis will utilise an existing framework as evidenced in BluePages Depression Information WebPages (http://www.bluepages.anu.edu.au/treatments/).</p> <p>CAHE and CONROD will collaboratively identify key data domains to be incorporated into data synthesis and extraction. These data domains may include</p> <ul style="list-style-type: none"> • A brief introduction • Overview of the intervention • Effectiveness of intervention • Any adverse events associated with interventions • Service provision • Recommendations • Key references <p>Data on these fields will only be extracted if it has been reported in the literature identified. If this information is not reported in the literature, CAHE cannot make assumptions nor go hunting for more references.</p> <p>These processes will result in development of evidence summaries for individual conservative interventions for WAD.</p>
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<p>Recommendations</p>	<p>Recommendations for individual interventions will be based on decisions made on hierarchy of evidence (of retrieved publications) and an informal critical review undertaken while extracting the data (as mentioned above).</p> <p>A systematic critical appraisal using neither a published critical appraisal tool, nor evidence grading using standardised tools, will <u>NOT</u> be undertaken.</p> <p>CAHE and CONRAD will collaborate on the development and the final format of recommendations.</p>
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