



Original Article

Effects of wearing modern hijab on cervical range of motion in female students in a private college of Karachi.

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Abstract

Background: Cervical spine allow maximum and necessary movements for the functioning of head and sensory organs. Any issue with the flexibility and joint movement can be determined by assessing the cervical range of motion. Cervical range of motion (CROM) assessment is commonly used in clinical practice. The current study aims to find the effects of wearing a hijab on the cervical range of motion compared to the normal cervical range of motions.

Methodology: A cross-sectional study was conducted among hijab-wearing female students from Bahria University Medical and Dental College, from November 2019 to January 2020. The study subjects were recruited using a CROM device. Hijab-wearing female students between 18–23 years of age who wear hijab for at least 3 months, with the duration of wearing hijab for at least or at most 6 hours/day were included in the study.

Results: A total of 384 students were recruited. Mean Cervical flexion for wearing hijab ≤ 6 hours was 61.06 ± 17.19 , and > 6 hours was 55.28 ± 16.09 ($p < 0.001$). Mean extension for wearing hijab ≤ 6 hours was observed to be 41.03 ± 12.89 and for > 6 hours was 37.96 ± 10.94 ($p = 0.008$). Mean Lateral flexion for wearing hijab ≤ 6 hours was 42.66 ± 10.32 , and > 6 hours was 38.96 ± 11.01 ($p = 0.002$). While mean right rotation for wearing hijab ≤ 6 hours was 59.50 ± 14.27 , and > 6 hours was 63.47 ± 14.13 ($p = 0.010$). Moreover, the mean Left rotation for wearing hijab ≤ 6 hours was 64.66 ± 17.86 , and > 6 hours was 70.58 ± 14.34 ($p = 0.001$).

Conclusion: The routine wearing of the hijab affects cervical mobility. Moreover, it is concluded that wearing a hijab for > 6 hours greatly affects the range of the head for movement, by decreasing the cervical range of motion.

Keywords

Neck Pain, Cervical Range of Motion, Mobility, CROM Device, Variety of Hijab.



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Introduction

It is estimated that females made up 49.6% of the world's population¹. Wearing a hijab in females is a requisite part of many religions and cultures, including Muslims, Christians, Jewish etc². Hijab is an Arabic word that means barrier or partition. It is a veil that covers the head, neck, and chest of females³. Hijab themes have now become diverse following fashion and modernism but remain within the boundaries of each culture⁴. The forms of hijab today have been equipped with different kinds of accessories to make it look beautiful and heavy⁵.

There are six main religions in the world, of which Christianity is largest, then Islam, Hinduism, Buddhism, Sikhism and Judaism⁶. In Pakistan, approximately 95%-98% population is Muslims, and most females wear hijab. In the U.S, approximately 433,000 females report wearing a hijab. In Saudi Arabia, an estimated 9,210,133 females above the age of 15 wear hijab⁷.

Mobility at the cervical spine is supported by delicate bony and soft tissue structures and allows multidimensional movement⁸. The unique three-dimensional movement of the head is provided by a delicate cervical spine. Most of these movements are centred at the craniocervical junction, which is responsible for motion and stability⁹. Wearing of hijab in routine, for a prolonged period might induce cervical pain¹⁰. It is suggested that the impairments in the cervical range of motions usually develop at an initial stage. Therefore, the most common symptom is often associated with cervical spine disorders, with a limited range of motion in the cervical region^{11, 12}. According to the international classification of function (ICF), the cervical range of motion is considered an important assessment to distinguish patients with neck pain associated with mobility deficits and neck pain with headaches¹³. An observed common pattern is that people with pain in the cervical often report a limited or reduced cervical range of motion compared to those with no cervical spine pain¹⁴. Kasch et al performed clinical assessment of prognostic factors for long term pain and handicap after a whiplash injury. They concluded that one of

the prognostic factors for long-term pain and handicap after a whiplash injury is reduced cervical mobility and high neck pain¹⁵. The current study investigates the effects of wearing a hijab on the cervical range of motion compared to the normal cervical range of motions.

Methodology

This cross-sectional study was conducted among hijab-wearing female students of Bahria University Medical & Dental College (BUMDC) by using CROM (cervical range of motion device, university of Minnesota, December 1988, revised version) within the period of 3 months. Prior ethical approval was taken from the Ethical Review Committee of Bahria University Medical and Dental College (ERC approval number ERC-19/2020).

The calculated sample size was 384 which was drawn from Openepi.com version 3.0 by taking statistical conditions of 95% confidence interval and 5% margin of error. To get the maximum sample size, we used 50% hypothesized prevalence. A non-probability convenient sampling technique was used. Hijab-wearing female students of BUMDC, age between 18–23 years were included in the study. Moreover, students wearing hijab for at least 3 months, with duration of wearing hijab of least 6 hours/day were also included. While females not wearing hijab, or those who are including in any other cervical-related experimental study, or have chronic neck pain due to any pathology, or have any non-pathological neck pain, musculoskeletal deformity, and presence of any congenital deformity were excluded from the study.

The CROM device was used to record and measure flexion, extension, lateral flexion, and rotation of the participants. For measurement, the subject was seated on a chair with feet resting on the floor, backs straight against the chair's back, and arms rested on their laps. Any jewelry, scarf protectors, glasses, and hair clips was removed before placing CROM on the participant's head. Before the measurement, the investigator explained and demonstrated all the cervical movements to the participants. The participant then performed a trial

practice of the movements to ensure the familiarization of movement with CROM placed on their head. After the demonstration and practice, the participant performed neck movement in flexion, extension, lateral flexion, and rotation.

Each measurement of the subject was recorded three times. For measuring flexion and extension, the investigator recorded the starting position on the sagittal plan inclinometer, and then at the end of the movement. The value was recorded two more time. For measuring lateral flexion, the start and end of movement measurements were recorded on the frontal plan inclinometer. While for rotation, a transverse inclinometer and a magnetic necklace were used to measure the start and end of movement measurement.

The amount of each movement was calculated by subtracting the ending position from the starting position, except rotation. For rotation movements, the magnetic inclinometer was manually set at zero before the movement, and then the measurement of movement was done. After the recordings, the measured reading was compared to normal ranges of the cervical range of motions. The value after the movement directly indicates the amount of rotation. After recording, the readings obtained were compared with normal ranges of cervical range of motion given in a range of joint motion evaluation chart DSHS 13-585A (REV. 03/2014)¹⁶.

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 23.0. Mean cervical flexion, mean extension, mean lateral flexion, mean right rotation was assessed from a continuous measurement scale. To know the significance between the hours of wearing hijab and other variables, independent sample t-test was applied. More than two group comparison was assessed using one-way ANOVA test where $p\text{-value} \leq 0.05$ was considered statistically significant.

Results

A total number of 384 students from different departments, including DPT (108), MBBS (194), BDS (52), and MLT (Medical lac technology) (30) take part in this study. Question related to the time since wearing the hijab, was divided into ≤ 6 and > 6 -hour timings. 67% of students wear hijab for > 6 h, and 33% wear hijab for ≤ 6 hours a day.

Mean cervical flexion for wearing hijab ≤ 6 hours was 61.06 ± 17.19 , and > 6 hours was 55.28 ± 16.09 ($p < 0.001$). While the mean extension for wearing hijab ≤ 6 hours was observed to be 41.03 ± 12.89 and for > 6 hours was 37.96 ± 10.94 ($p = 0.008$). The mean Lateral flexion for wearing hijab ≤ 6 hours was 42.66 ± 10.32 , and > 6 hours was 38.96 ± 11.01 ($p = 0.002$).

Whereas the mean right rotation for wearing hijab ≤ 6 hours was 59.50 ± 14.27 , and > 6 hours was 63.47 ± 14.13 ($p = 0.010$). Mean Left rotation for wearing hijab ≤ 6 hours was 64.66 ± 17.86 , and > 6 hours was 70.58 ± 14.34 ($p = 0.001$). The meantime since wearing hijab ≤ 6 hours was 7.45 ± 0.88 years and those using for > 6 hours were 7.73 ± 0.99 ($p = 0.008$) (Table 1).

Time since wearing the hijab was found to be significant ($p = 0.002$). Cervical flexion, extension, right rotation, and left rotation were also found significant, with p-values of 0.000, 0.000, 0.001, and 0.001, respectively (Table 2). It is suggested that the time since wearing a hijab was found to be significant ($p = 0.020$).

It was determined that the cervical flexion, extension, lateral flexion right rotation were found insignificant with p-value of 0.183, 0.526, 0.058, and 0.408, respectively. While left rotation was found to be significant ($p = 0.004$) (Table 3).

Table 1: Parameters compared with Hours of wearing hijab.

Variable	Hours of wearing hijab (Mean±SD)		p-value
	≤6 hrs	>6 hrs	
Cervical flexion	61.06±17.19	55.28±16.09	0.001*
Extension	41.03±12.89	37.96±10.94	0.008*
Lateral flexion	42.66±10.32	38.96±11.01	0.002*
Right rotation	59.50±14.27	63.47±14.13	0.01*
Left rotation	64.66±17.86	70.58±14.34	0.001*
Time since wearing hijab (years)	7.45±0.88	7.73±0.99	0.008*

*p-value ≤0.05 considered is statistically significant

Normal cervical ROM values cited from the published study¹⁷

Table 2: Department wise assessment of different parameters.

Variable	Departments (Mean±SD)				p-value
	DPT (n=108)	MBBS (n=194)	MLT (n=30)	BDS (n=52)	
Time since wearing hijab (years)	7.42±0.96	7.77±0.93	7.70±0.95	7.58±1.05	0.020*
Cervical flexion	64.81±13.12	53.50±16.35	55.64±15.42	55.91±19.96	0.000*
Extension	43.60±10.30	37.35±11.20	36.33±10.09	37.52±14.55	0.000*
Lateral Flexion	42.29±10.44	38.88±10.37	40.64±12.82	40.35±12.24	0.076
Right rotation	57.85±14.35	63.70±13.19	67.28±16.32	62.48±15.02	0.001*
Left Rotation	67.36±14.72	70.80±15.10	72.09±14.23	61.27±18.95	0.001*

*P-value ≤0.05 considered is statistically significant

Table 3: Year-wise analysis with study parameters.

Variable	Year of study (Mean±SD)					p-value
	1st year	2nd year	3rd year	4th year	5th year	
Time since wearing hijab (years)	7.83±0.89	7.40±0.82	7.65±1.00	7.63±1.06	7.87±1.09	0.02*
Cervical flexion	56.4±17.35	55.65±15.18	60.31±16.34	58.21±18.03	54.26±17.02	0.183
Extension	39.31±11.83	38.67±11.06	39.89±12.90	40.07±12.22	36.07±9.75	0.526
Lateral Flexion	39.28±9.21	38.88±9.77	42.83±12.42	38.65±12.19	40.99±10.00	0.058*
Right rotation	60.48±14.98	61.63±14.95	61.52±15.02	64.92±13.68	63.26±10.87	0.408
Left Rotation	62.17±14.28	66.74±14.90	67.59±16.84	74.21±13.47	71.89±13.60	0.004*

*p-value ≤0.05 considered is statistically significant

Discussion

Our study investigated the active cervical range of motion in females who routinely wear hijab. The findings of the study indicated a significant difference in the CROM of hijab-wearing females when compared with the normal cervical range of motions. It was determined that the females who wear hijab reported a significant limitation of

CROM in all directions i.e. flexion, extension, lateral flexion, right and left rotations. Furthermore, females who wear hijab for more than 6 hours and were more senior, report a significant decrease in the left rotation while other movements showed an insignificant difference.

A study reported effects of head scarfs on cervical spine proprioception. They collected data from 12

females and divided them into two groups: routinely wear hijab and never wear hijab. Subjects had to relocate their head to a neutral position after performing right rotation, left rotation, extension, and flexion. Their study concluded that headscarves have a negative impact on head positioning and there was an error in the head positioning accuracy in headscarf-wearing females¹⁸.

McCarthy et al revealed the association of reduced cervical extension with helmet-wearing in American soccer players. Meanwhile, no reduction in ROM was seen without the use of the helmet¹⁹. In contrast to our study, CROM was measured without the use of the hijab. Whereas the individuals of our study wore a hijab for at least and at most > 6 hours. Time since wearing a hijab was found to be significant ($p=0.020$). Consequently, it was determined that the hijab can cause a restriction to maximum CROM during ADL's. This restriction results in an adaptive shortening of muscles and postural deformities that leads to reducing CROM. Dunleavy and Goldberg reported that there is more CROM with erect posture as compared to habitual posture²⁰. While no postural analysis or EMG was done in this study, therefore, this point needs to be assessed in future studies.

Side of wrapping hijab could also be considered an important factor. Normally, right-handed females wrap the hijab over the left side first then tie it up on the right side near the ear. Due to this, they avoid left-sided movement to keep the hijab in place for prolonged periods. This style explains significant left rotation reduction. However, detailed information regarding the hijab-wearing style was not obtained from subjects. In this study, time of wearing hijab and year of the study were considered. There is also an association found between cervical proprioception and hijab. Alqabbani et al. found that there are increased position errors at a cervical joint in hijab-wearing females. Furthermore, there is also an association between forwarding head posture and CROM²¹.

This study considered factors such as time of wearing a hijab, year of study, and their association

with CROM in hijab-wearing females. Future research should also consider other factors such as wearing a hijab, cervical proprioception, and forward head postures. Moreover, there were multiple limitations in the current study since it was limited to a single institute. Moreover, there were multiple confounding factors such as timings, modern hijab styles, occupation and stress levels.

Furthermore, there multiple recommendations should also be considered for future studies. Since the literature provided evidence of a general agreement on reduced CROM with age and neck pain^{22,23}. In the current study sample, the population represents young adults, therefore, it should be predicted that the limitation of the CROM may increase with age and time. This suggest that there is a need for future studies investigating CROM in older females who wear hijab. Future research should consider other factors also, such as the style of wearing a hijab, cervical proprioception, and forward head postures, stress levels, time since wearing hijab and association of decreased ROM with neck pain and abnormal postures. Moreover, future research should also consider the preventive measures and exercises so that hijab can be made easy for females across the globe.

Conclusion

It is concluded that modern hijab is considered an important factor in decreasing the cervical range of motion. It is found that an increase in weight on the head results in decreased range of motion. While increased duration of wearing modern hijab and multiple accessories also contributes in decreasing the cervical range of motion.

Conflicts of Interest

The authors have declared that no competing interests exist.

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