



# Evaluation of Epidemiology and Etiologies of Acute Limping in Children Presented to the Emergency Department of Pediatric Hospital of Amirkola in Babol, Iran

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## Abstract

**Background:** Limping is a common complaint of children presenting to the emergency departments of hospitals; therefore, it is important to identify its causes and avoid unnecessary measures. In this study, common etiologies for limping in children presenting to the emergency department of Pediatric Hospital of Amirkola in Babol, Iran were evaluated.

**Methods:** All children under 15 years of age presented to the emergency department of Pediatric Hospital of Amirkola, during 2017-2018, with complaints of acute limping were retrospectively evaluated. Initially, 71 patients were found among whom 53 were selected based on inclusion and exclusion criteria of the study. The census method was used to obtain the required samples. Patient information including demographic data, clinical signs, and symptoms at admission were gathered. Statistical analysis was done using SPSS v22 software (IBM, USA), and  $p < 0.05$  was considered statistically significant.

**Results:** Of 53 children, 33 (62.3%) were boys and 20 (37.7%) were girls. The mean age of participants was  $4.53 \pm 2.79$  years old, and the mean length of hospital stay was  $10.5 \pm 7.2$  days. Inflammation and infections were the most common etiologies with a cumulative prevalence of 58.49 and 28.30%, respectively. Transient synovitis was the most common differential diagnosis with a prevalence of 43.4%, and the most affected joints were hips with a prevalence of 73.5% ( $p$ -values=0.001).

**Conclusion:** Most of the diseases for acute limping in children are self-limited, but this should not lead to disregard for infection as a differential diagnosis.

**Keywords:** Child, Emergency service, Hospital, Iran, Tenosynovitis

## Introduction

Abnormal walking known as limping, is one of the common complaints in children presented to the emergency department, and based on the difference between normal walking and limping, there are various differential diagnoses for limping, including self-limited diseases to neoplasm-related limping (1). In children, pain, weakness, structural or functional abnormality in the spine, hip, or lower limbs could lead to limping (2). Important differential diagnoses for limping include trauma (Fractures, contusion, child abuse, overuse injuries), Perthes's disease, slipped capital femoral epiphysis, benign hypermobility joint syndrome, chondromalacia patellae, limb-length discrepancy, toxic synovitis, osteomyelitis, septic arthritis, and discitis (3). Trauma is the most common etiology for limping in children, and in non-trauma patients, transient synovitis with an incidence rate of 40% is the most common etiology (4). Fortunately, most of the cases are self-limited and don't need serious intervention, but the main concern is about life-threatening causes (5). In the emergency setting, it is critical to first rule out life-threatening conditions such as septic arthritis in hip joints, osteomyelitis, testicular torsion, and incarcerated hernia, then evaluate emergent etiologies such as trauma, Lyme disease, and neuromuscular disorder (5). Complete history taking and physical examination are necessary to assess patients and choose appropriate diagnostic and treatment methods (6). Complete Blood Count (CBC), blood culture, Erythrocyte Sedimentation Rate (ESR), and C-reactive protein measurement are the most important laboratory tests, and plain film radiography and ultrasound are usually the first imaging modalities in the emergency setting to evaluate children presented with acute limping (7,8). In this study, an attempt was made to determine the etiologies and prevalence of acute limping in children presented to the emergency department of Pediatric Hospital of Amirkola in Babol, Iran.

## Materials and Methods

This study was conducted after obtaining the approval of the health research institute at Babol University of Medical Sciences (ID: IR.MUBABBOL.HRI.REC.1398.201). The medical records of all children with complaint of acute limping presented to the

emergency department of Pediatric Hospital of Amirkola in Babol, Iran during the years 2017-2018 were retrospectively investigated. At first, 71 children were found among whom 18 were excluded based on inclusion and exclusion criteria, and 53 were selected for further analysis. Inclusion criteria were the history of acute limping and the age below 15, and the exclusion criteria were the history of trauma in patient, age above 15, and history of underlying diseases. Census method was used to obtain the required samples. Patient information including demographic data, clinical signs and symptoms, and related features at admission were gathered from medical records, then entered into the pre-prepared form. Statistical analysis was done by SPSS v22 software (IBM, USA). Frequency, percentage, mean, and standard deviation were used for descriptive statistics and Fisher's exact test, chi-square, and t-test for analytical statistics, and  $p < 0.05$  was considered statistically significant. Continuous variables included age (presented as year), body temperature (presented as degrees celsius), and duration of limping (presented as day). Qualitative nominal variables included gender (presented as male/ female), location (rural/city), affected joint (hip, knee, etc.), and diagnosis (transient synovitis, septic arthritis, etc). All patients' information was kept confidential by the research team. Results Of the 53 children enrolled in this study, 33 (62.3%) were boys and 20 (37.7%) were girls, and there wasn't significant difference between gender and presence of acute limping ( $p$ -value= 0.07).

Also, 23 (43.3%) cases lived in cities while 30 (56.6%) lived in villages ( $p$ -value=0.33), and the mean age of participants was  $4.53 \pm 2.79$  years. Also, the mean length of hospitalization was  $10.5 \pm 7.2$  days. Frequency of patients with fever (axillary body temperature more than  $37.6^{\circ}\text{C}$ ) was 20 (38%) which was not statistically significant ( $p$ -value=0.074). Right and left lower limb involvement was reported in 49 and 51% of patients, respectively, which wasn't statistically significant ( $p$ -value=0.89). As indicated in table 1, inflammation and infections were the most common etiologies for acute limping in our patients with a cumulative prevalence of 58.49 and 28.30%, respectively. Differential diagnosis has been shown in details in table 2.

The most common affected joints included hips, knee,

**Table 1.** Frequency and percentage of acute limping etiologies based on gender

Etiologies	Infections	Inflammation	Vascular diseases	Malignancy	Congenital disorders	Others	Total
Gender							
Boy	9(16.98%)	19(35.84%)	2(3.77%)	1(1.88%)	0(0%)	2(3.77%)	33
Girl	6(11.32%)	12(22.64%)	0(0%)	0(0%)	2(3.77%)	0(0%)	20
Total	15	31	2	1	2	2	53

**Table 2.** Detailed differential diagnosis of acute limping in patients

Etiologies	Differential diagnosis	Frequency
Inflammation	Transient synovitis	23 (43.4%)
	Reactive arthritis	4(7.5%)
	Myositis	2(3.7%)
	Rheumatic fever	1(1.8%)
	Kawasaki disease	1(1.8%)
Infection	Septic arthritis	9(17%)
	Osteomyelitis	2(3.7%)
	Brucellosis	1(1.8%)
	Cellulitis	3(5.6%)
Vascular diseases	Perthes disease	2(3.7%)
Malignancy	Leukemia	1(1.8%)
Congenital disorders	DDH <sup>1</sup>	2(3.7%)
Others	GBS <sup>2</sup>	1(1.8%)
	Brain tumors	1(1.8%)

1. Developmental dysplasia of the hip

2. Guillain-Barre Syndrome

ankle, foot, and femur with a prevalence of 73.5, 7.5, 3.7, 5.6, and 1.8 %, respectively, and in 7.5% of patients, there was no extra-articular involvement. Moreover, the involvement of hip joints was significantly more than other parts ( $p$ -value=0.001). In table 3, the frequency of different etiologies for acute limping in our cases is indicated based on their age group. As shown, 32.07% of our patients were children under 3 years of age with acute limping due to inflammation.

Laboratory parameters including White Blood Cell (WBC) count and ESR were measured. The mean and standard deviation of WBC was  $9239 \pm 3627$  per microliter. Also, minimum and maximum values of ESR were 4 and 165, respectively.

## Discussion

Transient synovitis with a prevalence rate of 43.4% was the most common differential diagnosis in our study, which is similar to the study results of Fischer and Beattie (5), Gaston and Murray (9), and Carreño ML *et al* (4) with 39.5, 40, and 53.16 % prevalence rate, respectively for acute limping in children. In table 4, other etiologies for acute limping in our study were compared with the results of previous research. For infection as an etiology, there was a difference between the results of our study and those of Fischer and Beattie, probably due to the difference in ethnicity, epidemiologic factors, and small sample size. Also, our results were different from Gaston's, probably due to our small sample size.

**Table 3.** Frequency of different etiologies for acute limping based on patients' age group

Etiologies Age group	Inflammation	Infection	Vascular diseases	Malignancy	Congenital disorders	Others	Total
Under 3 years old	17(32.07%)	3(5.66%)	0(0%)	0(0%)	2(3.77%)	2(3.77%)	24
3-7 years old	10(18.86%)	8(15.09%)	1(1.88%)	1(1.88%)	0(0%)	0(0%)	20
Above 7 years old	4(7.54%)	4(7.54%)	1(1.88%)	0(0%)	0(0%)	0(0%)	9
Total	31	15	2	1	2	2	53

**Table 4.** Comparison of etiologies for acute limping in children between our study and Fischer and Beattie's and Gaston and Murray's study

Etiologies Study	Inflamma- tion	Infection	Perthes dis- ease	Malignancy	DDH	Non-specific
Our study	58.5%	28%	3.7%	1.8%	3.7%	Nm <sup>3</sup>
Fischer and Beattie (5)	42.7%	3.6%	2.1%	0.8%	0%	Nm
Gaston and Murray (9)	Nm	4%	2%	1%>	Nm	30%

In our study, the most affected joints were hip, knee, and other lower extremity joints with a prevalence of 73.5, 7.5, and 11%, respectively. Fischer and Beattie (5) reported a 33.7, 19.3, and 18% prevalence rate for hip, knee, and other lower extremity joints as affected joints, respectively.

In children under 3 years old, the most common etiology for acute limping in our study was inflammation with a prevalence of 32.07%, whereas, in the study of Herman and Martinek (1) and Leung and Lemay (3), DDH and septic arthritis were the most common etiologies for acute limping in children under 3 years old. However, several limitations were apparent in the course of the research including small sample size, incomplete medical record information, and lack of cooperation of some patients.

## Conclusion

There are a wide variety of etiologies for acute limping in children; however, our study and previous literature show that most of these diseases are self-limited and do not require costly procedures and long-term hospitalization, but this should not lead to disregard for infection as a differential diagnosis. It seems that Kocher criteria are useful to be applied for differentiating between infection and other

etiologies the disorder. In summary, in children with acute limping aged between 3 to 9 years old, with no fever, with weight-bearing capacity, and a good general condition, transient synovitis can be definitely considered the etiology and this conclusive diagnosis would simply prevent using costly and additional diagnostic measures. It is strongly recommended to perform prospective studies with larger sample size and a more structured questionnaire to cover all possibilities for acute limping and their related factors in children.

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## **Conflict of Interest**

The authors have no conflict of interest to declare.

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