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ORIGINAL ARTICLE

Comparison of Efficacy of Azithromycin Versus Ceftriaxone in Treatment of Enteric Fever

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ABSTRACT

Objective: Research was conducted at the Hayatabad Medical Complex in Peshawar to evaluate the relative effectiveness of azithromycin and ceftriaxone in the treatment of enteric fever.

Methods: After the ethical approval from institute review board, this random controlled trial was conducted at Department of Pediatrics, Hayatabad Medical Complex, Peshawar, from 20 July, 2019 to 20 Jan, 2020. Each patient was randomly assigned to a treatment group through toss method in Group A and Group B. Patients in Group A received azithromycin (20 mg/kg/day; maximum, 1000 mg/day) and patients in Group B were administered with ceftriaxone (75 mg/kg/day; maximum, 2.5 g/day). Efficacy of both drugs was determined keeping in view complete resolution of symptoms of enteric fever within a week time.

Results: The mean ± S. D of age of the participants in both groups were 5.38±1.95 and 5.74±1.84 years. The mean ± S. D of disease duration of the participants in both groups were 6.14±1.25 and 5.90±1.17 days. The mean ± S. D of time of defersevence of the participants in both groups were 2.38±0.57 and 4.66±0.716. In azithromycin group, 44 (88%) patients showed effective results while in the ceftriaxone group, 23 (46%) patients showed effective results. P Value = 0.000

Conclusion: Azithromycin could be a convenient and cheap alternative for the treatment of typhoid fever, especially in children in our local population.

Keywords: Azithromycin, Ceftriaxone, Typhoid Fever

INTRODUCTION

Salmonella typhi causes typhoid fever, a potentially fatal illness. It's a systemic infection that causes a high temperature to persist, as well as other symptoms including nausea, vomiting, and a pounding head pain. This illness is contagious and may spread by drinking or eating tainted substances. Typhoid is responsible for between 120,000 and 161,000 deaths annually, with an estimated 11-20 million cases (1). Antibiotics are effective against typhoid illness. Several patients were effectively treated with chloramphenicol after its introduction for typhoid in 1948 by Woodward, but by 1970, salmonella had developed resistance to it (2). Salmonella developed resistance to cotrimoxazole and ampicillin in the 1980s and 1990s, turning typhoid fever into a multidrug-resistant disease. Multidrug-resistant typhoid fever (MDRTF) is caused by strains of salmonella typhi that are immune to three commonly used antibiotics: chloramphenicol, ampicillin, and trimethoprim-sulfamethoxazole (3). Despite its efficacy, children cannot take fluoroquinolones on a regular basis, and quinolone-resistant strains of Salmonella typhi have recently been found (4). Recently, an XDR strain of Salmonella typhi has been described; this strain is resistant to all of the standard antibiotics used to treat typhoid fever (ampicillin, ciprofloxacin, chloramphenicol, trimethoprim-sulfamethoxazole, and ceftriaxone). Children with typhoid fever have few therapy choices. Infections produced by the XDR strain of Salmonella typhi may be treated with carbapenems and azithromycin, respectively. Azithromycin has been shown to be more effective than ceftriaxone in the treatment of typhoid fever, according to a number of studies (6). Azithromycin, when taken orally once daily, seems to be beneficial in treating uncomplicated typhoid fever in children, according to a research by Frenck et al. from the United States (5). Researchers in New Delhi came to the conclusion that oral azithromycin might be an effective and inexpensive option for treating typhoid fever, particularly in children in underdeveloped nations. Azithromycin, according to the research conducted by Aggarwal et al., is both safe and effective for the treatment of mild cases of typhoid fever (7). The purpose of this study is to evaluate the relative effectiveness of azithromycin and ceftriaxone in the treatment of enteric fever in patients presenting to the Hayatabad Medical Complex in Peshawar.

METHODOLOGY

After the ethical approval from institute review board, this random controlled trial was conducted at Department of Pediatrics, Hayatabad Medical Complex, Peshawar, from 20 July, 2019 to 20 Jan, 2020. 100 pediatric patient with enteric fever, between 2-12 years, of both Genders were recruited through probability consecutive sampling. Patients who are allergic to ceftriaxone or azithromycin, and the Patients with major complications of enteric fever (e.g., pneumonia (CXR), intestinal hemorrhage (stool occult blood) or perforation (Erect Abdomen X-ray), shock, or coma) were excluded from the study. The research only included those patients who passed the first eligibility screening. After obtaining each patient's agreement, they were randomly divided into two groups (Group A and Group B) for therapy. Patients in Group A were given azithromycin at a dosage of 20 mg/kg per day (up to a maximum of 1000 mg/ day), whereas those in Group B were given ceftriaxone at a dosage of 75 mg/kg/day (up to a maximum of 2.5 g per day). Both medicines were evaluated for their ability to alleviate enteric fever symptoms entirely. Age, sickness duration, gender, place of residence, and parental socioeconomic level were all put into a proforma. SPSS version 23.0 was used for data entry and analysis. Quantitative factors such as age, illness duration, and defervescence duration were analyzed to determine their means and standard deviations (days). Statistics were performed on categorical factors like gender and effectiveness to determine frequency and percentages. A chi-square test was used to compare the two groups' levels of effectiveness. Differences in effectiveness between the two groups were analyzed by stratifying participants by age, gender, place of residence, socioeconomic status, and length of time in defervescence. The Chi-square test with post-stratification was used with a significance level of P 0.05. Results were shown graphically in tables, charts, and graphs.

RESULTS

Table 1 represent the clinical and demographic characteristic of the study participants in both groups. In azithromycin group, 16 (32%) patients were female and 34 (68%) patients were male whereas in ceftriaxone group, 26 (52%) patients were female and 24 (48%) patients were male. The mean ± S. D of age of the participants in both groups were 5.38±1.95 and 5.74±1.84 years.

The mean ± S. D of disease duration of the participants in both groups were 6.14±1.25 and 5.90±1.17 days. The mean ± S. D of time of defersevence of the participants in both groups were 2.38±0.57 and 4.66±0.716. In the azithromycin group, 29 (58%) patients were from rural areas and 21 (42%) patients were from urban areas. In ceftriaxone group, 31 (62%) patients were from rural areas and 19 (38%) patients were from urban areas. In the azithromycin group, 10 (20%) patients were from high class families, 24 (48%) patients were from low class families and 16 (32%) patients were from middle class families. In ceftriaxone group, 4 (8%) patients were from high class families, 20 (40%) patients were from low class families and 26 (52%) patients were from high class families. In azithromycin group, 44 (88%) patients showed effective results while in the ceftriaxone group, 23 (46%) patients showed effective results. P Value = 0.000 (Table 2). Efficacy in both groups was cross tabulated with gender, residence, socioeconomic status and time of defersevence were presented in table 3.

Table 1: Clinical and demographic characteristic of the study participants in both groups

Parameters	Azithromycin (n= 50)	Ceftriaxone (n= 50)
Gender		
Male	34 (68%)	24 (48%)
Female	16 (32%)	26 (52%)
Age	5.38±1.95	5.74±1.84
Disease duration (days)	6.14±1.25	5.90±1.17
Time of defersevence	2.38±0.57	4.66±0.71
Residence		
Urban	21 (42%)	19 (38%)
Rural	29 (58%)	31 (62%)
Socio-economic status		
High	10 (20%)	4 (8%)
Low	24 (48%)	20 (40%)
Middle	16 (32%)	26 (52%)

Table 2: treatment efficacy frequency in both study groups

Treatment	Efficacy	Frequency	Percent	P Value
Azithromycin	No	6	12.0%	0.00001
	Yes	44	88.0%	
Ceftriaxone	No	27	54.0%	
	Yes	23	46.0%	

Table 3: Efficacy in both groups with respect to age, gender, residence, socioeconomic status and time of defersevence

Age Group	Study Group	Efficacy		P Value
		Yes	NO	
< 6 Years	Azithromycin	35 (67%)	4 (16%)	0.000
	Ceftriaxone	16 (31%)	21 (84%)	
> 6 Years	Azithromycin	9 (56.3%)	2 (25%)	0.148
	Ceftriaxone	7 (44%)	6 (75%)	
Gender-wise				
Male	Azithromycin	29 (70.7%)	5 (29.4%)	0.004
	Ceftriaxone	12 (29.3%)	12 (70.6%)	
Female	Azithromycin	15 (57.7%)	1 (6.3%)	0.001
	Ceftriaxone	11 (42.3%)	15 (93.8%)	
Residence-wise				
Rural	Azithromycin	24 (61.5%)	5 (23.8%)	0.005
	Ceftriaxone	15 (38.5%)	16 (76.2%)	
Urban	Azithromycin	20 (71.4%)	1 (8.3%)	0.000
	Ceftriaxone	8 (28.6%)	11 (91.7%)	
Socio-economic status-wise				
Low	Azithromycin	21 (79%)	3 (21.4%)	0.003
	Ceftriaxone	9 (20%)	11 (78.6%)	
Middle	Azithromycin	15 (58%)	1 (6.3%)	0.001
	Ceftriaxone	11 (42.3%)	15% (93.8%)	
High	Azithromycin	8 (72.7%)	2 (66.7%)	0.837
	Ceftriaxone	3 (27.3%)	1 (33.3%)	
Time of Defersevence				
< 3	Azithromycin	43 (100%)	6 (86%)	0.012
	Ceftriaxone	0	1 (14%)	
> 3	Azithromycin	1 (4.2%)	0	0.293
	Ceftriaxone	23 (95.8%)	26 (100%)	

DISCUSSION

Female patients accounted for 32% and male patients accounted for 68% of the azithromycin group and 52% and 48% (16/50) of the ceftriaxone group, respectively, in the current research. The mean ± S. D for the length of illness in the azithromycin group was 5.38 ±1.947 days, and time of defervescence was 2.38±0.57. While in ceftriaxone group the mean ± S. D for the length of illness was 5.90±1.17 days, and time of defervescence was 4.66±0.71. Twenty-nine (58%) of the azithromycin group were from rural locations, whereas only twenty-one (42%) were from metropolitan areas. Of those given ceftriaxone, 31 (62%) were from rural regions whereas just 19 (38%) lived in metropolitan centers. Ten patients (20%) in the azithromycin group came from very wealthy households, 48% came from very poor families, and 32% came from middle-class families. Among the fifty patients given ceftriaxone, 8% were from wealthy households, twenty (40%) were from lower-income households, and sixteen (52%) were from - middle-class households. The azithromycin group had 44 (88% successful) patients whereas the ceftriaxone group had 23 (46% successful patients) with P-Value = 0.000. According to a clinical trial, Thirty (100%) of thirty patients in the azithromycin group and thirty (88.2%) of thirty-four patients in the ceftriaxone group achieved clinical cure in a single trial. Azithromycin patients need more time than ceftriaxone patients to have their bacteremia completely go. Azithromycin-treated individuals did not have a recurrence, but 5 of the patients treated with ceftriaxone did. Similar to our findings, in which 44 (88%) patients in the azithromycin group showed successful results, 23 (46%) patients in the ceftriaxone group showed effective results, and no major side effects occurred in any subject under study, this investigation found no serious side effects (8).

Another research included participants aged 5-12 years, on the fifth day of therapy, 59.1% of patients were afebrile whereas 40.9% were not. Sixty-nine percent of the individuals in the azithromycin group were no longer feverish by day five. In the Ofloxacin group, 48.7% became afebrile on day 5th. Proportion of patients becoming afebrile on 5th day of treatment was significantly higher in the azithromycin group as compared to Ofloxacin group (p= 0.01) (9) findings of which were comparable to our study Results from 10 studies that were similar to ours showed that 32% of patients receiving azithromycin were female and 68% were male, whereas 52% of patients receiving ceftriaxone were female and 48% were male.

In another study, fifty individuals were given azithromycin and 48 were given ceftriaxone at random. Only 22% of the participants were less than five years old, while 78% were considered to be five years or older. The azithromycin group had a mean defervescence period of 4.44 ±1.25 days, whereas the ceftriaxone group averaged 4.38 ±1.21 days. Both the azithromycin and ceftriaxone groups had very high rates of success with their treatments, at 94% and 97.9% respectively. In both groups, complications occurred seldom. Azithromycin resistance was found in 18%, whereas ceftriaxone resistance was found in 2.1%. A total of 97.6% of those who were sensitive to azithromycin improved, whereas only 78% of those who were resistant did so. The majority of patients who had developed resistance to azithromycin exhibited clinical improvement after therapy with this medicine, according to a study that were similar to ours and found the same thing in the azithromycin group (10).

CONCLUSION

In conclusion, when it comes to treating typhoid fever, particularly in youngsters, azithromycin may prove to be a more practical and cost-effective option.

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