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

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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%\(^2\) in adults. 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
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. 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. 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. 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.

The NPQ has been previously validated as a good clinical tool to assess pain and disability in neck disorders. 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) 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 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 not have a significant effect at 3 or 6 weeks, but did significantly decrease NPQ scores thereafter (12, 24, 52 weeks).

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).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise</td>
<td>–3.1</td>
<td>1.37</td>
<td>0.02</td>
</tr>
<tr>
<td>Weeks &gt; 3</td>
<td>–3.6</td>
<td>0.83</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Weeks &gt; 6</td>
<td>2.3</td>
<td>2.057</td>
<td>0.3</td>
</tr>
<tr>
<td>NPQ (baseline)</td>
<td>0.6</td>
<td>0.061</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Pillow, weeks ≤ 6</td>
<td>–0.5</td>
<td>1.52</td>
<td>0.7</td>
</tr>
<tr>
<td>Pillow, weeks &gt; 6</td>
<td>–3.03</td>
<td>1.27</td>
<td>0.02</td>
</tr>
</tbody>
</table>

NPQ: Northwick Park Neck Pain Questionnaire.
pillow performed the best in terms of waking symptoms, with the feather pillow performing the worst\textsuperscript{16}. Another study showed that rubber pillows were beneficial in decreasing cervical pain\textsuperscript{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 neck pain alone and to the use of a neck support pillow alone, or the use of a neck support pillow in other conditions, to guide clinical practice recommendations.

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**REFERENCES**