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Cervical Pain: A Comparison of Three Pillows

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ABSTRACT. Lavin RA, Pappagallo M, Kuhlemeier KV. Cervical pain: a comparison of three pillows. *Arch Phys Med Rehabil* 1997;78:193-8.

Objective: To compare three pillows with regard to pain intensity, pain relief, quality of sleep, disability, and overall satisfaction in subjects with benign cervical pain. The three pillows evaluated were the subjects' usual pillow, a roll pillow, and a water-based pillow.

Study Design: Subjects used their usual pillows for the first week of this 5-week randomized crossover design study. They were subsequently randomly assigned to use each of the other two pillows for 2-week periods.

Setting: Outpatient neurology and physiatry clinics.

Patients: Forty-one subjects with benign cervical pain syndromes and free of cognitive impairments.

Main Outcome Measures: Visual analog scale (VAS), Sleep Questionnaire, Sickness Impact Profile (SIP), and a satisfaction scale rating the pillows.

Results: The water-based pillow was associated with reduced morning pain intensity, increased pain relief, and improved quality of sleep. The duration of sleep was significantly shorter for the roll pillow. Overall SIP findings showed a significant advantage for the water-based pillow over the roll pillow and standard pillow.

Conclusions: Proper selection of a pillow can significantly reduce pain and improve quality of sleep but does not significantly affect disability outcomes measured by the SIP.

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BENIGN CERVICAL PAIN syndromes affect a large proportion of the population. Different epidemiologic studies have found a lifetime incidence of 35% to 80%.^{1,2} The incidence increases with age and is often accompanied by headaches and pain radiating into the upper extremities.³⁻⁵ Cervical pain is frequently attributed to post-traumatic muscle tears, cervical disk pathology, and zygapophysial joint disease.⁶⁻¹¹

While numerous orthotic devices purport to treat neck pain and associated headaches, few published evaluations have been found methodologically acceptable.¹² A single study has suggested that soft cervical collars were beneficial for pain reduction¹³; other studies report no significant change in pain levels.¹⁴⁻¹⁶ Although soft cervical collars do not limit cervical active range of motion, it has been suggested that they may be beneficial if worn during sleep to limit unconscious neck movement.^{13,17,18}

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Cervical pillows have not been studied in conjunction with cervical pain.

In this study three types of pillows—standard, roll, and commercially developed water-based pillows—were evaluated in a diverse neck pain population, with and without cervicogenic headaches, to determine whether pain levels, sleep patterns, and daily function were influenced by the type of pillow used.

MATERIALS AND METHODS

Subjects

Forty-six subjects with neck pain were recruited through a newspaper advertisement. Individuals with a history of dementia, neoplasm, or known infection in the cervical region were excluded. Five subjects were lost to follow-up before completion of the study. All subjects were evaluated at an outpatient center between April and June, 1995. There were 20 men and 21 women between the ages of 26 and 76 years (\bar{x} = 48yrs). The duration of neck pain ranged from 1 month to 25 years. Only one subject experienced neck pain for 1 month, and four experienced it for longer than 3 months and less than 6 months. Neck pain for 6 months or more was reported by 88% of the subjects, and 78% of the subjects reported having it for one year or more.

Twenty-three subjects experienced daily neck pain, and 13 of these subjects characterized the pain as constant. The remaining subjects experienced neck pain at least once weekly. Twenty-nine subjects awoke from sleep because of neck pain; 13 of these subjects awoke every night, while another 14 subjects awoke at least once each week. Seventeen subjects indicated that pain interfered with normal activity or work. Twenty-seven subjects had previously sought medical attention, chiropractic treatment, or physical therapy. Twenty-five subjects were taking medications. The most frequently used medications were non-steroidal anti-inflammatory drugs and acetaminophen. The factors most commonly associated with neck pain exacerbations were emotional stress, sleep, weather changes, recumbency, physical activity, and exposure to cold.

The initial assessment included a complete history and physical examination. Mechanical neck pain was further evaluated by assessing pain associated with active range of motion, cervical compression maneuvers, resisted extremity maneuvers, and cervical or trapezius muscle tenderness. Most subjects complained primarily of axial neck pain exacerbated by these maneuvers. None of the subjects had sensory or motor abnormalities associated with radiculopathy; however, intermittent radicular pain complaints in the upper extremities were reported by some of the study subjects. None of the subjects exhibited myelopathic abnormalities on clinical examination. Cervicogenic headaches were determined to occur simultaneously with neck pain exacerbations and varied with cervical movements and various stress maneuvers such as manual traction and compression of the cervical spine. Twenty-two subjects had headaches that were temporally associated with exacerbations of their neck pain. These headaches were considered a manifestation of the severity of neck pain exacerbations and were not associated with migraine symptoms. The reported onset of neck pain was often insidious or attributed by the subject to trauma after a motor

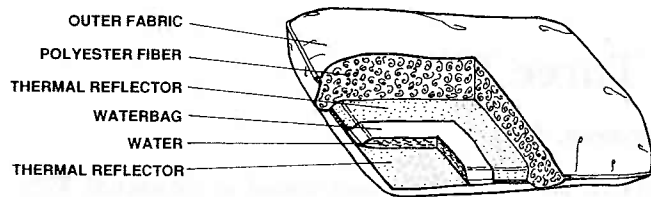


Fig 1. Diagram of cutaway view of cervical water-based pillow.^a

vehicle accident or to "arthritis." No attempt was made to determine the anatomic location of the cervical pain generators.

All subjects agreed to maintain a stable medication regimen during the course of this 5-week study. They were also instructed to continue their usual work, household activities, exercise regimen, and modalities. Subjects did not receive physical therapy or manipulation during this study.

Pillows

The pillows compared included the subject's current pillow (usually a standard down or foam pillow served as the reference or "standard pillow"), a water-based pillow (Mediflow Water-base Pillow^a), and a roll pillow (Cervi-Garde, model 1540^b). The water-based pillow consisted of approximately four inches of soft polyester fiber over a 3.8-cm water base at the bottom of the pillow which was filled with 2,360mL of water. The water volume could be adjusted to change the firmness of the pillow. It is schematically represented in figure 1. The water-filled pouch was covered by a thermal reflector fabric to prevent heat transfer from the skin of the user to the water-filled pouch. A cylindrical polyester fiber-filled roll pillow, 43cm length \times 17.8cm diameter, was chosen for comparison because it was the most commonly marketed type of cervical pillow. At least seven cervical roll pillows with similar dimensions and composition were available from different distributors.^c

Study Design

All subjects were instructed to sleep using their usual pillow during the first week of the study. Subsequently, they were randomly assigned to use either the roll pillow or the water-based pillow for 2 weeks and then to switch to the remaining pillow for the final 2 weeks of the study. The roll pillow was used subsequent to the standard pillow by 19 of the subjects while the water-based pillow was used subsequent to the standard pillow by 22 of the subjects.

Outcome measures included daily scores for pain intensity, pain relief, quality of sleep, and level of function recorded in a diary. The daily diary consisted of a visual analog scale (VAS) with verbal descriptors for pain intensity and a 0% to 100% scale with verbal descriptors of pain relief.¹⁹⁻²⁰ The scales were completed upon awakening and again prior to sleep. The daily sleep questionnaire²¹ was completed every morning to assess the length of time it took to fall to sleep, the number of times the individual awoke, the degree of difficulty falling back to sleep, the duration of sleep, the quality of sleep, how rested the individual felt, and how the sleep compared with the individual's perception of normal sleep. Subjects kept a daily record of medication consumption and any changes in "as needed" or over-the-counter medications. At the end of each trial period with a given pillow, the subjects were asked to rate their level of satisfaction with the pillow and to complete the Sickness Impact Profile (SIP).²² The satisfaction scale consists of seven categories: very satisfied, satisfied, slightly satisfied, neutral, slightly unsatisfied, unsatisfied, and very unsatisfied. For the

Table 1: Effect of Pillow Type on Pain Intensity

Pillow Type	Morning*	Evening [†]
Roll	4.67 \pm .46	4.17 \pm .48
Standard	4.83 \pm .42	4.31 \pm .44
Water	3.75 \pm .36	3.67 \pm .40

A lower value is associated with less pain. Values are mean \pm SE.

* Morning $p < .01$ (roll vs standard $p > 0.5$, roll vs water $p < .005$, standard vs water $p < .025$).

[†] Evening $p > 0.1$.

purpose of data analysis, these categories were subsequently collapsed into three groups by combining the first three categories into a satisfied group and the last three categories into an unsatisfied group. Subjects rated their relative satisfaction with each pillow independent of their ratings of the other pillows. Thus, a subject could assign the same level of satisfaction rating to all three pillows.

Some subjects were unable to complete a particular pillow trial, usually because of increased incidence and severity of neck pain and headaches associated with use of a particular pillow. These subjects were requested to end the trial with that pillow and to complete the satisfaction scale and the SIP. They were also instructed to switch to the remaining pillow if the study was not yet completed. In addition to the initial evaluation visit, subjects had a second visit at the end of the study to collect the diaries and to discuss benefits or problems associated with the pillows.

Statistical Analysis

Satisfaction and sleep responses were compared statistically using the nonparametric Kruskal-Wallis rank ordering test using each day's responses for each subject as the unit of analysis. Using each night's sleep report as an independent event was considered a more valid analysis than averaging of the nonparametric responses. SIP scores and VAS scores for pain intensity and pain relief were analyzed with two-way (treatment and subject) analysis of variance (ANOVA). The unit of analysis for VAS was the mean VAS score for a subject over the trial period for each pillow type.

RESULTS

Average pain intensity scores and comparison of scores by analysis of variance are given in table 1. There was a significant effect of pillow type on morning pain intensity scores ($p < .01$), but not evening pain intensity scores ($p > 0.1$). Tukey's tests for multiple comparisons revealed that pain intensity in the morning was not different for the roll and standard pillows ($p > 0.5$), but was less with the water pillow than either the roll pillow ($p < .005$) or the standard pillow ($p < .025$). Average pain relief (table 2) was influenced by pillow type both in the morning ($p < .01$) and the evening ($p < .05$) with greater pain relief being seen in patients using the water pillow compared to patients using the roll pillow.

During the course of the roll pillow trial, 10 subjects dropped out during the trial period and gave uniformly negative comments regarding the roll pillow. An additional two subjects did

Table 2: Effect of Pillow Type on Pain Relief Compared to the Standard Pillow

Pillow Type	Morning	p	Evening	p
Roll	2.42 \pm .42	$<.01$	2.76 \pm .44	$<.05$
Water	3.87 \pm .41	<0.1	3.86 \pm .42	<0.1

A higher value is associated with greater pain relief. Values are mean \pm SE.

