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Original Article

Association of Knee Pain in Long Standing and Sitting among University Teachers

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ABSTRACT

Background: Prolonged sitting and standing raise the load on the knee, thus increasing the risk of knee pain and severity among teachers. **Objective:** To determine the association of knee pain in long-standing and sitting among school and university teachers. **Methods:** It was a cross-sectional survey conducted on 185 patients with a history of chronic knee pain. The data was collected from school and university teachers in the private and public sectors. Data were collected from both male and female teachers having knee pain and aged between 27 to 60 years and the patients who have a history of knee osteoarthritis, carcinoma, traumatic injury and wound/infection were excluded from the survey. The categorical variables were evaluated by frequency and percentages, while mean and standard deviation were calculated for continuous variables. The correlation was calculated between knee pain reported by university professors due to long periods of standing or sitting. **Results:** Out of 185 participants, 111 (60%) were females and 74 (40%) were males, with a mean age of 41.37±11.33. There was a weak positive correlation between knee pain and standing hours, which was statistically significant ($r=0.273$, $n=185$, $p<0.001$). There was a negative correlation between knee pain and sitting hours, ($r=-0.160$, $n=185$, $p<0.05$). **Conclusion:** This study found that prolonged standing hours may increase knee pain among teachers as compared to prolonged sitting. More standing hours during academic activities tend to increase knee pain while prolonged sitting did not increase that pain. There was a negative correlation between knee pain and sitting hours, and weak positive correlation between knee pain and standing hours, which was statistically significant.

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INTRODUCTION

The knee joint is the synovial joint which is formed by the tibia, patella and femur the tibiofemoral joint and the patellofemoral joint make up this intricate hinge joint. They form the patellofemoral joint when they come together the knee is the biggest joint in the human body and is often considered the most strained joint.[1] The arrangement of bones inside the joint serves as a fulcrum for the muscles that flex and extend the knee. The extracapsular, intracapsular, and ligament designs, as well as the cross-joint muscle extensions, provide the joint with the essential stability to withstand the significant biomechanical force exerted on it.[2]

In terms of knee flexion and extension in the sagittal plane, the knee joint primarily functions as a hinge, enabling movement along a single axis. There are two menisci in the space formed between the femur's condyles and the tibia's condyles. They have a triangular cross-section and are shaped like a crescent. Each lamella has two horns, one anterior and one posterior.[3] Each meniscus has an inferiorly inclined surface that is concave on the superior side to match the femoral condyles and flat on the inferior side to match the relatively level tibial plateau.

The horns of the medial meniscus are significantly farther apart than those of the lateral meniscus, creating the appearance that the medial meniscus is shaped like an 'O' rather than a "C." This is because the medial meniscus has grown in size, exposing a large region that may be vulnerable to damage.[4,5] Knee pain affects 46.2% of the population over the age of 60, with women (58%) being more prevalent than males (32%). Older patients more than 60 years of age and complaints of knee discomfort and illness have a poor quality of life. Knee discomfort may be caused by a variety of circumstances, such as an accident, a malfunction in the joint's mechanism, or even one of the several varieties of arthritis.[6] A knee injury may affect not only the bones, cartilage, and ligaments inside the joint but also the fluid-filled sac ligament and tendon which surrounds the knee joint this is because the knee joint is made up of a complex network of bones, cartilage, and ligaments (bursa).[7] The body's structure may need improvement. Fragments of bone or cartilage may break off and float within the joint if the bone or cartilage is damaged or decaying. This might be due to degeneration or an accident.

This might be the result of a fracture or cartilage injury.[8] This phenomenon might be caused by many factors. Iliotibial Band Syndrome is more common among athletes who engage in long-distance running or cycling. The kneecap seems to have shifted slightly out of position.[9] When this happens, the patella, a triangular bone that normally sits on the outside of the knee and covers the front, goes inside. The patella is responsible for guarding the front of the knee. The patella is often seen on the lateral side of the patellar compartment of the knee.

The patient will be informed if the kneecap remains misaligned after the initial treatment. If you suffer from hip or foot discomfort, you may need to change your stride to protect the afflicted joint.[10,11] Changing your stride may put additional strain on your knee joints, resulting in knee pain. Resting your knee for the first 24 to 48 hours after the onset of knee pain is one of your options. Instead, every hour, gently move your knee for 10 to 20 seconds.[12] Climb the stairs using your good leg as your lead leg and then try to put more weight on your injured leg after 48 hours. If you have chronic pain, you should try to engage in more physical activity. If there is a

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railing, you should use it. When descending stairs, start with the leg that is hurting the most. Heat therapy is a safe and effective treatment option for the majority of aches and pains.[13] When treating a new wound, keep all sources of heat away from it. This method may result in greater subcutaneous bleeding, making treatment of the underlying disease more challenging. It is in your best interests to avoid allowing the heated item to come into prolonged contact with your skin for more than twenty minutes at a time.[14]

Many people feel that applying ice to an injured knee for a short period is an effective treatment for knee pain. Making ice packs is as easy as putting ice cubes in a plastic bag or a moist tea towel, then freezing the combination. In its place, you may use a pharmacy-bought pre-packaged variety or a bag of frozen peas. Bag of frozen corn might be substituted. Applying a little amount of oil to the area before applying the ice pack may help prevent it from adhering to the skin[15] Applying oil to an afflicted region that has recently been wounded or sutured is not a good idea. Instead, place a plastic bag over the area and cover it with the bag to avoid it becoming wet. A cool, damp flannel should be placed on top of the oil. If you're using a plastic bag, you may skip this step. It's best to put the ice pack on top of the flannel.[16] Prolonged sitting and standing raise the load on the knee, thus increasing the risk of knee pain and severity among teachers. The purpose of the study was to determine the association of knee pain in long-standing and sitting among school and university teachers.

METHODS

It was a cross-sectional survey conducted on 185 patients with a history of chronic knee pain. The data was collected from the teachers of the University of Lahore using non-probability convenience sampling and the study was completed six months after the approval of the synopsis. The calculated sample size is 185 calculated by using a 90% confidence interval and 5% margin of error and by taking the expected percentage of pain among teachers as 21.8% respectively.

Data were collected from both male and female teachers, aged between 27 to 60 years and having knee pain of at least 3 points on the numeric pain rating scale (NPRS) and the patients having a history of knee osteoarthritis, carcinoma, traumatic injury and wound/infection were excluded from the study. The questionnaire consisted of demographics and an NPRS scale consisting of 11 points that start from "0" indicating no pain to "10" indicating extreme pain. Using SPSS version 25 the data was analyzed in which both categorical variables were evaluated by frequency and percentages, while mean and standard deviation were calculated by continuous variables. The correlation was calculated between knee pain reported by university professors due to long periods of standing or sitting.

RESULTS

Results showed that the majority of the participants 71 (38.38%) were normal weight while only 16 (8.65%) of them were underweight and the rest 57 (30.81%) and 41 (22.16%) were overweight and obese respectively (Figure I). The results regarding the length of sitting and standing per week at your workplace showed that the mean and standard deviation were found to be 17.43±1.765 and 13.81±2.653 respectively (Table I). There was a negative correlation between knee pain and sitting hours ($r=-0.160$, $n=185$, $p<0.05$). Knee pain and standing hours per week have a statistically significant linear relationship ($r=0.273$, $p<0.001$). The direction of the relationship is positive (i.e., knee pain and standing duration

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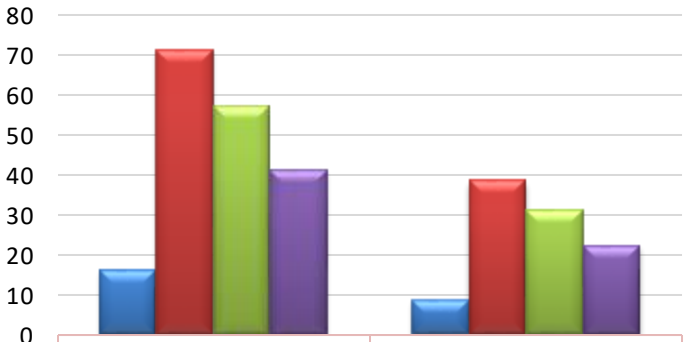
are positively correlated), which means that these variables tend to increase together (i.e., greater pain is associated with greater standing hours). Thus, there was a weak positive



	No. of Participants	Participants %age
Underweight	16	8.65
Normal weight	71	38.38
Overweight	57	30.81
Obesity	41	22.16

Figure I: Frequency and Percentage of Body Mass Index

Table I: Length of Sitting and Standing per Week

	Mean	Standard Deviation
Length of sitting per week at the workplace	17.43	1.765
Length of standing per week at the workplace	13.81	2.653

Table II: Correlation between NPRS and Length of Sitting

		Numeric Pain Rating Scale	Length of sitting per week at the workplace	p-value
Numeric Pain Rating Scale	Pearson Correlation	1	-.160*	0.029
	n	185	185	
Length of sitting per week at the workplace	Pearson Correlation	-.160*	1	
	n	185	185	

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Table III: Correlation between NPRS and Length of Standing

		Numeric Pain Rating Scale	Length of standing per week at the workplace	p-value
Numeric Pain Rating Scale	Pearson Correlation	1	.274**	<0.001
	n	185	185	
Length of sitting per week at the workplace	Pearson Correlation	.274**	1	
	n	185	185	

correlation between knee pain and standing standing hours, which was statistically significant (r=0.273, n=185, p<0.001).

DISCUSSION

In the present study, the relationship was evaluated between long-standing and sitting knee pain in university teachers. It helped to understand the relationship between long-standing academicians and sitting in knee pain. The present study found that long-standing causes increased knee pain among teachers, while long sitting appears to minimize the pain in the knee. Our results are in line with what was stated in a systematic review in which they found a significant correlation between occupations.[17] These results are also found in several other epidemiological findings and laboratory studies.[18]

The weak correlation between prolonged standing and lower extremity symptoms has also been established by another systematic review and recommends refraining from standing for a long duration (>40 minutes).[19] Although the exact prolonged standing time was not measured, the weekly hours were analyzed and also found a mild association of prolonged standing with knee pain. While

knee pain is not one of the most prevalent pains related to work-associated musculoskeletal disorders among teachers but it is still prevalent in 25-35 percent.[20,21] As a risk factor, the population and prolonged standing poses can increase knee pain. In addition, while doing vigorous physical exercise during leisure time, long working hours are also found to contribute to musculoskeletal disorders, especially knee pain.[21] The prolonged standing posture raises the load on the joints of the knee.[22] Prolonged standing posture among teachers can lead to body pain, discomfort and even health problems, especially lower musculoskeletal extremity disorders. [23] As recorded in other studies, prolonged sitting typically affects the upper extremity and lower back compared to lower limb pain.[24,25]

Similarly, the negative association effect of sitting with knee pain was discovered. In another study, long sitting periods were also found associated with fatigue during the working day, reduced job satisfaction, hypertension, and musculoskeletal disorder symptoms in the shoulders, lower back,

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thighs, and knees of office workers.[26] This length of sedentary work may be harmful to workers' musculoskeletal systems, in addition to its potential negative effects on cardiovascular and metabolic health. The study discovered acute negative effects, such as a clinically significant increase in thigh soreness, as a result of two hours of prolonged sitting.[27] The observed changes suggest that prolonged sitting may cause musculoskeletal discomfort and that taking breaks to break up prolonged periods of sitting is recommended. In contrast to the current study, in which participants sat for a total of four hours, the previous one considered two hours of work to be equivalent to prolonged sitting and discovered that sedentary behavior lasting longer than two hours increased the risk of cardiovascular disease, whereas the current study sat participants for a total of two hours.[28]

CONCLUSION

This study found that prolonged standing hours may increase knee pain among teachers as compared to prolonged sitting. Increased standing hours during academic activities tend to increase knee pain while prolonged sitting did not increase knee pain. There was a negative correlation between knee pain and sitting hours, and weak positive correlation between knee pain and standing hours, which was statistically significant.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.
Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.
Competing interests: None
Funding: No funding source is involved.
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