# Original Article

# Factors Associated With Osteoarthritis Of The Knee In Former Professional Male Footballers In Bangladesh

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## Abstract

***Background:**: Osteoarthritis is one of the commonest disabilities that affect human life. Knee joint is most commonly affected by osteoarthritis. The professional footballers are exposed to heavy and prolonged physical activities that often exceed normal health capacities during both training and competition and are at risk of developing knee osteoarthritis of the knee (KOA). **Objective:** To evaluate the factors related to KOA in former professional male footballers in Bangladesh. **Materials and Methods:** This was a multicenter cross-sectional study. Purposively Selected footballers subsequently underwent knee radiographs at Bangabandhu Sheikh Mujib Medical University (BSMMU) and Kurmitola General Hospital (KGH). Patients were examined at Sports Medicine Clinic of KGH and Department of Physical Medicine and Rehabilitation of BSMMU from January 2019 to December 2019. **Results:** The mean age of ex footballers was 59.49±9.19 years. We found 46.55% prevalence of KOA among footballers. Among 174 footballers 37.63% had history of familial OA and 8.62% had gout. An average matches played by a footballer was 497 and average training in career was 3924 hours. We found knee injury, BMI, family history of OA, gout and total matches played were significant risk factors for KOA. Other did not proved significant. **Conclusion:** Knee injury was the prime factor here for causing KOA later. So we need to give more attention in preventing knee injuries beside other strategies to reduce risk of developing KOA, moreover early diagnosis of KOA, modification of activities of daily living and exercise is needed.*

***Key words:** Osteoarthritis, Professional footballers, Risk factors.*

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## Introduction

Osteoarthritis is the commonest form of joint disorder and it is one of the commonest disabilities that affect human life.[1,2] It ranked among the top 10 disabilities across the globe.[3] Osteoarthritis is a degenerative disease of joint characterized by loss of articular cartilage, appearance of osteophytes at bone margins, formation of subchondral sclerosis and cyst and a variety of biochemical and morphologic alterations in synovial membrane and joint capsule.[4]

Damage of articular cartilage is the hallmark of osteoarthritis. The subchondral bone remodels leading to collapse and cyst formation and the ligament and joint capsule degenerations. All these constitute the pathogenesis of osteoarthritis.

Knee joint is most commonly affected by osteoarthritis. As the average life expectancy of Bangladeshi population increments regularly the prevalence of OA knee also increases in an arithmetic mode.[5] The osteoarthritis of knee (KOA) is a multifactorial disease including both generalized and local factors. The general factors are age, sex, body mass index, hereditary etc. and local factors are previous injury, occupation, alignment etc.[6,7]

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About 265 million people play football worldwide and among them more than 100 thousands are professional and male.[8] In professional football, the injury risk about 1000 times higher than manufacturing and construction work or service sector.[9]

The professional footballers are exposed to heavy and prolonged physical activities that often exceed normal health capacities during both training and competition.[10,11] This excessive physical activities and insufficient recovery time may lead to acute, chronic or recurrent injuries of the musculoskeletal system.[12,13]

There are limited studies among retired footballers although they are at risk of KOA.[14-19] None of these studies examined the specific factors in KOA among professional footballers. The aim of this study is to find out the risk factors among professional male footballers in Bangladesh.

## Materials and Methods

This was a cross-sectional study on formal professional male footballers from January 2019 to December 2019 placed in two different medical institutes respectively the Sports Medicine Clinic at Kurmitola General Hospital (KGH) and the Department of Physical Medicine and Rehabilitation of Bangabandhu Sheikh Mujib Medical University (BSMMU). Patients were selected by questionnaires distributed to retired professional male footballers. A purposive sample of 174 eligible participants was recruited from aged 40 years and older, had responded to the questionnaire and willingness to do knee radiographs if needed.

Knee osteoarthritis was defined both clinically and radiographically according to ACR criteria for classification of idiopathic osteoarthritis of the knee.

A structured questionnaire was used for collecting the information on demographic, constitutional and biochemical risk factors such as age, BMI, positive family history of KOA, hips or hands among first degree relatives or history of joint replacement surgery. The career details of the footballers were also collected. Other variables are body pain, any other comorbidities, current medications and high risk occupations after retirement from professional football were also collected by questionnaire.

The details of knee injuries during their career such as how many times they sustained knee injury and significance of knee injuries were obtained. Significant knee injury was considered as one which caused you pain for most days of at least a 3 month period and resulted in an absence from all training and matches during this time.They were also asked about total duration of their career, number of matches and training duration.

Statistical analysis was carried out by SPSS version 26 and percentage, mean with standard deviation, Odds ratio and confidence interval were calculated. This study was approved by Ethical committee of KGH. All participants gave consent for questionnaire and knee radiographs.

## Results

We had registered 250 retired professional male footballers for the study. But not all of them responded completely. At last 174 retired footballers came to our sports clinic and complied with all the necessary examinations and radiographs if needed. The mean age of the players was 59.49±9.19 years.

The average BMI was 24.21±2.53 kg/m2. Out of 174 footballers, 57 (32.76%) had normal BMI. Majority (96, 55.17%) players were overweight and only 21 (12.07%) were obese. Among 174 footballers, 65 (7.36%) had family history of osteoarthritis and 15 (8.62%) had gout. About half of the footballers joined high-risk occupation after retiring from football. A total of 96 (55.17%) footballers had history of significant knee injury during their career. Average career training was 3924±2041 hours and an average matches played by each player was 497±261. Majority (35.63%) of retired footballers was midfielders. About 30% were defenders, 24% were forwards and the rest were goalkeepers. Out of 174 professional footballers, 81 (46.55%) footballers were diagnosed to have KOA (Table I).

**Table I:** Baseline Characteristics and Prevalence

| | **Study Population (n=174)** |
|---|---|
| Age (Year), Mean (SD) | 59.49 (9.19) |
| BMI (kg/m2), n (%) | |
| Normal | 57 (32.76) |
| Overweight | 96 (55.17) |
| Obese | 21 (12.07 |
| | |
| Family History of OA, n (%) | 65 (37.36) |
| Suffers from gout, n (%) | 15 (8.62) |
| High-risk occupation after football, n (%) | 86 (49.43) |
| Knee injury, n (%) | 96 (55.17) |
| Career training dose (hours), mean (SD) | 3924 (2041) |
| Matches played, mean (SD) | 497 (261) |
| Position, n (%) | |
| Goalkeeper | 18 (10.34) |
| Defender | 52 (29.89) |
| Midfielder | 62 (35.63) |
| Forward | 42 (24.14) |
| | |
| Outcome measure, n (%) | |
| Knee OA | 81 (46.55) |

Odds ratio of KOA for age showed increased odds of 1,022, but 95% Confidence Interval (CI) was not significant (0.988-1.057).

The relationship of BMI with KOA showed that Odds Ratio (OR) for overweight footballers was 1.858 with 1.174-2.940 95% CI and OR for obese was 2.803 with 0.901-8.721 95% CI. Overall Odds Ratio of KOA for BMI was 1.250 with 1.094-1.427 95% CI.

The footballers with history of familial OA and gout had significantly increased odds ratio (1.952 and 3.496 respectively). Those males who joined high risk profession after retiring football had increased odds ratio of 1.585 but not significant.

Footballers had 15% increased odds of KOA for the every 1000 hours career training but not significant as 95% CI was 0.989-1.334. For every 100 matches the odds of KOA had significantly increase (13.5%) with 95% CI of 1.009-1.277. According to position of footballer player none had significant odds of KOA though midfielder and forward had increased odds of 1.371 and 1.2 respectively (Table II).

**Table II:** Odds Ratio for Primary Outcome Risk Factors

| | Odds Ratio (95% CI) |
|---|---|
| Age (Year) | 1.022 (0.988-1.057) |
| BMI (kg/m2) | 1.250 (1.094-1.427) |
| Normal | |
| Overweight | 1.858 (1.174-2.940) |
| Obese | 2.803 (0.901-8.721) |
| | |
| Family History of OA | 1.952 (1.048-3.638) |
| Suffers from gout | 3.496 (1.067-11.452) |
| High -risk occupation after football | 1.585 (0.870-2.888) |
| Knee injury | 1.779 (1.353-2.340) |
| Career training dose (per 1000 hour) | 1.149 (0.989-1.334) |
| Matches played (per 100 matches) | 1.135 (1.009-1.277) |
| Position* | |
| Goalkeeper | 0.293 (0.092-0.93) |
| Defender | 0.977 (0.510-1.874) |
| Midfielder | 1.371 (0.736-2.556) |
| Forward | 1.200 (0.599-2.405 |

* OR presented with respect to all other tiers

There was 78% significant increase of odds of KOA for knee injury with 1.353-2.340 95% CI. Those footballers who experienced 1-2 knee injury during their career had significant increase of odds of KOA (OR-3.095, 95% CI 1.051-9.113). But footballers with 3-4 knee injury had increase odds of KOA but not significant (OR-4.846, 95% CI 0.505-46.492) (Table III and Figure 1).

**Table III:** Odds Ratio for number of knee injury with 95% Confidence interval

| Number of injuries | Knee OA |
|---|---|
| 0 | Reference |
| 1-2 | 3.095 (1.051-9.113) |
| 3-4 | 4.846 (0.505-46.492) |

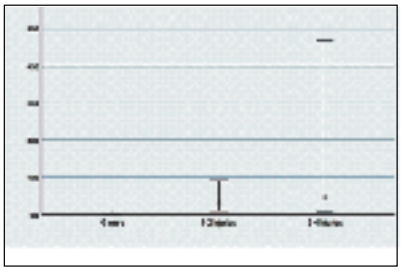

**Figure 1:** Odds Ratio for number of knee injury with 95% Confidence interval

# Discussion

The study was done with the collaboration of the two institutes respectively the Department of Physical Medicine and Rehabilitation of BSMMU and the Sports Medicine Clinic, a specialized clinic of Department of Physical Medicine and Rehabilitation, KGH, Dhaka.[20] In this study mean age of retired footballers was 59.49±9.19 years. Parekh et al. showed 59±11.7 years mean age and another one showed 38±5 years.[21]We found 46.55% prevalence of KOA among the footballers. The prevalence of KOA were 50%, 49%, 80% and 27.5% in previous four studies.[18,19,22,23] Among the 174 footballers 37.63% had history of familial OA and 8.62% had gout. Parekh et al. reported 31.2% had familial OA and 11.8% had gout. An average matches played by a footballer was 497 and average training in career was 3924 hours. Parekh et al. showed on average 470 matches played and 7840 hours training by a footballer. Gouttebarge, et al. in 2018 showed career duration of a footballer was 11±5 years.

In our study we took several variables to find out the risk factors for developing KOA in retired footballers. The variables were age, BMI, family history of OA, gout, high risk occupation after retiring from football, knee injury during playing, total training period, total matches played and position in the field. We found knee injury, BMI, family history of OA, gout and total matches played were significant risk factors for KOA. Other did not proved significant.

Parekh et al.[21] showed knee injury, age, gout and career training to be significant. Gouttebarge, et al.[9] showed knee injury was significant risk factor for developing KOA.

This study showed an importance to survey nationwide football players and grow more awareness among the players to avoid the preventable causative factors for the KOA and can mintain a long time carrer. The whole team management get the idea and do for the players thereby in right way.

# Conclusion

Family history of OA, gout, matches played and higher BMI were proved to be the risk factors for knee OA. Especially knee injury was very significant. So we need to give more attention on who are at risk of developing KOA. For that more focus should be given for early diagnosis of KOA, ADL modification and exercise.

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