1. INTRODUCTION

Diarrhea is a major public health problem, with over two million deaths occurring each year across the globe, particularly among children younger than five years. Diarrhea is also one of the major causes of mortality in children under five years old in developing countries. Every year nearly 1.4 billion episodes of acute infective diarrhea (AID) occur in children less than 5 years of age in developing countries of which 123.6 million episodes required outpatient medical care and 9 million episodes required hospitalization.

*Escherichia coli* (E. coli) is the predominant nonpathogenic facultative anaerobic member of the human intestinal micro flora. However, few of the strains of *Escherichia coli* have developed the potential to cause disease of the gastrointestinal, urinary and central nervous systems in humans. Diarrheagenic *Escherichia coli* (DEC) has been identified as a major etiologic agent of diarrhea worldwide. Different strains of E. coli, particularly *Enterotoxigenic E. coli* (ETEC), *Enteropathogenic E. coli* (EPEC) and *Enteroaggregative E. coli* (EAEC or EAggEC) appear to be the major causes of diarrhea in children with potentially fatal outcomes for untreated illnesses.

Traditionally, outbreaks of food-borne diarrheagenic *E. coli* infections were primarily associated with raw & undercooked meat, other types of food products have also been implicated in outbreaks, including unpasteurized (raw) milk, butter and cheese made from raw milk, yogurt and ice cream, unpasteurized apple juice and cider, melons, grapes, radish and alfalfa sprouts, carrots, bagged lettuce and spinach. The ability of diarrheagenic *E. coli* to make its way into and persist in food products, in conjunction with an increased incidence and severity of diarrheagenic *E. coli* infections in the young, the elderly, and immunocompromised individuals, necessitates the routine assessment and validation of established and novel pathogen mitigation strategies throughout the food production chain.

The six classes of diarrheagenic *E.coli* associated with human gastroenteritis are *enteropathogenic E.coli* (EPEC), *enteroaggregative E. coli* (EAEC or EAggEC), *enteroinvasive E.coli* (EIEC), *enterotoxigenic E. coli* (ETEC), *enterohemorrhagic E. coli* (EHEC), and *diffuse adherent E. coli* (DAEC).
*E. coli* is considered as part of intestinal flora and no attempt is usually made for characterizing these strains further in routine diagnostic microbiology laboratory setting in a developing country. Accurate identification of DEC is important in understanding the disease spectrum and burden, tracing the sources of infection and routes of transmission. To identify and differentiate the multiple types of diarrheagenic *E. coli* in the laboratory, a wide variety of methods are employed. Some of them include culturing on specific growth media, assessing biochemical profiles, serotyping and screening for the presence of virulence characteristics.\textsuperscript{12,13} Culture methods are often low yield for enteropathogens, particularly in the setting of antibiotic use. Microscopy for parasites is also insensitive and, although inexpensive, requires substantial time, equipment, and training. Antigen detection tests on stool have proliferated since the 1970s and have been a major advance for diarrheal diagnostics but are costly.\textsuperscript{14} Polymerase chain reaction (PCR) has proved to be more sensitive and specific than most conventional techniques and has been used to identify DEC in a number of studies.\textsuperscript{15-19} There are not many studies in India aimed at evaluating different diagnostic methods in the identification of Diarrheagenic *E. coli*. The present study will attempt to look at different diagnostic methods, namely microscopy, culture methods & PCR in identifying strains of DEC causing morbidity & mortality in diarrhea patients in Kanpur, India. It will also provide an opportunity to determine the antimicrobial susceptibility patterns of the isolated strains along with their genotyping, which will help in formulating appropriate treatment guidelines in patients infected with Diarrheagenic *E. coli*. 