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ORIGINAL ARTICLE

Evaluating the Role of Paracetamol in Alleviating Symptoms of Upper Respiratory Infections

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ABSTRACT

Background: Fever is a very common adaptive immune response in acute respiratory tract disorders during infancy. Antipyretic / analgesic drugs such as paracetamol (acetaminophen) are widely used to improve the comfort of the child.

Objective: To determine the efficacy of paracetamol in symptomatic relief of upper respiratory tract infections in children aged 2 to 5 years.

Study Design: Descriptive case series

Study Setting: Department of Pediatrics, Ayub Teaching Hospital, Abbottabad

Duration of study: Six months from October 13, 2020, to April 13, 2021

Subjects and methods: All children aged 2 to 5 years of either gender having upper respiratory tract infections and duration of symptoms of >2 days were consecutively enrolled. Patients were prescribed Paracetamol in a dose of 10 mg/kg/dose 6 hourly for 3 days. Patients were followed up after 3 days to see the efficacy of Paracetamol in symptomatic relief of upper respiratory tract infections.

Results: Of 284 children, the mean age of the children was 4.01 ±1.10 years. There were 135 (47.5%) males and 149 (52.5%) females. The mean weight of the children was 12.36 ±3.42 kg. The mean duration of symptoms was 5.11 ±0.95 days. The efficacy of paracetamol in symptomatic relief of upper respiratory tract infection was found to be 184 (64.8%). A non-significant difference of efficacy of paracetamol was observed with age (p-value 0.578), gender (p-value 0.908), weight (pvalue 0.586), and duration of symptoms (p-value 0.872).

Practical Implication: This study was planned to determine the efficacy of paracetamol in symptomatic relief of upper respiratory tract infections. The results of this study could be used in owing to locally produced evidence.

Conclusion: The efficacy of paracetamol was observed in 64.8% children aged 2 to 5 years with symptomatic relief of upper respiratory tract infections in children.

Keywords: Efficacy, Paracetamol, Children, Upper Respiratory Tract Infections

INTRODUCTION

Upper respiratory tract infection (URTIs) is a term used to encompass acute infections of the nose, paranasal sinuses, pharynx and larynx [1]. They are the main reason of school absenteeism in children, occurring at a rate of 6-8 episodes on average annually. They are common in winter and spring but can present throughout a year in the form of common cold, pharyngitis, tonsillitis and sinusitis. Symptoms of URTIs include fever, blocked nose, rhinorrhea, cough, and sore throat [2]. It is caused by viruses such as rhinovirus, para influenza virus, coronavirus, adenovirus, respiratory syncytial virus (RSV), coxsackie virus and influenza virus [(1)]. Among these, rhinovirus account for 25-30% of URTIs, coronavirus for 10% and the others for 25-35%. According to World Health Organization, in low socioeconomic countries acute respiratory tract infections caused by RSV is responsible for about 600,000 death per year [(3)]. Transmission of viruses causing URTIs occurs by small particle aerosols (droplets), large particle aerosols and by direct contact with infectious agent on skin or environmental surfaces followed by passage to the nares or eyes. So, transmission occurs easily in congested places [(4)].

URTIs are mostly of viral origin, however, antibiotics are widely prescribed. This unjudicial use of antibiotics leads to drug-related adverse events, development of antibiotics resistance and clinical failure, and unnecessary burden on parents pockets [(5)]. As already mentioned, most of the URTIs are self-limiting viral ailments that will resolve with time and supportive management. However, it is essential for the caregiver to identify any infection that may have hazardous consequences and need medical intervention. Appropriate symptomatic treatment may include NSAIDs, decongestants, antitussives, antihistaminic and vitamin preparations [(6)]. Among symptoms of URTIs, fever is the major cause that parents seek medical attention for their children. It causes discomfort to the child, may result in increased total body water loss and consequently dehydration and leads to delayed recovery due to decrease in activity and appetite. So, antipyretics are commonly used to lessen the secondary effects of fever [(7)]. National guidelines (NICE 2013) also recommend home management of fever with associated discomfort or pain with antipyretics and analgesics like Paracetamol and Ibuprofen. Both have similar safety and tolerability but globally paracetamol is considered as having better gastrointestinal, renal and respiratory safety and overall better tolerability than Ibuprofen [(8-10)].

In a study by Yaqub A, et al. has shown that efficacy of paracetamol was 75.33% in symptomatic relief of upper respiratory tract infections in children aged 2 to 5 years [(2).] To the best of our knowledge, no study has been carried out regarding efficacy of paracetamol in symptomatic relief of upper respiratory tract infections in children in Khyber Pakhtunkhwa population. Therefore, this study was planned to determine the efficacy of paracetamol in symptomatic relief of upper respiratory tract infections in Ayub Teaching Hospital, Abbottabad. The results of this study could be used in owing to locally produced evidence.

MATERIALS AND METHODS

Study Design: Descriptive case series

Study Setting: Department of Pediatrics, Ayub Teaching Hospital, Abbottabad

Sample Technique: Non-probability consecutive sampling

Duration of study: Six months from October 13, 2020 to April 13, 2021

Sample selection criteria: Inclusion criteria:

- Children aged 2 to 5 years
- Both gender

- Upper respiratory tract infections as per operational definitions
- Duration of symptoms >2 days

Exclusion criteria

- Patients with breathing difficulty i.e., R/R >30/min on physical examination
- Patients with O_2 saturation <93% on oximeter
- Patients taking antibiotics on medical record
- Parents refused for consent

Data collection procedure: The data collection was started after approval of synopsis. Children coming to paediatric OPD meeting the inclusion criteria was assessed on their first visit to OPD. Diagnosis was made on history and physical examination. An informed consent was taken from parents of children with URTIs and then patients were enrolled in study. Basic demographics like age, gender, duration of symptoms and weight on weighing scale was noted. Parents were interviewed and Performa was filled at the site and collected by trainee researcher herself.

Patients were prescribed Paracetamol in a dose of 10 mg/kg/dose 6 hourly for 3 days. Patients were followed up after 3 days to see the efficacy of Paracetamol in symptomatic relief of URTIs as per operational definition. Efficacy was noted on especially designed proforma.

Data analysis: Data were entered and analyzed with statistical analysis program (IBMSPSS version 22). Frequency and percentage were computed for qualitative variables like gender and efficacy.

Mean ±SD was presented for quantitative variables like age, duration of symptoms and weight.

Efficacy was stratified among age, gender, duration of symptoms and weight. Post stratification chi square test was applied, p ≤0.05 was considered statistically significant.

RESULTS

The mean age of the children was 4.01 ±1.10 years. (Table 1). There were 147 (51.8%) children with ≤4 years and 137 (48.2%) with >4 years of age. (Figure 1). Gender distribution showed that 135 (47.5%) children were males and 149 (52.5%) were females. (Figure 2). The mean weight of the children was 12.36 ±3.42 kg. (Table 2). There were 116 (40.8%) children with ≤12 kg of weight and 168 (59.2%) with >12 kg of weight. (Figure 3) . The mean duration of symptoms was 5.11 ±0.95 days. (Table 3) There were 192 (67.6%) patients with ≤5 days of duration of symptoms whereas 92 (32.4%) with >5 days of duration of symptoms. (Figure 4) The efficacy of paracetamol in symptomatic relief of upper respiratory tract infection was found to be 184 (64.8%). (Figure 5). A non-significant difference of efficacy of paracetamol was observed with age (p-value 0.578), gender (p-value 0.908), weight (p-value 0.586), and duration of symptoms (p-value 0.872). (Tables 4-7)

Table 1: Mean age of the children, years (n=284)

Mean ±SD	Minimum	Maximum
4.01 ±1.10	2	5

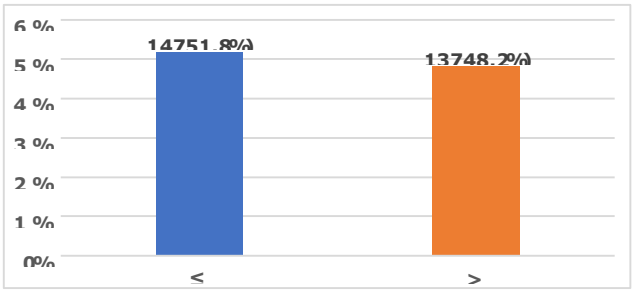

Figure 1: Age distribution of the children, years (n=284)

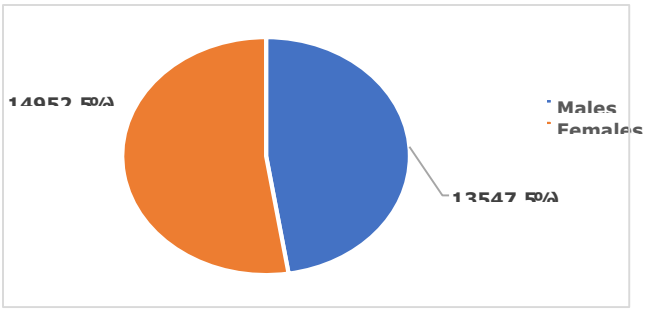

Figure 2: Gender distribution of the children (n=284)

Table 2: Mean weight of the children, kg (n=284)

Mean ±SD	Minimum	Maximum
12.36 ±3.42	6.70	17.00

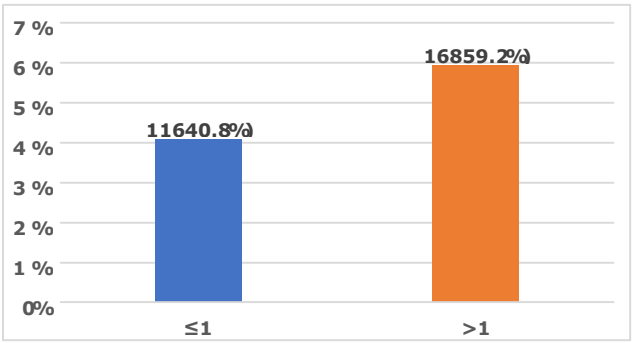

Figure 3: Weight distribution of the children, kg (n=284)

Table 3: Mean duration of symptoms, days (n=284)

Mean ±SD	Minimum	Maximum
5.11 ±0.95	3	7

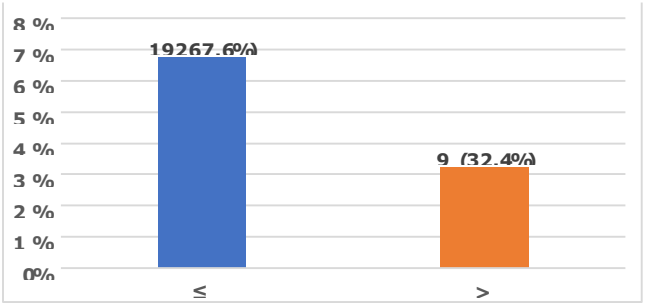

Figure 4: Duration of symptoms of the children, days (n=284)

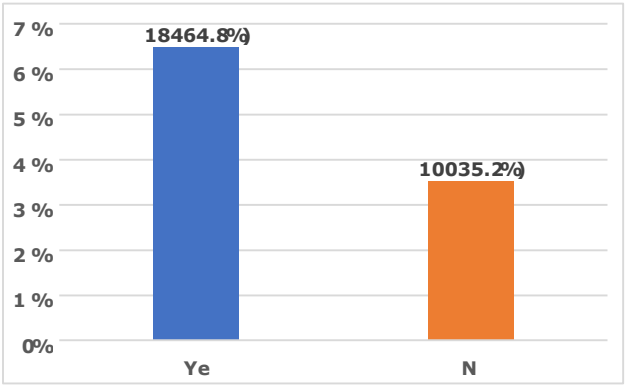

Figure 5: Efficacy of paracetamol in symptomatic relief of upper respiratory tract infection (n=284)

Table 4: Comparison of efficacy of paracetamol with age of the children (n=284)

Age, years	Efficacy		Total	p-value
	Yes	No		
≤4	93 (50.5)	54 (54.0)	147 (51.8)	0.578
>4	91 (49.5)	46 (46.0)	137 (48.2)	
Total	184 (100)	100 (100)	284 (100)	

Table 5: Comparison of efficacy of paracetamol with gender of the children (n=284)

Gender	Efficacy		Total	p-value
	Yes	No		
Males	87 (47.3)	48 (48.0)	135 (47.5)	0.908
Females	97 (52.7)	52 (52.0)	149 (52.5)	
Total	184 (100)	100 (100)	284 (100)	

Table 6: Comparison of efficacy of paracetamol with weight of the children (n=284)

Weight, kg	Efficacy		Total	p-value
	Yes	No		
≤12	73 (39.7)	43 (43.0)	116 (40.8)	0.586
>12	111 (60.3)	57 (57.0)	168 (59.2)	
Total	184 (100)	100 (100)	284 (100)	

Table 7: Comparison of efficacy of paracetamol with duration of symptoms (n=284)

Duration of symptoms, days	Efficacy		Total	p-value
	Yes	No		
≤5	125 (67.9)	67 (67.0)	192 (67.6)	0.872
>5	59 (32.1)	33 (33.0)	92 (32.4)	
Total	184 (100)	100 (100)	284 (100)	

DISCUSSION

URTIs are major junk of diseases presenting to pediatrician. Recurrent URTI is a common problem in aged 2 to 6 years mostly viral in origin. [11-15] Fever is common presenting symptom in all URTI and is a major concern of parents. [16] Different medications are being used to treat different symptoms of URTI including antipyretics (paracetamol), antihistamines, cough suppressants such as dextromethorphan, anti-inflammatory agents (ibuprofen) [17,18], phenylpropanolamine, and decongestants such as pseudoephedrine. They showed some relief of symptoms but did not provide evidence for shorten the duration of illness in children. [19,20] According to the current study findings, the efficacy of paracetamol in symptomatic relief of upper respiratory tract infection was found to be 184 (64.8%). Somewhat similar findings were observed in a previous study as well. In a study by Yaqub A, et al. has shown that efficacy of paracetamol was 75.33% in symptomatic relief of upper respiratory tract infections in children aged 2 to 5 years [20]. Study in India done to see the response of paracetamol in children with uncomplicated URTI in age group from 6 months to 6 years [21]. The variables used in the study were rate of fall of temperature, fever clearance time, percentage reduction of temperature, symptomatic improvement (based on categorical improvement in alertness activity [22,23], comfort, mood, fluid intake and, appetite), proportion of afebrile children after 1, 2, 4 and 6 hours of dose, and adverse effects of drug like raised liver enzymes [24]. Analgesics are commonly recommended for the headache, myalgias, and malaise associated with most URTIs. Historically, nonsteroidal anti-inflammatory drugs are touted to have better efficacy than acetaminophen [25,26]. However, a pragmatic trial of maximum patients randomized to clinician advice on as-needed or around-the-clock paracetamol, ibuprofen, or both, found no inferiority in symptom relief between agents or type of usage. The authors' experience supports the equivalency of both analgesics, and choice of one over the other is usually determined by the need to avoid specific toxicities [27].

Randomised controlled trial's quantitative systematic review by Fahey et al compared antibiotics to placebo for URTIs in children sorted that antibiotic treatment could not reduce complication rates or alter clinical outcome in URTI . Persistent cough is one of the most troublesome and longest-lasting symptoms of URTIs. It is not common knowledge that the 2 mainstay therapies, expectorants and suppressants, approach cough management in conflicting ways [28]. The former enhances the effectiveness of the cough, increasing mucous hydration and decreasing mucous viscosity to produce "juicier" coughs. In so doing, expectorants boost the respiratory system's reflex to rid itself of irritating sputum and debris. Guaifenesin, the only marketed expectorant in the United States, shortens the total duration of cough, but increases cough productivity and frequency. Cough suppressants do the exact opposite through peripheral and central inhibition of cough. Benzonatate, a peripheral agent, acts by anesthetizing stretch receptors in the lungs [29]. Dextromethorphan, as the D-isomer of the synthetic codeine analogue levorphanol, acts on the cough center in the brain's medulla. Both are effective in reducing cough intensity and frequency. Central-acting cough suppressants can become drugs of abuse. Although this is commonly known for codeine and other traditional opioids, even dextromethorphan in high dosages can be misused for its euphoric and hallucinatory properties, often by younger individuals. The authors' approach with patients is to explain the mechanisms of action for these 2 drug classes. If patients request assistance with bringing up phlegm and do not mind more intense coughing for a shorter duration of time, then guaifenesin is the natural choice. Most liquid formulations at 100 mg per teaspoon need to be dosed up to 600 mg/d or greater to achieve effect. If the patient's goal is to achieve relief from their cough during critical portions of their workday or at night to achieve uninterrupted sleep, the authors advise a cough suppressant [30].

Thus, paracetamol could prove to be most effective, economical and feasible drug to be prescribed in children presenting with symptoms of Viral URTI, so that unnecessary use of antibiotics and their side effects could be lessened [31]. However, the importance of choosing the right dose of paracetamol to treat fever should be strongly stressed, since a low dose could compromise effectiveness, and physicians should carefully choose the dose of paracetamol guaranteeing antipyretic efficacy and safety in children [32].

The findings of this study could be highlighted in the light of limitation that this was a single center study and was conducted in a limited number of sample size. In addition, certain important variables like presenting complaint and complication or side effects were not reported in this study. Although paracetamol, the most widely used antipyretic medication in children, has long been recognized as safe and efficacious when used in the recommended dose range [33] , it has nevertheless also been associated with adverse effects, some of which may be potentially serious although rare. Further multicenter long-term studies are recommended to preclude the findings of this study.

CONCLUSION

The efficacy of paracetamol was observed in 64.8% children aged 2 to 5 years with symptomatic relief of upper respiratory tract infections in children.

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