The Use of Neck Support Pillows and Postural Exercises in the Management of Chronic Neck Pain

Alisha N. Jamal, Brian M. Feldman, and Eleanor Pullenayegum

ABSTRACT. ***Objective.*** Chronic neck pain is a common problem with a profound effect on quality of life. Identifying evidence-based management strategies is fundamental in improving patient outcomes. This study is a reanalysis of the data from Helewa, *et al* to further characterize the effects of postural exercises and neck support pillows on neck pain.

Methods. A full factorial model was used. All interactions were analyzed adjusting for the Northwick Park Neck Pain Questionnaire (NPQ) at baseline.

Results. Postural exercises significantly decreased NPQ scores at ≥ 3 weeks, and the use of a neck support pillow significantly decreased NPQ scores at ≥ 12 weeks.

Conclusion. These interventions could be beneficial in reducing neck pain symptoms. (J Rheumatol First Release August 1 2016; doi:10.3899/jrheum.151368)

Key Indexing Terms:
NECK PAIN EXERCISE THERAPY NECK SUPPORT PILLOW
NORTHWICK PARK NECK PAIN QUESTIONNAIRE

Chronic neck pain is common, and is known to have a significant effect on disability as well as quality of life. A systematic review revealed that the 1-year incidence of neck pain globally ranged from 10.4% to 21.3%[1], with a Canadian study reporting the annual incidence of neck pain as 14.6% in adults[2]. Moreover, a 2010 study found that neck pain ranked 21st in terms of global burden of disease, as well as the fourth highest overall for disability[3]. These findings suggest that neck pain is a common and highly disabling health problem for many Canadians. Therefore, it is imperative to identify the best practice management strategies to reduce both the disability and overall negative effect chronic neck pain can have on quality of life.

There is emerging evidence that conservative measures including neck support pillows and exercise can be beneficial in reducing symptoms of chronic neck pain. Helewa, *et al*[4] previously published a prospective randomized controlled trial (RCT) using (1) an active neck and postural exercise taught by a physiotherapist, (2) a neck pillow support, or (3) a combination of neck and postural exercise with a neck support pillow for sleeping, and measured the outcomes on the Northwick Park Neck Pain Questionnaire (NPQ). The study found that the combination of exercise along with pillow support led to statistically lower scores on the NPQ. Neither exercise alone nor a neck support pillow alone was shown to significantly decrease the NPQ scores[4].

There are a few studies that have shown that the use of neck pillows can be beneficial in the management of chronic neck pain. An RCT of 149 patients with cervicobrachialgia found that those who received a specialized neck support pillow during and after rehabilitative treatment had a significantly smaller increase in cervical pain and reduction in sleep disturbance up to 12 months after treatment[5]. Similarly, in an RCT of 36 patients with chronic biomechanical neck pain, those who used a cervical neck pillow over a 4-week period had significantly lower scores on the Neck Disability Index and a lower pain score on the numerical rating pain scale[6]. A prospective cohort study of neck supports showed that 47% of patients with tenderness at the C6–C7 level improved at 8 months, and this improvement was sustained at 35 months[7]. These findings provide evidence that neck support pillows alone can significantly improve the symptoms of neck pain.

Despite frequent use of postural exercises in the management of neck pain, the evidence surrounding their use is still being debated. A Cochrane review found that there is moderate evidence to support upper extremity strength training, endurance training, as well as cervico-scapulothoracic strengthening in improving neck pain in the short term[8]. However, the authors concluded that the quality of the evidence was insufficient to determine the effectiveness of exercises on the management of chronic neck pain[8]. A systematic review concluded that there are few good-quality studies on proprioceptive exercises for the management of neck pain and that these had no consistent benefit[9]. Finally, a recent RCT comparing upper cervical and thoracic manipulation with mobilization and exercise in patients with

From the Division of Rheumatology, and Division of Pediatric Medicine, The Hospital for Sick Children; Child Health Evaluative Sciences, SickKids Research Institute, Toronto, Ontario, Canada.

A.N. Jamal, BSc, MSc, MD, Division of Pediatric Medicine, Hospital for Sick Children; B.M. Feldman, MD, MSc, FRCPC, Division of Rheumatology, The Hospital for Sick Children; E. Pullenayegum, BA, MA, PhD, Child Health Evaluative Sciences, SickKids Research Institute.

Address correspondence to Dr. B.M. Feldman, Division of Rheumatology, The Hospital for Sick Children, 555 University Ave., Toronto, Ontario M5G 1X8, Canada. E-mail: brian.feldman@sickkids.ca

Accepted for publication June 6, 2016.

headache found that those randomized to the manipulation arm had a significant reduction in both disability and headache intensity at 3 months compared with the exercise group[10]. Taken together, these studies indicate that the evidence surrounding the efficacy of exercises in the management of neck pain has not yet been fully elucidated.

The purpose of our study was to reanalyze the data from the RCT by Helewa, *et al*[4] to further characterize the effects of postural exercises and neck support using contoured pillows on chronic neck pain.

MATERIALS AND METHODS

The methodology for the Helewa study has been previously described[4]. Briefly, participants were randomly allocated to 1 of 4 groups: (1) active control: heat or cold + massage, (2) control + instructions on using a neck support pillow, (3) control + active neck and postural exercises, and (4) control + neck support pillow + postural exercises. Group allocations were done through randomly selected, randomly ordered blocks. Assessors who were blinded to the treatments received carried out assessments. Outcomes were measured using the NPQ, which was self-administered at 0, 3, 6, 12, 24, and 52 weeks[4].

The NPQ has been previously validated as a good clinical tool to assess pain and disability in neck disorders[11,12].

For the reanalysis, data for the trial were managed using R: A Language and Environment for Statistical Computing. A full factorial model including the neck support pillow, exercise, and weeks as a factor for all 2–way and 3-way interactions was analyzed adjusting for NPQ at baseline. Akaike Information Criterion (AIC)[13] and likelihood ratio tests were used to eliminate interactions that did not improve the fit, and showed that the functional form for time could be simplified to 2 indicators for weeks > 3 and weeks > 6. Because there was missing data on followup, multiple imputation was used to account for this to improve efficiency. Analysis used a linear mixed-effects model, fitted through maximum likelihood when estimating AIC and restricted maximum likelihood when estimating variables; the best-fitting correlation structure used random intercepts and random effects for both time and exercise. P values < 0.05 were considered statistically significant.

RESULTS

In comparison to the active control, postural exercises significantly lowered NPQ scores by a mean of 3.1 points [standard error (SE) 1.37] at 3 weeks and beyond (Table 1). The use of a neck support pillow did not significantly decrease NPQ scores compared with control at 3 and 6 weeks (estimated mean decrease 0.5, SE 1.52); however, this relationship did become significant after 6 weeks. Specifically, the use of the neck support pillow was associated with a mean decrease of 3.03 (SE 1.27) in NPQ scores at 12, 24, and 52 weeks (Table 1).

Table 1. Linear mixed-effects model for NPQ scores. The neck support pillow arm did not have a significant effect at 3 or 6 weeks, but did significantly decrease NPQ scores thereafter (12, 24, 52 weeks).

Variables	Coefficient	Standard Error	p
Exercise	–3.1	1.37	0.02
Weeks > 3	–3.6	0.83	< 0.0001
Weeks > 6	2.3	2.057	0.3
NPQ0 (baseline)	0.6	0.061	< 0.0001
Pillow, weeks ≤ 6	–0.5	1.52	0.7
Pillow, weeks > 6	–3.03	1.27	0.02

NPQ: Northwick Park Neck Pain Questionnaire.

DISCUSSION

Data from the Helewa RCT were previously published[4], and showed that a combination of exercise with the neck support pillow significantly decreased NPQ scores; however, exercise alone and pillow alone did not. In our study, we reanalyzed the data using a linear mixed-effects model, which treated time (weeks) as a factor. This significantly improved the fit of the data, and enabled us to analyze data beyond the 12-month timepoint. With this novel way of analyzing the data, we found that exercise alone significantly reduces NPQ scores at 3 weeks. The effect of exercise is sustained over time, indicating that postural exercises are beneficial in decreasing neck pain and improving functional status.

Second, we found that the neck support pillow alone significantly reduced NPQ scores at the 12-, 24-, and 52-week timepoints. Our study found that being randomized to use a neck support pillow for ≥ 12 weeks for the management of chronic neck pain will have a beneficial effect on neck pain and functional status.

Our findings are similar to those of others who have shown that exercise can be used to improve symptoms of chronic neck pain. An RCT of 96 office workers found that a neck and shoulder stretching exercise program significantly reduced their pain, with those performing exercises > 3 times/week yielding greater improvement in both their quality of life and neck function[14]. Similarly, a prospective cohort study on patients with chronic nonspecific neck pain showed that an 8-week physiotherapy program incorporating physical exercise, health education, and swimming significantly improved the patient's disability[15]. Our findings are consistent with others in the literature, indicating that exercise alone can significantly decrease symptoms of pain and disability in neck pain.

To the best of our knowledge, ours is one of the first studies to show that using a neck support pillow can significantly reduce symptoms of chronic neck pain as a monotherapy. One study on patients with cervicobrachialgia comparing combining the use of a neck support pillow along with inpatient rehabilitation with inpatient rehabilitation alone found that the group with the neck support pillow had statistically significant smaller increases in the intensity of cervical spine pain and fewer sleep disturbances secondary to pain[7].

There have been very few studies on the use of neck support pillows for the management of chronic neck pain with little consensus on the type and material of pillow. One study found that using a latex pillow, the OR of having cervical stiffness was 0.9, headache was 0.4, and scapular/arm pain was 0.6. They concluded that the latex

pillow performed the best in terms of waking symptoms, with the feather pillow performing the worst[16]. Another study showed that rubber pillows were beneficial in decreasing cervical pain[17]. Our analysis shows evidence that The Shape of Sleep pillow (www.shapeofsleep.com) is beneficial in reducing neck pain symptoms; however, future studies will need to address the optimal material and type of pillow, and the use of neck support pillows in other conditions, to guide clinical practice recommendations.

Our results should be interpreted considering the possible limitations to our reanalysis. First, some of the data were missing on followup, so multiple imputation was used and may have influenced our findings. However, the data were analyzed both with and without multiple imputations, and the results were similar. Second, for participants randomized to the neck support only group, our analysis did not take into consideration whether the neck support pillow was used continuously, or for the hours per day it was used. Further studies will need to address the optimal duration of use required to improve outcomes. Finally, our reanalysis looked at time periods > 3 weeks and ≥ 12 weeks; however, there were not enough data for analysis past 52 weeks. Further studies will be required to address whether there is a longterm benefit of using a neck support pillow and the time period in which this benefit is sustained.

We have demonstrated that randomization to both exercise alone and to the use of a neck support pillow alone, or together, reduces symptoms of neck pain and functional limitation as measured by the NPQ tool. Randomization to the neck support pillow alone with proper instruction by trained physiotherapists can significantly reduce symptoms of pain and functional limitation as measured by the NPQ when used for a treatment time ≥ 12 weeks. Neck support pillows can be used as an adjunct to exercise in the management of neck pain or on their own once a physiotherapist has properly instructed patients.

ACKNOWLEDGMENT

We acknowledge that the late Dr. Hugh Smythe asked us to do this reanalysis and we are grateful for his provision of the data.

REFERENCES

1. Hoy DG, Protani M, De R, Buchbinder R. The epidemiology of neck pain. Best Pract Res Clin Rheumatol 2010;24:783-92.
2. Côté P, Cassidy JD, Carroll LJ, Kristman V. The annual incidence and course of neck pain in the general population: a population-based cohort study. Pain 2004;112:267-73.
3. Hoy D, March L, Woolf A, Blyth F, Brooks P, Smith E, et al. The global burden of neck pain: estimates from the global burden of disease 2010 study. Ann Rheum Dis 2014;73:1309-15.
4. Helewa A, Goldsmith CH, Smythe HA, Lee P, Obright K, Stitt L. Effect of therapeutic exercise and sleeping neck support on patients with chronic neck pain: a randomized clinical trial. J Rheumatol 2007;34:151-8.
5. Bernateck M, Karst M, Merkesdal S, Fischer MJ, Gutenbrunner C. Sustained effects of comprehensive inpatient rehabilitative treatment and sleeping neck support in patients with chronic cervicobrachialgia: a prospective and randomized clinical trial. Int J Rehabil Res 2008;31:342-6.
6. Erfanian P, Tenzif S, Guerriero RC. Assessing effects of a semi-customized experimental cervical pillow on symptomatic adults with chronic neck pain with and without headache. J Can Chiropr Assoc 2004;48:20-8.
7. Smythe HA. The C6-7 syndrome—clinical features and treatment response. J Rheumatol 1994;21:1520-6.
8. Gross A, Kay TM, Paquin JP, Blanchette S, Lalonde P, Christie T, et al; Cervical Overview Group. Exercises for mechanical neck disorders. Cochrane Database Syst Rev 2015;1:CD004250.
9. McCaskey MA, Schuster-Amft C, Wirth B, Suica Z, de Bruin ED. Effects of proprioceptive exercises on pain and function in chronic neck- and low back pain rehabilitation: a systematic literature review. BMC Musculoskelet Disord 2014;15:382.
10. Dunning JR, Butts R, Mourad F, Young I, Fernandez-de-Las Peñas C, Hagins M, et al. Upper cervical and upper thoracic manipulation versus mobilization and exercise in patients with cervicogenic headache: a multi-center randomized clinical trial. BMC Musculoskelet Disord 2016;17:64.
11. Leak AM, Cooper J, Dyer S, Williams KA, Turner-Stokes L, Frank AO. The Northwick Park Neck Pain Questionnaire, devised to measure neck pain and disability. Br J Rheumatol 1994;33:469-74.
12. Wlodyka-Demaille S, Poiraudeau S, Catanzariti JF, Rannou F, Fermanian J, Revel M. French translation and validation of 3 functional disability scales for neck pain. Arch Phys Med Rehabil 2002;83:376-82.
13. Akaike H. A new look at the statistical model identification. IEEE Trans Automat Contr 1974;19:716-23.
14. Tunwattanapong P, Kongkasuwan R, Kuptniratsaikul V. The effectiveness of a neck and shoulder stretching exercise program among office workers with neck pain: a randomized controlled trial. Clin Rehabil 2016;30:64-72.
15. Cuesta-Vargas AI, González-Sánchez M. Changes in disability, physical/mental health states and quality of life during an 8-week multimodal physiotherapy programme in patients with chronic non-specific neck pain: a prospective cohort study. PLoS One 2015;10:e0118395.
16. Gordon SJ, Grimmer-Somers KA, Trott PH. Pillow use: the behavior of cervical stiffness, headache and scapular/arm pain. J Pain Res 2010;3:137-45.
17. Gordon SJ, Grimmer-Somers K, Trott P. Pillow use: the behaviour of cervical pain, sleep quality and pillow comfort in side sleepers. Man Ther 2009;14:671-8.