Original Article

Prevalence of proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities, Rawalpindi

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Abstract

Objective: To investigate the Prevalence of proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities, Rawalpindi

Study design: It is a descriptive cross sectional study.

Place and duration of study: A four-month study was carried out in public sector Institutes of Rawalpindi city. (from June 2023 to September 2023)

Material and Methods: A Descriptive Cross-Sectional study design, in which 300 females from Public Sector Universities, in Rawalpindi city participated. Female subjects from age 15-29 years, wearing a headscarf for 1-2 years continuously, and wearing a scarf for up to 4 to 5 hours per day participated in the research to check the appropriate results. Those who have a history of orthopedic, neurological, or vestibular disease, who don't wear headscarves daily, and females wearing headscarves for >3 hours/day and less than 1 year were excluded. After the informed consent, data is analyzed by SPSS version 26.

Results: Overall, the study showed that 71% (213/300) of students who wore headscarves in public universities in Rawalpindi city had issues with sensing their neck position and limited neck movement while 87 are normal.

Conclusion: The research provided valuable insights into the prevalence of position errors and restricted neck movement among female students in Rawalpindi city and it was concluded that it is much more prevalent in the females wearing it regularly for more than 2 years and for more than 3- 4 hours/day.

Keywords: cervical spine, joint position error, cervical range of motion, goniometer, headscarf, self-structured questionnaire

1. Introduction

Seven cervical vertebrae make up the head-neck system, which has a special motion and morphology to meet the demands of the highly mobile head-torso transitional zone. The kinematics of this system are quite intricate, the sensory platform is also supported by the cervical spine, which also moves and positions it in three dimensions.[1,2] The cervical spine, which is the neck part of the spine, can be divided into five sections. Each of these sections has its unique shape that affects how it moves and contributes to the overall neck function. These sections are the connection between the head and neck (C0-C1), the first bone (C1), the second bone (C2), the area between C2 and C3, and the levels from C3 to C7. The main differences between the upper part of the neck (upper cervical spine) and the lower part (lower cervical spine) are that there's no disc between the bones, the ligamentum flavum is missing, and C1 and C2 have different shapes.[1,3,4] The head, which weighs 10 to 15 pounds, stays steady on the atlas thanks to the flexible neck. The neck, in turn, is held up by the head, which acts like a support beam. No other portion of the musculoskeletal system moves more than 600 times an hour on average, whether we are awake or asleep; this includes the neck.[5,6]

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The "Functional Spine Unit" (FSU) is like a tiny working part of your spine. It includes two neighboring vertebrae (the bones in your spine) and the soft stuff that connects them, without the muscles. When something moves in a certain way, it spins around a special point called the "Instantaneous Axis of Rotation" (IAR).[3] This IAR usually goes through or very close to one of the vertebrae in your spine. In simple terms, each FSU can move in six different ways, like forward, backward, side to side, and turning, thanks to this IAR. So, we say each FSU has 6 degrees of freedom for movement.[3,7] While during cervical extension, a motion pattern trend was seen from lower to middle segments, the cervical flexion movement first relied more on the middle cervical segments and thereafter on the lower ones.[8] When we talk about how your spine and neck move, we're mainly looking at how the top and front parts of your spine shift around.[9,10] The neck can move in different ways: Bending it forward (flexion) is usually between 0 to 45 degrees, Leaning it backward (extension) is also about 0 to 45 degrees, Tilting it sideways (lateral flexion) goes from 20 to 45 degrees, Turning your head left or right (rotation) can go from 0 to 90 degrees.[11] The Universal Goniometer (UG) was used to measure active CROM. The UG's dependability ranged between considerable and perfect.[12] Restricted cervical ranges typically refer to limited motion or range of motion in the neck. Cervical function is essential for daily activities involving head stabilization and orientation. People with neck pain often can't move their neck as much as usual, and how much it's affected depends on how much pain they're feeling and how well they think they're doing.[13,14] The cervical facet capsules' existence of mechanoreceptive and nociceptive nerve terminals indicates that the cervical spine's proprioception and pain perception are influenced by neural input from the facets and that the cervical spine is under the control of the central nervous system.[15,16,17,18] The many spindles in neck muscles, along with the receptors tell our brain how our body is positioned. According to some evidence, the CNS receives ensemble encoding of the muscle spindle discharge patterns and uses a pattern recognition system to determine joint position and movement.[19,23] Proprioception is critical for sensorimotor control of posture and movement. Han et al described proprioception as like your body's built-in GPS. It uses sensors to figure out where your body parts are and how they're moving.[20,21] Revel et al., 1991 pioneered the joint position error (JPE) test. It is a popular test for determining head repositioning accuracy. To check how well people can tell where their head is, a special laser on a headband was used. The test started with participants sitting up straight about 90 centimeters (cm) from a wall. They had their feet on the floor and their backs against a chair. They were told to find a comfortable head position and remember it as their "normal" position. Then, with their eyes closed, they were asked to slowly turn their head left and right, bend it forward and backward as much as they could. After each move, they had to go back to that comfortable "normal" head position they remembered.[22] Treatments like neck adjustments, cold and hot therapy, gentle muscle massage, acupuncture, and careful stretching can be helpful.[24] When it comes to hands-on treatments, some focus on moving the joints gently, like mobilization and manipulation, while others work on the soft tissues with massage and nerve techniques; and combined techniques include targeted exercises.[25] Cervical discomfort, posture, and general mobility can all benefit from stretching your neck, eyes to the sky, ear to shoulder, and chin to the chest.[26] Along with traditional physiotherapy, stretching exercises and massages performed on the SCM muscle promote ROM and endurance.[27]

2. Materials & Methods

The research was conducted by Descriptive Cross-Sectional study design, in which 300 females from Public Sector Universities, in Rawalpindi will participate. The duration of this study is 4 months. A total of 300 female subjects from age 15-29 years participated in the research to check the appropriate results. Subjects were selected from government colleges and universities Arid Agriculture University, Rawalpindi Medical University, Rawalpindi Women's University, Fatima Jinnah University, Government Viqar-un-Nisa University for Women. We chose people for the study based on who was available and willing to participate, rather than using a random method. Participants will be selected for the study according to the inclusion and exclusion criteria. Inclusion criteria include; age: 15-29 years. Females wearing headscarves for a minimum duration of 1-2 years. Females who wore a scarf for up to 4 to 5 hours per day. Exclusion criteria include; a history of orthopedic, neurological, or vestibular disease. Females who don't wear headscarves

daily. Females wearing headscarves for >3 hours/day and less than 1 year. Data Collection Tools are a self-designed questionnaire, goniometer, and cervical joint position error test.

Data will be analyzed by SPSS version 26. For qualitative and quantitative variables mean, frequency, and percentages were taken. Frequency charts and plots were used to show the results of qualitative variables.

3. Results

In the current study total of 300 study participants i.e., public sector university students of Rawalpindi are included and the objective of the study is to find out the prevalence of proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities of Rawalpindi. The findings indicated that 45 students were between 15 and 19 years old, 82 students were in the 20 to 24 age range, and 173 participants were between 25 and 29 years old.

Findings	Frequency	Percent	Valid Percent	Cumulative Percent
relocation in 1.5-2 inch=NO ERROR	92	30.7	30.7	30.7
relocation in >2 inch =ERROR	208	69.3	69.3	100.0
Total	300	100.0	100.0	

Table 1 illustrates that 92 participants out of 300 have normal cervical flexion while 208 out of 300 show marked joint position error in cervical flexion.

Table 1: Joint position error in active cervical flexion

According to this study majority of participants have no position error in left lateral flexion and 105 students wearing headscarves have shown positive results.

Figure 1: Joint position error in active cervical left lateral flexion

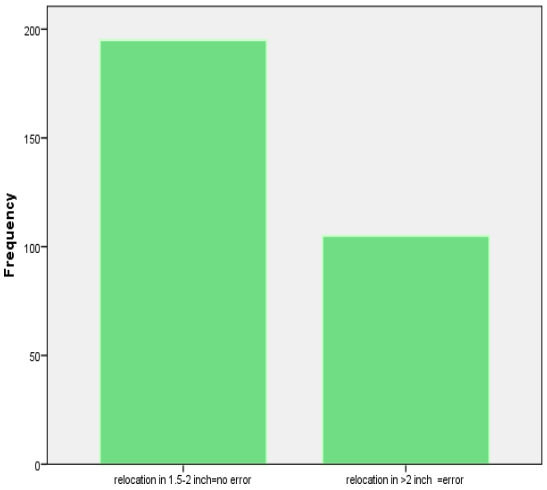


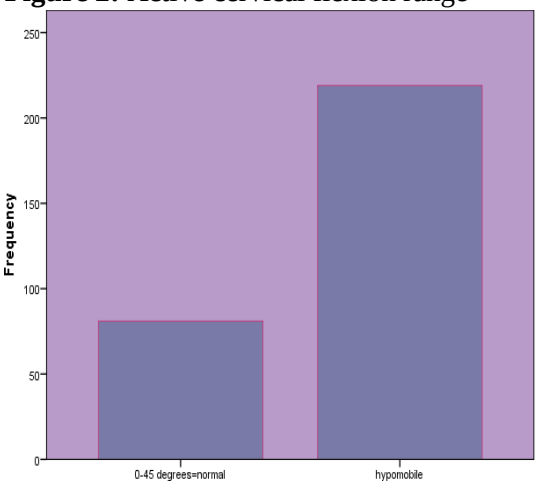
Table 2 shows that 174 out of 300 have cervical joint position error in left cervical rotation and 126 participants have shown normal results.

Table 2: Joint position error in the active cervical rotation left

Findings	Frequency	Percent	Valid Percent	Cumulative Percent
relocation in 1.5-2 inch=NO ERROR	126	42.0	42.0	42.0
relocation in >2 inch=ERROR	174	58.0	58.0	100.0
Total	300	100.0	100.0	

Only 81 students wearing a scarf had normal cervical flexion range of motion and 219 were hypo-mobile while wearing a scarf.

Figure 2: Active cervical flexion range



As per the results of the study, 213 out of 300 (71% of total participants showed positive results) i.e., proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities of Rawalpindi city are prevalent. And 87 participants showed negative results i.e., proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities of Rawalpindi are not prevalent in 29% of participants.

Table 3: Total score of the self-designed questionnaire

Range of total score	Frequency	Percent	Valid Percent	Cumulative Percent
0-24(-ve)	87	29.0	29.0	29.0
25-48(+ve)	213	71.0	71.0	100.0
Total	300	100.0	100.0	

4. Discussion

This study aims to analyze the prevalence of proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities of Rawalpindi. Due to the long-term use of hijab/headscarf from years and for long duration daily, the sequel study shows that there is a high prevalence of JPE in active cervical flexion & and left side rotation and ranges are mostly restricted in active cervical flexion due to the use of headscarf.

Likewise, results are shown in the study by Alqabbani, S. F. et.al in 2016, in both the cumulative joint position error score and during head rotation to the right, the joint position error was higher in women wearing headscarves than in women who did not. Equivalently, our study emphasizes the prevalence of JPE however we took a sample size of 300, and the above-mentioned study only includes 12 participants in their research. The purpose of above mention study is to compare the joint position sense of scarf wearer women with the non-wearer but our study is prevalence-based. The results of the above-mentioned study and the findings of our study depict that there is a high proportion of JPE in female students wearing a headscarf.[22]

According to Aziz, K., Ali, S. T., Fahim, M. F., Khan, R., & Shahid, the study aims to find out how wearing a hijab affects the range of motion in the neck compared to what's considered normal. The age limit of participants of our study is greater as compared to the above study i.e., our age limit is b/w 15 to 29 years & participants of the above study are b/w 18 to 23 years of age. According to the findings of our study the particular movement in which participants show hypo mobility is active cervical flexion. (i.e., 219 were hypo-mobile while wearing scarf) which is measured via UG. Our also includes another variable of proprioception along with CROMs.[28]

In 2023, researcher Reem Javed Malik and her team conducted a study at Shifa Tameer-e-Millat University in Islamabad. They had 111 undergraduate students, aged 17 to 26, take part in this study. The main goal of this study was to figure out what's considered normal when it comes to how accurately people can sense the position of their necks (called cervical joint positioning error or CJPE) and how this relates to how the neck works. Our study particularly targeted hijab-wearing female students ranging in age b/w 15-29 years. Above mentioned study only includes a few students of one university on the other hand the results of our research are more generalized as compared to it because we have a larger sample size and we include more universities in our study.[29]

A particular demographic group, such as students who wear headscarves or are from a particular ethnicity or cultural background, may be overrepresented in the sample. The generalizability of your findings might be constrained by this. It may be difficult to prove a direct causal connection between the wearing of a headscarf and proprioception problems or reduced cervical ranges. Numerous other elements, such as physiology, way of life, and habits of an individual, may also be at play in these problems. It might be challenging to measure cervical ranges and proprioception faults accurately. The validity and reliability of your results may be impacted by differences in measurement instruments and

methods. A cross-sectional study might not be able to identify changes over time due to the small duration of time.

Conclusion:

This study gave a detailed understanding of the extent of JPE & CROM restrictions among female students in the area. We concluded that most students have position errors and range limitations as a result of wearing the hijab for a prolonged period. It was also found that these problems are not prevalent in the females who are involved in regular fitness activities; those who weren't enrolled in such programs were more likely to experience the effect on their spine. The results showed that the effect is infrequent when students wear scarves for shorter periods.

Recommendations:

We recommend that if someone researched the same topic they should include all the female students including hijab wearer and non-wearer so the results would be more comprehended. One should also consider other elements, such as physiology, way of life, and habits of an individual. For valid & reliable results in research that follows the same area, they should use standardized and specially designed tools. They should do the research for an extended period so that changes can also be recorded.

Conflict of Interest:

The authors declare that there is no conflict of interest.

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