

Epidemiologic Evaluation of Patients with Monoarthritis in Kashan, Iran

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ABSTRACT

Background & Objective: Monoarthritis is the inflammation of a single joint. There is limited data on the etiology of monoarthritis in Iran. This study was aimed to evaluate epidemiologic characteristics of the patients with monoarthritis in Kashan, Iran.

Materials & Methods: This cross-sectional study was conducted on 227 patients with monoarthritis referred to the rheumatology clinic of Kashan, Iran between 2018 and 2019. General, physical and rheumatological examinations were performed on all patients. synovial fluid samples were analyzed for viscosity, leucocyte count, Gram's staining, culture and microscopic evaluation of crystals.

Results: Mean age of the patients at the baseline was 56.1 ± 17.2 years, out of whom 44.1% were male. Acute and chronic monoarthritis cases were 51.5% and 48.5%, respectively. The most common involved joint was the knee (60.7%) followed by the ankle (32.2%). Pseudogout (39.3%) and gout (31.6%) were the most common causes of acute monoarthritis. There was no significant difference in etiology of acute monoarthritis between male and female (P value=0.33). Osteoarthritis (53.50%) and rheumatoid arthritis (25.50%) were the most common causes of chronic arthritis. A significant correlation was obtained between sex and causes of chronic monoarthritis (P value=0.012). Patients with various etiologies of chronic monoarthritis had significantly different mean age (P value<0.001).

Conclusion: The knee joint was the most common site affected by monoarthritis. Pseudogout and osteoarthritis were the most common causes of acute and chronic arthritis, respectively.

Keywords: Etiology, Epidemiology, Monoarthritis, Synovial fluid Gout, Joint



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Introduction

Monoarthritis is the inflammation of a single joint which is usually accompanied by stiffness, pain, swelling, warmth, and redness of the joint. The most common causes of monoarthritis are infection, trauma and crystals (gout and pseudogout) (1). Septic arthritis is caused due to the infection of the joint by bacterial agents such as *Neisseria gonorrhoea*, *Staphylococcal aureus* and *Mycobacterium* (2). Some viruses such as parvovirus, human immunodeficiency virus (HIV), Epstein-Barr virus (EBV), hepatitis B virus (HBV), hepatitis C virus (HCV), chikungunya virus and Zika virus may cause monoarticular arthritis/ arthralgia (3-5). Crystal-induced arthritis is usually caused by deposition of monosodium urate (gout) or calcium pyrophosphate dehydrates (pseudo-gout) in the joint fluid (6). Chronic conditions such as rheumatoid arthritis and osteoarthritis may start initially in one joint as monoarthritis and then involve other joints. In addition, seronegative spondyloarthropathies such as reactive arthritis and psoriatic arthritis may manifest as monoarthritis (7, 8).

The incidence of septic arthritis in western Europe is 4-10 cases per 100,000 patient-years. It is 7.8 cases per 100,000 person-years in the United States, and the most common cause of monoarthritis is disseminated gonococcal infection (DGI) with an incidence of 2.8 cases per 100,000 person-years (9, 10). Approximately all non-gonococcal septic arthritis cases in the United States and the majority of septic arthritis in Europe are caused by *S. aureus* (11). Generally, it is estimated that the incidence of septic arthritis in developed countries is six cases per 100,000 patient-years, while there are no clear incidence data available for septic arthritis in developing countries (12, 13).

The result of a study conducted in Babol, Iran showed that the most common causes of monoarthritis were gout (85%) and reactive arthritis (6%) (14). In a study performed in Tehran, 34.5% of monoarthritis was septic arthritis (15). Overall, there is limited data on monoarthritis in Iran and in the north of Isfahan province.

This has necessitated this study aimed at epidemiologic evaluation of patients with monoarthritis in Kashan, Iran.

Materials and Methods

This cross-sectional study was conducted on 227 patients with monoarthritis referred to the rheumatology clinic of Shahid-Beheshti hospital, Kashan, Iran from March 2018 to February 2019. Due to the fact that all patients were studied in this period, the study was a census and there was no need to calculate the sample size. All patients over 18 years of age with signs of monoarthritis who consented to joint aspiration were included in the study. The patients with bone tumors, Rheumatoid Arthritis (RA), under-treatment of Systemic Lupus Erythematosus (SLE) and any rheumatic disease were excluded from the study. In addition, patients who did not consent to joint aspiration were not included in the study. General, physical and rheumatological examinations were performed on all patients at the time of first visit. Demographic data, including age, sex and duration of arthritis were collected by referring to patients' medical records. Movement limitation, tenderness and swelling restricted to the joint were objective criteria for the early diagnosis of arthritis. Joint aspiration was performed on all patients and synovial fluid was evaluated for viscosity leucocyte count, Gram's staining, culture and microscopic evaluation of crystals. A white blood cell (WBC) count lower than 2,000 cells/ μ L and polymorphonuclear leukocytes (PMN) lower than 25% was considered as non-inflammatory monoarthritis. A WBC count higher than 2,000 cells/ μ L, and PMN higher than 50% was defined as inflammatory monoarthritis. The septic arthritis was considered probable when WBC count was higher than 5,000 cells/ μ L, and PMN was higher than 90%. First, Gram staining of synovial fluid was performed; then, synovial fluid was centrifuged at 3000 rpm for 15 min and the precipitate was cultured on blood agar, eosin methylene blue agar (EMB), chocolate agar (up to for 48 hours) and Thioglycolate broth (up to 5 days).

The data were analyzed by SPSS version 22. The numerical data were reported as mean \pm SD and

categorical data were reported as frequency and percentages. Chi-square test was performed to compare the frequency of variables between causes of monoarthritis. In addition, analysis of variance (ANOVA) was used to compare the mean age among patients with different causes of monoarthritis. The study was approved by the Ethics Committee of Kashan University of Medical Sciences.

Results

A total of 227 patients with monoarthritis were studied. The patients had a mean age of 56.1 ± 17.2 years. Frequency distribution of monoarthritis patients according to demographic variables and clinical findings is summarized in [Table 1](#). One hundred (44.1%) patients were male and 127 (59.9%) were female. The most common involved joint was the knee (60.7%). The etiology of monoarthritis among patients under study is summarized in [Table 2](#) and [Table 3](#). One hundred seventeen cases (51.50%) had acute monoarthritis, while 110 patients had chronic monoarthritis (48.50%). Synovial fluids were non-inflammatory, inflammatory and septic in 73 (32.2%), 135 (59.5%) and 19 (8.4%) cases, respectively. Synovial culture was positive for 21 samples from which *Staphylococcus aureus*, *Klebsiella spp* and coagulase-negative *Staphylococci* were isolated in 12, 6 and 3 patients, respectively.

The frequency of pseudogout (calcium pyrophosphate dihydrate crystal: CPPD) and gout in males was higher than females. Nevertheless, there was no significant difference in etiology of acute monoarthritis between male and female (P value=0.33, [Table 2](#)). The patients diagnosed with CPPD had the highest mean age, and a significant difference was observed between mean age of the patients with different causes of acute monoarthritis (P value<0.001). The prevalence of osteoarthritis and rheumatoid arthritis in females was higher than males, and a significant correlation was obtained between sex and causes of chronic monoarthritis (P value=0.012, [Table 3](#)). The patients with various etiologies of chronic monoarthritis had significantly different mean age (P value<0.001).

Table 1. Frequency distribution of monoarthritis patients according to demographic variables and clinical findings

Variable	Frequency (%)	
Sex	Male	100 (44.1)
	Female	127 (55.9)
Viscosity	Normal	206 (90.7)
	Decreased	21 (9.3)
Culture	Negative	206 (90.7)
	Positive	21 (9.3)
Crystal	Positive	83 (36.6)
	Negative	144 (63.6)

Variable		Frequency (%)
Disease type	Acute	117 (51.5)
	Chronic	110 (48.5)
	Infected	135 (59.5)
Synovial fluid	Notinfected	73 (32.2)
	Septic	19 (8.4)
Involved joint	Knee	137 (60.7)
	Ankle	42 (32.2)
	Wrist	20 (8.8)
	Other	28 (11.8)

Table 2. The relationship between demographic variables and the causes of acute arthritis

Variable		Etiology of acute monoarthritic (Number)					P value
		CPPD (46)	Gout (37)	Reactive arthritis (13)	Septic arthritis (21)	Total (117)	
Sex	Male	27 (39.7%)	25 (36.8%)	7 (10.3%)	9 (13.3%)	68 (58%)	0.33
	Female	19 (39.7%)	12 (24.5%)	6 (12.2%)	12 (24.5%)	49 (42%)	
Synovial	Inflammatory	43 (46.2%)	37 (39.8%)	11 (11.8%)	2 (2.2%)	93 (79%)	<0.001
	Non-inflammatory	3 (60%)	0	2 (40%)	0	5 (4%)	
	Septic	0	0	0	19 (100%)	19 (17%)	
Mean age (year ±SD)		68.2±14.6	59.9±16.2	38.4±18.2	48.2±17.7	-	<0.001

Table 3. The relationship between demographic variables and the causes of chronic arthritis

Variable		Etiology of chronic monoarthritic (Number)						P value
		Rheumatoid arthritis (28)	Osteoarthritis (59)	Chondromalacia (7)	Bruce llis (6)	Unknown (10)	Total (110)	
Sex	Male	9 (28.1%)	17 (53.1%)	0	5 (15.6%)	1 (3.1%)	32 (29%)	0.012
	Female	19 (24.3%)	42 (53.8%)	7 (8.9%)	1 (24.4%)	9 (11.50%)	78 (71%)	
Synovial fluid	Inflammatory	26 (61.9%)	0	0	6 (14.3%)	10 (23.8%)	42 (38%)	<0.001
	Non-inflammatory	2 (2.9%)	59 (86.8%)	7 (10.3%)	0	0	68 (62%)	
Mean age (year ±SD)		55.1±15.4	56.5±10.9	26±4.7	34.1±11.19	61±12.19	-	<0.001

Discussion

Monoarthritis is defined as pain, swelling and inflammation in a single joint (9). Monoarthritis may have acute or chronic etiology. Most common causes of acute monoarthritis include trauma, mechanical

derangement, infectious agents and crystals (gout and pseudogout). Tuberculosis, fungal infections, rheumatoid arthritis, seronegative spondyloarthropathy, and osteoarthritis are the causes

of chronic monoarthritis (16). The causes of monoarthritis can be different in various regions of the world and are related to age. In the present study, a total of 227 patients with symptoms of monoarthritis were studied, whose mean age was 56.1 ± 17.2 years. Similar to our findings, in a study conducted by Heydari et al., in Iran, patients with monoarthritis had the mean age of 53 ± 17 years (14). Monoarthritis can occur in any age group. The mean age of patients with monoarthritis is 30 to 60 years in most of the studies conducted on subjects of 18 years and over (16-18). In the present study, a significant correlation was observed between age and causes of acute or chronic monoarthritis (P value=0.001). This finding is similar to the results of other reports. Pseudogout occurs predominantly in patients over the age of 55 years and our patients with pseudogout had the mean age of 68 years. Chondromalacia usually affects the young people and our patients had the mean age of 16 years. Jeong et al., and Rasheed et al., found an association between age and etiology of monoarthritis (19, 20).

Large joints (especially the knee) are usually involved in most cases of monoarthritis and small joints (like the toes, fingers, etc.) are affected less frequently. The knee joint is the most common involved location followed by the hip and the ankle (16). In the study of Binard and colleagues, the knee was involved in 62%, the hip in 15%, the wrist in 15% and the ankle in 4% of monoarthritis cases (17). In the study of Mue conducted in Nigeria, the knee joint was involved in 45.7% of the cases followed by the hip joint 31.4%, the shoulder joint 11.4%, the ankle joint 8.6% and the elbow joint 2.9% (21). Fletcher et al., reported that monoarthritis involves the knee, the ankle and the wrist in 74%, 8% and 6.6% of the patients, respectively (22). In the study of Rasheed, the knee was the most common site of involvement (60%) followed by the ankle (16%), the wrist (10%), the metatarsophalangeal joints (6%), the hip (4%) and the elbow joints (4%) (20). Our study also showed somewhat the similar joints involvement. In the present study, the most common involved joint was the knee (60.7%) followed by the ankle (32.2%) and the wrist (7.1%) (20).

In the current study, 51.50% of the cases had acute monoarthritis and 48.50% of the patients were suffering from chronic monoarthritis. In a study conducted in India, 16.3% of the patients presented with acute monoarthritis, while 83.7% had chronic arthritis (16). In Pakistan, 38% of the subjects with monoarthritis had the acute disease, while 62% of the patients had the chronic disease (21). In contrast to our findings, the prevalence of chronic monoarthritis in majority of previous studies is higher than the cases of acute monoarthritis. This difference can be attributed to the fact that the inpatients included in our study had the acute disease. In the previous studies, the most common causes of acute monoarthritis were gout (15%–27%) and septic arthritis (8%–27), while the cause remained unknown in up to a third of the cases (16%–36%) (18, 19). In our study conducted in

Kashan, crystal- induced arthropathy was the most common cause of acute monoarthritis (CPPD: 39.3%, Gout: 31.6%) followed by septic arthritis (17.9%). Heydari et al., reported that the most common etiology of acute monoarthritis in Babool is gout (85%) followed by reactive arthritis (6%) (14). In our study, 8.4% of the cases had septic arthritis, while Heydari et al., did not report any cases with septic arthritis. They had collected their samples only from internal clinic therefore did not find septic arthritis.

Osteoarthritis (53.50%) and rheumatoid arthritis (25.50%) were the most common causes of the chronic arthritis in our study similar to the majority of previous studies. Overall, the prevalence of osteoarthritis in Iran is 16.6–20.7%, and the prevalences of rheumatoid arthritis in the urban and rural areas of Iran are 0.33% and 0.19%, respectively (23). Heydari et al., did not report osteoarthritis or rheumatoid arthritis among monoarthritis patients in Babol, because they had low sample size (14). In the study of Inaoui et al., conducted in France, rheumatoid arthritis and SPA were the most common causes of chronic monoarthritis (24). Jeong et al., reported that 18.1% of the patients with chronic monoarthritis in South Korea had rheumatoid arthritis and 13.5% had spondyloarthritis (19). In the study of Rasheed et al., osteoarthritis and SPA were the most common causes (20). The variability in causes among the aforementioned studies can be due to various sample sizes and regional differences.

The present study is not devoid of limitations. The retrospective nature of the study may have resulted in inaccuracies during the data collection and interpretation process due to potential errors in record keeping. In addition, data were collected from a single center.

Conclusion

The knee joint was the most common site affected by monoarthritis. Pseudogout and Gout were the most common causes of acute monoarthritis followed by septic arthritis. Osteoarthritis and rheumatoid arthritis were the most common causes of chronic arthritis.

Acknowledgments

None.

Conflict of Interest

The authors declare that they have no conflict of interest in the research.

References

1. Thomas M, Bonacorsi S, Simon A-L, et al. Acute monoarthritis in young children: comparing the characteristics of patients with juvenile idiopathic

- arthritis versus septic and undifferentiated arthritis. *Sci Rep.* 2021;11(1):1-10. [DOI:10.1038/s41598-021-82553-1] [PMID] [PMCID]
2. Zamani B, Shayestehpour M. A Case of knee monoarthritis caused by mycobacterium tuberculosis. *Am J Case Rep.* 2019;20:522-4. [DOI:10.12659/AJCR.915150] [PMID] [PMCID]
 3. Bilborrow JB, Amaral JK, Schoen R. Chikungunya: an emerging rheumatological pandemic? *Curr Rheumatol Res.* 2021;2(1):12-17. [DOI:10.46439/rheumatology.2.012]
 4. Norton N, Mansbridge C, Pelosi E, Wilson-Davies E. Primary herpes simplex virus type 2 infection associated with monoarthritis of the knee. *Infect Disease Clin Pract.* 2020;28(6):e50-e1. [DOI:10.1097/IPC.0000000000000886]
 5. Vera AO, Vázquez-Gómez I, Montolio-Chiva L, et al. Viral arthritis: Descriptive analysis of a series of 131 patients. *BMJ Publishing Group Ltd;* 2020.
 6. Oliviero F, Bindoli S, Scanu A, et al. Autoinflammatory mechanisms in crystal-induced arthritis. *Front Med.* 2020;7:166. [DOI:10.3389/fmed.2020.00166] [PMID] [PMCID]
 7. Thomas KN, Anuja AK, Gupta L. Clinical profile of adults and children with reactive arthritis in India-A cohort study. *Indian J Rheumatol.* 2020;15(4):304.
 8. Talari H, Sehat M, Shayestehpour M, Minaee K, Zamani B. The association of psoriatic arthritis with carotid intima-media thickness. *J Kerman Univ Med Sci.* 2021;28(2):173-8.
 9. Imhoff FB, Bauer DE, Uçkay I. Native joint arthritis in adults. *Bone and joint infections: From Microbiology to Diagnostics and Treatment.* 2021:139-50. [DOI:10.1002/9781119720676.ch9]
 10. Elsissy JG, Liu JN, Wilton PJ, Nwachuku I, Gowd AK, Amin NH. Bacterial septic arthritis of the adult native knee joint: a review. *JBJS Rev.* 2020;8(1):e0059. [DOI:10.2106/JBJS.RVW.19.00059] [PMID]
 11. Jin T, Mohammad M, Pullerits R, Ali A. Bacteria and host interplay in staphylococcus aureus septic arthritis and sepsis. *Pathogens.* 2021;10(2):158. [DOI:10.3390/pathogens10020158] [PMID] [PMCID]
 12. Hunter S, Baker JF. Ten-year retrospective review of paediatric septic arthritis in a New Zealand centre. *Int Orthopaed.* 2021;45(1):147-54. [DOI:10.1007/s00264-020-04611-z] [PMID]
 13. D'Angelo F, Monestier L, Zagra L. Active septic arthritis of the hip in adults: what's new in the treatment? A systematic review. *EFORT Open Rev.* 2021;6(3):164-72. [DOI:10.1302/2058-5241.6.200082] [PMID] [PMCID]
 14. Heidari B, Khosousi Niaki M. Etiology of acute arthritis in patients referred to Shahid Beheshti Hospital, Babol, 1995-99. *J Babol Univ Med Sci.* 2001;3(1):29-33.
 15. Noorbakhsh S, Zarabi V, Talebi Taher M, Tabatabaei A, Ali Beik N. Searching for group A streptococcal polysaccharide antigens in synovial fluid of patients with arthritis. *Razi J Med Sci.* 2013;20(114):20-7.
 16. Sonawale A, Sabnis NH, Karale M. Etiology and outcome of mono-articular arthritis: a follow up study. *Int J Adv Med.* 2018. 2018;5(2):7. [DOI:10.18203/2349-3933.ijam20180429]
 17. Binard A, Alassane S, Devauchelle-Pensec V, et al. Outcome of early monoarthritis: a followup study. *J Rheumatol.* 2007;34(12):2351-7.
 18. Siva C, Velazquez C, Mody A, Brasington R. Diagnosing acute monoarthritis in adults: a practical approach for the family physician. *Am Family Physic.* 2003;68(1):83-90.
 19. Jeong H, Kim AY, Yoon HJ, et al. Clinical courses and predictors of outcomes in patients with monoarthritis: a retrospective study of 171 cases. *Int J Rheumatic Disease.* 2014;17(5):502-10. [DOI:10.1111/1756-185X.12259] [PMID]
 20. Rasheed U. Diagnosis of patients presenting with monoarthritis. *Ann Pak Inst Med Sci.* 2012;8(1):14-8.
 21. Mue D, Salihu M, Awonusi F, Yongu W, Kortor J, Elachi I. The epidemiology and outcome of acute septic arthritis: a hospital based study. *J West Afr Coll Surg.* 2013;3(1):40-52.
 22. Fletcher MR, Scott JT. Chronic monarticular synovitis. Diagnostic and prognostic features. *Ann Rheum Dis.* 1975;34(2):171-6. [DOI:10.1136/ard.34.2.171] [PMID] [PMCID]
 23. Khabbazi A, Soroosh M. Rheumatology training and research in Iran. *Rheumatol Int.* 2019;39(8):1307-19. [DOI:10.1007/s00296-019-04325-5] [PMID]
 24. Inaoui R, Bertin P, Preux PM, Trèves R. Outcome of patients with undifferentiated chronic monoarthritis: retrospective study of 46 cases. *Joint Bone Spine.* 2004;71(3):209-13. [DOI:10.1016/S1297-319X(03)00136-2]

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