JOINT MOBILISATION VERSUS MECHANICAL TRACTION IN THE TREATMENT OF NON-SPECIFIC NECK PAIN IN ADULT PATIENTS: A RETROSPECTIVE REVIEW

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ABSTRACT *Acute non-specific neck pain (NSNP) is one of the most common musculoskeletal conditions referred to physiotherapists by general practitioners. Joint mobilisation and mechanical traction is often used by physiotherapists to treat acute neck pain but very little good quality research exists to guide the use of either of these modalities.*

AIM: *This research aimed to assess which treatment had a better outcome in reducing acute NSNP in adult patients as measured on the Visual Analogue Scale (VAS): mechanical traction (MT) or joint mobilisation (JM) of the cervical spine when combined with either electrotherapy (ET) or exercise (EX) and soft tissue mobilisation (STM).*

METHODOLOGY: *Descriptive, retrospective analysis of clinical records of patients complaining of acute NSNP treated at the Physiotherapy Outpatient Department of Steve Biko Hospital from 2000-2011, was conducted. Non-probability purposive sampling was done. A total of 109 patient records were included. The outcomes of the study were VAS and clinical improvement. Regression analysis was employed to determine whether the change in VAS scores was clinically significant for either treatment group with respect to the secondary treatment categories.*

RESULTS: *During multivariate regression analysis the number of treatment sessions received was found to be a confounding variable. After adjustment of the data for the confounding variable the outcomes of acute NSNP patients treated with MT or JM differed marginally (p=0.08) with respect to change in VAS. During logistic regression analysis the number of treatment sessions was also found to be a confounding variable and after adjustment of the analysis patients treated with MT or JM combined with either EX & STM or ET differed significantly (p=0.03) with respect to change in VAS. Compared to the JM group, the MT group had a 3.26 fold risk of poor clinical outcome. Relative to ET, EX and STM prevented poor clinical outcome (OR=0.39; 95% CI; p=0.04).*

CONCLUSION: *Joint mobilisation combined with EX & STM had a clinically significant, positive outcome in the treatment of acute NSNP, as opposed to mechanical traction.*

KEY WORDS: *ACUTE, NON-SPECIFIC NECK PAIN, JOINT MOBILISATION, MECHANICAL TRACTION*

INTRODUCTION

Neck pain is a common complaint in industrialised countries and a significant portion of direct health care costs are associated with neck pain due to visits to healthcare providers, sick leave and related loss of productivity (Gross et al 2005). Neck pain is only second to the occurrence of lumbar pain in the general population and in musculoskeletal practice (Vernon et al 2007; Cleland et al 2005). In 50%-80% of cases, no systemic or underlying cause can be identified for individuals suffering from neck pain (Heintz and Hegedus2008; Fritz and Brennan 2007). These individuals fall into a group of patients classified as suffering from mechanical disorders, which include degenerative disorders. When a patho-anatomical diagnosis of neck pain cannot be made, the IASP recommends that the term "cervical spinal pain of unknown origin" be applied (Merskey and Bogduk 2012). Annually, 44% of patients with non-specific neck pain (NSNP) seek medical treatment, of which one third receive some type of non-operative treatment (Haldeman et al 2008). However, acute neck pain is most often idiopathic and roughly 40% of adults suffering from acute (NSNP) will recover fully while 30% will have persistent mild symptoms and a further 30% will experience chronic NS-NP of

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moderate or severe intensity (Australian Acute Musculoskeletal Pain Guideline Group 2004).

Gross et al (2005) reported from a systematic literature review, that joint mobilisation is commonly used in the treatment of neck pain but the effectiveness is short-lived and inconclusive when used alone. On the other hand, the Joint & Bone Decade Task Force concluded that intermittent mechanical cervical traction and exercise seem to be the most effective forms of treatment to combine with joint mobilisation of the cervical spine for long-term reduction of acute neck pain and increased function (Hurwitz et al 2008).

Very little is known about the application and clinical results of mechanical cervical traction for acute NSNP. The effects of traction are mainly mechanical and it is proposed only to be used in conditions where the mechanical effects of traction will produce an improvement in the patient's symptoms, i.e. in mechanical or NSNP neck pain (Moeti and Marchetti 2001) and is always combined with other treatment modalities (Michlovitz and Nolan 2005). Graham et al (2006) concluded from a SLR, that intermittent cervical traction reduced neck pain and that when combined with exercise, showed a clinically important reduction in neck pain and increase in function, although no studies could link the mechanical effects of traction with clinically relevant outcome measures pertaining to acute NSNP. Inadequate information is available concerning which rehabilitative conservative management or combination therapy is most effective in the treatment of acute or chronic NSNP (Gross et al 2002). Despite the extent, costs, and morbidity of neck pain, surprisingly little research has evaluated specific treatments for acute NS-NP and very little is known about the natural history of acute NS-NP (Bronfort et al 2001). Therefore inconclusive results relating to the efficacy of universally used physiotherapy modalities exists in the available literature. One reason for the poor outcomes in the studies reported in the physiotherapy literature is that many of the studies researching conservative treatment for the management of neck pain have heterogeneous patient populations and treatment modalities (Cleland et al 2007). Despite the high prevalence of mechanical neck pain, a large gap exists in current literature, which has failed to provide sufficient, conclusive evidence supporting one specific physiotherapy intervention over another in the conservative treatment of acute, sub-acute and chronic NS-NP. The aim of the retrospective review was to assess which treatment had a better outcome in reducing acute NSNP in adult patients as measured on the Visual Analogue Scale (VAS): mechanical traction (MT) or joint mobilisation (JM) of the cervical spine, when combined with either electrotherapy (ET) or exercise (EX) and soft tissue mobilisation (STM).

METHODOLOGY

In the current study a descriptive, longitudinal design, using a retrospective analysis of clinical patient records at the Physiotherapy outpatient department (POPD) of the Steve Biko Hospital (SBH), was applied. Purposive, non-probability sampling of the records of patients diagnosed with acute NSNP, from 1 January 2000 to 31 December 2010 were done. The inclusion criteria were adults aged 18-55 years, acute cervical pain of no known origin and one or more physiotherapy treatments in a two week period. Patients were excluded from the study if a definite diagnosis for neck pain other than NSNP was confirmed or if serious pathology was present such as fractures, dislocations, instabilities, radiculopathies, arthritis, acute whiplash or previous cervical surgeries, involvement in litigation or compensation claims, as well as incomplete data in the patient record.

A self-developed data sheet was used to capture the relevant data form the patient records. Data collected included occupation, which primary treatment (joint mobilisation or mechanical traction) was used and which secondary treatment ET or EX& STM was used in combination with the primary treatment. The variables captured from the patient records were severity of symptoms at onset of treatment as indicated on the VAS, severity of symptoms at discharge (VAS), change in VAS scores, number of treatments received and age of the patient. As five variables were anticipated to play a role, by convention ten to fifteen subjects needed to be included for each variable, thus a 100 patient records were needed, 50 for each treatment group, to make up the sample size. All of the patient records with a diagnosis of acute neck pain for the period 1 January 2000 to 31 December 2010 were selected by the principle investigator. A total of 519 records were found, of these only 303 patients were referred for physiotherapy for acute NSNP, and only 136 of these fitted the inclusion criteria of the study. The data collection process is set out in Figure 1.

A change in the VAS for pain intensity was used as outcome measure in this study. The pain the patient reported at onset and discharge of treatment was recorded in the clinical records by the physiotherapist on a VAS. This facilitated reproducibility in the clinical and research setting. Clinical improvement was determined by calculating the change in VAS scores from onset to discharge of treatment.

Data analysis

Descriptive Statistics

Descriptive statistics were calculated for the baseline characteristics of each classification category, including, for continuous variables (age, VAS score at onset of treatment, VAS score at discharge, change in VAS score and number of treatment sessions received), means with standard deviations, frequency, percentage and cross-tabulation for discrete variables (nominal and ordinal), that included the treatment group, secondary treatment categories and clinical outcome.

Multivariate linear regression analysis and logistic regression analysis

Multivariate linear regression analysis was employed to determine the extent to which there is a linear relationship between continuous variables (age, VAS score at onset of treatment, VAS score at discharge, change in VAS score and the number of treatment sessions received) and discrete variables (clinical outcome). This was used to determine whether the change in VAS score was clinically significant for either treatment group with respect to the secondary treatment category.

Logistic regression analysis was used to predict the outcome of a categorical continuous variable (a continuous variable that can take on a limited number of values, the magnitudes of which are not meaningful, but whose ordering of magnitudes may or may not be meaningful) based on one or more predictor variables. Logistic regression measured the relationship between a categorical

continuous variable and a discrete variable. Logistic regression was employed to determine which treatment group had a better clinical outcome with respect to the secondary treatment category.

Ethics:

Ethical clearance to conduct the study was obtained from the Research Ethics Committee of the Faculty of Health Sciences of the University of Pretoria. Permission was also obtained from the Chief Executive Officer of SBH. Access to the patient records was restricted to specific categories of information, as set out in the data collection sheet.

RESULTS

A 136 records adhered to the inclusion and exclusion criteria, n=107 for the joint mobilisation group and n=29 for the mechanical traction group. The mean age of the mobilisation group was 47.62 (SD=14.79) and 52.52 (SD=11.56) for the mechanical traction group. It was apparent from the data analysis that mechanical traction was only used as a treatment modality if the patient presented with a pain rating >5 on the VAS. There was a greater number of clinical records in the mobilisation group with a pain rating <5 on the VAS in comparison to the mechanical traction group and a pain rating of ≥5 on the VAS was set as a new inclusion criteria for both treatment groups. This was done to ensure that the data was homogenous for both treatment groups in order to more accurately compare the outcome measures. For this reason a total of 13 files were excluded from the mobilisation group and two from the mechanical traction group, which left a total of n=96 for the mobilisation group and n=27 for the mechanical traction group in the final data analysis. The descriptive statistics for the primary treatment groups are summarised in Table 1. This summary indicates that there was no significant difference in the VAS scores at onset of treatment between the two primary treatment groups. The VAS scores at discharge indicated that the joint mobilisation group (mean 36.7mm; SD=3.03) left the clinic in less pain than the mechanical traction group (mean 47.8mm; SD=3.02). Also, the overall change in VAS scores was greater for the joint mobilisation group (mean 39.4mm; SD=2.87) than the mechanical traction group (mean 30.7; SD=3.06). Clinical improvement was seen in 77.08% of the patients in the joint mobilisation group and 55.56% of the patients in the mechanical traction group.

Table 2 demonstrated a summary of the secondary treatment categories and outcome variables. There was no significant difference between the onset VAS scores between the ET group and the EX & STM group. There was however, a significant difference in the discharge VAS scores between these two categories, with the ET group having a mean score of 4.78mm (SD=2.99) and the EX & STM group having a mean of 3.40mm (SD=2.90), when combined with either of the primary treatment groups. The overall change in VAS score was greater for the EX & STM category (when used in conjunction with the primary treatment group) (mean 4.20mm; SD=2.78) than the ET group (mean 3.00; SD=3.03). During the data analysis no interaction was found to be present between the primary treatment groups and secondary treatment categories.

Age, VAS scores at onset and number of treatments were considered as possible confounding variables for the treatment outcomes. Multivariable linear regression analysis of the change in VAS scores determined that age (p=0.3) and VAS scores at onset (p=0.16) was not confounding variables, but the number of treatment sessions with a p value of 0.001 (95%CI). The mechanical traction group received statistically significant more treatment sessions overall compared to the joint mobilisation group(Table 1). The primary treatment groups differed marginally (p=0.08) with respect to the change in VAS scores after the means were adjusted for the number of treatment sessions (3.49 for the joint mobilisation group and 4.33 for the mechanical traction group). The secondary treatment categories differed significantly (p=0.03) with respect to the change in VAS scores (means adjusted for the number of treatment sessions: 2.74 for the joint mobilisation group and 3.88 for the mechanical traction group).

Logistic regression analysis was again employed to determine the clinical improvement. The VAS scores at onset (p=0.71) and age (p=0.45) was not statistically significant (Table 2). The number of treatment session was clinically significant with a p value of 0.004 and was found to be a confounding variable. Traction had an increased risk of poor clinical improvement (OR=3.26; 95% CI; 1.16-9.15), i.e. relative to the joint mobilisation group, the mechanical traction group had a 3.26 fold increased risk for poor clinical improvement. Relative to the ET group, EX &STM was preventative of poor clinical improvement when combined with mechanical traction (OR=0.39; 95% CI, p=0.04; 0.16-0.96).

DISCUSSION

The mean age for the joint mobilisation and mechanical traction groups was 47.62 and 52.52 years respectively. Hoving et al (2004) found that age ≥40 years, with accompanying lumbar pain and headaches, were predictors of worst outcome and an indicator for the development of chronic neck pain. Raney and Peterson (2008) developed a clinical prediction rule for patients suffering from neck pain who might benefit from mechanical traction which determined that patients who will benefit mostly from mechanical traction need to be aged ≥55 years. This might explain why the physiotherapists chose MT as a therapy intervention for patients with a mean age of 52.52 (SD=11.56) instead of joint mobilisation based on clinical predictors for MT. Patients who received JM as primary treatment modality indicated a greater decrease in VAS scores at discharge [from 7.62 (SD=1.61) to 3.67(SD=3.03)]when likened to the traction group[from 7.85 (SD=1.23) to 4.78 (SD=3.01)]. The joint mobilisation group also demonstrated a greater change in VAS scores and thus a decrease in VAS scores from onset of treatment to discharge, compared to the traction group. Based on the findings of Todd (1996) both treatment groups demonstrated a clinically significant change in pain, that is more than 13 mm decrease. Joint mobilisation, however, indicated a greater relief from acute NSNP which is in accordance with Fritz and Brennan (2007), who devised a classification system on which the treatment choice for neck pain should be based. According to this classification, joint mobilisation should be the treatment of choice for acute NSNP. A high quality trial by Cleland et al (2005) indicated a mean change of 15.5 mm on the VAS with joint mobilisation as primary treatment modality compared to a 4.2 mm change for the placebo group. However, Gross et al. (2004), identified 33 trials

in a Cochrane review that didn't favour joint mobilisation alone for the relief of acute neck pain, and this followed an earlier conclusion by Gross et al (2002) which indicated that physiotherapists should use joint mobilisation and exercise for acute NSNP.

The mechanical traction group received more treatment sessions compared to the joint mobilisation group. Hellsing et al (1994) noted that a mean of three treatments were needed for acute NSNP and up to five treatment sessions were considered to be cost effective, good use of resources and effective in reducing acute NSNP. Mechanical traction just barely falls into these parameters [4.33 (SD=2.92)], while joint mobilisation fits easily into these parameters [3.49 (SD=1.99)]. In previous studies investigating mechanical traction for neck pain, Cleland et al (2005) proposed a decrease in acute neck pain over an average of 7.1 treatment sessions of a multi-modal approach of joint mobilisation, mechanical traction and exercise. The mechanical traction group in this study showed a clinically significant relief from pain over an average of 4.33 sessions, when combining mechanical traction with secondary treatment categories. Graham et al. (2008) found limited evidence to support the use of intermittent mechanical cervical traction, exercise and heat for NSNP when compared to only exercise and heat.

When the analysed data for the ET category was compared to the EX & STM category the number of treatments received for both secondary treatment categories was the same. There was, however, a significant difference in the VAS scores at discharge as well as change in VAS scores between the two secondary treatment categories. The EX & STM category fared far better in relieving pain when combined with either one of the primary treatment groups in relation to the ET category, which is in harmony with a systematic review (Kay et al, 2005) which determined that specific cervical exercises might be effective for the treatment of acute NSNP. Although both the secondary treatment categories indicated a clinically significant change in the VAS scores, it would seem as if EX & STM in combination with either joint mobilisation or mechanical traction brought about a greater decrease in acute NSNP. Gross et al (2004) found that joint mobilisation and ET was not effective in reducing acute or chronic neck pain compared to joint mobilisation and exercise therapy which brought about pain relief and increased function. This was reiterated by Hurwitz et al(2008),Jull et al (2002) and Jensen et al (2007), who stated that joint mobilisation and exercise, is more effective in neck pain relief than joint mobilisation and ET.

The primary treatment groups and secondary treatment categories were also assessed with respect to the number of subjects who showed clinical improvement. A total of 74 of the 96 patients in the joint mobilisation group indicated clinical improvement of their symptoms, while 15 of the 27 patients in the mechanical traction group showed clinical improvement. This once again strengthens the finding that joint mobilisation is more effective than mechanical traction in combination with secondary treatment modalities for acute NSNP if change in VAS scores and clinical improvement were used as outcome measures. This is in agreement with the management strategies proposed for the treatment of acute NSNP by Graham et al (2008), who proposed multi-modal treatment strategy of cervical joint mobilisation combined with strength and endurance exercises.

CONCLUSION

Joint mobilisation combined with exercise and STM had a clinically significant, positive outcome in the treatment of acute non-specific neck pain, as opposed to mechanical traction combined with exercise and STM.

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