Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Paediatrics

Radiological and Clinical Outcomes of Short Versus Long-Term Parenteral Antimicrobial Therapy in Infantile Septic Arthritis

Dr. Suraya Akter[1*], Prof. Dr. Monir Hossain[2], Dr. Sadia Alam[3], Dr. Md Aminul Islam[4], Dr. Rounak Jahan[5], Dr. Most. Airin Afroz[6], Dr. Mukta Thakur[7]

[1]Specialist, Department of Paediatrics, Square Hospital Limited, Dhaka, Bangladesh
[2]Professor, Department of Neonatal Medicine & Neonatal Intensive Care Unit, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh
[3]Registrar, Department of Paediatrics, Gonoshasthaya Samaj Vittik Medical College, Dhaka, Bangladesh
[4]Aerospace Medicine Specialist, Aeromedical Institute, Bangladesh Air Force, Bangladesh
[5]Resident, Department of Paediatrics, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh
[6]Registrar, Department of Cardiology, National Institute of Traumatology & Orthopedic Rehabilitation (NITOR), Dhaka, Bangladesh
[7]Junior Consultant, Department of Paediatrics, Directorate General of Health Services (DGHS), Dhaka, Bangladesh

DOI: https://doi.org/10.36347/sjams.2025.v13i05.014 | **Received:** 05.04.2025 | **Accepted:** 09.05.2025 | **Published:** 13.05.2025

***Corresponding author:** Dr. Suraya Akter
Specialist, Department of Paediatrics, Square Hospital Limited, Dhaka, Bangladesh

Abstract **Original Research Article**

***Background*:** Despite the emphasis on early treatment in pediatric septic arthritis, the optimal duration of parenteral antimicrobials remains unclear. This study aimed to compare the clinical and radiological outcomes of short-term versus long-term parenteral antimicrobial therapy in infants. ***Aim of the Study*:** The aim of the study was to compare the radiological and clinical outcomes of short-term versus long-term parenteral antimicrobial therapy in infants with septic arthritis. ***Methods*:** This randomized controlled trial was conducted from July 2021 to June 2023 at the Department of Paediatrics, Dhaka Shishu Hospital, Dhaka, Bangladesh, enrolling 69 infants (0–2 months) with clinically or radiologically diagnosed septic arthritis. Patients were block-randomized into Group A (long-term antimicrobials) and Group B (short-term therapy). Outcomes included clinical and radiological improvement, complications at 12 months, and final prognosis. Follow-up was done every three months for one year. Data were analyzed using SPSS 26.0 with Chi-square, Fisher's Exact, and t-tests; $p < 0.05$ was considered significant. ***Results*:** In this study, both groups showed similar baseline clinical and radiological features, with no significant differences. Clinical response rates were high in both groups (91.4% in Group A vs. 85.3% in Group B), and comparable improvement was observed at the 3rd month and after one year. Radiological recovery at six months and the incidence of complications—such as limb-length discrepancy and restricted movement—were also similar. ***Conclusion*:** Short-term parenteral antimicrobial therapy offers similar clinical and radiological outcomes to long-term therapy in infants with septic arthritis, making it a viable alternative.

Keywords: Radiological Outcome, Clinical Outcome, Infantile Septic Arthritis.

INTRODUCTION

Historically, musculoskeletal infections in neonates and young children have been underrepresented in clinical research, with predominant emphasis placed on hospital-acquired infections and *Staphylococcus aureus* [1]. Nevertheless, several other pathogens—including *Neisseria meningitidis*, Group B *Streptococcus*, *Escherichia coli*, *Klebsiella pneumoniae*, *Kingella kingae*, and *Salmonella* species—can also lead to septic arthritis (SA) [2–5], particularly in children under the age of four [6, 7]. SA most frequently involves the hip and knee joints, accounting for approximately 80% of cases [8], and constitutes an orthopedic emergency due to the risk of severe complications such as joint destruction, cartilage injury, osteomyelitis, and leg length discrepancies [9,10]. The condition may arise through direct inoculation, hematogenous dissemination, or contiguous spread from a nearby infection. Clinical signs generally include fever, joint swelling, tenderness, and restricted mobility, although these manifestations may be less pronounced in very young patients [11]. Identified risk factors include male sex, hemoglobinopathies, disorders of phagocytic function, and invasive procedures such as umbilical artery catheterization [12].

The diagnosis of pediatric SA is primarily based on clinical evaluation, laboratory investigations, and imaging studies [13]. Kocher's criteria—which include a temperature ≥38.5°C, inability to bear weight, white blood cell (WBC) count ≥12,000/μL, erythrocyte sedimentation rate (ESR) ≥40 mm/h, and C-reactive protein (CRP) ≥20 mg/L—are commonly used to distinguish SA from transient synovitis [14]. Ultrasonography is useful for identifying joint effusions, while magnetic resonance imaging (MRI) provides additional information regarding concurrent osteomyelitis, although it may be limited in early fluid-phase infections. A definitive diagnosis is confirmed through joint aspiration, which typically yields purulent fluid, a positive Gram stain or culture, or synovial fluid WBC count exceeding 50,000/mm³ [3]. Early intervention—preferably within five days of symptom onset—is essential to avoid sequelae such as osteonecrosis resulting from elevated intra-articular pressure. Initial empirical antimicrobial therapy usually comprises vancomycin, clindamycin, or third-generation cephalosporins, with transition to oral antimicrobials once clinical and laboratory parameters normalize [15].

Despite widespread agreement on the importance of early intervention, there is no standardized consensus regarding the optimal duration of antimicrobial therapy for pediatric SA [16–18]. Traditionally, treatment includes an initial intravenous (IV) antimicrobial phase of approximately one week, followed by oral antimicrobials to complete a total duration of 2 to 6 weeks, depending on patient-specific factors and microbial sensitivity [19]. However, emerging studies suggest that shorter courses of oral antimicrobials may be equally effective [20], offering potential benefits such as reduced hospital stay, lower risk of antimicrobial resistance, and decreased healthcare costs. Surgical management—whether via arthrocentesis, arthroscopy, or arthrotomy—is frequently required, particularly for deep-seated joints such as the hip or shoulder [21]. While each drainage method has specific advantages and indications, no single approach has been universally accepted as superior. As such, further research is warranted to establish evidence-based diagnostic and therapeutic protocols that optimize outcomes in pediatric septic arthritis.

Although early diagnosis and prompt treatment are universally emphasized, a clear consensus on the ideal duration of parenteral antimicrobial therapy in pediatric SA remains lacking. Current guidelines vary considerably, and while recent evidence supports shorter IV treatment durations, most existing recommendations are derived from expert opinion or small-scale studies, with limited high-quality data specific to infants. This gap contributes to ongoing uncertainty in clinical decision-making, particularly in balancing treatment effectiveness with risks such as antimicrobial resistance and prolonged hospitalization. The purpose of this study was to compare the radiological and clinical outcomes of short-term versus long-term parenteral antimicrobial therapy in infants with septic arthritis.

Objective

- The aim of the study was to compare the radiological and clinical outcomes of short-term versus long-term parenteral antimicrobial therapy in infants with septic arthritis.

METHODOLOGY & MATERIALS

This randomized controlled trial was conducted at the Department of Paediatrics, Dhaka Shishu Hospital, Dhaka, Bangladesh, from July 2021 to June 2023. A total of 69 infants diagnosed with septic arthritis were enrolled and randomly assigned to two groups: Group A (long-term parenteral antimicrobial therapy) and Group B (short-term therapy).

Inclusion Criteria:

- Infants aged 0 to 2 months
- Clinically and/or radiologically diagnosed with septic arthritis

Exclusion Criteria:

- Infants diagnosed with congenital syphilis
- Infants with major congenital anomalies

The study variables included independent factors such as clinical features and radiological findings. Dependent variables were clinical improvement, radiological findings at 6 months, complications at 12 months, and the final outcome (favorable or unfavorable). Septic arthritis was defined by the presence of clinical signs of systemic infection with joint inflammation, confirmed by a positive sepsis screen, microscopy, or radiological evidence. A favorable outcome was defined as the absence of permanent joint deformity, stiffness, dislocation, or limb-length discrepancy; unfavorable outcomes included the presence of any of these complications. Block randomization was used to allocate patients into two groups: Group A (long-term parenteral antimicrobial therapy) and Group B (short-term therapy). Follow-up evaluations were conducted every three months for one year, including clinical assessments and radiographic evaluations at 12 months to assess joint or limb abnormalities. Data analysis was performed using SPSS version 26.0. Descriptive statistics and inferential tests, including the Chi-square test, Fisher's exact test, and Independent Sample t-test, were used. A p-value < 0.05 was considered statistically significant. Ethical approval was obtained from the ethical committee of Bangladesh Shishu Hospital and Institute. Informed written consent was taken from the parents or legal guardians, with assurances of confidentiality and respect for participants' rights.

RESULTS

Table 1: Distribution of Clinical Features in Both Treatment Groups (n=69)

Clinical Feature	Group A (n=35)	Group B (n=34)
Irritability	35 (100.0%)	34 (100.0%)
Poor feeding	35 (100.0%)	34 (100.0%)
Swelling	35 (100.0%)	34 (100.0%)
Restricted movement	35 (100.0%)	34 (100.0%)
Fever	22 (62.8%)	21 (61.8%)

The clinical features observed in all patients in both groups included irritability, poor feeding, swelling in the affected joint, and restricted movement. Fever was present in 62.8% of patients in Group A and 61.8% in Group B. There were no significant differences in the prevalence of these clinical features between the groups.

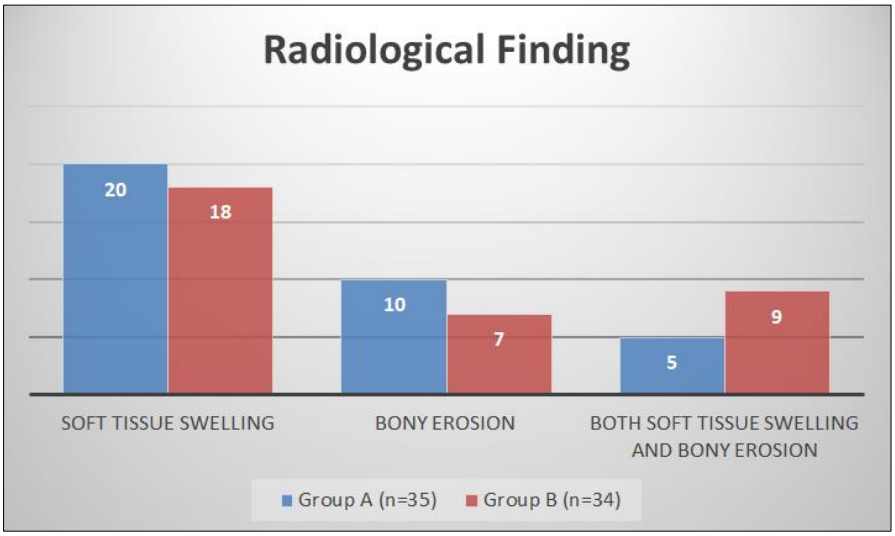

Figure 1: Baseline Radiological Findings of Patients (n=69)

Figure 1 shows that in group A, 20 (57.1%) patients presented with soft tissue swelling, 10 (28.6%) with bony erosion, and 5 (14.3%) had both findings. In group B, 18 (52.9%) patients had soft tissue swelling, 7 (20.6%) had bony erosion, and 9 (26.5%) showed both. There was no statistically significant difference in radiological findings between the groups ($p = 0.414$).

Table 2: Distribution of Treatment Response in Both Groups (n=69)

Treatment Response	Group A (n=35)	Group B (n=34)
Responders	32 (91.4%)	29 (85.3%)
Non-responders	3 (8.6%)	5 (14.7%)

Table 2 illustrates the distribution of treatment response among patients in both groups. In group A, 32 (91.4%) patients responded to therapy within 7 days, whereas 29 (85.3%) patients in group B responded within 14 days.

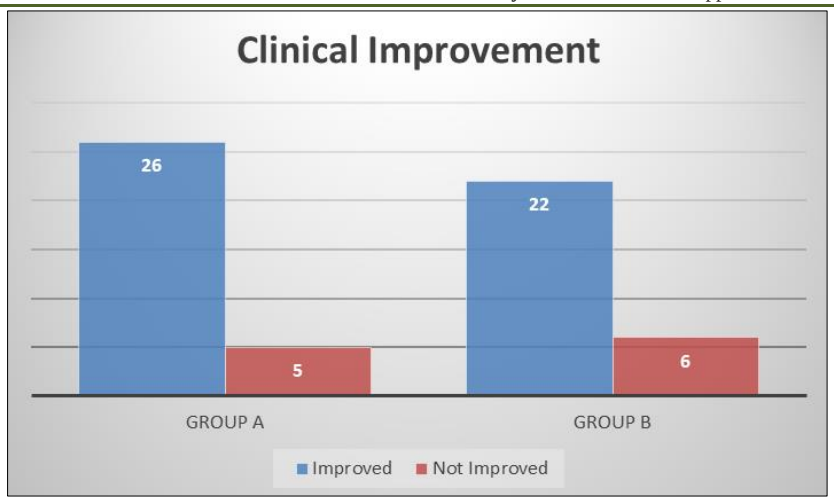

Figure 2: Distribution of Clinical Improvement at the 3rd Month (n=59)

Figure 2 presents the clinical improvement observed at the 3rd month post-treatment. In Group A, 26 (83.9%) patients showed improvement, while 22 (78.6%) patients in Group B improved. The difference between the groups was not statistically significant (p = 0.602).

Table 3: Radiological Findings after Six Months of Treatment (n=55)

Radiological Finding	Group A (n=29)	Group B (n=26)	*p* value
Normal	26 (89.7%)	24 (92.3%)	0.999
Soft Tissue Swelling	3 (10.3%)	2 (7.7%)	

Table 3 shows that the majority of patients in both groups exhibited normal radiological findings after six months of treatment. Soft tissue swelling persisted in 3 (10.3%) patients from group A and 2 (7.7%) patients from group B. The difference between the groups was not statistically significant (p = 0.999).

Table 4: Distribution of Patients by Complications (n=52)

Complication	Group A (n=27)	Group B (n=25)
Limb-length discrepancy	1 (3.7%)	2 (8.0%)
Restricted movement	4 (14.8%)	4 (16.0%)

Table 4 shows that complications were relatively uncommon in both groups. Limb-length discrepancy was observed in 1 (3.7%) patient from group A and 2 (8.0%) patients from group B. Restricted movement occurred in 4 patients in each group.

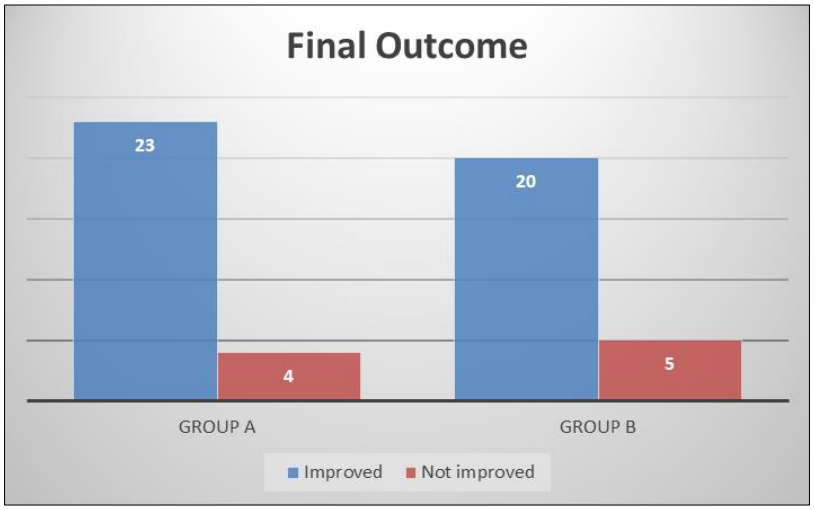

Figure 3: Distribution of Patients by Final Outcome after One Year of Treatment (n=52)

Figure 3 illustrates that the majority of patients in both groups showed clinical and radiological improvement after one year of treatment. In group A, 23 (85.2%) patients improved, compared to 20 (80.0%) in group B. However, 4 (14.8%) patients in group A and 5 (20.0%) in group B did not show improvement. The difference between the groups was not statistically significant (p = 0.722).

DISCUSSION

Infantile septic arthritis is a critical medical condition that demands timely and effective intervention to avoid lasting damage to the joints. Intravenous antimicrobial therapy continues to be the primary approach to treatment, although there remains ongoing debate regarding the ideal duration of administration. The present study aimed to compare the radiological and clinical outcomes of short-term versus long-term parenteral antimicrobial therapy in infantile septic arthritis. A total of 69 infants were enrolled in this randomized controlled trial at the Department of Paediatrics, Dhaka Shishu Hospital. Participants were divided into two groups: Group A (long-term therapy) and Group B (short-term therapy).

In this study, all enrolled infants in both treatment groups presented with a consistent clinical profile—100% showed irritability, poor feeding, joint swelling, and restricted movement, while fever was present in approximately 62% of cases. These findings align with previous literature, such as Umadevi *et al*., [22], which reported that neonates with septic arthritis frequently present with nonspecific signs like irritability and feeding difficulties, highlighting the diagnostic challenges in early infancy. Additionally, Montgomery *et al*., [23], observed decreased joint motion in all affected infants and joint swelling in over 70%, further supporting the clinical indicators found in our cohort. The uniformity of these symptoms across both treatment groups underscores the importance of early identification based on key clinical features, irrespective of the antimicrobial regimen used.

Radiological findings in this study revealed that soft tissue swelling was the most common feature in both groups—20 patients (57.1%) in Group A and 18 patients (52.9%) in Group B—followed by bony erosion and combined findings. These observations are consistent with Ranson *et al*., [24], who emphasized that early radiographic signs in neonates with septic arthritis often include soft tissue swelling and joint space widening. The detection of bony erosion in 28.6% of Group A and 20.6% of Group B, along with combined features in a subset of patients, reflects the progressive nature of the disease if not managed promptly. The absence of a statistically significant difference between the groups (p = 0.414) suggests that the duration of parenteral antimicrobial therapy did not influence the initial radiological manifestations, supporting the view that early imaging findings are largely uniform regardless of treatment duration.

Regarding early treatment response, the majority of infants in both groups demonstrated favorable outcomes. Specifically, 91.4% of patients in Group A showed clinical improvement within 7 days, while 85.3% of Group B patients responded within 14 days. These findings indicate that both long-term and short-term parenteral antimicrobial regimens are effective in managing infantile septic arthritis. Although Group A exhibited a slightly faster rate of improvement, the high response rates in both groups reinforce the efficacy of prompt and appropriate antimicrobial intervention in achieving clinical recovery.

By the third month post-treatment, 83.9% of patients in Group A and 78.6% in Group B demonstrated clinical improvement, with no statistically significant difference between the groups (p = 0.602). This is consistent with the findings of Bono *et al*., who reported that decreased range of motion and swelling were observed in 100% and 71.4% of infants under three months, respectively. The high rates of improvement in both groups in our study suggest that both treatment durations can be effective. The absence of a significant difference further indicates that the length of antimicrobial therapy may not be the primary determinant of medium-term clinical outcomes in infantile septic arthritis.

At the six-month follow-up, the majority of patients in both groups exhibited normal radiological findings, with only a small proportion showing persistent soft tissue swelling—10.3% in Group A and 7.7% in Group B. The difference was not statistically significant (p = 0.999), suggesting that both treatment durations were similarly effective in resolving radiological abnormalities. These results highlight the overall success of antimicrobial therapy in restoring joint integrity, with only minimal residual swelling observed in a small number of patients.

At one-year follow-up, both clinical and radiological outcomes remained favorable across both treatment groups. Complications such as limb-length discrepancy and restricted joint movement were relatively rare, observed in only a small percentage of patients. Despite a few patients not achieving full clinical improvement at one year, the overall recovery was substantial in both groups. These findings support the effectiveness of both short- and long-term parenteral antimicrobial therapies in managing infantile septic arthritis and underscore the critical importance of early diagnosis and timely treatment initiation. Importantly, the lack of statistically significant differences between the groups suggests that shorter antimicrobial courses may be a viable option without compromising clinical or radiological outcomes.

In resource-limited settings—where sequelae rates can be as high as 66% [25, 26], our study reinforces the need for standardized, early intervention protocols to minimize long-term morbidity. By demonstrating comparable outcomes between the two treatment durations, this study offers valuable evidence supporting the potential for shorter, cost-effective antimicrobial regimens without increasing the risk of adverse outcomes.

Limitations of the Study

This study had several limitations:

- The observation period was restricted to 12 months.
- Joint fluid examination was not performed on all affected joints.
- MRI imaging was not available for all patients.

CONCLUSION

Both short-term and long-term parenteral antimicrobial therapies resulted in similar clinical and radiological outcomes in infants with septic arthritis, with no significant differences in treatment response, recovery, or complication rates, indicating that short term parenteral antimicrobial therapy may be viable alternative to prolonged antimicrobial therapy.

REFERENCES

1. Pääkkönen M. Septic arthritis in children: diagnosis and treatment. *Pediatr Health Med Therapeut.* 2017 May 18;8:65–68.
2. Moon JB, Lee JH, Ryu BJ. Septic arthritis of the hip joint caused by Klebsiella pneumoniae: a case report. Journal of Yeungnam Medical Science. 2022 Jan 13;40(2):193-7.
3. Straticiuc S, Ignat A, Hanganu E, Lupu VV, Ciubara AB, Cretu R. Neisseria meningitidis Serogroup C causing primary arthritis in a child: case report. Medicine. 2016 Feb 1;95(5):e2745.
4. Tirta M, Ampelas D, Tsintavis P, Pilichou A, Krallis P, Ampelas DG. Salmonella septic hip arthritis in immunocompetent children: three case reports and literature review. Cureus. 2022 Aug 5;14(8).
5. Laliotis N, Chrysanthou C, Konstandinidis P, Giannakopoulou L. Diagnostic approach and arthroscopic treatment of septic arthritis of the knee, in an infant. Clinical Case Reports. 2020 Dec;8(12):3388-92.
6. Ceroni D, Cherkaoui A, Ferey S, Kaelin A, Schrenzel J. Kingella kingae osteoarticular infections in young children: clinical features and contribution of a new specific real-time PCR assay to the diagnosis. Journal of pediatric orthopaedics. 2010 Apr 1;30(3):301-4.
7. Dodwell ER. Osteomyelitis and septic arthritis in children: current concepts. Current opinion in pediatrics. 2013 Feb 1;25(1):58-63.
8. Arnold JC, Bradley JS. Osteoarticular infections in children. Infectious Disease Clinics. 2015 Sep 1;29(3):557-74.
9. Grover P, Bala K, Muralidharan J, Angrup A, Ray P. Clostridium septicum arthritis in a young infant: A case report. Anaerobe. 2019 Jun 1;57:32-4.
10. Boeisa AN, Khalaf AA. Bilateral Knee Septic Arthritis in a Seven-Month-Old Girl. Cureus. 2023 Apr 10;15(4).
11. Donders CM, Spaans AJ, Bessems JH, van Bergen CJ. A systematic review of the optimal drainage technique for septic hip arthritis in children. Hip International. 2022 Sep;32(5):685-93.
12. Ben-Zvi L, Sebag D, Izhaki G, Katz E, Bernfeld B. Diagnosis and management of infectious arthritis in children. Current infectious disease reports. 2019 Jul;21:1-2.
13. Brown DW, Sheffer BW. Pediatric septic arthritis: an update. Orthopedic Clinics. 2019 Oct 1;50(4):461-70.
14. Mignemi ME, Menge TJ, Cole HA, Mencio GA, Martus JE, Lovejoy S, Stutz CM, Schoenecker JG. Epidemiology, diagnosis, and treatment of pericapsular pyomyositis of the hip in children. Journal of Pediatric Orthopaedics. 2014 Apr 1;34(3):316-25.
15. Saavedra-Lozano J, Calvo C, Carol RH, Rodrigo C, Núñez E, Obando I, Rojo P, Merino R, Pérez C, Downey FJ, Colino E. SEIP–SERPE–SEOP Consensus document on the treatment of uncomplicated acute osteomyelitis and septic arthritis. Anales de Pediatría (English Edition). 2015 Apr 1;82(4):273-e1.
16. Kolyvas E, Ahronheim G, Marks MI, Gledhill R, Owen H, Rosenthall L. Oral antimicrobial therapy of skeletal infections in children. Pediatrics. 1980 May 1;65(5):867-71.
17. Nelson JD, Howard JB, Shelton S. Oral antimicrobial therapy for skeletal infections of children: I. Antimicrobial concentrations in suppurative synovial fluid. The Journal of Pediatrics. 1978 Jan 1;92(1):131-4.
18. Feigin RD, Pickering LK, Anderson D, Keeney RE, Shackleford PG. Clindamycin treatment of osteomyelitis and septic arthritis in children. Pediatrics. 1975 Feb 1;55(2):213-23.
19. Rutz E, SpoeRRi M. Septic arthritis of the paediatric hip-A review of current diagnostic approaches and therapeutic concepts. Acta Orthop Belg. 2013 Apr 1;79(2):123-34.
20. Peltola H, Vuori-Holopainen E, Kallio MJ, SE-TU Study Group. Successful shortening from seven to four days of parenteral beta-lactam treatment for common childhood infections: a prospective and randomized study. International journal of infectious diseases. 2001 Jan 1;5(1):3-8.
21. Donders CM, Spaans AJ, van Wering H, van Bergen CJ. Developments in diagnosis and treatment of

paediatric septic arthritis. World Journal of Orthopedics. 2022 Feb 18;13(2):122.
22. Umadevi S, Kali A, Sreenivasan S, Pramodhini S, Charles MV. Septic Arthritis caused by Group A Streptococcus in Newborn: An Unusual Presentation. J Clin Diagn Res. 2013 Jun;7(6):1143-4.
23. Bono KT, Samora JB, Klingele KE. Septic Arthritis in Infants Younger Than 3 Months: A Retrospective Review. Orthopedics. 2015 Sep;38(9):e787-93.
24. Ranson M. Imaging of pediatric musculoskeletal infection. InSeminars in musculoskeletal radiology 2009 Sep (Vol. 13, No. 03, pp. 277-299). © Thieme Medical Publishers.
25. Nunn TR, Cheung WY, Rollinson PD. A prospective study of pyogenic sepsis of the hip in childhood. The Journal of Bone & Joint Surgery British Volume. 2007 Jan 1;89(1):100-6.
26. Stoesser N, Pocock J, Moore CE, Soeng S, Hor P, Sar P, Limmathurotsakul D, Day N, Kumar V, Khan S, Sar V. The epidemiology of pediatric bone and joint infections in Cambodia, 2007–11. Journal of tropical pediatrics. 2013 Feb 1;59(1):36-42.