Original Article

Comparative Study Between Integrated Management of Childhood Illness Guidelines and Traditional Methods in Management of Acute Pharyngitis among Children Under Five Years in Zagazig District, Egypt

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Abstract

Background: Pharyngitis is one of the most frequently faced pediatric problems with serious complications in primary care.
Objective(s): To compare between Integrated Management of Childhood Illness (IMCI) guidelines and traditional management concerning diagnosis and antibiotic prescription for acute pharyngitis in children less than 5 years, as well as to determine validity of IMCI guidelines in diagnosis of acute pharyngitis by comparing their results to throat culture as a golden standard.
Methods: A comparative cross-sectional study was conducted in one primary health care center and one unit where IMCI guidelines were implemented; as well as one center and one unit where traditional management of acute pharyngitis was implemented in Zagazig district, on 343 children under five years complaining of sore throat or difficult feeding. About 86 children were randomly selected from each health facility during the period of first of January until end of June 2017. Doctor's clinical diagnosis and antibiotic prescription were reported for all children, while throat swabs were taken from children managed according to IMCI guidelines for bacterial culture.
Results: According to IMCI, only 11 % of children were diagnosed as bacterial pharyngitis, antibiotic prescription was significantly lower among those managed according to IMCI compared to traditional methods (11% & 96.5% respectively, P<0.001). However, throat culture revealed that 28.5% of children managed according to IMCI guidelines had positive bacterial growth. Sensitivity of IMCI guidelines to detect bacterial cases of pharyngitis was only 36.7 % and Positive Predictive Value (PPV) was 94.7%, while their specificity to exclude bacterial and detect viral infection was about 99.2% and the Negative Predictive Value (NPV) was 79.7%.
Conclusion: Application of IMCI guidelines is considered valuable in prevention of antibiotic abuse. However, the sensitivity of IMCI guidelines to detect bacterial pharyngitis was 36.7%.

Key words: integrated management of childhood illness guidelines, validity, acute pharyngitis

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INTRODUCTION

Many bacterial and viral organisms can induce pharyngitis, either as a single manifestation or as part of a more generalized illness. Group A streptococcus is the most common bacterial cause of acute pharyngitis approximately 15 to 30 percent of cases in children. Children experience more than 5 Upper Respiratory Tract Infections (URTIs) per year [(1)]. Sore throat is a common reason for people consulting general practitioners. Evidence shows that most are viral, self-limiting, easily self-managed, and do not require antibiotics. Physicians who rely on the clinical impression alone are likely to over treat for fear of acute rheumatic fever or locally or systemically invasive disease [(2)]. A properly performed and interpreted throat culture is the gold standard for the diagnosis of group A streptococcal pharyngitis, The widespread misuse of antibiotics used for treatment of pharyngitis has resulted in emergence of drug resistant bacterial pathogens with serious side effects and waste of health care resources [(3)].

Most children have their medical care provided by health workers with little access to diagnostic aids and with limited therapy [(4)]. The World Health Organization (WHO) guidelines for the diagnosis and management of common clinical problems are based on pattern recognition of a collection of signs and symptoms, and treatment designed to treat the common causes of identified clinical problems [(5)].

Although the Integrated Management of Childhood Illness (IMCI) works well in many settings, local and national constraints include low healthcare worker compliance, the perceived length and expense of training, inadequate counseling of child care-givers, the weakness of health systems to support IMCI policy and lack of institutional or governmental budget allocations for implementation. The need for support from national health policy, financial commitment and health system strengthening should be emphasized [6, 7].

The aim of present study was to compare between IMCI guidelines and traditional management concerning diagnosis and antibiotic prescription for acute pharyngitis in children less than 5 years. Also, to determine validity of IMCI guidelines in diagnosis of acute pharyngitis by comparing their results to throat culture as a golden standard.

METHODS

Study setting and design: Zagazig district is divided into urban and rural areas. It includes 8 urban primary health care centers and 53 rural units. Integrated management of childhood illness (IMCI) is applied in 4 centers and 10 units of them. We have randomly chosen one center and one unit where IMCI guidelines are implemented and one center and one unit where traditional management was implemented. A Comparative cross-sectional study was conducted.

Sampling: The sample size was estimated using EpiInfo version 6.04 statistical package. The total number of children under five years in Zagazig district in 2013 was 183,455. Assuming that the prevalence of throat infections among children under five years is 23.5 % [8], the confidence level is 95% and the degree of precision is 80%, the estimated sample size was 312 children. 10% was added to compensate for non-response due to any cause. So, the final study sample size was 343 children under five years. Half of the sample was randomly selected from health facilities implementing IMCI guidelines and the other half from facilities implementing traditional management of acute pharyngitis during the period of first of January until end of June 2017 (about 86 children from each health facility).

Inclusion criteria: Children aged 2 months up to 5 years complaining of sore throat or difficult feeding, common cold and or fever.

***Exclusion criteria*:**

- Patients with history of antibiotic administration in the preceding week to examination.
- History of long acting penicillin injection monthly.
- History of chronic disease as chronic kidney disease, chronic liver disease, cardiac disease or immune-deficiency disease.
- Children of parents who didn't give consent.

Data collection tools: All children included in the study were categorized into 2 groups: Group A where traditional management was implemented and Group B where IMCI was implemented. Personal and clinical history was taken for all children and doctor's clinical diagnosis and antibiotic prescription were reported, while throat swabs were taken from group B implementing IMCI guidelines.

Collection of throat swabs was performed by swabbing posterior pharyngeal wall behind uvula and tonsillar fauces with sterile cotton tipped applicators taking due precautions not to contaminate specimens with oropharyngeal flora in the saliva, tongue and cheeks. Samples were then transported immediately, within no more than 2 hours, to the Microbiology Department, Faculty of Medicine, Zagazig University where they were screened for possible bacterial pathogens e.g. Streptococcus pyogens, pneumococcus, Corynebacterium diphtheria, Staphylococcus aureus, Neisseria meningitis and Vincent's organisms. For isolation of Streptococcus pyogens, samples were streaked on 7% sheep blood agar plates and incubated under CO2, at 37 ˚C for 24-48 h. β hemolytic colonies were tested with catalase test, Gram stain and bacitracin susceptibility test. For Corynebacterium diphtheria, the swabs were inoculated on tellurite blood agar and incubated aerobically at 35-37 ˚C for up to 48 hours. For diagnosis of Vincent's organisms direct smears were Gram stained and examined microscopically for visualization of Gram negative spirochetes and Gram negative fusiform rods.

Statistical analysis

Data were entered and analyzed using statistical package of social sciences (SPSS version 21). Qualitative analysis for antibiotic prescription was tested by chi-square. Results of diagnosis of acute pharyngitis according to IMCI were compared to the results of throat culture as a golden standard by calculation of sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV).

Ethical considerations

The study conformed to the international ethical guidelines and that of declaration of Helsinki. Official permissions were obtained from the concerned health authorities before conducting the study. All participants had the right to: refuse participation in this study at any time, know the purpose of the study, respect their privacy, keep total confidentiality, and be reassured that it will not have any negative effect on them or their physicians. Informed consent was obtained from each participant. This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors. Anonymity and confidentiality of participants' data were ensured.

RESULTS

Table 1 shows the antibiotic prescription for acute pharyngitis among children managed according to the different methods. It was found that it was significantly lower among those managed according to IMCI compared to traditional methods. (11% & 96.5% respectively, P<0.001).

The result of throat culture shows that about twenty nine percent (28.5%) of cultures done had positive bacterial growth, while the majority of cases (71.5%) gave negative culture which excludes bacterial infection and was considered viral (Figure 1). Sensitivity of IMCI guidelines to detect bacterial cases of pharyngitis was about thirty seven percent (36.7 %, C.I. 23.8 -51.7). PPV was about ninety five percent (94.7%, C.I. 71.9- 99.7). While its specificity to exclude it and decide viral infection was about ninety nine percent (99.2%, C.I. 94.9- 100) and NPV was 79.7%, C.I 72.3-85.6 (Table 2).

Table (1): Distribution of studied children according to antibiotic prescription for acute pharyngitis in relation to IMCI guidelines application

Antibiotic prescription	Traditional management (*n*=171)		IMCI (*n*=172)		Total (*n=343)*		χ^2	p
	No.	%	No.	%	No.	%		
Yes	165	96.5	19	11.0	184	53.6	**251.8**	**<0.001**
No	6	3.5	153	89.0	159	46.4		

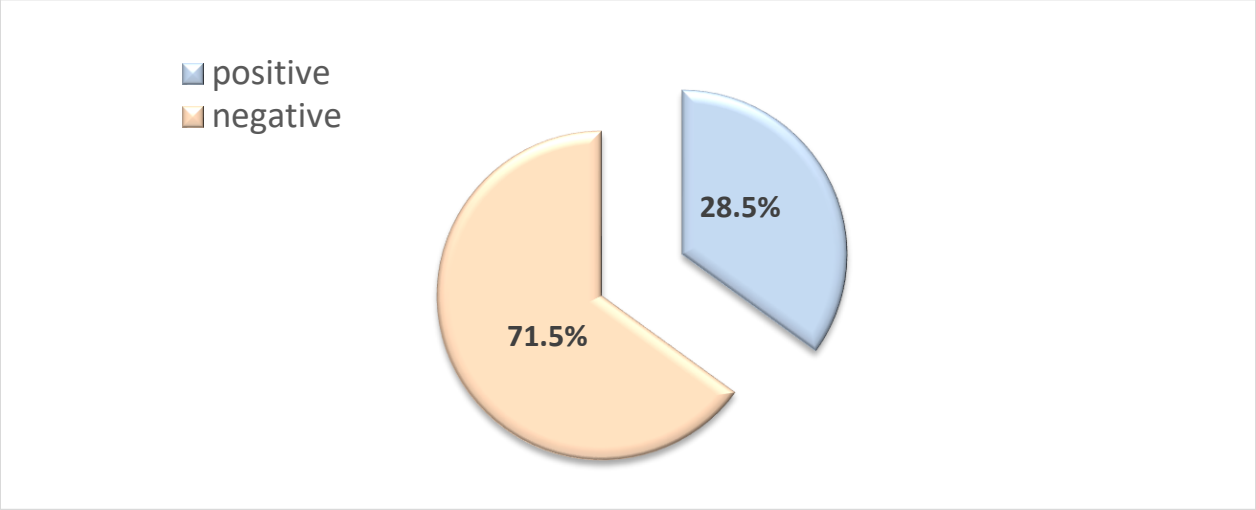

Figure (1): Culture results of throat swab for children managed according to IMCI guidelines for acute pharyngitis

Table (2): Validity of IMCI guidelines in diagnosis of acute pharyngitis in children under 5 years

IMCI diagnosis	Culture Results		Total	PPV	NPV	Sensitivity %	Specificity %
	Bacterial	Viral					
Bacterial	18	1	19				
Viral	31	122	153	94.7	79.7	36.7	79.7
Total	49	123	172				

DISCUSSION

In Egypt, the Ministry of Health and Population introduced the IMCI strategy in 1997. It was supported by WHO, UNICEF, USAID and the World Bank to include IMCI in the basic package of services delivered at the Primary Health Care (PHC) facilities **(9).** Several challenges have impeded the scale up of IMCI including insufficient numbers of trained health workers, absence of essential medicines and equipment, inadequate supervision after training, health worker factors (e.g. gender and job satisfaction), and community or household factors that influence quality care provided to the child in the household (10).

The current study revealed that according to IMCI, only 11% of children were diagnosed as bacterial pharyngitis, while according to traditional management most of the cases (96.5%) were diagnosed as bacterial pharyngitis. The results agreed with Martin et al. (11) who reported that viruses are responsible for more than 80% of pharyngitis cases while group A-streptococcus bacteria (GAS) accounts for only 15% of cases. This means that application of IMCI guidelines is considered valuable in proper diagnosis of pharyngitis cases. Results of the group implementing traditional management disagree with these studies, as there is over-diagnosis of bacterial pharyngitis which leads to over-prescription of antibiotics.

As regard to antibiotic prescription for acute pharyngitis, the present study explored that antibiotic prescription was significantly lower among those managed according to IMCI compared to traditional methods, that means there is over-prescription of antibiotics in the group implementing traditional management. In comparison, a study conducted in the United States reported that antibiotics were prescribed by doctors in 53% of an estimated 7.3 million visits of children complaining of sore throat every year. Also, it was found that 27% of the children had non-recommended antibiotic prescription **(12)**. So, it is important to diagnose patients with acute pharyngitis and if it is viral in origin; to avoid incorrect and unnecessary treatment (13).

Throat culture is considered the criterion standard for diagnosis of group A streptococcus pharyngitis. According to the results of throat culture of children in the group implementing IMCI guidelines, it was noticed that 28.5% of children had positive bacterial growth. Similarly, Steinhoff et al. reported that the prevalence of group A Beta hemolytic streptococci (GABHS) by throat culture was 24% **(14).** It is necessary to determine the validity of IMCI guidelines to confirm its importance in diagnosis of acute pharyngitis. This study showed that sensitivity of IMCI guidelines to detect bacterial cases of pharyngitis was 36.7% and its specificity to exclude bacterial cases of pharyngitis and decide viral infection is 99.2%**.** That means 18 out of 49 with positive throat culture would correctly receive antibiotics and 122 out of 123 with negative culture would not receive treatment. Hence, IMCI guidelines are considered valid in exclusion of bacterial infections of pharynx which in turn helps in decreasing rates of unnecessary antibiotic prescriptions.

The results of the current study are similar to the results of the study conducted by Rimion et al. (15)**,** who evaluated the WHO guidelines of Acute Respiratory Infection in a large urban pediatric clinic in Egypt and reported that WHO guidelines were sensitive by 12% and specific by 94% in case of acute pharyngitis.

CONCLUSIONS & RECOMMENDATIONS

Application of IMCI guidelines is considered valuable in prevention of antibiotic abuse. However, the sensitivity of IMCI guidelines to detect bacterial pharyngitis was 36.7%.

It is recommended therefore to implement IMCI guidelines in all primary health care centers and units all over the country and training of all doctors and nurses to apply them. With proper attention to the family physicians to be able to identify patients with acute pharyngitis who require specific antibiotic therapy.

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Conflict of Interest: None to declare.

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