International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Prevalence of Bacterial and Parasitic Diarrhoea in under Five Children of Semiurban Area of Belgaum, Karnataka

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Received: 20/06/2014 *Revised: 29/07/2014* *Accepted: 03/11/2014*

ABSTRACT

Background: The leading killers of the world's youngest children are pneumonia and diarrhoea, accounting for 29% of deaths among children under five years of age worldwide and it is estimated that each year 2.5 billion cases of diarrhoea occur among under five children. Community based etiological data regarding the cause of diarrhea is lacking globally. *Rotavirus* and diarrheogenic *E coli* are the most common organisms identified while from parasites although rare with acute diarrhoea, *Ancylostoma duodenale*, *Ascaris lumbricoides* and *Enterobius vermicularis* are common isolates.
Objective: To know the prevalence of bacterial and parasitic diarrhea among under five children attending Ram Nagar Urban health center, Belgaum, Karnataka.
Materials and methods: The present cross sectional study was conducted for 10 months among 310 under five children with diarrhoea who attended Ramnagar urban health center.
Results: The mean age of the children was 35.95 ± 18.33 months. Out of total 310 stool samples examined, 85 (27.41%) samples were positive for microorganisms. Out of 74 stool samples positive for bacteria, 68 (21.93%) were positive for *Escherichia coli*, 1 (0.32%) and 5 (1.61%) stool samples were positive for *Shigella flexneri* and *Klebsiella oxytoca* respectively. Out of 6 samples which showed parasites, *Ascaris lumbricoides*, *Ancylostoma duodenale* and *Enterobius vermicularis* were isolated from 3 (0.96%), 1 (0.32%) and 2 (0.64%) samples respectively.
Conclusion: Most frequently isolated bacteria and ova were *E-coli* and ova of *Ascaris lumbricoides.*

***Key words**:* Prevalence, Bacteria, Parasites, Diarrhoea, Under five children

INTRODUCTION

In this new millennium, it is important to note that a number of new infections, not known previously, and many new infectious diseases are emerging and becoming a global health concern. Among the gastrointestinal tract infections, the diarrhoeal diseases account for a high morbidity and mortality in several parts of the world. WHO predicts that there will be about 5 million deaths in under five children by 2025, of which 97% will be in the developing countries and mainly caused by infectious diseases, within which diarrhoea will continue to play a leading role. [(1)]

It is estimated that each year 2.5 billion cases of diarrhoea occur among under five children and estimates suggest that over the past two decades the overall incidence has remained relatively stable. [(2)]

In India, diarrheal diseases are major health problem among under five children. Acute diarrheal diseases are responsible for about 13% of deaths in under five children and they remains among the top five causes of death despite the availability of easily implementable interventions and existence of national guidelines for management at the community level. [(3)]

Rotavirus and diarrheogenic *Escherichia coli* are the most common organisms identified while from parasites although rare with acute diarrhoea, *Ancylostoma duodenale*, *Ascaris lumbricoides* and *Enterobius vermicularis* are common isolates. *Shigella* species are accountable for about 10-20% of diarrhoea episodes. *Vibrio cholera*, predominantly identified in outbreaks mainly affects children 2-5 years old. There is a lack of nationwide data on the etiology of diarrhoea in under five children. [(3)]

So, an attempt has been made to find the prevalence of bacterial and parasitic diarrhoea by identifying pathogens among under five children attending Ramnagar urban health center of Belgaum district of Karnataka.

MATERIALS AND METHODS

The present cross sectional study was conducted for 10 months (January to October 2013) among 310 under five children with diarrhoea who attended Ramnagar urban health center. Informed consent was obtained from parents/guardian attending their children. Sample size was calculated using formula: $n = 4pq / d^2$. Where p = Prevalence of diarrhoea among under five children = 9 % (Source: NFHS - 3 - Karnataka urban area), q = 100 – p = 91% and d = Absolute error (3%). Correction for finite population was done. Final calculated sample size was 310. Ethical clearance was obtained from JNMC Institutional Ethics Committee on human subjects' research.

In this study, fresh diarrheal stool samples were collected in a sterile container from under five children with diarrhoea who attended Ramnagar urban health center and transferred to the microbiology laboratory at department of microbiology of JNMC under all aseptic precautions and on ice packs and processed within 4 hours of collection by a qualified microbiologist to identify bacterial and parasitic pathogens.

Routine stool microscopy of saline and iodine preparations was done to identify ova of parasites followed by standard formal ether method of concentration.

A portion of stool sample was processed on Mac conkey's medium after taking all preparations. These media plates were incubated at 37^0C over night. The plates showing colonies were further processed for standard biochemical tests (Indole, H_2S, Urea, Citrate, Mannitol, TSI, Motility) for species identification of bacteria.

All the data were entered into SPSS-20 trial version and analyzed. The results were presented in the form of descriptive statistics.

RESULTS

In the present study, comprising of 310 under five children, 174 (56.1%) were males and 136 (43.9%) were females. The mean age of the children was 35.95 ± 18.33 months. With regard to age distribution it was observed that the majority of the male children were from the age group of 49-60 [40(12.9%)] months and lowest were from 37-48 [30(9.7%)] months. The majority of the female children were from the age group of 49-60 [38(12.3%)] months and lowest

were from 37-48 [18(5.8%)] months (Figure 1). In this study, 164 (52.9%) participants were from nuclear and 146 (47.1%) were from joint family.

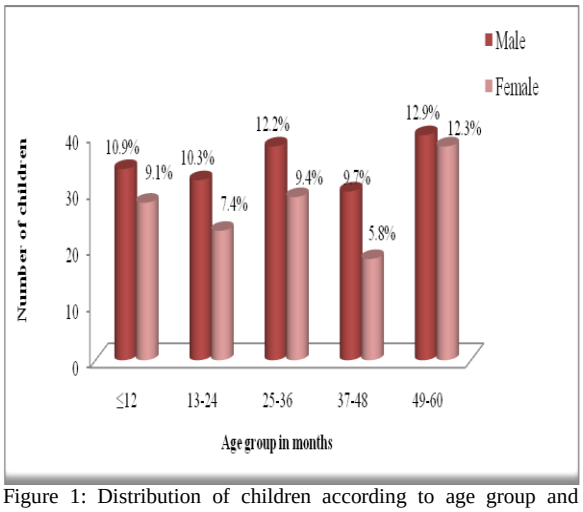

Figure 1: Distribution of children according to age group and Gender

With regards to socioeconomic status, 33 (10.6%) children belonged to class V, 133 (42.9%) to class IV, 99 (31.9%) to class III, 44 (14.3%) to class II and 1 (0.3%) belonged to the class-I according to modified B.G Prasad's classification.

Out of total 310 stool samples, 85 (27.41%) samples were showing microorganisms. Out of 74 stool samples which were positive for bacteria, 68 (21.93%) samples were positive for *Escherichia coli*. Hence, *E. coli* was the commonest organism isolated. Out of 6 samples which showed parasites, ova of *Ascaris lumbricoides*, *Ancylostoma duodenale* and *Enterobius vermicularis* were isolated from 3 (0.96%), 1 (0.32%) and 2 (0.64%) samples respectively. Out of 5 samples which were showing mixed organisms, *Klebsiella oxytoca* and *Citrobacter freundii*, *E. coli* and Ova of *A. lumbricoides* and *E. coli* and Ova of *E. vermicularis* were isolated from 2 (0.64%), 2 (0.64%) and 1 (0.32%) stool samples respectively (Table 1).

Table No. 1: Prevalence of bacteria and parasites in under five children with diarrhoea.

	Species	**Number** (n=310)	**Percentage**	**Total**
Bacteria	*Escherichia coli*	68	21.93	74 (23.87%)
	Klebsiella oxytoca	5	1.61	
	Shigella flexneri	1	0.32	
Parasites	Ova of *Ascaris lumbricoides*	3	0.96	6 (1.93%)
	Ova of *Ancylostoma duodenale*	1	0.32	
	Ova of *Enterobius vermicularis*	2	0.64	
Mixed Organisms	*Klebsiella oxytoca* and *Citrobacter freundii*	2	0.64	5 (1.61%)
	Escherichia coli and Ova of *Ascaris lumbricoides*	2	0.64	
	Escherichia coli and Ova of *Enterobius vermicularis*	1	0.32	
Total		85	27.41	85 (27.41%)

DISCUSSION

In this study, from total 310 stool samples, 85 (27.41%) samples were showing microorganisms. Out of 74 stool samples which were positive for bacteria, 68 (21.93%) samples were positive for *Escherichia coli*. Hence, *E. coli* was the commonest organism isolated. *E-coli* was most common bacteria isolated in the study conducted in India and in systematic review focused on developing countries. [3,4] A cross sectional study conducted in Beijing, China revealed that *E-coli* was present in 10.2% samples. [5]

In our study, *Shigella flexneri* was isolated from one (0.32%) sample only while *Shigella* species were found in 10-20% of diarrhoea episodes in a systematic review done in India. [3] A Saudi Arabian study conducted in Najran region revealed that 10.7% stool samples of under five children showed the presence of any bacteria in which *Shigella* species were isolated in 2% of samples. Isolation of parasites from samples were 1.2%. [6] A cross sectional study conducted in Beijing, China revealed that *Shigella* species were present in 5.2% stool samples of under five children. [5] Another Saudi Arabian study conducted in Makkah city showed that 2% stool samples were positive for *Shigella* from 5% of total bacterial isolation. [7]

In our study, out of 6 samples which showed parasites, *Ascaris lumbricoides*, *Ancylostoma duodenale* and *Enterobius vermicularis* were isolated from 3 (0.96%), 1 (0.32%) and 2 (0.64%) samples respectively. Study conducted in Dhinoj primary health center, Gujarat, India, revealed that 9.7% children had *A. lumbricoides* infestation, 3.9% showed *A. duodenale* in their stool samples and 0.4% samples suggested the presence of *E. vermicularis*. [8] A study conducted in Kathmandu, Nepal revealed that total parasitic isolation from stool samples was 12% out of which *Ascaris lumbricoides* was isolated from 0.6% samples. [9]

In present study, out of 5 samples which were showing mixed organisms, *Klebsiella oxytoca* and *Citrobacter freundii*, *E. coli* and Ova of *A. lumbricoides* and *E. coli* and Ova of *E. vermicularis* were isolated from 2 (0.64%), 2 (0.64%) and 1 (0.32%) stool samples respectively.

CONCLUSION

E-coli and ova of *Ascaris lumbricoides* were most frequently isolated organisms. Among mixed organisms, *Klebsiella oxytoca* + *Citrobacter freundii* and *E-coli* + Ova of *Ascaris lumbricoides* were commonly isolated. Deworming campaign should be continued for prevention of intestinal parasitism. Health education regarding personal and environmental sanitation should be given to the community by health personnel through community outreach activities. IEC activities should be carried out regularly especially regarding washing hands with soap and water at critical times, optimal breastfeeding practices, safe drinking water and basic sanitation, vaccinations, and adequate nutrition.

ACKNOWLEDGEMENT(S)

I express my deepest sense of gratitude towards my parents, teachers, friends and participants. I express my gratitude towards KLE University and Principal Sir. I am thankful to whole staff of dept. of public health, microbiology and community medicine. I immensely thank Mr. M. D. Mallapur sir for statistical help. I immensely thank Mr. Santosh H for his contribution in data collection. I bow my head in respect before God the almighty.

Source of support: Nil
Conflict of Interest: None

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How to cite this article: Pandya K, Wantamutte AS, Nagamoti MB et. al. Prevalence of bacterial and parasitic diarrhoea in under five children of semiurban area of Belgaum, Karnataka. Int J Health Sci Res. 2014;4(12):89-93.

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