



## Original Article

## Prevalence of Patellofemoral Pain Syndrome and Its association with Knee Stiffness in Sanitary Workers

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## ABSTRACT

Patellofemoral pain syndrome is an overuse injury that causes pain in the front of knee and it's more common in females. Heavy workload and consistent stress on knee especially in labour work is also affecting male population with this syndrome. It can affect quality of life by limiting functions and it has long term effects. **Objective:** To determine the prevalence of patellofemoral pain syndrome in sanitary workers who are facing knee stiffness or knee pain. **Methods:** A sample of 128 participants of age 30-50 years of sanitary workers was included for the survey, according to inclusion criteria. For the selection of participants, convenience sampling was used. Pendulum test, Patellar grind test, and Knee Injury and osteoarthritis outcome score survey for symptoms and pain were used to collect data. An informed consent was signed by the participants stating that personal information of participants is confidential. **Results:** SPSS version 22 was used to define the descriptive and associated analysis of data. Results showed that there is association between Knee injury and osteoarthritis outcome score symptoms and patellar grind test ( $p > .0001$ ) while there is no association between knee outcome score pain sign and pendulum test ( $p = .482$ ). 259 participants reported 71% overall prevalence of patellofemoral pain. **Conclusions:** It is concluded that male sanitary workers had high prevalence levels of Patellofemoral pain. Preventative measures such as ergonomics training, physical activity should be taken into consideration to enhance quality of life.

## INTRODUCTION

Patellofemoral pain syndrome commonly referred to as runner's knee or anterior knee pain is a common condition characterized by pain in the front of the knee. It primarily affects the area where the patella glides along the groove of the femur (thigh bone) [1]. PFPS often occurs during physical activities that involve repetitive knee movements, such as running, jumping, squatting, or climbing stairs [2]. Patellofemoral pain syndrome is characterized by discomforting pain experienced in the area surrounding or behind the patella (kneecap) and is worsened by engaging in activities that apply pressure to

the patella while bearing weight on a bent knee [3]. It is estimated that approximately 1.75 million patients, or roughly 6%, experienced PFPS. 55% of the reported cases were found in women [4]. The South region had the highest proportion of cases at 42%, while the Northeast region had the lowest at 14% following 1,319 physically healthy and active young adults with no prior PFPS history, it was found that 3% developed PFPS over a period of 2.5 years [5]. Additionally, women were more prone to developing the condition compared to men [6]. Pain around or behind the patella is the main symptom of PFPS.

The pain may worsen with activities that involve bending the knee, such as walking downhill, squatting, or sitting for extended periods with knees bent [6]. Work-related tasks like washing, cleaning etc. are performed by sanitation workers. These tasks act as risk factor for patellofemoral pain syndrome which include Activities like prolonged standing, awkward postures, squatting, and kneeling [7]. These positions impart load on joints of sanitary workers which leads to joint pain and tissue damage. That's why sanitary workers are more prone to this disease due to their working patterns [8]. PFPS doesn't involve any structural abnormalities, and diagnostic imaging is not necessary to confirm the condition [9]. Musculoskeletal disorders pose a significant problem for sanitary workers, impacting both their QOL and leading to economic burdens through a combination of reduced productivity [10]. Sanitary workers face an increased risk of PFPS, leading to higher rates of absenteeism and work restrictions [11]. Their health, being highly exposed and vulnerable, is a major concern. Additionally, their job involves handling waste, which necessitates repetitive heavy physical activities like lifting, carrying, pulling, and pushing. These significant occupational issues are prevalent among sanitary workers worldwide [12]. The precise cause of PFPS may not always be evident, but its development is believed to be influenced by various contributing factors. These factors can include: Overuse or repetitive stress, engaging in activities that put excessive stress on the knee joint without allowing sufficient recovery time can lead to PFPS [13]. Weakness or imbalances in the muscles surrounding the knee, such as the quadriceps and hip muscles, can alter the patellar tracking and increase the risk of PFPS [14]. Malalignment of the patella, Flat feet or high arches can affect the alignment of the leg and increase the likelihood of developing PFPS [15]. Common risk factors associated with PFPS involve being female and participating in activities such as running, squatting, and stair climbing [16, 17].

Patellofemoral pain is frequently affecting workers due to uneven load distribution and excessive stress on knee. It possesses a significant challenge to profession that involves labor work and has notable implications on activities of daily living and functioning. The aim of this study was to determine the prevalence of PFPS and its severity in sanitary workers.

## METHODS

This was a Cross Sectional study. The aim and objective of the study was to find out the prevalence of Patellofemoral pain and its association with knee stiffness in sanitary workers. Convenience sampling technique was adhered for sample selection. The duration of study after ethical approval was for 6 months from March 2023 to August

2023. Inclusion criteria for sample selection were patients between the ages of 30-50. The patients should be males. The duration of workers employment and experience should be taken into consideration. Sanitary workers who had congenital abnormalities or any other orthopedic condition are to be excluded. Workers who use any assistive devices like crutches, walkers etc. cannot be a part of the study. Self-reported prior surgery in lower extremities. The sample size was estimated as 259 individuals within the age group of 30-50, calculated using WHO calculator to calculate the sample size (). With a confidence level of 95%, a margin of error of 5%, and a population proportion of 13.5%. Data collection tools consisted of patellar grind test to observe prevalence of PFPS, pendulum test to assess knee stiffness and KOOS survey to detect severity of symptoms. Data were collected from private sectors e.g. orange line stations, metro stations and style textile company Lahore. Study participants included male sanitary workers who have working experience of minimum 1 year. The research committee of the University of Management and technology gave approval for research conductance. All participants signed an informed consent form. Every piece of information was kept confidential.

## RESULTS

Table 1 displayed the age distribution of participants, ranging from a minimum age of 30 to a maximum age of 50 with the mean age of  $41.27 \pm 6.13$ , frequency of working hours of participants in the study. 120(46.3%) participants were working 4-6 hours daily while 139(53.7%) participants were working 6-8 hours daily. There were 68(26.3%) participants have 1-3 year experience, 90(34.7%) have 3-6 years' experience while 101(39%) have 6-9 years' experience. 107(41.3%) participants were working part time while 152(58.7%) were working full time.

**Table 1:** Demographics

Variable		Mean $\pm$ SD
Age	Minimum=30	41.27 $\pm$ 6.13
	Maximum=50	
Working hours of participants		<b>Frequency (%)</b>
		4-6 hours (120) 6-8 hours (139)
Experience of Participants	1-3 years	68 (26.3)
	3-6 years	90 (34.7)
	6-9 years	101 (39.0)
Job Timing of Participants	Part time	107 (41.3)
	Full time	152 (58.7)
Total participants		259 (100.0)

SD is standard deviation

Table 2 table showed the frequency of patellar grind and pendulum test of participants of study. Patellar grind test

was positive for 184(71%) and negative for 75(29%) participants. Pendulum test was positive for 80(30.9%) participants and negative for 179(69.1%) participants.

**Table 2:** Pendulum and Patellar grind test

Variable		Frequency (%)
Pendulum Test	Positive	80 (30.9)
	Negative	179 (69.1)
Patellar grind test	Positive	184 (71.0)
	Negative	75 (29.0)
	Total	259 (100.0)

Table 3 illustrates the association of KOOS symptoms with patellar grind test and p-value > 0.0001 shows that there is association between KOOS symptoms and patellar grind test.

**Table 3:** KOOS symptoms association with patellar grind test

Variable		Pendulum Test		Pearson R value	p-value
		Positive	Negative		
KOOS Symptoms	Severe (1-25)	18(16.7%)	90(83.3%)	.18.337	.000
	Moderate (51-75)	19(45.2%)	23(54.8%)		
	Mild (26-50)	37(38.5%)	59(61.5%)		
	No Symptoms (76-100)	6(46.2%)	7(53.8%)		

KOOS is knee injury and osteoarthritis outcome score. R is coefficient correlation

## DISCUSSION

The present study was conducted as a cross-sectional investigation with the objective of determining the prevalence of patellofemoral pain syndrome and whether it is associated with knee stiffness or not among sanitary workers. For this purpose convenience sampling technique was used. Sanitary workers with congenital abnormalities and those who used assistive devices were excluded from the study. To check the prevalence, patellar grind test was used. To find out association of knee stiffness with PFPS, pendulum test was used and KOOS survey was obtained to evaluate severity of syndrome. Patellofemoral pain syndrome is a growing disorder among industrial and sanitary workers as the amount of workload and consistent engagement of musculoskeletal unit to do their jobs are making them more susceptible to injury. The current study recorded prevalence of 71% as 184 subjects represented positive to patellar grind test. This is supported by past study of JS Baptista in 2022. According to prior study the economic sector are more prone to PFPS because of numerous numbers of risk factors that affects general health and physical fitness. The past study presented with 30% of prevalence of patella femoral pain in workers. The study concluded that more attention is required to counter patellofemoral disorder [9]. The findings of this study are in consistent by findings from Nilmart *et al.*, where prevalence was evaluated in people suffering from PFPS

with low to moderate level of physical activity. The past study illustrated that 72% of participants reported with PFPS tenderness at medial side of patella and 70% with lateral side. This is in similarity with current study where 71% prevalence was determined but in individuals with moderate to high activity levels under stress. The prior study added that patellar facet palpation could be another criteria to diagnose patellofemoral pain syndrome [14]. Through the present study, it is inferred that patellar grind test appeared to be positive in 184 individuals out of 259, highlighting the dangers and risks involved with recurrent loads on knee joint. This is supported by previous study that focused on athlete group. 62.5% weight lifters were found to be diagnosed with PFPS and total 80 participants were found positive with patellar grind test. Hence, concluding that excessive tracking of patella could wear down the cartilage and make the knee joint unstable. This is why people complains about knee giving out during activities of daily living [19]. With regards to different occupations, it was noted that prevalence of PFP was exceptionally higher in people with occupational workload such as automobile industrial workers and garbage carriers. Moreover, there was clear association of deformities like genu varum along with PFP in workers. The results of this previous study supports the findings of current study that pateelofemoral pain syndrome is significantly increasing in sanitary workers and demographic factors such as age and BMI has an impact on it [20]. In people with PFPS, hypermobility of patella is induced. This gives rise to unstable knee joint and increase the risk of falls. All in all, severity of symptoms could disturb the body mechanics and may result in discoordination and impaired balance. This makes patella to give away and subject falls down. In the current study to figure out physical activity and Quality of Life in included sample, KOOS survey was obtained. KOOS is a knee specific questionnaire from assessment of knee health according to various factors involved [21]. The current study concluded that 1 to 25 subjects reported severe symptoms and almost 70 to 100 subjects showed normal Activities of daily living. 56 subjects reported moderate symptoms of pain, stiffness and reduced QOL. The study is supported by Lee *et al.*, research that was conducted in 2019. The current study findings are in line with previous study as KOOS score showed reduction in all aspects of physical activity. The worst knee was associated with moderate level of physical activity. In short lifestyle habits of workers could adversely affect their quality of life [22]. The stiffness of knee is a common symptom in all ailments regarding knee. The current studies objective was to calculate knee stiffness in PFPS patients. For this purpose pendulum test was taken as a data collection tool. In this particular test, affected leg is dropped from the position of extension and then the

oscillations were checked. More oscillations means absence of knee stiffness. In current study, no association was observed between patellofemoral pain syndrome and pendulum test. However, this is in contrast with prior study of Bohinc *et al.*, which claimed that knee disorders reduced active and passive range of motion of knee thus causing stiffness and rigidity. Reduction in ROM's of knee results in tightness of surrounding muscles. Tightness further leads to formation of contractures and diminished physical activity but no such association with stiffness was observed in current study [23]. The cross sectional study came to conclusion that there is high prevalence of patellofemoral pain syndrome among sanitary workers and a reduced quality of life.

## CONCLUSIONS

This study shows that male sanitary workers had high prevalence levels of patellofemoral pain syndrome. Considering this and the significant levels of disability, PFPS should be a top research priority. Approximately one in ten people currently experience PFPS, making it a widespread condition. Knee pain due to PFPS were commonly reported among male sanitary workers due to their prolonged sitting, standing positions, working in the same awkward and cramped position for long periods of time and doing heavy duty work throughout the day which increases pressure on their knee joint that's why sanitary workers frequently complain of knee discomfort caused by PFPS. Therefore, based on the findings of this study, it is advised to use preventative measures (ergonomics training, physical activity) to enhance QOL.

## Authors Contribution

Conceptualization: GH, BFR

Methodology: MA, MM, SMK, SQ

Formal analysis: GH

Writing-review and editing: HHR, ZN

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The author declares no conflict of interest.

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