

FREQUENCY OF HAMSTRING TIGHTNESS AND ITS ASSOCIATION WITH QUALITY OF LIFE AMONG SEWING MACHINE WORKERS

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ABSTRACT:

Background: Sewing machine workers, a significant part of the global workforce, face ergonomic challenges due to prolonged sitting, repetitive movements of lower limb in pressing of sewing machine paddle and fine movement skills. Prolonged sitting and paddling task raises risk of musculoskeletal problems. **Objective:** To determine the frequency of the Hamstring Tightness and its impact on Quality of life among the sewing Machine Workers. **Methodology:** The study design was analytical cross sectional study. This study design was used to identify the influential characteristics of the target population at a certain point in time. A cross sectional study captures a specific moment in time. It was used to support or refute hypothesis. It did not take a lot of time or money to complete. It had several variables when the data snapshot was taken. **Result:** This study investigates the impact of Hamstring Tightness on various dimensions of health and quality of life among 377 participants. The mean age of participants was 31.66 years (SD = 5.18), with a gender distribution of 57.6% males and 42.4% females. Findings revealed that 60.2% of participants were affected by Hamstring Tightness. Using the SF-36 questionnaire, significant associations were observed between Hamstring Tightness and several health domains: general health ($p < 0.001$), physical functioning ($p < 0.001$), emotional health ($p < 0.001$), physical health ($p < 0.001$), social activities ($p < 0.001$), pain ($p < 0.001$), emotional wellbeing ($p < 0.001$), and overall QOL ($p < 0.001$). Participants with Hamstring Tightness consistently reported poorer outcomes across these domains compared to their counterparts without the condition. **Conclusion:** The frequency of Hamstring Tightness among Sewing Machine Workers was 60.2%. Hamstring tightness has a significant impact on quality of life among Sewing Machine Workers.

Key Words: Hamstring Tightness, Quality of Life, Sewing Machine Workers, Occupational Health, SF 36 questionnaire.

Introduction:

Sewing machine workers, a significant part of the global workforce, face ergonomic challenges due to prolonged sitting, repetitive motion of lower limb involved in pressing and working of sewing machine paddle and focused fine movement skills. Long-term use of this prolonged sitting and paddling task raises the risk of acquiring lower limb musculoskeletal disorders related to the sewing machine job. (1) Worldwide, Musculoskeletal issues rank on second lead as most usual cause of disability. (2) The symptoms of musculoskeletal discomfort make employees more conscious of their level and type of pain, their ability to participate well at work, and their financial difficulties. (3) High force, repetition, and poor posture are examples of biomechanical dangers. Additionally, it could lead to psychological issues. (4)

Hamstring tightness can lead to a number of different musculoskeletal issues including decrease in range of motion that inhibits in performance of activities. (5) As a proper definition, Tightness of hamstring muscle is termed as the inability to fully extend the knee when the hip is flexed, which results in pain or discomfort in the posterior compartment of the thigh from the hip to the knee. (6) The three muscles that make up the hamstrings are the semitendinosus, semi-membranous, and short and long heads of the biceps femoris. All of these muscles originate in the hip and knee joints. They execute hip extension and knee flexion. (7)

The hamstrings are susceptible to get tightened in sewing machine workers. Hamstring tightness is defined as the inability to extend the knee beyond 160 degrees when the hip is flexed to 90 degrees. The frequency of hamstring tightness was (83.4%), with a higher prevalence in men (91.8%) than in women (78.7%) in a study of General Sir John Kotelawala Defence University, Sri Lanka 2019. (8) Hamstring tightness is measured by active knee extension test (AKET) with the hip stabilized at 90 degrees flexion. Tight hamstrings are indicated by the angle of flexion of the knee. (9) Sewing machine workers are one occupation that is impacted by a broad spectrum of co-morbidities such as physical, mental, psychological and psychosocial problems as well as sleep disturbances. (10) Workers experience stress, anxiety, and sadness as a result of their workload and pressures, which makes them unstable and reduces their productivity. Mental health issues also lead to incorrect or disrupted sewing work and a decline in productivity. (11)

To measure QOL, RAND SF36 structured questionnaire has been implicated to determine mental, physical, pain and other aspects of sewing machine workers. (12) Data on eight subscale scores and two composite scores for mental and physical health are provided by the RAND-36. Because composite scores make it easier to evaluate the results, their use has grown in popularity. (13) The RAND SF-36 is a 36-item questionnaire designed to assess quality of life across various domains, including physical functioning, limitations due to physical health, limitations due to emotional issues, energy levels and fatigue, emotional well-being, social functioning, bodily pain, and overall general health. Scoring the RAND SF-36 involves two main steps rated on a scale from 0 to 100, with 0 representing the lowest possible score and 100 the highest. Higher scores indicate a better health state. (14)

In conclusion, the convergence of occupational demands and musculoskeletal health in sewing machine workers highlights the significance of exploring the frequency of hamstring tightness and its impact of hamstring tightness on their quality of life.

Methodology:

The formal research permission was granted by University of South Asia, Tufail Road Campus under reference USA/FAHS/2024/808. The data was gathered between April 2024 and June 2024 following guided protocols and ethical considerations. All individual were given a

thorough explanation the study goal and methods before willingly deciding to participate in it through an informed consent. Data was sought from 160 females and 217 male tailors; aged 25 to 50, who stitch clothes in a sitting posture and have prolonged working (sitting) hours. Sample size was calculated by RAO Software that was 377. Non-probability convenient sampling technique was used to recruit participants. Data was collected from areas of Baghbanpura Bazar, Naulakha bazar, Gunj bazar, Kahna, Attari Saroba, Anarkali bazar in Lahore. Individual general parameters, such as age (31.66 ± 5.181), height (167.23 ± 6.908) and weight (61.83 ± 7.735), were measured. Inclusion criteria was: Working hours 6-12hours per day (8), sewing machine workers who sit for longer durations (8), and age range 25-50 years (16). The following was the exclusion criteria: any physical therapy treatment in the previous 5 weeks from current time of data collection (17), workers with history of hamstring injury in last two years (17), recent history of fracture or sprain. (18), history of any other neurologic or musculoskeletal problems (18), and recent surgeries around hip and knee joint. (18). Active knee extension test was used to check hamstring tightness in supine lying. Also known as 90/90 flexion test. Less than 20° was considered positive finding of tight hamstrings. After performing the test, measuring height, weight, and BMI, RAND SF 36 Questionnaire was distributed to every participant. Positive hamstring tightness 227 (60.2%) and negative hamstring tightness 150 (40.8%).

By SPSS version 29, the mean values and standard deviation of the measured data were computed. Continuous variables were measured and represented in histograms. Categorical variables were represented in bar charts and pie charts. Descriptive analysis was done.

Results:

- **Distribution of Age & Gender:**

The results of our study showed that the mean of age of the participants were 31.66 with std. deviation 5.181 and total numbers of participants were 377 including males and females. The frequency of male gender was 217 (57.6%) and female was 160 (42.4%) as shown in Table. 1

- **Distribution of Weight:**

The frequency of underweight Participants were 53 (14.1%), Healthy weight participants were 225 (59.7%), Overweight participants were 86 (22.8%) and Obese participants were 13 (3.4%).The percentage of normal healthy weight participant was more than underweight, Overweight and obese one as shown in Table. 1.

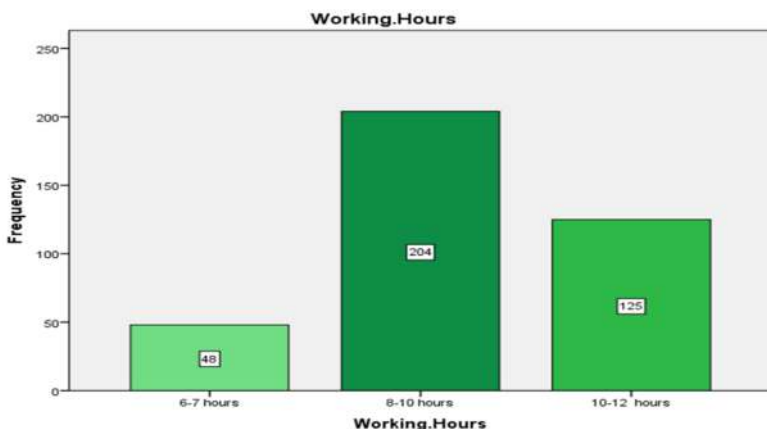
Table. 1:

Variable	*= <i>Mean</i> ± <i>SD</i> , **= <i>n</i> (%)
Age (years)	$31.66 \pm 5.18^*$
Height (cm)	$167.23 \pm 6.9^*$
Weight (kg)	$61.83 \pm 7.735^*$
Gender	
Male	217 (57.6%)**
Female	160 (42.4%)**

- **Distribution of working hours:**

The frequency of 6 to 7 working hours were 48 (12.7%), 8 to 10 working hours were 204 (54.1%) and 10 to 12 working hours were 125 (33.2%). The Percentage of 8 to 10 working hours was more than the 6 to 7 and 10 to 12 working hours as shown in figure below.

Figure. 1:



- **Distribution of dominant side:**

The frequency of the right dominant side 327 (86.7%) and left dominant side was 50 (13.3%).

- **Distribution of Hamstring Tightness:**

The frequency of the Positive Hamstring Tightness in the Sewing Machine Workers was 227 (60.2%) and negative Hamstring Tightness was 150 (40.8%) as shown in Table.2

Table. 2: Distribution of Hamstring Tightness

	Frequency	Percent
Yes	227	60.2
No	150	40.8
Total	377	100.0%

- **Association of Hamstring tightness and quality of life**

The frequency of Poor Quality of life in Participants with Hamstring Tightness was 175 and 52 was with Good quality of life. The frequency of Poor Quality of life in Participants without Hamstring Tightness was 14 and 136 was with Good quality of life. The P value was < 0.001

showing the significant decrease in QOL Hamstring Tightness Positive Patients as shown in Table. 3.

Table. 3: Association of Hamstring tightness and quality of life

	Rand SF-36 Poor	Rand SF-36 Good	Total	P value
Hamstring Tightness Present	175	52	227	<0.001
Hamstring Tightness Absent	14	136	150	
Total	188	189	377	

Discussion:

Frequency of hamstring tightness in current study was 60.2% and it was higher in males (57.6%) and lower in females (42.4%). Our study resembles a previous study on hamstring tightness among sewing machine operators that found prevalence of 83.4% (n=141) and it was higher in males (91.8%) than females (78.7%). Prolonged sitting was a contributed factor in study of 2019, Sri Lanka. The current study aimed to find the frequency of Hamstring Tightness and its impact on quality of life. Among 377 participants (217 males, 160 females), 227 participants had Hamstring Tightness, 150 did not. Meanwhile prevalence of hamstring tightness was higher in females, prevalence found in males 4% and in female prevalence found was 96%. The large difference could be because of more female then males in the respective study (study suggests).Although our study had more males than females. (8)

Study done in Tamil Nadu about health related issues regarding QOL in garment workers states 84% prevalence of health issues including (77.6%) musculoskeletal problems, (2.1%) obesity issue. Meanwhile, participants in our study who had Hamstring Tightness showed 175 (77%) with poor quality of life (QOL) and 52 (22.9%) with good QOL. That study looked for prevalence of health related issues in garment work operators while our study focused on domain wise evaluation of health related issues regarding pain, social functioning, general health, psychological and psychosocial factors, emotional wellness and role limitations. (10)

Our study focused on 377 participants mean age 31.66 std. 5.181 with QOL domains of pain, social functioning, physical functioning, general health, emotional wellbeing, energy fatigue category, role limitation due to mental and physical health. Meanwhile another study focused on effect of hamstring tightness, pain intensity, and disability on sleep quality in patients with chronic low back pain. The mean age of the 387 participants was 41.67 ± 13.38 years; 233 were females (60.2%), and 154 were males (39.8%). The mean RMQ score was 11.45 ± 2.34, the mean PSQI score was 8.58 ± 2.60, and the mean NPRS score was 4.97 ± 1.37. (15)

Limitations and Recommendations:

There were a few limitations that should be stated as follow in order to be helpful for future studies. Tailors work environment and tasks can vary significantly affecting the generalizability of findings some tailors may work in factories with different ergonomics compared to those who

work in small shops or home. Keeping in view the mentioned limitations, recommendation such as conduction of pilot studies to refine research methods, ensuring feasibility, and identify potential issues before scaling up to a larger study will improve the research further.

Conclusion:

The frequency of hamstring tightness among sewing machine workers was 60.2%. Hamstring tightness has a significant impact on quality of life among the said population.

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