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ORIGINAL ARTICLE

To determine the frequency of Baker's cyst on MRI in patients with knee pain.

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ABSTRACT… Objective: To determine the frequency of Baker's cyst in patients presenting with knee pain, considering MRI as imaging modality. **Study Design:** Descriptive, Cross-sectional study. **Setting:** Department of Radiology, JPMC, Karachi. **Period:** 03 January 2021 till 02 July 2021. **Material & Methods:** Total 113 patients presenting with knee pain for >4 weeks duration who were referred for knee MRI were selected in the study. Both male and female patients between 15-65 years included in the study. Post-surgical patients and those with contraindication to MRI were excluded from the study. MRI of effected knee was performed in every selected patient by using 1.5 Tesla MRI by placing the knee in extended position with slight external rotation to facilitate imaging. MR images were interpreted by one consultant radiologist for presence or absence of Baker's cyst. **Results:** Patients of 15 to 65 years age were included in the study with mean age of 44.94 ± 6.69 years. Out of 113 patients, 65 (57.52%) were male and 48 (42.48%) were female with male to female ratio of 1.4:1. Mean BMI of patients was 27.45 ± 3.02 kg/m2. Mean duration of pain was 5.78 ± 2.30 months. In our study, 22 patients with knee pain were found to have Baker's cyst on MRI with frequency of 19.47%. **Conclusion:** This study concluded that frequency of Baker's cyst on MRI in patients with knee pain is quite high.

Key words: Arthritis, Baker's Cyst, Knee Pain, MRI, Magnetic Resonance Imaging, Meniscal Lesion, Ultrasonography.

INTRODUCTION

Knee joint pain is regarded as one of the leading causes of hospital visits related to knee problems.[1] Damage to soft tissue structures surrounding and stabilizing the knee joint, including menisci, ligaments, tendons and muscles causes knee pain and associated symptoms with other cause being non-traumatic injury like inflammation and infection, etc.[2] Knee pain in a middle or old age patient requires x-ray of knee joint as the first line imaging modality followed by ultrasound and MRI knee joint.[3]

Baker's cysts commonly occur as a result of abnormal distension of a communicating Gastrocnemius and Semi-membranous bursa.[4] and they get manifested in several knee conditions, mainly rheumatoid arthritis, osteoarthritis (OA), and meniscal injuries.[5] Baker's cysts are of clinical significance in the sense that they may be overlooked or may mimic other conditions. The distended bursa if clinically evident appears as a popliteal mass.[6] Complications include cyst rupture leading to cellulitis and pseudo thrombophlebitis and direct compression of popliteal vein and artery by the cyst resulting in deep venous thrombosis or ischemia respectively.[7]

Plain radiographs are helpful in detecting underlying bone pathologies frequently associated with popliteal cysts, such as inflammatory arthropathies, osteoarthritis, and detached bone fragments.[8] Ultrasound is rapid, noninvasive, relatively inexpensive and easy-to-use investigation to be employed in the setting of suspected popliteal cyst.[9,10]

MRI is gold standard for noninvasive and accurate diagnosis of Baker's cyst for its appropriate treatment. It is important to identify a select group of patients to monitor popliteal cysts since it is

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difficult to make a correct clinical diagnosis without imaging, and also because recognition of Baker's cyst is useful to reduce the risk of complications of cyst rupture. On literature review very limited data on this topic was found. This study will provide an empirical evidence for routine use of MRI in patients presenting with knee pain of unknown origin. On MRI Baker's cyst appears as non-enhancing cystic lesion in medial aspect of popliteal fossa between tendons of medial head of the Gastrocnemius and Semimembranosus muscles returning hypointense signals on T1W images and homogeneously hyperintense signals on T2W images.[11] In a study only 12% patients with knee pain had Baker's cyst on MRI.[12] while in another study, this percentage was found to be 25.8%.[13]

The objective of the study was "To determine the frequency of Baker's cyst on MRI in patients with knee pain."

MATERIAL & METHODS

This is a descriptive, cross-sectional study conducted in radiology department, JPMC, Karachi from 3rd January 2021 till 2nd July 2021. Total 113 cases calculated by using WHO calculator for sample size with 95% confidence level, 6% margin of error and taking expected percentage of Baker's cyst in patients with painful knee studied with MR imaging as 12.0%12 using non-probability consecutive sampling technique. All patients of any gender (male or female) between 15 – 65 years age with pain in knee (VAS >3) for >4 weeks duration who were referred for MRI of knee joint were included in the study. Patients with previous history of knee surgery, patients who have contraindication to MRI i.e. MRI incompatible prosthesis or cardiac pacemaker and those with history of trauma to knee joint were excluded from the study.

Total 113 patients fulfilling the inclusion criteria referred for MRI to Department of Radiology, JPMC, Karachi were selected. Consent from institutional ethical review committee was taken (F.2-81/2021-GENL/56902/JPMC). Informed consent was taken from every patient. After this, MRI of effected knee was performed in every patient by using 1.5 Tesla MR with SE T1W, FSE T2W and STIR sequences by placing the knee in extended position with slight external rotation to facilitate imaging. MR images were reported by senior consultant radiologist (with atleast 5 years of post-fellowship experience) for presence or absence of Baker's cyst. This all data (age, gender, duration of symptoms, place of living (rural/urban), osteoarthritis (yes/no), diabetes mellitus (yes/no), BMI and Baker's cyst (yes/no) was recorded on a specially designed proforma.

SPSS version 25.0 was utilized to analyze the collected data. Mean and standard deviation were calculated for age, BMI and duration of symptoms. Frequency and percentage were calculated for gender, place of living, osteoarthritis, diabetes mellitus, side affected and Baker's cyst.

Effect modifiers like age, gender, BMI, duration of symptoms, place of living, osteoarthritis, side affected and diabetes mellitus were controlled through stratification. Post-stratification chi square was applied and p-value ≤ 0.05 was considered as significant.

RESULTS

Patients between 15 to 65 years of age were included in the study with mean age of 44.94 ± 6.69 years. Out of 113 patients 65 (57.52%) were male and 48 (42.48%) were females, male to female ratio was 1.4:1. Mean duration of pain was 5.78 ± 2.30 months. Mean height, weight and BMI of patients was 152.45 ± 11.29cm, 85.34 ± 8.67 kg and 27.45 ± 3.02 kg/m2 respectively.

In our study, 22 patients with knee pain were found to have Baker's cyst on MRI with frequency of 19.47%.

Age (in years)	No. of Patients	%age
15-40	44	38.94
41-65	69	61.06
Total	113	100.0

Table-I. Distribution of patients according to Age (n=113). Mean ± SD = 44.94 ± 6.69 years

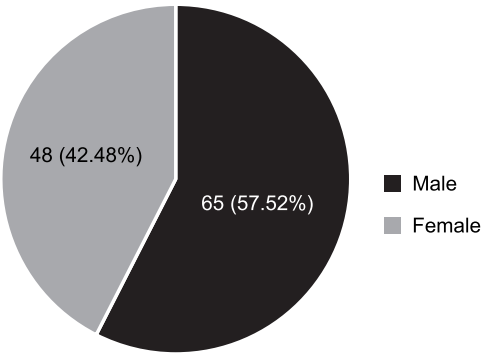

Figure-1. Distribution of patients according to gender (n=113)

Duration of Disease (in months)	No. of Patients	%age
≤6	78	69.03
>6	35	30.97

Table-II. Distribution of patients according to duration of disease (n=113). Mean ± SD = 5.78 ± 2.30 months

DISCUSSION

Baker's cysts are mostly seen in association with osteoarthritis and meniscal tears, both of which are known as intra-articular disorders. Baker's cysts can lead to pain in posterior knee which continues even after surgical treatment undertaken intra-articular lesion.[14,15] The name Baker'cyst is attributed to a surgeon William Morant Baker who belonged to Britain and who assessed 8 cases of popliteal cysts[16] In addition to Baker, various surgeons had explained about popliteal cysts prior to him. Among them was Robert Adams[15] who in 1840 explained a bursa enlargement that was below Gastrocnemius' medial head that was connected with knee joint by a valvular opening. Baker's final conclusion was that the reason behind popliteal cyst was arthritis. Similarly, in 1856, after examining 11 knees with popliteal cysts, Foucher[17] found that these are caused by bursa distention below the inner head of Gastrocnemius. Likewise, Wilson et al[18] in 1938, assessed 30 knees and concluded that in 26 knees bursa was the reason behind as it was found between medial head of Gastrocnemius and Semimembranosus, 58% of these directly connected with the knee joint.

Pathologies of knee associated with Baker's cysts consist of presence of meniscus tears[19,20], chondral lesions[19] osteoarthritis[21], anterior cruciate ligament tears and inflammatory arthritis.[19] Of all the above mentioned conditions meniscal tears are the most common association with popliteal cysts.[19]

This study is conducted to assess Baker's cyst frequency on MRI in patients suffering from knee pain. In our study, frequency of Baker's cyst on MRI in patients with knee pain was found in 22 (19.47%) patients. In a study, Baker's cyst on MRI in patients with pain in knee joint was found in 12% patients.[12] In another study, this percentage was found to be 25.8%.[13] Liao et al[22] found a prevalence of 12.9% for Bakers's cyst in patients having knee pain; however their population also consisted of patients with different kind of diseases, such as microcrystal deposit arthropathy, rheumatoid arthritis, and seronegative spondyloarthropathies and, in whom the build-up of joint pain may have been linked to inflammatory mechanisms.

There are few studies which show occurrence of 5-58% for Baker's cysts on MRI that has been performed to look for other knee pathologies which shows an increase in the occurrence with age, internal changes and/or effusion and presence of joint abnormality.[23,24] Sansone et al. identified that in 94% of cases, Baker's cysts presented with other pathologies visualized in MRI.[25] These findings established a powerful relationship between cysts in popliteal region and pathologies intra-articularly.[25,26] Nearly every popliteal cyst is a secondary cyst and in 30-60% of cases, degenerative cartilage lesions are responsible for them.[23,26]

Association of Baker's cyst with intra articular derangement was reported by Rupp et al. in 100 patients. They discovered that articular cartilage lesion was commonly accompanied lesion with cysts in popliteal region indicating a role in pathophysiology of popliteal cystic lesions.[27] It was noted in Sansone et al. study that in 43% of cases, degenerative changes in cartilage was seen, in association with Baker's cyst.[25,26] However, in other studies there was a link between

Baker's cysts and cartilage alteration.[25]

Marti-Bonmati et al. did not detect any statistically major link between degree and presence of the cartilage pathologies.[28] Degenerative and inflammatory arthropathy and cartilage lesion are pathologically related to Baker's cyst.[29] In the discussed study, 90 percent of total 30 patients with the popliteal cyst had pathology seen in the posterior horn of medial meniscus. The quantity and presence of fluid within the Baker's cyst were also the reason of lesions of menisci.[28] Regardless of the fact that Baker's cysts are more frequently seen with meniscal tear, their incidence is related to meniscal degeneration, particularly of posterior horn.[28]

Sansone et al. concluded that the meniscal tears were the commonest lesions associated with Baker's cyst as seen in 83 percent of cases.[25] The medial meniscus was usually involved with Baker's cyst as reported by the same author in 90 percent of case, whereas in 17% of cases, bilateral meniscal involvement was noted.[26] Medial meniscal lesions alone were seen in 33% of the cases.[26]

CONCLUSION

This study concluded that frequency of Baker's cyst on MRI in patients with knee pain is quite high. So, we recommend that routine use of MRI in every patient presented with knee pain should be done for diagnosing this problem on early stage to stop the progression of disease and thus reduce associated complications.

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3	Kelash Kumar	Critical review.	
4	Mahesh Kumar	Statistics.	
5	Nazia Azeem	Data entry, Concept of study.	