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Prevalence of patellofemoral pain among medical students in Egypt

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Abstract---Background: There is a wide variation of the prevalence of patellofemoral pain (PFP), there is limited studies concerning the prevalence of PFP in Arabic population and specifically medical students in the universities. Objectives: The aim of this study was to evaluate the prevalence of PFP in the medical students of Cairo University (aged 18–25 years) using a self-report online questionnaire. Methods: The present cross-sectional study was conducted in Cairo city on 532 medical students of age 18-25 years. Data was collected through online questionnaire. Results: Overall prevalence rate of PFP was 28.76%. PFP was higher in females than males (23.5% and 5.3%,

respectively), it was insignificantly associated with BMI, time of sitting with bending knee ($P>0.05$), while significantly associated with time of standing ($P<0.05$). Conclusions: Patellofemoral pain is common among young active medical students in Cairo University with higher prevalence in females than males.

Keywords---patellofemoral pain, prevalence, medical students.

Introduction

Patellofemoral pain syndrome (PFPS) is a common condition leading to significant pain around the knee joint and patellar area. PFPS mostly affects young adults resulting in limitation of their physical activity and social participation [1]. There is a wide variations of the prevalence of PFPS; which is estimated between 15% and 45% [2, 3]; but the annual incidence and real prevalence of PFPS are unclear [4]. The pathology of PFPS is not clearly understood and the most affected structures of this disorder are the anterior synovium, infrapatellar fat pad, subchondral bone, and medial or lateral retinaculæ [5]. Overloading of these structures may lead to pain that is usually aggravated by at least one activity that includes weight bearing on a flexed knee [2].

In the past, PFPS was a condition of individuals performing intensive physical training such as athletes or military recruits; but there is a growing evidence that PFPS is common in the whole population(2). However, the association between the incidence of PFPS and physical activity is not completely clear. Some authors stated that PFPS in young adults seemed to be associated with high levels of physical activity, while others have found no relationship between them [6, 7].

The diagnosis of PFPS has been based on a detailed subjective and objective clinical examination, with pain on several provocative tests including the patellofemoral compression test, palpation of the patella and pain on resisted extension(3). However, PFPS is diagnosed by exclusion of other knee pathologies, such as traumatic knee injuries, and overuse injuries including, iliotibial band friction syndrome and jumper's knee [8, 9, 10].

Clinical assessment in large cohort studies are costly and inconvenient to participants, making the diagnosis and identification of the true prevalence a more complicated task (8).Variations in documentation of the incidence and prevalence of PFPS may be due to the assessment of different populations. Most of the PFPS prevalence studies were limited to surveys of military personnel, athletic groups, or school children [3, 11,12,13, 14]with higher incidence and prevalence among females[15, 16].

There are currently no known valid clinical tests for anterior knee pain (AKP) or PFPS [17, 18]. One of the functional assessment tools used to evaluate the symptoms of patients with PFPS is anterior knee pain questionnaire (AKPQ) [19]. It includes 13 questions about the ability to perform a number of different activities as well as a question about pain. It is considered a valid and reliable method that can be easily completed by patients or subjects [20].

Xu et al. [21] stated that 20.7% of the general Chinese population suffered from PFPS and also Smith et al. [3] reported a high prevalence level for PFPS in many populations. However, there are many studies showed the prevalence of PFPS in the foreign populations, there is limited studies concerning the prevalence of PFPS in Arabic population and specifically medical students in the universities. Consequently, there is still a need for further research to assess the prevalence of this syndrome in Arabic population. Up to the author's knowledge, there is still no convincing data available about the prevalence of PFPS among university students and especially medical students in Egypt and hence, this study was conducted.

The objectives of present study were to

- Evaluate the prevalence of PFP in the medical students of Cairo University (aged 18–25 years) using a self-report online questionnaire that was designed to detect individuals with PFP
- Investigate the association between PFP and BMI, physical activity

Methods

This is an observational cross-sectional study conducted in Cairo, Egypt. The study was approved by the ethical committee of Faculty of Physical Therapy, Cairo University, Egypt (No:P.T.REC/012/002653).

Subjects

The study was conducted in Cairo University among medical students (males and females) with their ages ranged from 18 to 25 years. The minimal sample size was calculated using the sample size equation: $n = z^2 p(1-p)/d^2$ [22], considering target population more than 1000, and study power 95%, the sample size equal 246 according data obtained from previous study by [21].

n = required sample size

z = confidence level at 95% (standard value of 1.96)

p = estimated prevalence of PFPS

d = precision

Procedures

Data were collected through online questionnaire distributed through social media and emails from June 2020 to June 2021. The questionnaire includes 3 sections:

- 1) First section includes introduction to the participants by explaining the aims and benefits of the study and Informed consent was obtained from all participants by marking a checkbox.
- 2) Second section includes demographic data of participated students that involved: Participants' age, height, and weight, knee and foot posture, and daily physical activities were recorded.
- 3) Third section is the valid and reliable Arabic version of Anterior Knee Pain Questionnaire AKPQ [23], based on their current symptoms and functional

abilities. Anterior knee pain scale (Kujala questionnaire for patellofemoral joint pain) is a 13-items knee specific self-report questionnaire, it documents response to six activities thought to be associated specifically with anterior knee pain syndrome (walking, running, jumping, climbing stairs, squatting, and sitting for prolonged periods with knees bent), as well as symptoms such as limp, inability to bear weight through the affected limb, swelling, abnormal patellar movement, muscle atrophy, pain and limitation of knee flexion. The maximum total score of this assessment tool is 100, with higher scores indicating greater levels of function with lower levels of pain. A cutoff of 83 on the AKPQ was chosen to identify those individuals with PFPS, following the recommendations made in the study by Kujala et al. [19].

Statistical analysis

Descriptive statistics was used to describe the characteristics of the participants. The prevalence of PFP was calculated in the overall sample and in the male and female participants. Pearson correlation analysis was used to examine the association between each factor (BMI, physical activity) and PFP. Furthermore, the participants were categorized into small groups according to knee deformities (present or not) as well as flat feet (present or not). $P \leq 0.05$ was considered statistically significant. All of the statistical analyses were performed using SPSS 22.0 (SPSS Inc., Chicago, IL, USA).

Results

Five hundred thirty-two responses were received to the study questionnaires, among which 30.08% were male ($n = 160$) and 70.11% were female ($n = 373$). General characteristics of the participants were showed in (table 1). The prevalence of suspected PFP was 28.76 % ($n = 153$), the mean age, height, mass and BMI of the participants were showed in (Table 2). The prevalence of PFP was considerably high among females (23.5 %), while it was 5.3% among males with ratio 4:1.

Table 1: General characteristics of the participants

Variables	n	%
Total	532	
With PFP	153	28.76%
Without PFP	379	71.24%
Gender		
Female:	373	70.11%
With PFP	125	33.51%
Without PFP	248	66.49
Male:	160	30.08%
With PFP	28	17.5%
Without PFP	132	82.5%
Knee deformities in PFP	24	4.50%
Flatfeet in PFP	35	6.60%

Table 2: Demographics of the participants with PFP

With PFP(N=154)	
variables	Mean(SD)
Age (year)	21.9 (2)
Weight (Kg)	66.99 (11.3)
Height (CM)	164.8 (7.8)
BMI	24.7 (3.5)
AKPS	74.6 (7)
Time of sitting with bending knee(hour)	3.5(2.5)
Time of standing (hour)	2.6144(1.7)

BMI: body mass index, SD: standard deviation, AKPS: anterior knee pain scale, PFP: patellofemoral pain

Pearson correlation coefficients analysis revealed that PFP (anterior knee pain scale score) was negatively correlated with time of standing ($r = -0.213$; $P = 0.008$). Pearson correlation coefficients analysis revealed that PFP (anterior knee pain scale score) was not significantly associated with time of sitting with bending knee (hour) ($r = -0.051$; $P = 0.529$), There was no correlation between PFP and BMI ($r = 0.025$; $P = 0.759$) (Table 3).

Table3: Association between AKPS and BMI, time of sitting, time of standing in PFP

variables	Pearson correlation		
	BMI	Time of sitting with bending knee(hour)	Time of standing (hour)
AKPS	0.025	-0.051	-0.213(**)
P-VALUE	0.759	0.529	0.008

** Correlation is significant at the 0.05 level

Discussion

The results of this study revealed that the prevalence of PFPS was 28.76 %, and this percentage is considered high. And also, the results of this study revealed that there was a higher prevalence for female than male by ratio (4:1). In addition to that, the results revealed that PFP was associated with time of standing. PFP had no association with BMI (kg/m²), and time of sitting with bending knee (hour).

Variations in reported incidence and prevalence of PFPS may be due to differing populations assessed, inconsistencies in the diagnosis and lack of high quality evidence on which to base assessment [12, 24]. Patellofemoral pain syndrome (PFPS) is thought to affect the general population(11), and more specifically adolescents [14], young active adults [13], elite athletes [25, 26], and military recruits [27]; with higher incidence and prevalence rates often cited among females [15, 27].

The results of this study came in agreement with Boling et al. [15] who reported that the prevalence of PFPS in military persons is 13.5%; with 15.3% for females and 12.3% for males. The annual prevalence of PFPS in the general population was reported as 22.7%, with the annual prevalence in females 29.2% and males 15.5% [8]. In addition to that, Fairbank et al. [28] reported that the annual prevalence of PFPS was 28.9%. Moreover, Clarsen et al. [26] reported an annual prevalence of PFFPS was 35.7% with symptoms of any duration, and 6.4% with symptoms lasting greater than 30 days

Considering the gender affection, this study showed high prevalence for females. This result came in line with Hall et al. [29], Myer et al. [30], and Steinberg et al. [31] who stated that the prevalence of PFPS in only adolescent female athletes was 22.7%. One study of female athletes (mean age 21.6) at the 3rd Iranian Sports Olympiad reported point prevalence of symptoms greater than 3 months of 16.7% [25]; and another with female university ballet dancers reported point prevalence (of unknown duration) as 29.3% [32].

There are anatomical and biomechanical factors that may lead to a higher prevalence of PFPS in the females compared to the males. One of those factors is the difference in quadriceps angle (Q-angle) as females have larger Q-angles than males and a greater Q-angle is a risk factor for PFPS. Theoretically, a greater Q-angle increases the lateral pull of the quadriceps muscle and potentiates patellofemoral joint disorders [15, 33, 34, 35].

Lower extremity muscle strength is believed to be another risk factor for PFPS. Females have been reported to be significantly weaker than males on measurements of hip abduction, hip extension, hip lateral rotation, and quadriceps strength [30, 31]. This muscle weakness places the females at a higher risk of joint pain and injuries, including PFPS [36, 37, 38].

Limitations of the study

The results of data collected can't be generalized to the whole population because this study was undertaken among the medical field students and hence it couldn't be the same findings for the students with similar ages in the engineering, agriculture field and....etc. Future studies will be needed to determine of prevalence of PFPS in other individuals in other schools or institutions with the same age range.

Conclusions

Patellofemoral pain is common among young active medical students in Cairo University with higher prevalence in females than males.

Declaration

Abbreviations

PFPS: Patellofemoral pain syndrome; AKP: Anterior knee pain; BMI: Body mass index

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Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to current Cairo University regulations & Egyptian legislation but are available from the corresponding author on reasonable request and after institutional approval.

Authors' contributions

All authors contributed equally in all parts of this study.

Ethics approval and consent to participate

The aim and procedures of the study were explained to every participant and an informed consent was obtained before being enrolled in the study. The study was approved by the physical therapy faculty ethical committee (No: P.T.REC/012/002653).

Consent for publication

Not applicable.

Competing interests

The authors declare that we have no competing interests (financial and nonfinancial).

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