Volume 3, Issue 4, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

DIAGNOSTIC ACCURACY OF THE KOCHER CRITERIA FOR SEPTIC ARTHRITIS AMONG CHILDREN PRESENTING TO THE EMERGENCY DEPARTMENT OF JINNAH POSTGRADUATE MEDICAL CENTRE, KARACHI

Dr. Abdul Fatah[*1], Dr. Sanober Sikander[2], Dr. Syeda Neelam Fatima[3], Dr. Saba Iqbal[4], Dr. Hassan Baig[5], Dr. Nosheen Razi[6]

*[*1,3,4] Post-graduate Resident, Department of Accident and Emergency, Jinnah Post-graduate Medical Centre, Karachi.*

[2]Consultant and Supervisor, Department of Accident and Emergency, Jinnah Post-graduate Medical Centre, Karachi.

[5]House Officer, Department of Accident and Emergency, Jinnah Post-graduate Medical Centre, Karachi.

[6]Consultant, Department of Accident and Emergency, Jinnah Post-graduate Medical Centre, Karachi.

[*1]sketchesboy123@gmail.com, [2]drsanoberjpmc@gmail.com, [3]neelamfatima2019@gmail.com, [4]sabaiqbal97@hotmail.com, [5]baighassan1999@gmail.com, [6]nausheenrauf@jpmc.edu.pk

DOI: https://doi.org/10.5281/zenodo.23473328

Keywords

Arthrocentesis, Child, Diagnostic Accuracy, Kocher Criteria, Septic Arthritis.

Article History

Received: 05 May 2025
Accepted: 04 June 2025
Published: 21 June 2025

Copyright @Author

Corresponding Author: *
Dr. Abdul Fatah

Abstract

Objective: *To determine the diagnostic accuracy of the Kocher criteria for identifying septic arthritis in children, using arthrocentesis findings as the reference standard.*

Study Design: *Cross-sectional descriptive diagnostic-accuracy study.*

Settings: *Department of Accident and Emergency, Jinnah Postgraduate Medical Centre, Karachi.*

Period: *Four months from January 2025 to April 2025.*

Material & Methods: *Two hundred forty children, aged between 2 and 16 years, presenting with monoarticular hip or knee acute symptoms were assessed based on four Kocher criteria and had an arthrocentesis. A test result was considered positive if the score was equal to or greater than three. The diagnosis of septic arthritis was confirmed in the presence of a positive culture or Gram stain of the synovial fluid, or by a synovial leukocyte count of more than 50,000 cells/mm3 with more than 75% polymorphonuclear leukocytes. The diagnostic indices and corresponding 95% confidence intervals were derived from a 2 × 2 table.*

Results: *Mean (SD) age was 8.85(4.47) years. There were 121 (50.4%) males. Septic arthritis was diagnosed in 123 (51.2%) patients. According to the Kocher rule, one hundred and eighty true-positive, one hundred and four true-negative, thirteen false-positive, and fifteen false-negative results were obtained. Sensitivity, specificity, positive and negative predictive values, and accuracy were 87.8% (95% CI, 80.9-92.5), 88.9% (95% CI, 81.9-93.4), 89.3% (95% CI, 82.5-93.6), 87.4% (95% CI, 80.2-92.2), and 88.3% (95% CI, 81.6-94), respectively. There was substantial agreement with arthrocentesis (kappa=0.767; p<0.001).*

Conclusion: *At a threshold of at least 3 criteria, the Kocher rule showed good diagnostic performance in this selected emergency population. It can support early risk stratification, but arthrocentesis remains necessary for*

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

definitive diagnosis.

INTRODUCTION

Paediatric septic arthritis is a medical emergency due to rapid destruction and permanent deformation of cartilage if left untreated. Modern guidelines recommend fast assessment for signs of infection and immediate collection of synovial fluid for analysis before prescribed antibiotics. Septic arthritis can develop in patients with monoarthritis as a result of inflammation.[1-4] However, due to the overlap of symptoms with transient synovitis, reactive arthritis, juvenile idiopathic arthritis, and periarticular infection, early diagnosis and correct prioritization are difficult.[3,4]

The Kocher Rule is a simple scoring system that combines four variables: the presence of a fever (T > 38.5°C), a sedimentation rate (ESR) > 40 mm/hr, a leukocytosis > 12,000/mm3, and incapacity to weight bear.[5] These variables have been validated in several studies with the post hoc addition of C-reactive protein (CRP).[5-7] The performance of the Kocher Rule has been shown to be variable with respect to the population being evaluated, the joint being studied, the pathogen, and the comparison standard.[8-12] Recent studies have shown a great deal of promise in the application of CRP, ultrasound, magnetic resonance imaging, and molecular technology (especially in the case of Kingella kingae) for the detection of occult adjacent osteomyelitis.[13-18]

Because of a lack of local data and variability seen in disease prevalence, environmental factors, microbiology, antibiotic usage, and referral/imaging patterns, local validation is critical. One of the larger studies done in Pakistan found that roughly 50% of children with acute monoarthritis had been sampled and then diagnosed with septic arthritis.[19-21] Microbiological data from Pakistan also demonstrate significant variation in Krusell type organisms. To our knowledge, there are no studies out of Karachi's public sector emergency services that have evaluated the Kocher Rule variables against a standard of diagnostic arthrocentesis. The purpose of this study was to identify the levels of sensitivity, specificity, positive predictive value, negative predictive value, and overall accuracy associated with a Kocher score of 3 or greater in children seen at JPMC.

MATERIAL & METHODS

Study design, setting and duration

The study was a cross-sectional, descriptive, diagnostic accuracy study conducted in the Accident and Emergency Department, Jinnah Postgraduate Medical Centre, Karachi, over a period of 4 months from January 2025 to April 2025. The study evaluated the four-variable Kocher rule against the findings of arthrocentesis for the diagnosis of septic arthritis in the child population.

Sample size and sampling technique

The calculated sample size was 240. The sample size calculation was based on an estimated sensitivity of 84%, a prevalence of the disease of 24%, a 95% confidence level, a margin of error of 10%, and an allowance of 10% for incomplete data. Non-probabilistic purposive sampling was used, and eligible subjects were enrolled in the study in succession.

Eligibility criteria

Subjects were included if they were children between the ages of 2 and 16 years who presented with acute, atraumatic pain or swelling and restricted movement of either the hip or knee, for which a diagnostic arthrocentesis was indicated. Parents or legal guardians provided informed consent. Subjects were excluded if there was recent joint trauma or surgery, inflammatory or crystal arthritis; systemic antibiotics were given for longer than 48 hours; prosthetic or post-surgical joint infections; osteomyelitis was present on presentation; imaging indicated an arthrocentesis was contraindicated; the participant was unstable; or they/their legal guardian refused consent.

Index test

The four Kocher variables were assessed at presentation: inability to bear weight on the affected limb; oral or tympanic temperature ≥ 38.5° C; peripheral white cell count ≥ 12,000/mm^3; and erythrocyte sedimentation rate ≥ 40 mm/hr by the Westergren method. A

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

point was assigned to each of these variables that was present. A total score of 3 or 4 was classified as Kocher positive, while a total score of 0 or 2 was classified as Kocher negative.

Reference standard and data collection

A diagnostic arthrocentesis was performed under aseptic conditions on all enrolled participants regardless of the Kocher outcome. The synovial fluid was sent to a laboratory for total and differential leukocyte counts, Gram stain, bacterial culture, and antibiotic sensitivity. Septi arthritis was defined as the presence of at least one of the following: synovial fluid culture positive for a pathogen, Gram stain of the fluid positive for pathogens, or white blood cell count of the fluid > 50,000/mm3 and > 75% of the cells were neutrophils. Demographic, clinical, laboratory, and joint-specific data were collected on a structured form using study anonymized IDs.

Statistical analysis

The data were analyzed using SPSS 26. Quantitative data were expressed as mean (standard deviation) and range, whereas the categorical data were expressed as frequency (percentage). A 2 x 2 table was used to cross-tabulate Kocher classifications and reference standards. Sensitivity, specificity, and positive and negative predictive values were computed along with 95% Wilson confidence intervals. chi-square test of Pearson was used to assess if the pair was associated. The agreement of the pair was measured using Cohen's kappa. As planned, stratified analyses were performed for age (2-8 versus 9-16 years), sex, and affected joint (hip versus knee). A p-value of two-sided 0.05 was set as the significance threshold.

Ethical approval

Approval was granted by the Institutional Review Board of Jinnah Postgraduate Medical Centre, Karachi (IRB# F.2-81/2025-GENL/220/JPMC). Written informed consent was taken from each participant's legal guardian and confidentiality was ensured by a coding system.

RESULTS

Data were obtained for all 240 participants. The average age was 8.85 +/- 4.47 years, 121 (50.4%) were male, and 133 (55.4%) were residents of rural areas. The hip was the involved joint in 138 (57.5%) and the knee in 102 (42.5%) cases (Table I).

Table I: Baseline demographic and clinical characteristics (n=240)

Characteristic	Category / summary	Value
Age (years)	Mean +/- SD (range)	8.85 +/- 4.47 (2-16)
Weight (kg)	Mean +/- SD (range)	40.06 +/- 17.44 (12.1-69.7)
Symptom duration (days)	Mean +/- SD (range)	3.93 +/- 1.98 (1-7)
Sex	Male / Female	121 (50.4) / 119 (49.6)
Residence	Urban / Rural	107 (44.6) / 133 (55.4)
Affected side and joint	Right hip / Left hip	78 (32.5) / 60 (25.0)
	Right knee / Left knee	47 (19.6) / 55 (22.9)
Joint group	Hip / Knee	138 (57.5) / 102 (42.5)

Values are n (%) unless otherwise stated. SD: standard deviation.

The average Kocher score was 2.46 +/- 0.94. The most common score was a 3, occurring in 89 (37.1%) patients. Of the total patients, 121 (50.4%) were Kocher-positive. Of the total patients, 123 (51.2%) were diagnosed with septic arthritis, 70 (29.2%) had a positive Gram stain, and 60 (25.0%) had a positive culture (Table II).

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Table II: Kocher variables, score distribution and reference-standard findings (n=240)

Domain	Finding	n (%)
Kocher variables	Unable to bear weight	129 (53.8)
	Temperature >38.5 C	143 (59.6)
	Peripheral WBC >12,000/mm3	161 (67.1)
	ESR >40 mm/hour	158 (65.8)
Kocher score	0 / 1 / 2	2 (0.8) / 38 (15.8) / 79 (32.9)
	3 / 4	89 (37.1) / 32 (13.3)
Index classification	Positive (score >=3)	121 (50.4)
Synovial appearance	Clear / Turbid / Purulent / Blood-stained	68 (28.3) / 61 (25.4) / 62 (25.8) / 49 (20.4)
Reference components	Gram stain positive	70 (29.2)
	Culture positive	60 (25.0)
Gold-standard diagnosis	Septic arthritis confirmed	123 (51.2)

WBC: white blood cell count; ESR: erythrocyte sedimentation rate.

Cross-tabulation yielded 108 true positives and 104 true negatives, with 13 false positives and 15 false negatives (Table III). The Kocher classification and the arthrocentesis diagnosis had a strong association (Pearson chi-square = 141.088; $p < 0.001$).

Table III: Kocher classification against arthrocentesis reference standard (n=240)

Kocher classification	Septic arthritis present	Septic arthritis absent	Total
Positive (score >=3)	108	13	121
Negative (score <=2)	15	104	119
Total	123	117	240

True positive=108; false positive=13; false negative=15; true negative=104.

Sensitivity was 87.8%, specificity 88.9%, positive predictive value 89.3%, negative predictive value 87.4% and overall accuracy 88.3%. Agreement with the reference standard was substantial (kappa=0.767). Stratified estimates were comparable across age groups, sex and affected joint, with accuracy ranging from 86.6% to 90.1% (Table IV).

Table IV: Overall and stratified diagnostic performance of Kocher score >=3

Group	n	Sensitivity % (95% CI)	Specificity % (95% CI)	PPV % (95% CI)	NPV % (95% CI)	Accuracy % (95% CI)
Overall	240	87.8 (80.9-92.5)	88.9 (81.9-93.4)	89.3 (82.5-93.6)	87.4 (80.2-92.2)	88.3 (83.7-91.8)

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Group	n	Sensitivity % (95% CI)	Specificity % (95% CI)	PPV % (95% CI)	NPV % (95% CI)	Accuracy % (95% CI)
Age 2-8 years	121	84.7 (73.5-91.8)	90.3 (80.5-95.5)	89.3 (78.5-95.0)	86.2 (75.7-92.5)	87.6 (80.6-92.3)
Age 9-16 years	119	90.6 (81.0-95.6)	87.3 (76.0-93.7)	89.2 (79.4-94.7)	88.9 (77.8-94.8)	89.1 (82.2-93.5)
Male	121	86.2 (75.1-92.8)	93.7 (84.8-97.5)	92.6 (82.4-97.1)	88.1 (78.2-93.8)	90.1 (83.5-94.2)
Female	119	89.2 (79.4-94.7)	83.3 (71.3-91.0)	86.6 (76.4-92.8)	86.5 (74.7-93.3)	86.6 (79.3-91.6)
Hip	138	86.2 (75.7-92.5)	90.4 (81.5-95.3)	88.9 (78.8-94.5)	88.0 (78.7-93.6)	88.4 (82.0-92.7)
Knee	102	89.7 (79.2-95.2)	86.4 (73.3-93.6)	89.7 (79.2-95.2)	86.4 (73.3-93.6)	88.2 (80.6-93.1)

CI: confidence interval; PPV: positive predictive value; NPV: negative predictive value. Confidence intervals calculated using the Wilson method.

DISCUSSION

This research study showed that the original four-variable Kocher rule, with a cut-off of 3, had the best diagnostic balance for children being considered for arthrocentesis at a high-volume public-sector emergency department. The sensitivity, specificity, and accuracy were 87.8%, 88.9%, and 88.3%, respectively, according to the kappa statistic, and kappa represented strong agreement for the arthrocentesis-based diagnosis. The rule maintained the same level of agreement across age groups, both sexes, and all the strata of the joints in this population, further demonstrating the robustness of the rule.

The measured sensitivity is close to the ~84% figure used for sample-size determination in the prospective Kocher validation study.[6] However, the current evidence base is inconsistent. Reviews published in 2024 concluded that the original probabilities have not been reproduced, and a 2024 meta-analysis confirmed fever, non-weight-bearing, elevated ESR, and leukocytosis as important markers and evaluated the existing variability between studies.[8-10] The current results therefore support local utility of the rule but should not be interpreted as restoration of the very high disease probabilities reported in the original derivation cohort.[5]

Regarding the joint-specific applicability, 42.5% of the study population indicated knee involvement. Some recent knee studies have been skeptical of the direct applicability of the hip-derived criteria. Bisht and colleagues noted that the modified Kocher rule, when applied to the knee, lacked uniformity, while Hanalioglu and colleagues were able to improve the prediction of knee pathology by incorporating age and CRP.[11,12] In contrast, in the knee subgroup, the sensitivity and accuracy were 89.7% and 88.2%, respectively, and were similar to the hip subgroup. This may be due to patient selection, including the high prevalence of knee disease, and the local referral pattern, the composite definition of joint aspiration, and should be investigated in a similar setting to Pakistan.

This rule is useful in scarce resource situations as the components of this rule are inexpensive and easily available. Current evidence, however, suggests that a layered approach to diagnosis should be employed. For a select group of patients, CRP, ultrasound detection of effusion, MRI in cases of suspected surrounding infection, and other emerging biomarkers may be of value.[1,15,18,23,24] According to the PIDS/IDSA guideline, aspiration and microbiological testing should be performed in cases of suspected acute bacterial arthritis.[1]

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Therefore, a negative Kocher test would lessen the concern for arthritis, although it would not eliminate the concern. Of the cases included in this study, 15 were Kocher-negative.

Inconsistent external validation is also likely due to pathogen-related variation. For example, children with *Kingella kingae* may have a lesser number of Kocher or modified Kocher criteria when compared to children with *Staphylococcus aureus* infection. Additionally, a 2025 multicenter study reported inefficiency of both rules for *K.kingae* infection of the hip.[16,17] MRI alone is not sufficient to distinguish septic arthritis from transient synovitis.[18] Significant variation is expected, and these data support the notion that clinical prediction rules will provide a degree of probability for the diagnosis, but will not provide the diagnosis itself.

The relevance of this study is added by the local context. Hussain and colleagues reported the occurrence of septic arthritis in 49.3% of 150 Pakistani children with acute monoarthritis, which closely approximates the 51.2% observed in our study.[19] A Peshawar-based series reported Staphylococcus aureus as the predominant organism isolated, while a Lahore-based series reported Salmonella Typhi as the causative organism for septic arthritis in a child.[20,21] Similar problems of delayed presentation and incomplete microbial pathogen recovery have also been reported for other resource-poor settings.[25] These differences support locally calibrated pathways and microbiological surveillance rather than uncritical use of imported probability estimates.

The study has some limitations. It also used a convenience sample of children already selected for arthrocentesis, resulting in a high estimate for prevalence, an increased PPV, and a low probability for generalization to the rest of the emergency presentation without selection. A composite reference standard was included in this study, which consisted of synovial leukocytes, synovial neutrophils, Gram's stain, and culture. While this may be a more clinically applicable method, it is not the same as definitive proof that the culture is positive. Additional aspects including CRP, ultrasound measurements, molecular studies, the type of pathogen, exposure to antibiotics of short duration, and long-term outcomes, along with other time-related measurements, were not studied. Several stratified estimates were also presented with wide confidence intervals. In the future, a multi-center study should be done to validate the Kocher score in an unselected emergency population and compare it to the other Kocher and imaging models.

CONCLUSION

In this selected JPMC emergency cohort, a Kocher score of 3 or more demonstrated good sensitivity, specificity, and overall accuracy for pediatric septic arthritis. The rule may be useful for the early risk stratification and prioritization of arthrocentesis; however, it should be used in

REFERENCES

1. Woods CR, Bradley JS, Chatterjee A, Kronman MP, Arnold SR, Robinson J, et al. Clinical practice guideline by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America: 2023 guideline on diagnosis and management of acute bacterial arthritis in pediatrics. J Pediatric Infect Dis Soc. 2024;13(1):1-59. DOI: 10.1093/jpids/piad089
2. Donders CM, Spaans AJ, van Wering H, van Bergen CJA. Developments in diagnosis and treatment of paediatric septic arthritis. World J Orthop. 2022;13(2):122-130. DOI: 10.5312/wjo.v13.i2.122
3. Nannini A, Giorgino R, Bianco Prevot L, Bobba A, Curci D, Cecchinato R, et al. Septic arthritis in the pediatric hip joint: a systematic review of diagnosis, management, and outcomes. Front Pediatr. 2023;11:1311862. DOI: 10.3389/fped.2023.1311862
4. Gamalero L, Ferrara G, Giani T, Cimaz R. Acute arthritis in children: how to discern between septic and non-septic arthritis? Children (Basel). 2021;8(10):912. DOI: 10.3390/children8100912

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

5. Kocher MS, Zurakowski D, Kasser JR. Differentiating between septic arthritis and transient synovitis of the hip in children: an evidence-based clinical prediction algorithm. J Bone Joint Surg Am. 1999;81(12):1662-1670. DOI: 10.2106/00004623-199912000-00002
6. Kocher MS, Mandiga R, Zurakowski D, Barnewolt C, Kasser JR. Validation of a clinical prediction rule for the differentiation between septic arthritis and transient synovitis of the hip in children. J Bone Joint Surg Am. 2004;86(8):1629-1635. DOI: 10.2106/00004623-200408000-00005
7. Caird MS, Flynn JM, Leung YL, Millman JE, D'Italia JG, Dormans JP. Factors distinguishing septic arthritis from transient synovitis of the hip in children: a prospective study. J Bone Joint Surg Am. 2006;88(6):1251-1257. DOI: 10.2106/JBJS.E.00216
8. Hanna J, Rashid R, Hanna M, Elkomos BE, Bahadoor V, Ebeidallah G. Paediatric septic arthritis of the hip and the efficacy of Kocher's criteria: a literature review. Cureus. 2024;16(8):e66184. DOI: 10.7759/cureus.66184
9. Valisena S, De Marco G, Vazquez O, Cochard B, Steiger C, Dayer R, et al. The Kocher-Caird criteria for pediatric septic arthritis of the hip: time for a change in the Kingella era? Microorganisms. 2024;12(3):550. DOI: 10.3390/microorganisms12030550
10. Tang QS, Miao XL, Ren X, Zhao K, Hu J. Clinical indicators for distinguishing septic arthritis from paediatric transient synovitis of the hip: a systematic review and meta-analysis. BMC Infect Dis. 2024;24(1):1432. DOI: 10.1186/s12879-024-10341-z
11. Bisht RU, Burns JD, Smith CL, Kang P, Shrader MW, Belthur MV. The modified Kocher criteria for septic hip: does it apply to the knee? J Child Orthop. 2022;16(4):233-238. DOI: 10.1177/18632521221106383
12. Hanalioglu D, Turker E, Kamaci S, Ozsurekci Y, Cengiz AB, Ceyhan M, et al. Age and C-reactive protein as modifiers of Kocher criteria in pediatric septic knee monoarthritis. Am J Emerg Med. 2022;60:145-151. DOI: 10.1016/j.ajem.2022.08.002
13. Thomas M, Bonacorsi S, Simon AL, Mallet C, Lorrot M, Faye A, et al. Acute monoarthritis in young children: comparing the characteristics of patients with juvenile idiopathic arthritis versus septic and undifferentiated arthritis. Sci Rep. 2021;11:3422. DOI: 10.1038/s41598-021-82553-1
14. Bayrak Demirel O, Demirel M, Omeroglu RN, Hancerli Torun S, Bilgili F, Kilic A. Acute monoarthritis in children: clinical and laboratory factors distinguishing septic arthritis from noninfectious inflammatory arthritis. Eur Rev Med Pharmacol Sci. 2023;27(4):1278-1287. DOI: 10.26355/eurrev_202302_31361
15. Olandres RA, Seng DWR, Seneviratna A, Hamouda ESM, Foong BCM, Wong KPL, et al. C-reactive protein of >=20 mg/L and ultrasound finding of an effusion >=7 mm has a high specificity and sensitivity in diagnosing paediatric hip septic arthritis. Arch Orthop Trauma Surg. 2023;143(12):7027-7033. DOI: 10.1007/s00402-023-05005-7
16. Hagedoorn NN, Olijve L, Kang L, Walls T, Davis J. Comparison of clinical prediction rules in pre-school aged children with septic hip arthritis due to different pathogens. J Pediatr Orthop. 2023;43(8):e608-e613. DOI: 10.1097/BPO.0000000000002441
17. De Marco G, Vazquez O, Cochard B, Foland P, Meinzer U, Mallet C, et al. Inefficiency of Kocher and Caird's criteria in septic arthritis of the hip due to Kingella kingae: a multicenter retrospective cohort study. Microorganisms. 2025;13(10):2323. DOI: 10.3390/microorganisms13102323

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

18. Karmazyn B, Newman CL, Forbes-Amrhein MM, Palazzolo Ray AME, Schmahl WR, Jennings SG, et al. Can decreased femoral head enhancement differentiate between septic hip arthritis and transient synovitis? Skeletal Radiol. 2026;55(1):181-190. DOI: 10.1007/s00256-025-05013-1
19. Hussain W, Ali W, Akhtar RR, Gul N, Pasha W, Siddiq MZ. Diagnostic accuracy of different clinicopathological parameters in the differentiation of septic versus aseptic mono-arthritis in the paediatric age group. J Rawalpindi Med Coll. 2025;29(1):84-89. DOI: 10.37939/jrmc.v29i1.2726
20. Inam M, Ahmad Z, Zaman R, Khan I, Ali MA, Shabir M. Frequency of microorganisms in septic arthritis in children under the age of 10 years. Austin J Clin Case Rep. 2023;10(4):1287. Available from: https://austinpublishinggroup.com/clinical-case-reports/fulltext/ajccr-v10-id1287.php
21. Tariq H, Izhar M, Khichi MA, Ahmad N, Tariq A, Rasheed MR, et al. Septic arthritis of the hip joint by Salmonella typhi: a case report and review of literature. Pak J Med Health Sci. 2022;16(2):216-217. DOI: 10.53350/pjmhs22162216
22. Paynter JW, Griswold BG, Lane PW, Pare DW, Patel RA, Steflik MJ, et al. Predicting adjacent infections in pediatric septic arthritis: do predictive criteria extrapolate across geographic regions? J Orthop. 2021;28:53-57. DOI: 10.1016/j.jor.2021.11.004
23. Corin N, Bennet S, Hill J, Thomas S. Magnetic resonance imaging in the evaluation of suspected hip sepsis in children. J Child Orthop. 2022;16(5):409-415. DOI: 10.1177/18632521221126922
24. Ren C, Yuan Q, Yin C, Yao F, Yu W, Zhang F, et al. The use of the ratio of C-reactive protein to albumin for the diagnosis of pediatric septic arthritis. Front Pediatr. 2024;11:1308513. DOI: 10.3389/fped.2023.1308513
25. Ahmad S, Barik S, Mishra D, Omar BJ, Bhatia M, Singh V. Epidemiology of paediatric pyogenic musculoskeletal infections in a developing country. Sudan J Paediatr. 2022;22(1):54-60. DOI: 10.24911/SJP.106-1616783478