



Original Article

Association of Patellofemoral Syndrome with Prolonged Duration of Sitting among Teachers; A Cross-Sectional Survey

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ABSTRACT

Although there are several etiologies for patellofemoral pain syndrome, prolonged sitting is one of the less well-understood causes. Recently, there has been some discussion about the alignment problems. **Objective:** the study was to determine the association of patellofemoral syndrome with duration of sitting among teachers. **Methods:** This was a Cross-Sectional Study conducted among 278 males 104 (37.4%) and female 174 (university teachers having an age range of 25 to 50 years, spending an average of 4 hours in sitting 62.6%) position and having pain were included in the study, based on convenience sampling technique. Data was collected after taking ethical approval from The University of Lahore by using the SNAPPS (survey instrument for natural history, etiology, and prevalence of patellofemoral pain studies) Questionnaire. SPSS 25 was used to analyze data. **Results:** The descriptive statistics showed a mean and standard deviation to be 30.81± 4.08 for age, 5.39± 1.09 for the sitting duration, 5.233±2.81 for teaching experience, and 22.28±11.48 for patellofemoral pain syndrome. The results showed that there were 12.6% of teachers with no chances of PFPS at the time of data collection, 11.5% with minimal chances, 73% had borderline and 2.9% having early symptoms of PFPS. The results regarding association of PFPS and sitting duration per day showed a significant direction association as shown by p-value 0.01. **Conclusion:** The study concluded that there was a significant association between number of sitting hours and PFPS among teachers. Most prolonged sitters are at more risk for developing patellofemoral pain syndrome. There were no teachers in the advance stage of patellofemoral pain syndrome.

INTRODUCTION

PFPS (Patellofemoral Pain Syndrome) is a generic term that refers to pain that originates in the patellofemoral joint or in the soft tissues surrounding the joint. Kneeling, sitting, climbing stairs, and running are all examples of activities that might aggravate the problem over time. In the past, this condition was referred as anterior knee pain, although this is misleading because pain can be felt throughout the knee joint [1-4]. PFPS has an impact on daily activities. Score less than 83 on Anterior Knee Pain Questionnaire denoted the presence of Patellofemoral pain syndrome. Patients taken from different hospitals of Lahore aged between 18 to 35 years showed prevalence of PFPS higher in females (21.53%) than males (16.58%) [5]. Another study showed high prevalence rates of PFPS in females. Female university athletes were shown to have a significant

frequency of patellofemoral pain syndrome. Out of 160 females tested, 21.3% were feeling limp, 65% were feeling pain while walking, all of them were having trouble ascending stairs, 15.6% were being unable to run, and 33.8% were feeling light pain and 45.6% were feeling severe pain [6]. On the contrary to this, the frequency of PFPS was detected through Kujala Scoring questionnaire in sports scientists students of Lahore was found to be higher in males (62.15%) than in females (37.85%). PFP is prevalent among sports sciences students, with 63.54 percent reporting mild or no symptoms of anterior knee pain, 26.74 percent reporting moderate symptoms, and 9.72 percent reporting severe symptoms [7]. Some persons may be impacted by PFPS because of a VMO/VL imbalance in their body. The major cause is muscle atrophy in the VMO, which

leads in inordinate lateral track of the patella due to lateral ligament residual strain [8]. Hypo mobility of the medial patellofemoral joint sliding or decreased extensibility of the tensor fascia lata, iliotibial tract, or lateral retinaculum, for example, may result in increased lateral joint stress during knee flexion. Inappropriate joint load may remain if movement constraints are not addressed [9-10]. PFPS has a complicated etiology with several risk factors, some of which are controllable and others not. Changes in patellofemoral joint pressure and load caused by impairments in proximal, regional, and distal variables are widely regarded as a role in the development of PFPS. A considerable percentage of people with PFPS experience continuous symptoms and do not see long-term improvements, which might be due to other abnormalities that are not corrected by exercise. Joint and soft tissue mobility issues may contribute to the continuation or progression of pain [11-13]. PFPS may be induced by a patellar trauma, but it is more usually caused by a combination of variables (multifactorial causes), such as patellofemoral overuse and overload, anatomical and biomechanical abnormalities, reduced muscle, imbalance, as well as dysfunction. A combination of these elements is more likely to cause PFPS to worsen and be more resistant to treatment [14-16]. Although there are several etiologies for patellofemoral syndrome, prolonged sitting with knee flexion is one of the possible cause [17-18] which is less explored. Most of the variables previously discussed are associated with traumatic and joint disease. Recently, there has been some discussion about the alignment problems. Teachers are among the members of the population who may be forced to such lengthy periods of sitting. In this manner, it may benefit teachers and the whole community. The objective of study is to determine the association of patellofemoral syndrome with duration of sitting among teachers.

METHODS

This was a Cross-Sectional Study. The study was held at The University of Lahore. Sample size was calculated to be 278 with the help of previous literature [19].

Sample Size for % Frequency in a population (Random Sample)		
Population size	1000	If large, leaves as one million
Anticipated% frequency (p)	50	Between 0 & 99.99. if unknown. use %
Confidence Limits as +/- Percent of 100	5	Absolute precision%
Design effect (for complex sample surveys-DEFF)	1.0	1.0 for random sample

278 male and female university teachers having an age range of 25 to 50 years, and average of 4 hours in sitting position and having pain in knee joint were included in the study by using convenient sampling [20]. Patients having

known arthritis, malignancy, knee amputation were excluded. The diagnosis of anterior knee pain (AKP) or PFPS is problematic because there is no agreed-upon diagnostic criteria. As a result, it's usually a diagnosis made after all other disorders have been ruled out. The region of pain, age, length of symptoms, prevalent aggravating circumstances, manual palpation, and elimination of other illnesses are used to diagnose AKP [21]. So, the data was collected by using the SNAPPS [1] (survey instrument for natural history, aetiology and prevalence of patellofemoral pain studies) Questionnaire after excluding other diagnosis. Data analysis was performed using SPSS version 25.0. Mean and Standard Deviation was calculated for continuous quantitative variables, while for categorical variables frequency and percentages were calculated. Chi square test and cross tabs was performed to analyze the data association and Data was represented in the form of pie charts and bar charts.

RESULTS

The descriptive statistics showed a mean and standard deviation to be 30.82 ± 4.09 for age, $25.6 + 3.98$ for BMI, 5.39 ± 1.09 for sitting duration, 5.233 ± 2.81 for teaching experience and 22.28 ± 11.48 for patellofemoral pain syndrome. The results regarding gender showed that there were 37.4% male and 62.6% female teachers. The results regarding marital status showed that there were 53.2% married and 46.8% unmarried teachers. The results regarding PFPS scale showed that there were 12.6% teachers with no chances of PFPS at the time of data collection, 11.5% with minimal chances, 73% borderline PFPS and 2.9% having early symptoms of PFPS. There was no participant in advance stage PFPS (81-100%) [Table I]. The chi square test was applied to determine association of PFPS and sitting duration per day which showed significant association as shown by p value 0.01. Most prolonged sitters were at borderline of developing PFPS [Table II].

Variable		Mean + S.D	f (%)
Age		30.82 ± 4.09	
BMI		$25.6 + 3.98$	
Average sitting duration per day		5.4 ± 1.1	
Teaching experience		5.33 ± 2.81	
Gender (n=278)	Male		104 (37.4)
	Female		174 (62.6)
Marital Status (n=278)	Married	22.28 ± 11.48	148 (53.2)
	Unmarried		130 (46.8)
PFPS Score (n=278)	Total score		
	No PFPS (0-20% Score)		35 (12.6)
	Minimal PFPS (21-40% Score)		32 (11.5)
	Borderline PFPS (41-60% Score)		203 (73.0)

	Early PFPS (61-80%Score)	8 (2.9)
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Table 1: Demographic characteristics and PFPS Score of Participants

		No PFPS (0-20% Score)	Minimal PFPS (21-40% Score)	Borderline PFPS	Early PFPS (61-80% Score)	P-Value
Average sitting duration per day	2 hours	26	4	40	0	0.01
	5 hours	5	12	73	0	
	6 hours	0	8	43	4	
	7 hours	4	8	47	4	
Total		35 (12.6%)	32 (11.5%)	203 (73.0)	8 (2.9)	278

Table 2: Association of Average Daily Sitting Duration to PFPSScore

DISCUSSION

A substantial number of patients with PFPS participated in this research, and it is the first time that the frequency of PFPS with extended sitting has been reported. Our results agree with those of earlier investigations. A study by Ndonge, Matara & Muriithi (2019) looked into the prevalence of musculoskeletal illnesses in Kenyan primary school teachers in Machakos County. Knee pain prevalence was the second most impacted pain after low back pain with 57.6 percent teachers affected from it. The age factor, teaching for more than four hours while sitting, working with a head-down posture, and absence of back support on chairs were all positively associated risk factors with the musculoskeletal pains in the teachers [22]. Another research investigated the negative consequences of sitting among Iranian office workers. Results revealed that there's a link between sitting for long periods of time (more than 8 hours a day) and fatigue during the workday, reduced job satisfaction, hypertension, and musculoskeletal symptoms in different body areas of the office workers. 42 percent of office workers with prolonged sitting were found to be suffering from knee pain. Thus, sitting had a negative impact on office workers. Results of the study by Daneshmandi, et al (2017) are in line with the results of the current study [23]. Sedentary time is a significant factor for office workers. This sedentary period may have musculoskeletal effects on office workers, in addition to cardio-vascular and metabolic health hazards. During two hours of extended sitting, acute unfavorable consequence of clinically significant increase in thigh pain was discovered in the study by Baker, et al (2018). The observed changes show that prolonged sitting may cause musculoskeletal discomfort, and that taking breaks to break up extended periods of sitting is advisable. The study by Baker, et al (2018) considered 2 hours of working as prolonged sitting in contrary to the present study which undertook 4 hours as prolonged sitting period [24]. Lee, et al. (2019) stated that sedentary behavior which lasted

longer more than 10 hours was linked to chronic knee pain. Obese people who have a low level of physical activity and spend more time sitting are more prone to develop chronic knee pain. Findings of the study suggested that reducing general sedentary behavior, particularly among people with chronic knee pain, should be promoted. A high level of physical activity is recommended, especially for women over 50 and those who are obese. The study by Lee, et al (2019) has concurrent findings with the current study by showing effects of prolonged sitting on causing knee pain [25]. A study was conducted by Collins, et al. (2016) to evaluate the prevalence and characteristics of sitting pain in patients of patellofemoral pain syndrome. More than half of the study participants (54%) had problems in extended sitting and 26 percent patients stated pain in sitting after exercise. Patients having sitting pain were mostly females and were having lesser BMI and greater degree of pain [20]. Findings of Collins, et al. (2016) are in contrast to the findings of Lee, et al. (2019) where obesity contributed to knee pain instead of contribution of lower BMI to knee pain. Kim (2019) performed a study to see if there was a link between sitting duration and orthopedic issues in Korean seniors. Obesity was found to be strongly linked to sitting time in both men and women. Knee joint pain was found to be substantially linked with sitting duration of 7.5 hours per day. Findings are in line with the present study where prolonged sitting had contributed to the development of PFPS [26]. The strength of our study is that no previous study has investigated the association of prolonged standing with PFPS till yet. Majority of studies have evaluated the frequencies of different musculoskeletal symptoms with prolonged sitting but not specifically PFPS.

CONCLUSION

The study concluded that there was significant association between number of sitting hours and PFPS among teachers. Most prolonged sitters are more risk for developing patellofemoral pain syndrome. There were no teachers in advance stage of patellofemoral pain syndrome.

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