

---

Case Report

## Arab Knee: Management and Prevention-A Case Report

Inklebarger J, Galanis N, Akhtar A , Stone H, Adel G, Farooq G, Gyer G, Michael J, Bernardotto M

The London College of Osteopathic Medicine, 8-10 Boston Place, London NW1 6QH, UK

---

### Abstract

Radiographic osteoarthritis of the knee is very common in Saudi patients, especially in the patellofemoral compartment.

Some studies have considered repetitive daily prayer activities as a factor of causation. However prevention and management recommendations appear to be non-existent in the literature. This report describes the case of chronic bilateral anterior knee pain in a devout adult male of normal body weight, which was dramatically alleviated by using a padded cushion under the prayer rug. Simple strategies of temporarily modifying prayer posture, insuring good prayer form, and adequate knee padding, may offer promise as low tech and economical solutions for the management of anterior knee pain in this cultural group.

---

Key Words: Knee, Arab, Muslim, Salah, Kneeling, Prayer, Osteoarthritis, Patellofemoral, Pain, Imam

### Introduction

Radiographic osteoarthritis of the knee is very common in Saudi patients, especially in the patellofemoral compartment. [Boukal AAA 2010] Patellofemoral pain syndrome (PFPS) is a spectrum of processes characterized by retropatellar (behind the knee cap) or peripatellar pain (around the knee cap) arising from overuse and overload of the patellofemoral joint (PFJ). It has also been associated with biomechanical changes and a variety of pre-existing pathologies of the anterior joint. [Labella C 2004]

Anterior knee pain (AKP), chondromalacia patella (CMP) and knee osteoarthritis is also more common in females, and may be predisposed by pelvic-knee alignment variations such as an increased Q angle. [Emami MJ et al 2007]

Knee arthritis and knee pain is also more common in homogenous Arab populations. This may be due to both religious and cultural habits. [Hawamdeh ZM]

It has been speculated that anterior knee pain is associated with the daily kneeling and squatting habits is the ethnic group, and it appears to be an occupational hazard as well. For example, overload anterior knee pain (AKP) has specifically been associated with trade professions

requiring repetitive kneeling on carpets and floors [Kivimaki J et al]

Though a 2010 study reported less radiographic evidence of knee osteoarthritis and pain in Muslims compared to Buddhist of similar ethnic origin, [Chokkhanchitchai S et al 2010], a later hospital-based study reported a significantly higher incidence of knee pain for Arabs in comparison to the Western world. [Hawamdah Z et al 2013]

There is also a greater comparative prevalence of anteromedial and posterolateral knee cartilage degenerative in Arabian populations. [Hodge WA et al 2009]

Knee joint osteoarthritis (OA) of the knee joint is characterized as a chronic articular cartilage loss, subchondral sclerosis, juxta-articular bone cysts and marginal osteophytosis. These degenerative changes have a multifactorial causation (obesity), and may be accompanied by progressive pain, loss of function, and other clinical signs such as intra-articular effusion, crepitus, stiffness, and visible deformity.<sup>1</sup> [Buckwalter]

The progression of knee OA is also strongly linked to repetitive microtrauma, prior knee surgery as well as metabolic and endocrine factors such as diabetes, vitamin D deficiency. It has also been associated with genetic factors, a sedentary

life style, and obesity, coupled with joint overload. [Felson DT et al 1987, Jordan KM et al 2003, Oliveria SA et al 1995]

Knee OA is also more common in women than men and in more elderly populations. [Felson, Dieppe PA et al 1995]

Comparative computer tomography 3-dimensional reconstruction data has noted that Arab knees are significantly smaller than Caucasian knees accompanied by significant asymmetry of the proximal tibial plateau and femoral condyles. [Hafex MA et al 2016]

The causation of these significant asymmetrical anterior knee joint deformities unique to this cultural milieu have not yet been accounted for. However, these may be developmental deformities predisposed by repetitive kneeling overload PFJ micro-trauma and bony remodeling, if full prayer is commenced during the critical adolescent bone growth period.

### Case Report

A right-handed male Uber driver and shop worker of Middle-Eastern decent, presented to an outpatient clinic, reporting intermittent and progressively worsening bilateral anterior knee pain and intermittent swelling, which he associated with kneeling during daily prayers. The knee pain had been present for several years, had worsened over the past few months, and was accompanied by anterior knee grinding & clicking, morning knee joint stiffness, and occasional swelling.

He was then unable to tolerate kneeling and had modified his prayer position to chair sitting. Aside from chronic lower back pain, his medical history unremarkable. He had been taking naproxen as needed for knee and back pain and had also applied pain relieving ointments and gels to his back and knees. He had no drug allergies and his family history was also unremarkable. He was a non-smoker.

On examination posture, gait, lower limb and foot alignment were generally unremarkable and leg length was equal. There was no clinical knee joint effusion, deformity or scarring. Some mild roughening-thickening of the skin overlying the proximal patellar tendon was noted. Some left sided paraspinal muscle tension was present, but partial squat and single leg heel raises were accomplished without difficulty. The left greater

than right Slump test was positive reproducing left calf tension. The bilateral hips displayed a mild capsular pattern and mild PFJ crepitus was noted on bilateral passive knee extension. The knee ligaments were intact and there was no palpable knee joint line tenderness. The lower limbs were neurovascularly intact, and some mild to moderate discomfort was reported on R sacral springing.

The patient continued to pray 5 times per day, but began using a padded mat under the prayer rug. After a few weeks of using the padded mat, he reported that his bilateral anterior knee pain and first improved and then completely abated. He also became more aware of his kneeling prayer body positions and alignment. By using the under prayer mat cushioned pad routinely, he was able to return to full daily kneeling prayers.

### Discussion

Subsequent to advancement in molecular biology, knee OA is now understood to be a complex low-grade inflammatory-degenerative multifactorial disease, characterized by progressive loss of joint structure and cartilage degeneration. Genetic and epigenic factors, cultural behaviors, lifestyle, obesity and other preventable risk factors may also predispose to an accelerated trajectory of OA knee progression. [Musimeci G et al 2015]

Repetitive kneeling may be a risk factor. For example, carpet layers who engage in repetitive occupational kneeling, comprise less than 0.06% of the United States workforce yet they submit 6.2% of compensation claims for traumatic knee inflammation. [Thun M et al 1987]

Other studies have also noted as of yet unaccounted for anthropomorphic size-shape differences in the proximal tibial-distal femur in arthritic Arabian knees. This case report paper proposes that ethnic differences and anterior knee pain and arthritis may be associated with to biomechanical stress remodeling kneeling micro-trauma, which may be traced back into childhood, if full prayer patello-femoral joint (PFJ) compression overload is commenced prior to and during lower limb bone-joint maturation. Subsequent overload remodeling during critical childhood musculoskeletal development continued into adulthood, may be a predisposing factor to later in the life prevalence of knee injury and arthritis.

If the parent carpet layers were encouraging their children to engage in repetitive kneeling when a

potential existed for this activity to cause PFJ microtrauma with subsequent acceleration of knee OA later in life, there would likely be global outrage.

However, due to religious beliefs, recommendation for avoiding RSI kneeling could be tricky, as the children who pray are taught usually from the age of 5-6 or even younger how to pray with full mechanics. An abbreviated form is usually reserved for the elders who pray seated in chairs.

Forensic skeletal maturation models have noted transition to full skeletal maturity at 18.37 and 17.16 years for males and females. However, corresponding factors indicate that complete skeletal maturity of the knee does not provide conclusive evidence of bone maturity attainment by 18 years of age. [Koningsberg L et al 2019]

Ideally, it would be proposed then the repetitive kneeling activities be avoided until age 19 for both males and females. As this would likely be impossible to implement, alternative acceptable solutions may be required.

It has been estimated that 23.2% (1.6 billion) of the total global population is Muslim, and this religious group is rapidly growing.

Physical inactivity prevalence in the Muslim world is higher than non-Muslim countries and the difference is primarily due to higher rates among Arabs. [Kahan D 2015]

### **Some Low Tech Recommendations Of Arab Knee Treatment & Prevention**

Anterior and lateral knee x-rays may be useful in identifying and grading underlying knee arthritis and subsequent management recommendations. Addressing other contributory and potentially reversible contributory causes such as excessive body weight and improving general health, activity, adequate diet (vitamin D), exercise, weight loss, and physical conditioning are also recommended.

Identifying particularly at-risk subgroups may also be important. The number of people who complain of knee pain and are regular kneeling worshippers is anecdotally quite high and may number in the thousands. Praying outside the

Mosque and kneeling on hard surfaces may also predispose. [Image 1]

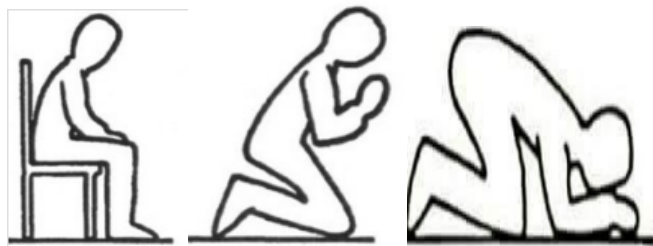


**Image 1:** Repetitive kneeling on a hard surface (hospital floor) during prayer may predispose to anterior knee pain.

Children attending Mosque and Islamic schools may be of also be at risk for anterior knee pain, as they from a very early age, are taught to engage in full kneeling prayer five times per day, seven days per week. Children may additionally sit in a kneeling posture for up to an hour, while attending after-school Quranic classes 5 days per week.

The most ready solution and mainstay for preventing potential future harm, would be to postpone traditional prayer activities and Quranic study kneeling until adulthood. However, recommendations for avoiding patellar-femoral joint overload prayer and Islamic study kneeling in children would be a break from long-held religious traditions, and would likely be an unacceptable. An alternative solution in keeping with Islamic tradition would be to ensure substantial sub-rug padding in Mosques and Quranic study rooms. Readily available cushioned under-prayer rug mats may also be useful, if sub-rug padding is not available. These mats are also lightweight and portable if the devotee is planning travel or will be engaging in outdoor prayer. If the anterior knee pain is progressive or advanced, temporary seated prayer may be required with a graded trial of return to full kneeling prayer upon

an under-rug padded surface. [Image 2]



**Image 2:** Seated, kneeling and bowing prayer postures.

Rehabilitative exercises and correct prayer form awareness may also improve biomechanics, and promote soft tissue regeneration for chronic pain management. [Butcher], and a graded return to praying activity is also recommended in order to prevent reoccurrence.

Though language barriers, mistrust of the health care delivery establishment, and perceived or real social stigmatization have been identified as contributory to inequalities in ethnic health, a lack of strategy and an ‘extreme’ shortage in minority health promotion interventions have also been identified. [Egede L]

Trusted and well respected Imams, as Muslim religious leaders possess the gate-keeper influence and authority to facilitate positive health change strategies in their communities, with some health care professions considering Imam participation essential to addressing the deepening inequalities in devotee health. [Choudhary et al]

As of 2017 Muslims comprise 4.8% or more of the national UK population, and with a higher birth rate and immigration growth trends forecast to continue, the incidence of anterior knee pain and other health inequalities in this ethnic group is also likely to grow, and it may be up to the Imams to address this and other health issues. [Mustafa Y et al]

A preponderance of peer-reviewed studies comparing osteoarthritis-associated knee pain in culturally diverse populations have identified biomechanical flexion and axial rotation overload during kneeling or squatting, consistent with greater anteromedial and posterolateral cartilage degenerative wear patterns in Saudi Arabian knees. However, the daily routines of Islamic kneeling-bowing prayer is a form of exercise, which may also promote lower limb flexibility,

strength and balance, provided that repetitive PFJ compression against hard surfaces is avoided. It is hoped that simple strategies such as using under-prayer padded mats, ensuring good prayer form, and encouraging seated prayer in those with knee pain, would afford some simple and economical solutions to support that management of anterior knee pain in this ethnic group. Obesity is a worldwide problem effecting many population groups including the Arab world, and it has been widely acknowledged as a risk factor for OA, with every 5 kg of weight gain conferring a 36% increase in the risk of knee OA. [Lementowski PW et al 2008]

Further follow up studies and additional investigation to verify any developmental links between childhood prayer activity and the detrimental anthropomorphic variations of adult Arab knees. Further research to guide public health prevention strategies will be also required, but any advancements will likely be highly dependent upon Imam community outreach and cooperation.

## References

1. Boukal AAA, Prevalence of Radiographic Knee Osteoarthritis in Saudi Arabia, *Clinical Rheumatology*, 2000;21(2):142-5
2. Buckwalter JA, Lane NE. (1997), Athletics and osteoarthritis. *Am J Sports Med*;25:873[PubMed] [GoogleScholar]
3. Butcher JD, et al. (1996), "Lower extremity bursitis". *Am Fam Physician*. 53 (7): 2317–24
4. Chokkhanhitchai S, Tangarunsanti T, Jaovisidha S, Nantiruj K, Janwityanujit S, (2010), The effect of religious practice on the prevalence of knee osteoarthritis, *Clin Rheumatol*, 2010 Jan;29(1):39-44
5. Choudhary S, Brophy S, Fareedi MA, Zaman B, Ahmed P, Williams DR, (2008), Intervention, recruitment and evaluation challenges in the Bangladeshi community: experience from a peer lead educational course. *BMC Med Res Methodol*;8:64. doi: 10.1186/1471-2288-8-64. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
6. Emami MJ, Ghahramani MH, Abdinejad F, Namazi H, (2007), Q-angle: an invaluable parameter for evaluation of

- anterior knee pain, Arch Iran Med, 2007;10(1):24-6.
7. Hodge WA, Harman MK, Bank SA, (2009), Patterns of knee osteoarthritis in Arabian and American knees, J Arthroplasty, 2009;24(3):448-53.
  8. Hafex MA, Sheikhedrees SM, Saweeres ES, (2016), Anthropometry of Arabian Arthritic Knees: Comparison to Other Ethnic Groups and Implant Dimensions, J Arthroplasty, 2016;31(5):1109-16
  9. Hawamdeh ZM, and Al-Ajlouni JM, (2013), The Clinical Pattern of Knee Osteoarthritis in Jordan: A Hospital Based Study, Int J Med Sci; 10(6): 790–795.
  10. LaBella C. (2004), Patellofemoral pain syndrome: Evaluation and treatment. Prim Care Clin Pract;31:977-1003.
  11. Lementowski PW, Zelicof SB. (2008), Obesity and osteoarthritis. Am J Orthop (Belle Mead NJ);37:148–151. [PubMed] [Google Scholar]
  12. Egede L. (2006), Race, ethnicity, culture, and disparities in health care. J Gen Intern Med. 2006;21(6):667–669. doi: 10.1111/j.1525-1497.0512.x. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
  13. Felson DT, Naimark A, Anderson J, Kazis L, Castelli W, Meenan RF. (1987), The prevalence of knee osteoarthritis in the elderly. The Framingham Osteoarthritis Study. Arthritis Rheum. 1987;30:914–18. [PubMed] [Google Scholar]
  14. Dieppe PA. (1995), Clinical features and diagnostic problems in osteoarthritis. In: Klipple JH, Dippe PA, editors. Practical Rheumatology. London: Mosby; 1995. pp. 141–56. [Google Scholar]
  15. Felson DT. (2003), Epidemiology of osteoarthritis. In: Brandt KD, Doherty. M, Lohmander S, editors. Osteoarthritis. 2nd ed. Oxford: Oxford University Press; 2003. pp. 9–16. [Google Scholar]
  16. Jordan KM, Arden NK, Doherty M, Jordan KM, Arden NK, Doherty M, Bannwarth B, Bijlsma JW, Dieppe P, Gunther K, Hauselmann H, Herrero-Beaumont G, Kaklamanis P, Lohmander S, Leeb B, Lequesne M, Mazieres B, Martin-Mola E, Pavelka K, Pendleton A, Punzi L, Serni U, Swoboda B, Verbruggen G, Zimmerman-Gorska I, Dougados M, (2003), EULAR recommendations 2003—an evidence based approach to the management of knee osteoarthritis: report of a task force of the standing committee for international clinical studies including therapeutic trials (ESCISIT) Ann Rheum Dis;62:1145–55. [PMC free article] [PubMed] [Google Scholar]
  17. Kahan D, (2015), Adult physical inactivity prevalence in the Muslim world: Analysis of 38 countries, Prev Med Rep; 2: 71–75.
  18. Kivimäki J, Riihimäki H, Hänninen K, (1992), Knee disorders in carpet and floor layers and painters, Scand J Work Environ Health;18(5):310-6.
  19. Konigsberg LW, Sgheiza V, (2019), The Use of Roche, Wainer, and Thissen's Skeletal Maturity of the Knee, J Forensic Sci;64(6):1769-1775.
  20. Musumeci G, Aiello FC, Szychlińska MA, Rosa MD, Castrogiovanni P, Mobasher A, (2015), Osteoarthritis in the XXIst Century: Risk Factors and Behaviours that Influence Disease Onset and Progression, Int J Mol Sci; 16(3): 6093–6112.
  21. Mustafa Y, Baker D, Puligari DB, Melody T, Young J, Smith FG, (2017), The role of imams and mosques in health promotion in Western societies—a systematic review protocol, Syst Rev; 6: 25. Published online 2017Feb2.doi:10.1186/s13643-016-0404-4
  22. Oliveria SA, Felson DT, Reed JI, Cirillo PA, Walker AM. (1995), Incidence of symptomatic hand, hip, and knee osteoarthritis among patients in a health maintenance organization. Arthritis Rheum;38:1134–41. [PubMed] [Google Scholar]
  23. Thun M, Tanaka S, Smith AB, Halperin WE, Lee ST, Luggen ME, Hess EV, (1987), Morbidity from repetitive knee trauma in carpet and floor layers. Br J Ind Med;44(9):611-20