ORIGINAL ARTICLE

IMPORTANCE OF MICROSCOPIC STOOL EXAMINATION IN PATIENTS WITH DIARRHOEA

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Background: Loose motion is a common symptom in patients reporting to our hospital. As it is a small set up where only facility for microscopic stool examination is available, we designed this study to know how much microscopic stool examination can help us in management of patients with diarrhoea. **Methods:** This cross-sectional descriptive study was conducted from January 2010 to April 2012, at Thall Scout Hospital, Hangoo, Khyber Pukhtoon Khwa, Pakistan. All the patients presenting with acute diarrhoea were included in the study. Patients older than 12 years of age were labelled as adults and those 12 years or younger as child. Stool specimens were collected using proper procedure and were examined microscopically. **Results:** Of 494 stool specimens examined, 117 (23.68%) were positive for parasites or their ova, 34 (6.88%) had numerous pus and red blood cells and 343 (69.43%) patients had only stool of loose/soft consistency. Of 117 stool specimens positive for parasites, *Giardia lamblia* was detected in 67 (57.26%) patients, *Entamoeba histolytica* in 22 (18.80%) patients, *H. nana* in 10 (8.55%) patients, *Tenea saginata* in 8(6.84%) patients, hook worm in 6 (5.13%) patients, *ascaris* in 2 (1.71%) and *Trichuris trichura* in 2 (1.71%) patients. **Conclusion:** Among the parasitic causes of diarrhoea, *giardia* is the most common cause in our study with *entameoba* the second most common cause.

Keywords: Parasite, diarrhoea, protozoa, helminthes, *Giardia lamblia*

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INTRODUCTION

The world health organization (WHO) defines diarrhoea as having three or more loose stool in a single day or having more stool than is normal for that specific individual.[1] Infectious diarrhoea is a great health problem mostly in developing nations.[2] The statistics show that about 3–5 billion people suffer from diarrhoea annually,[3] most of which are children from developing countries.[4] It has also been reported that in 2008 alone, about 1.3 million children died of diarrhoea,[5] with most of them belonging to world's poorest nations. Statistical data of 1980 showed that diarrhoea caused death of 4.6 million children in developing world.[6] With the widespread availability of oral rehydration solution (ORS) in the year 2008, the mortality from diarrhoea was reduced dramatically.[7] Children less than two years of age in developing countries contract six or more episodes of diarrhoea in a year with resultant significant morbidity. Adults get less episode of diarrhoea because of their acquired immunity.[8] In developed nations, course of diarrhoea is mild but still a problem though there is a significant reduction in mortality. However, economic loss and absence from school and working place may be significant.

A study in British population reported an annual prevalence of infectious diarrhoea to be about twenty percent.[9] Approximately one-third of people travelling from developed world to developing countries get diarrhoea.[10] It is very important to know the exact cause of diarrhoea not only for epidemiological purposes for also for the right treatment of diarrhoea. Many studies have been carried out in children to know about the causative agent of diarrhoea[11–13] but there are few such studies in adults regarding etiological agent of diarrhoea especially in developed countries.[12–14]

MATERIAL AND METHODS

This cross-sectional descriptive study was carried out at Thall Scout Hospital, Hangoo, Khyber Pukhtoon Khwa Province of Pakistan. Thall is located at the junction of North Waziristan Agency, Kurrum Agency and Orakzai Agency from January 2010 to April 2012. In this hospital only Frontier Corps soldiers and their families are treated. It is a small set up where only the base line investigations are available. For stool examination, only microscopy is available. So we can only look for parasites, leukocytes and red blood cells in the stool. Stool specimens of patients were collected in the hospital and fresh stool specimen were examined under the microscope using proper techniques.

All the patients with a history of loose motion of less than two weeks were included in the study. Patients with age less than 12 years were included in children group and those with age more than 12 years were included in adults group. Of 494 patients 418 (84.62%) were adult male, 21 (4.25%) were adult female, 25 (5.06%) were female children and 30 (6.07%) were male children.

Based on stool examination the patients were divided into three categories.

Stool positive for parasites or ova: All the patients whose stool was positive for parasites or their ova were included in this group.

Stool positive for pus cells and red blood cells: All the patients whose stool was negative for parasites and ova but had pus cells and red blood cells >10/high power field in their stool were included in this group.

Only of loose consistency: All the patients whose stool was negative for parasites and their ova and also negative for pus cells and red blood cells but was of loose/soft consistency were included in this group.

RESULTS

Of 494, 117 (23.68%) patients stool samples were positive for parasites or their ova, 34 (6.88%) patients had pus cells and red blood cells on stool R/E but no parasites and ova, 343 (69.43%) patients had only stool of loose/soft consistency but had neither parasites and ova nor pus cells and red blood cells on stool R/E.

Of 117 patients whose stool was positive for parasites or their ova, 89 (76.06%) patients had protozoa in their stool and 28 (23.93%) patients stool was positive for helminthes. Of these 117 patients giardia was positive in 67 (57.26%) patients, *Entamoeba histolytica (E. Histolytica)* was positive in 22 (18.80%) patients, *H. nana* was positive in 10 (8.55%) patients, *Tenea saginata* in 8 (6.84%) patients, hookworm in 6 (5.13%) patients, *ascaris* in 02 (1.71%) patients and *Trichuris trichura* (*T. trichura*) in 02 (1.71%) patients.

Table-1: Frequencies of different parasites (n=117)

Parasite	Frequency	Percentage
Giardia lamblia	67	57.26%
Entamoeba histolytica	22	18.80%
H. nana	10	8.54%
Tenea saginata	8	6.83%
Hook worm	6	5.12%
Ascaris lumbricoides	2	1.70%
Trichuris trichura	2	1.70%

Table-2: Age and sex distribution (n=494)

Adult male	418	84.62%
Adult female	21	4.25%
Child male	30	6.07%
Child female	25	5.06%

DISCUSSION

Because of new advancements in the recent years, an etiological agent can be isolated in up to seventy percent of cases of diarrhoea.[15,16] The most common diarrhoea causing pathogen includes rota virus, *Giardia lambelia*, interotoxigenic *Echerichia coli (E. coli), Compylobactor jejuni, Shigella, E. histolytica* and vibrio cholera 0:1.[15] The exact identification and isolation of these causative organism need advanced laboratory techniques and sophisticated methods like routine culture,[17] ELIZA,[18] in vivo studies in animals[19] and tissue cultures[20]. However, due to lack of advanced laboratory techniques and economic restriction in developing countries make such studies difficult. Although isolation of exact etiological agent does not affect oral rehydration therapy, yet it is necessary whether a patient with diarrhoea be given antibiotic and other drugs or not stool inspection for visible mucous and blood, PH measurement and microscopy for fats, parasites, red and white blood cells have been performed for years for the assessment of inflammatory diseases of colon and carbohydrates and fat malabsorption. Studies in past have shown importance of microscopic stool examination in detection of faecal white blood cells in patient with diarrhoea especially those suffering from shigellosis.[15]

Koch describes the importance of microscopic stool examination in the evaluation of diarrhoeal patients in the past[21] and recent research work has now established its value in the diagnosis of parasitic diarrhoea and shigellosis. Patient with diarrhoea who have blood in stool and whose microscopy show red blood cells most likely are infected with *E. histolytica* or *shigella*. These patients require antibiotic therapy. Studies have shown that patients suffering from shigellosis have numerous white blood cells in stool (more than 50/high power field) on microscopy which differentiates these patients from those infected with *E. histolytica*.[22,23] Patients with dysentery have numerous RBCs and WBCs on microscopic stool examination and are more likely to have numerous white blood cells in stool than all patients, which suggests the invasive nature of these agents.[15]

In our study, we divided our patients in three categories on the basis of stool microscopic findings **a.** in which a definite agent was identified and in which specific treatment should be given, **b.** in which specific etiological agent was not identified but their stool samples had numerous pus cells and red blood cells and **c.** included patients with diarrhoea in which no specific agent was identified and their stool had no pus cells and red blood cells but the only finding was that their stool was of loose/soft consistency. Now the question is that whether the latter two categories in our study require drug treatment besides oral rehydration therapy or not. In a study by Barbara J Stoll *et al*[15] they divided the common pathogen responsible for diarrhoea in two groups, one includes Rotavirus, Entrertoxigenic *E. coli* and *C. jejuni* which do not require treatment and other includes *Shigella, E histolytica , Vibrio cholerae* and *Giardia lamblia* which require specific therapy. They further classified the pathogens as causing watery diarrhoea which included Rotavirus, Enterotoxigenic *E coli* and Vibrio cholerea, agents causing dysentery which included *Shigella* and *E. histolytica* and others which included *Giardia lamblia* and *C. jejuni*. They also found out that patients with *Shigella* and *Entamoeba* had more feacal erythrcytes (>10/ HPF) than patients with other pathogens (48% and 39% respectively versus 12% all patients $p<0.01$). Now we may say that cat II in

our study can be classified as patients with dysentery most probably due to *Shigella* (as *Entamoeba* can be detected by stool microscopy) which require treatment for bacillary dysentery and cat III in our study can be classified as patients with watery diarrhoea not requiring drug treatment but only oral rehydration required.

In a study by Tinadue O *et al*[24] their findings are almost comparable with our study. Out of 300 patients with diarrhoea in their study 70 (23.3%) patients stool was positive for parasites. There were 18 (6%) helminthes and 52(18.6%) protozoa. Whereas in our study parasites were positive in 117 (23.68%) out 494 patients. Helminthes were positive in 28 (5.6%) patients and protozoa in 89 (18.06%).

There is a lot of room for improvement. Advanced investigations can be carried out to find out specific causes and to treat the patients accordingly. The study may be extended to general population and not restricted to a specific population like soldiers and their families which have a specific environment. But working in periphery with limited resources should not be an obstacle in our research. We should classify our health problems and find out their solution according to our environment by utilizing our limited resources in hand. At least it will help those working in that particular environment with those limited resources.

CONCLUSION

Though microscopic stool examination is a simple test, requiring a few minutes, yet is very effective in dysentery diagnosis and differentiating between *Shigella* and the invasive *E. histolytica*. Microscopic stool examination is of limited value in differentiating between agents causing watery diarrhoea especially enterotoxigenic *E. coli* and vibrio cholera 0:1. However, these agents cause self-limiting watery diarrhoea for which fluid therapy is mandatory and antibiotic used in these patients may only reduce the duration of disease and excretion of pathogen.

REFRENCES

1. Organization WH, Organization WH. The rational use of drugs in the management of acute diarrhoea in children: World Health Organization; 1990.
2. Cheng AC, McDonald JR, Thielman NM. Infectious diarrhoea in developed and developing countries. J Clin Gastroenterol 2005;39(9):757–73.
3. Farrell J, Ciarán K, Feldman M, Friedman L. Sleisenger & Fordtran's gastrointestinal and liver disease. Sleisenger and Fordtran's Gastrointestinal and Liver Disease. 2002.
4. Webber R. Communicable disease epidemiology and control: A global perspective: Cabi; 2009.
5. Elliott EJ. Acute gastroenteritis in children. BMJ. 2007;334(7583):35–40.
6. Grimwood K, Forbes DA. Acute and persistent diarrhoea. Pediatr Clin North Am 2009;56(6):1343–61.
7. Global networks for surveillance of rotavirus gastroenteritis, 2001–2008. Wkly Epidemiol Rec 2008;83(47):421–5.
8. Eckardt AJ, Baumgart DC. Viral gastroenteritis in adults. Recent Patents on anti-infective drug discovery. 2011;6(1):54–63.
9. Wheeler JG, Sethi D, Cowden JM, Wall PG, Rodrigues LC, Tompkins DS, *et al*. Study of infectious intestinal disease in England: rates in the community, presenting to general practice, and reported to national surveillance. BMJ 1999;318(7190):1046–50.
10. Black RE. Epidemiology of travelers' diarrhoea and relative importance of various pathogens. Rev Infect Dis 1990;12(Supplement 1):S73–S9.
11. Barnes GL, Uren E, Stevens KB, Bishop RF. Etiology of acute gastroenteritis in hospitalized children in Melbourne, Australia, from April 1980 to March 1993. J Clin Microbiol 1998;36(1):133–8.
12. Petersen AM, Nielsen SV, Meyer D, Ganer P, Ladefoged K. Bacterial gastroenteritis among hospitalized patients in a Danish county, 1991–93. Scand J Gastroenterol 1996;31(9):906–11.
13. Presterl E, Nadrchal R, Wolf D, Rotter M, Hirschl A. Enteroaggregative and enterotoxigenic Escherichia coli among isolates from patients with diarrhoea in Austria. Eur J Clin Microbiol Infect Dis 1999;18(3):209–12.
14. Svanteson B, Thorén A, Castor B, Barkenius G, Bergdahl U, Tufvesson B, *et al*. Acute diarrhoea in adults: aetiology, clinical appearance and therapeutic aspects Scand J Infect Dis 1988;20(3):303–14.
15. Stoll BJ, Glass RI, Banu H, Huq MI, Khan M, Ahmed M. Value of stool examination in patients with diarrhoea. Br Med J (Clin Res Ed). 1983;286(6383):2037–40.
16. Stintzing G, Bäck E, Tufvesson B, Johnsson T, Wadström T, Habte D. Seasonal fluctuations in the occurrence of enterotoxigenic bacteria and rotavirus in paediatric diarrhoea in Addis Ababa. Bull World Health Organ 1981;59(1):67–73.
17. Ewing WH. Edwards and Ewing's identification of Enterobacteriaceae: Elsevier Science Publishing Co. Inc.; 1986.
18. Yolken R, Kim H, Clem T, Wyatt R, Kalica A, Chanock R, *et al*. Enzyme-linked immunosorbent assay (ELISA) for detection of human reovirus-like agent of infantile gastroenteritis. Lancet 1977;2(8032):263–7.
19. Dean AG, Ching Y-C, Williams RG, Harden LB. Test for Escherichia coli enterotoxin using infant mice: application in a study of diarrhoea in children in Honolulu. J Infectious Dis 1972;125(4):407–11.
20. Sack DA, Sack RB. Test for enterotoxigenic Escherichia coli using Y-1 adrenal cells in miniculture. Infect Immun 1975;11(2):334–6.
21. Wolff H. The faecal smear in the therapy of diarrhoeas. Trop Geogr Med 1969;21(4):427–35.
22. Pickering L, DuPont H, Olarte J, Conklin R, Ericsson C. Fecal leukocytes in enteric infections. Am J Clin Path 1977;68(5):562–5.
23. Korzeniowski OM, Barada FA, Rouse JD, Guerrant RL. Value of examination for fecal leukocytes in the early diagnosis of shigellosis. Am J Trop Med Hyg 1979;28(6):1031–5.
24. Tinuade O, John O, Saheed O, Oyeku O, Fidelis N, Olabisi D. Parasitic etiology of childhood diarrhoea. Indian J Pediatr 2006;73(12):1081–4.

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