SUMMARY AND CONCLUSION
CONCLUSION

1. 12% of diarrhoea cases were due to enteric bacterial pathogens viz. Vibrio cholera, Salmonella species and Shigella species.

2. In 16% of cases protozoan parasites and helminthic ova were detected.

3. Large number of Candida species with pseudohyphae were detected in 5.6% of cases.

4. Viruses were detected in 66 of 198 stool samples submitted for detection by viruses by ELISA / RT-PCR.

5. Group A Rotavirus was found responsible for 17.3% of diarrhoea cases and was detected in young children, adolescents and in adults also.

6. Group B Rotavirus and Norovirus were detected in 4.1% and 3.4% of sporadic diarrhoea cases respectively.

7. Enterovirus were detected in 9.7% of diarrhoea cases but their definitive role in causation of diarrhoea could not be established.

8. There were 13 cases of sporadic diarrhoea out of 198 diarrhoea, in which more than one virus were detected in stool sample.

9. There was disagreement in identification of *Escherichia coli* by serology and PCR.

10. EPEC was most common pathotype of *Escherichia coli* detected from diarrhoea cases followed by STEC, ETEC, EIEC and EAEC.

11. EAEC was detected only in three stool samples of diarrhoea patients.

12. EPEC was also detected in adult diarrhoea cases also in significant numbers.

13. There were three isolates of EIEC having *east* gene and there were nine isolated from which only *east* genes was detected by PCR. Standalone significance of *east* gene is not yet known.

14. Co-infection of diarrhoeagenic *Escherichia coli* with one of the viruses was seen in 42 diarrhoea cases.

15. Significant amount of resistance was observed against various antibiotics tested in this study.

16. There were multiple clones of various diarrhoeagenic pathotypes of *Escherichia coli* as detected by RAPD finger printing.
SUMMARY

We have found that diarrhoea due to *Escherichia coli* is a significant problem in this part of country and also came across novel findings like higher prevalence of non-O:157 H:7 STEC pathotypes amongst diarrhoeagenic *Escherichia coli*; its potential to cause diarrhoea in children and identification of EPEC as an important pathotype causing diarrhoea in adolescent and adults also. Recognition of non-O:157 H:7 STEC isolates in significant number of diarrhoea cases assume importance in view of 2011 outbreak in Germany, which was caused by O104:H4 (a non-O:157 H:7 serotype) which transcended to other countries also.

Relative absence of diarrhoea due to EAEC in this part of country is important microbiological and epidemiological finding of our study. However as mentioned above also we are not discounting the possibility of presence of significant numbers of asymptomatic carriers.

Presence of *east* gene in EIEC isolates, significance of *Escherichia coli* isolates having only *east* gene, in causation of diarrhoea shall be venues to explore further to gain more insight into the mechanism of diarrhoea by *Escherichia coli*.

We could bring forth the issues with conventional serotyping in precise identification of diarrhoeagenic *Escherichia coli* as compared to PCR and RAPD fingerprinting provided insight to various clones / genotypes circulating in this region and shall serve as important tool for epidemiological interventions, if the study is extended to environment.

Molecular diagnostic methods are certainly very useful tools for sensitive detection, precise identification of enteric pathogens and also for determining genetic relatedness as corroborated by the findings in this study. At the same time we are aware of the limitations as regards to availability of sophisticated diagnostic modalities in resource scarce settings. Though we are of the firm
opinion that clinicians shall take decision to administer antibiotics on the basis of pathogen detected in diarrhoeic stool sample, in settings where such facilities are not available empirically antibiotics may be started in those cases having blood / mucus in their stool signifying invasive pathology.

As off-shoots of this study we could determine incidence of diarrhoeagenic viruses viz. Group A and Group B Rotavirus, Norovirus and Enterovirus. Group A Rotavirus, hitherto considered responsible for early childhood diarrhoea, was detected from older children and adults also. Similarly another interesting finding was detection of Group B Rotavirus, which is usually reported from outbreaks, was detected from sporadic cases of acute diarrhoea in children and adults as well.

The most important outcome, we would like to emerge from this study will be to impart realization to clinicians and microbiologists about importance and significant presence of diarrhoeagenic *Escherichia coli* as causative pathogen of diarrhoeal illness, futility of antimicrobials in absence of valid indications and emerging resistance even to newer antibiotics. We are aware of the fact that our peer health care providers are well aware of the various diarrhoeagenic organisms, but there is large gap in the knowledge and practical application at the level of actual patient care. Hence the need is to provide timely accurate diagnosis and bring positive change in the current practices, which shall bring profound changes to the way diarrhoeal diseases are managed.
Limitation of the study:

1. Campylobacter, Coccidian parasites mediated diarrhoea and other toxin mediated causes like *Clostridium difficile* were not explored.

2. Co-infection of Viruses + parasites and *E. coli* + parasites and *E. coli* + other enteric bacteria like *Salmonella, Shigella* and *Vibrio* was not looked into.

Future Scope:

1. G and P typing of Rotavirus isolates.

2. Typing of Enteroviruses detected in stool samples.

3. Differentiation between typical and atypical EPEC isolates.

4. To look for difference of antibiotic resistance profile between typical and atypical EPEC isolates, if any.

5. Recognition of carriers for EAEC and explore the true presence / absence of EAEC isolates in this region.

6. New sub-type; only *east* and EIEC with *east*.

7. Collaborative studies with other institutes to know the incidence of diarrhoeagenic *Escherichia coli*.

8. Community engagement for implementation of Household Water Treatment and Safe Storage (HWTS) program.

9. Creation of *Escherichia coli* diarrhoea registry.