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Research Article

## Cross-sectional study of parasitic causes of diarrhea in patients visiting a university hospital in Jeddah, Saudi Arabia

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**Abstract:** Diarrhea is considered a global health problem and a major mortality cause in children less than 5 years of age. Infectious diarrhea is usually associated with morbidity in the form of intestinal dysfunction and malnutrition. One of the major causes of diarrhea is intestinal parasitic infections. In this study, we investigate the parasitic causes of diarrhea in patients visiting King Abdulaziz University Hospital (KAUH) in Jeddah, Saudi Arabia during 2014. A total of 627 stool samples was received during 2014 at the Parasitology lab for stool analysis. Samples were analyzed using the formalin-ethyl acetate concentration technique and a direct smear was performed for all diarrheic samples. A thick smear was prepared from all diarrheic specimens and permanently stained with a modified Ziehl-Neelsen staining procedure to look for the presence of *Cryptosporidium*. Four hundred and eighty (76.6%) specimens were negative for intestinal parasites and 88 (14%) non-diarrheic specimens were positive for intestinal parasites. Fifty-nine (9.4%) specimens were diarrheic and 30 of them had intestinal parasites. The most frequent parasites seen in diarrheic samples were *Giardia lamblia* (28.8%) and *Entamoeba histolytica* (10.2%). *Cryptosporidium* was found in only 2 (3.4%) diarrheic specimens. The Results of this work recommend the establishment of a high standard sewage system to provide a better quality of life.

**Keywords:** Diarrhea, Intestinal parasites, Cardiovascular disorders, Ziehl-Neelsen stain.

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### 1. Introduction

Diarrhea is defined as a reduction in the consistency of stool or an increase in its fluidity. It is considered a complex illness with several causes. Acute diarrhea usually lasts for 2-3 weeks or less. Any diarrheal illness over 3 weeks is considered chronic diarrhea [1-3]. Diarrhea is considered a global health problem and a major mortality cause in children less than 5 years of age. Infectious diarrhea is usually associated with morbidity in the form of intestinal dysfunction and malnutrition [4-9]. Around half of hospitalized patients may develop diarrhea due to hospital-acquired infections which will add to the morbidity of these patients and the total cost for their health care [3].

Diarrheal diseases are a major cause of death and are marked second to cardiovascular disorders as a cause of mortality [1, 10-11]. In the early 1980s, diarrheal disorders were the biggest child killers, responsible for an estimated 4.6 million deaths

worldwide every year. Two and a half million children still die from these illnesses every year, almost all of them in developing countries [2, 10, 12].

One of the major causes of diarrhea is intestinal parasitic infections [2, 13-14]. Several intestinal parasites have been incriminated as a common cause of diarrhea, including *Giardia lamblia*, *Entamoeba histolytica*, *Cyclospora*, *Cryptosporidium*, *Isospora*, *Microsporidia*, *Strongyloides*, *Ascaris*, hookworm, *Trichiura*, and tapeworms [2, 7, 9, 14-28].

In this study, we investigate the parasitic causes of diarrhea in patients visiting the King Abdulaziz University Hospital (KAUH) in Jeddah, Saudi Arabia during 2014.

### 2. Materials and Method

This study was a cross-sectional study through the laboratory data of the King Abdulaziz University Hospital during the year 2014. Data were collected by IT data retrieval system and included all stool samples

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received in the Parasitology laboratory. A total of 627 stool samples was received during 2014 at the Parasitology lab for stool analysis. Of these, 59 (9.4%) samples were diarrheic. Samples were analyzed using the formalin-ethyl acetate concentration technique as described by Cheesbrough [26]. A direct smear was performed for all diarrheic samples. A thick smear was prepared from all diarrheic specimens and permanently stained with a modified Ziehl-Neelsen staining procedure to look for the presence of *Cryptosporidium* [30]. Results were analyzed by SPSS (Ver. 16).

### 3. Results

During 2014, 627 stool specimens were received at the Parasitology Laboratory at KAUH for stool analysis. Four hundred and eighty (76.6%) specimens were negative for intestinal parasites and 88 (14%) non-diarrheic specimens were positive for intestinal parasites. Fifty-nine (9.4%) specimens were diarrheic and 30 of them had intestinal parasites. The most frequent parasites seen in diarrheic samples were *Giardia lamblia* (28.8%) and *Entamoeba histolytica* (10.2%). *Cryptosporidium* was found in only 2 (3.4%) diarrheic specimens. Other parasites detected in diarrheic specimens were *Ascaris lumbricoides* (5.1%), *Hymenolepis nana* (1.7%), and hookworm (1.7%).

### 4. Discussion

Diarrheal diseases are a major cause of death and are marked second to cardiovascular disorders as a cause of mortality [1, 8, 28]. Intestinal parasitic infections are considered as one of the major causes of diarrhea [2, 13-14]. In this study, we found that 9.4% of stool specimens received for stool analysis were diarrheic specimens. *Giardia lamblia* and *Entamoeba histolytica* are most frequently seen parasites in diarrheic specimens. Two specimens (3.4%) contained *Cryptosporidium* oocysts. Other parasites detected in diarrheic specimens were *Ascaris lumbricoides*, *Hymenolepis nana* and hookworm. The estimated prevalence rate of parasitic diarrhea among these collected samples was 50.8%. In a previous study among school children in Jeddah, the prevalence of intestinal parasites was 9.5% and *Giardia lamblia* had been the most frequently reported parasite [31]. In this study, we found that 14% of non-diarrheic stool specimens received were positive for intestinal parasites. The percentage increase in the past 10 years can be explained by the sample selectivity in this work where all samples were collected from patients visiting the hospital. Other studies have reported a lower rate of parasitic diarrhea [9]. However, the specimen collection selectivity may explain the higher estimated prevalence rate in this study.

High estimated prevalence of diarrhea caused by intestinal parasitic infection may be contributed solely to water contamination in the area. Previous studies have reported the presence of *Giardia lamblia* cysts in

water samples from Jeddah [32]. Other studies have reported the presence of intestinal parasites in sewage treated water [33-34]. Since it is known that less than 20% of Jeddah city is covered by appropriate sewage system, contamination of drinking water is of high probability and, hence, a major drawback in hygiene. The Results of this work recommend the establishment of a high standard sewage system to provide a better quality of life.

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