

## Patellofemoral Pain Syndrome in Iranian Female Athletes

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**Abstract-** Patellofemoral pain syndrome (PFPS) is the most common overuse syndrome in athletes. It is one of the causes of anterior knee pain in athletic population who come to the sports medicine clinic. Patellofemoral pain is more common among female athletes especially adolescents and young adults. Symptoms include: persistent pain behind the patella or peripatella. Pain increases on ascending and descending stairs and squatting and prolonged sitting. The aim of this study was to evaluate the prevalence of PFPS in Iranian female athletes. 418 female athletes aged 15-35 years were examined in five sports: Soccer (190), volleyball (103), running (42), fencing (45) and rock climbing (38). The athletes who had non-traumatic onset anterior knee pain of at least 3 months that increased in descending and ascending stairs and squatting, had no other causes of anterior knee pain such as ligament instability, bursitis, meniscal injury, tendonitis and arthritis and no history of knee surgery during the one past year were diagnosed as PFPS. 26/190 (13.68 %) soccer players, 21/103(20.38 %) volleyball players, 7/42 (16.66 %) runners, 6/45(13.33 %) fencers and 10/38 (26.31%) rock climbers had patellofemoral pain. Among the 418 female athletes who were evaluated 70 had PFPS. Rock climbers were the most common athletes with PFPS followed by volleyball players and runners.

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### Introduction

Patellofemoral pain syndrome (PFPS) is a spectrum of processes characterized by retropatellar pain (behind the kneecap) or peripatellar pain (around the kneecap) arising from overuse and overload of the patellofemoral joint or from biomechanical or muscular changes in this joint (1).

PFPS is most common in adolescents and young adults, especially recreational or professional athletes who regularly participate in sporting activity, especially high-impact activities, such as running, basketball, and football (1,2). PFPS has a higher prevalence in military personnel than in the general population. PFPS is more common in females than males (3). It is more common in overweight persons (4). Patellofemoral pain usually is associated with functional activities such as ascending and descending stairs, squatting, and prolonged sitting (5) and crepitus, clicking, catching, and the sensation of

giving way (6) joint effusion is rare, and range of motion (ROM) is not limited (7).

Symptoms are typically bilateral and persistent, lasting over several years with little change. Since the pressure between the patella and its contact points on the femur increases as the knee is bent, PFPS is often referred to as an overuse injury (8). Excessive use of the patellofemoral joint: repeated weight bearing impact, or excessive loading, can also contribute to the symptoms of PFPS, especially in runners and other athletes, and particularly when ascending or descending steps or slopes, on uneven surfaces, and when squatting or sitting with flexed knees (1). Diagnosis can be aided by careful attention to both the patient's history and the physical examination. The reported incidence rate of patellofemoral pain syndrome among athletes in United States is greater than 25% (1). The results of a study in a British sports injury clinic have indicated that PFPS accounting for 5% of all injuries seen and 25% of knee

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injuries (9). The results of one study indicated that female basketball players had greater incidence of PFPS than male basketball players (10). In a study it was demonstrated that among 23 soccer players with knee chondral lesions 6 athletes had patellar cartilage damage in knee arthroscopy (11). A number of studies have reported that PFPS is the most common problem among runners (12, 13) and the results of a study indicated that among 161 runners 15 persons had PFPS (14). According to the results of a study in elite fencers, among 93 fencers prevalence of PFPS was 39.8% (15). The dramatic increase in participation by female athletes in recreational and competitive sports during recent years has coincided with a greater awareness of common musculoskeletal disorders such as patellofemoral pain syndrome (PFPS).

There is little knowledge presently of the incidence of PFPS in the adult population and in the athletes of the most countries despite some well-known epidemiological studies on knee pain. As there is no knowledge about the prevalence of PFPS in female athletes in Iran, the purpose of this study was to determine the prevalence of this syndrome among female athletes in 5 sports (soccer, volleyball, running, rock climbing, fencing).

## Patients and Methods

This study was a cross sectional survey that the authors evaluated 418 female athletes who wanted to participate in 3th. Iranian Sports Olympiad in 1387. The athletes had to be examined in screening program for medical problems. We could not examine them in their clubs then we went to the Tehran sports medicine board and evaluated 418 athletes from different sports clubs in 5 sports fields: 42 runners from 9 teams, 190 soccer players from 13 sports teams, 103 volleyball players from 7 teams, 45 fencers from 6 teams and 38 rock climbers from 5 teams. Since PFPS is common in some sports like running, such as volleyball, basketball. We tried to examine athletes in these sports but some of the

sports boards did not have any cooperation in examination. The researcher examined 418 athletes medically then they, who had knee pain, were evaluated more. Since overweight is a risk factor for PFPS, we measured weight and height of all of the athletes. All of the athletes nearly trained 3 sessions per week for the last 6 months. The mean of time at each session was: 2 hours in soccer, 2.5 hours in volleyball, 2 hours in running, 1.5 hours in fencing and 2 hours in rock climbing. Diagnostic criteria for PFPS were: 1- anterior knee pain of at least 3 months duration that was felt retropatellar or peripatellar and was aggravated by descending or ascending stairs , squatting or prolonged sitting; 2-the non- traumatic onset of anterior knee pain; 3- no history of knee surgery during the one past year; 4- no signs of meniscal involvement or cruciate ligaments and 5- no pre patellar bursitis or patellar tendonitis or Osgood Schlater disease or apophysitis and the other causes of anterior knee pain such as knee arthritis ,neurologic problems , patellar dislocation.

The athletes were evaluated by researcher clinically and they who had all of 5 diagnostic criteria were known as PFPS.

## Results

- From 190 soccer players 26 athletes had PFPS that prevalence was almost 13.68%( 12 players from 101 players on grass had PFPS it equals 11.88 % and 14 players from 89 indoor soccer players had PFPS, 15.73%)

- From 103 volleyball players 21 athletes had PFPS that prevalence was almost 20.38%.

- From 38 rock climbers 10 athletes had PFPS that prevalence was almost 26.31%.

- From 45 fencers 6 athletes had PFPS that prevalence was almost 13.33%.

- From 42 runners 7 athletes had PFPS that prevalence was almost 16.66%.

Totally from 418 female athletes in these sports 70 athletes had PFPS (16.74%).

Table 1. Demographic data

	Soccer	Volleyball	rock climbing	Fencing	Running	Total
Athletes number	190(45.4%)	103(24.6%)	38(9.09%)	45(10.76%)	42(10.04%)	418
Team numbers	13	7	5	6	9	40
Age(mean, SD)	22.31(2.07)	22.50(2.1)	20.04(2.4)	19.06(1.4)	20.67(1.8)	
Weight(mean, SD)	58.8(7.1)	60.3(7.1)	52.7(4.1)	53.8(4.7)	54.9(4.4)	
Height(mean, SD)	162.5(3.4)	165.7(2.9)	163(3.1)	160(3.4)	163.1(2.2)	
Exercise time (hours/week)	6	7.5	6	6	6	

## Discussion

Our results show that prevalence of PFPS in Iranian female athletes is 16.74% as compared to previous studies in the United Kingdom, mainland Europe, Australia and the USA that authors have stated that 25% (or a 1:4 ratio) of the general or sporting population presented with patellofemoral pain (9,16-18).

The cause of this little different may be the kind of sports. They did not evaluate the sports fields separately. In our study we could not evaluate basketball players so assessed fencers who probably PFPS prevalence in them is low. It can be the cause of less prevalence among athletes.

According to a study it is revealed that PFPS prevalence in female basketball players during the season is more than out of season and males (10). In our study athletes were during season but in other studies it is unknown. If they have examined out of season the difference between results will be higher than now.

According to a paper of Michael J. Callaghan, an incidence rate for PFPS of 25 % (1:4) was cited in 13/40 papers that were retrieved but other incidence rates cited ranged from 3% to 40% and the authors revealed that there were no epidemiological papers studying the incidence of PFPS in the United Kingdom (19) also in athletes especially female athletes only a little number of papers are about PFPS prevalence in separate sports fields.

Naslund *et al.* stated that PFPS affect 15–33% of the adult population and 21–45% adolescents; the only peer reviewed publication cited to support this statement is from Kannus *et al.* (1987) that their population was from the sports clinic context (20).

In addition to these two papers, the results of other studies (16-18) determined that PFPS incidence in athletes and general population was the same. It is not comparable to our country because in their country the general populations are more active than Iranian people and the level of physical activity is high in their country.

Thus there is a need for a properly conducted and funded epidemiological study to investigate the incidence and prevalence of PFPS or Anterior knee pain in the Iranian athletes.

In current study we evaluated prevalence of PFPS in 5 sports separately. Incidence of this syndrome among rock climbers was the highest (26.31%). Volleyball players (20.38%) were the second most prevalent group.

In the papers retrieved there is no paper about PFPS in rock climbers and we can not compare Iranian rock climbers to the rock climbers in other countries. The most of rock climbers who we examined were expert

mountain climbers for several years who were training in mountains 3 times a week, this high prevalence of PFPS among them can be result of mountain climbing.

For comparing incidence of PFPS in Iranian volleyball players to the others there is not epidemiological papers but it is revealed that the second most common chronic injuries among volleyball players is PFPS (21).

About incidence of PFPS in soccer players according to Levy *et al.* it is 26%. In many studies authors have evaluated incidence of knee injuries (acute & chronic) among soccer players and their results show that

PFPS was one of the most common chronic knee injuries among soccer players (22,23).

In current study 101 of soccer players were playing on grass and the others were indoor soccer players and the prevalence was 11.88% in grass players and 15.73% in others.

In examination of the athletes tightness of hamstring was evaluated in all athletes but the data is not included in paper. Indoor soccer players had more tightness than grass players that can be the cause of more prevalence of PFPS because tightness of hamstrings is a important factor in etiology of PFPS (8). This tightness might be result of less stretching and preparation programs among them.

In our study fencers had prevalence about 13.3% but the results of a previous study (15) showed 39.8% among elite fencers. The fencers who we examined were amateur fencers and they were in initiative levels, this may be the cause of low incidence of PFPS among Iranian fencers. The results of current study also revealed that PFPS in runners is about 16.6% and according to a previous study it was 9.31% (14).

This difference can be result of a lot of factors that are important in etiology of this syndrome. For example badly worn shoes or poorly designed shoes may produce excessive foot pronation and exacerbate any tendency to flat foot which may precipitate PFPS. Running or playing surface may also be important in PFPS. The distant of running probably is one of major factors in etiology and it is necessary to match running groups for comparing. There are many biomechanical and anatomical factors in PFPS which it is better to evaluate all of them in any athlete. In conclusion, it is therefore concluded that the incidence of PFPS among the Iranian female athletes in rock climbing and volleyball is almost 20% to 25% (1/4-1/5). PFPS is one of the most common etiologies of anterior knee pain among Iranian female athletes.

Without this type of investigation, incidence and prevalence of PFPS or Anterior knee pain of the sporting

population will remain unknown. Proper knowledge of the incidence and prevalence of this condition is important not only for researchers planning further investigations but also for clinicians who need to provide treatment services to this group of patients and for increasing success in sport activities.

There were many difficulties in the present study because many athletes think that by participating in a clinical examination and having knowledge of their problems will stop them from the continued participation in their sport. It is therefore recommended that clarification of the effects of this disease on sporting performance and success be given to athletes and their coaches.

Also we recommend more researches for evaluation of the etiological factors incidence in PFPS among athletes in different sports. When the most common factors in each sport are known, PFPS can be prevented from progressing and thus increase success in sporting activities.

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