Original Article

Frequency and seasonality of intestinal parasitism in Qassim region, Saudi Arabia

Abdelmageed Imam[1], Ali Altayyar[2], Elnour Eltayeb[3], Yousif Almushawa[4]

ABSTRACT

Objective: To determine the frequency and seasonality of intestinal parasitic infections among patients in Qassim region, Kingdom of Saudi Arabia (KSA).

Methodology: A descriptive study conducted during 3 years period at Buraidah Central Hospital (BCH) in Qassim region, KSA. The faecal specimens of 23,278 patients who attended BCH during the study period were analyzed by direct and concentrated microscopy techniques. The specimens of the subjects who came to hospital for pre-employment screening were excluded from the study.

Results: Pathogenic intestinal parasites were found in 1676 patients (7.2%). Nine parasites were recorded and were predominated by *Giardia lamblia* and *Entamoeba histolytica/dispar*. The monthly distribution of intestinal parasitic infections was highest during June and August (Summer) and were lowest during December and January (Winter).

Conclusion: *Giardia lamblia* and *Entamoeba histolytica/dispar* were found to be the common aetiologic agents of intestinal parasitic diseases among the study population. Summer time was identified as a potential local risk factor for acquisition of infection in the study region.

KEY WORDS: Intestinal parasites, Frequency, Seasonality.

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INTRODUCTION

The World Health Organization (WHO) estimates that over two billion people in the world are suffering from at least one type of intestinal parasitism (IP).[1] Some of the intestinal parasitic diseases are associated with severe morbidity that often results in mortality. Giardiasis, amoebiasis, ascariasis, hookworm disease, trichuriasis are common world-wide, and their impact on human health is high.[2,3] Frequency of different parasites varies from one geographic area to another, the ones with simple life cycles have a more cosmopolitan distribution than those which have complex life cycles.[4-7] Another important factor in the spread of parasitic diseases is the permanent or temporary migration of human populations.[8] The potential transmission of intestinal parasitic diseases in economically developed countries has emerged as a real possibility among travelers and immune-compromised individuals, and this has been recognized as a threat to public health.[9,10]

Several studies in the past had looked at the frequency of IP in various parts of Kingdom of Saudi Arabia (KSA).[11-15] Recent reports on IP from KSA indicated an overall decreasing pattern in the frequency of parasitic diseases. For example,

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Kalantan (Riyadh, 2001), Ali (Tabuk, 2010), and Zaglool (Makkah, 2011) had reported IP rates of 12.8%, 8.4%, and 6.2% respectively.[16-18]

Studies on IP from Qassim region in central part of KSA are scarce. The climate of this region is characterized by rainy winter, low humidity summer, and agriculture is an important part of the community culture. It is a fact that parasite habitat area is usually defined by climatic conditions while seasonal meteorological variations affect timing and intensity of human parasitic diseases.[19-21]

Data on frequency of IP is important to evaluate the burden of disease and understand on potential risk factors for their acquisition. Information on seasonal distribution of IP is helpful to develop focused prevention programs. In this report we present our findings on the frequency and seasonality of IP among patients at a major hospital in Qassim region, namely, Buraidah Central Hospital (BCH), over a period of three years.

METHODOLOGY

BCH is a Ministry of Health, 512-beds referral hospital, affiliated to College of Medicine, Qassim University, KSA. The faecal specimens of 23,278 patients during the study period January 2006 – December 2008, were processed at the laboratory department. The specimens of the subjects who came to hospital for pre-employment screening were excluded from the study.

In the laboratory department of BCH, specimens were received in tight-lid plastic containers. The specimens were first subjected to gross examination for consistency, presence of blood, mucous, or adult parasites. Saline wet smears were prepared directly from faecal material by placing a drop of saline in the center of the left half of a microscope slide, and a drop of iodine was placed in the center of the right half of the slide. Then with a stick applicator about 2mg of faeces were picked up and added to the saline drop. This was repeated and added to the iodine drop. The faeces were mixed with the drops to form suspensions and then each drop was covered by a coverslip. The two preparations were examined under a light microscope with 10X objective lens to demonstrate the presence of parasite eggs, larvae, protozoan trophozoites or cysts, and then with the 40X objective lens to confirm parasite details.

Concentrated smears were prepared by adding 1.0-1.5 g faeces to 10 ml formalin in a centrifuge tube, stirred, and brought into suspension. The suspension was then strained through 400 *u*m mesh sieve into another centrifuge tube. Next 10% formalin was added to the suspension in the tube to bring the total volume to 10 ml. Then 3.0 ml ethyl acetate was added to the suspension in the tube, and mixed well for 10 seconds. The tube was then centrifuged for 3 minutes, after which using an applicator the debris plug was loosened and the top three layers were poured off. The sediment was resuspended into the remaining fluid and examined microscopically in the same way as for the direct smears.

Seasonality was evaluated by calendar monthly distribution of the intestinal parasitic infections among the study population. The proposal of this study was approved by the Research & Ethics Committee of College of Medicine, Qassim University, and by the Regional Research & Ethics Committee, Ministry of Health, Qassim region, KSA.

Table-I: Frequency of IP during the study period.

	Parasite	*Number*	*%*
1	*Entamoeba histolytica / dispar*	585	34.8
2	*Giardia lamblia*	301	17.9
3	*Ascaris lumbricoides*	266	15.9
4	Hookworms	258	15.4
5	*Trichuris trichura*	208	12.5
6	*Hymenolepis nana*	44	02.6
7	*Schistosoma mansoni*	6	00.4
8	*Blastocystis hominis*	5	00.3
9	*Enterobius vermicularis*	3	00.2
	Total	1676	100

RESULTS

(A) Frequency: During the three years period of this study, faecal specimens from 23,278 patients were analyzed for the presence of intestinal parasites. Potential pathogenic intestinal parasites were found in 1676 patients (7.2%). Nine parasites were recorded, in descending frequency: *Entamoeba histolytica/dispar*, *Giardia lamblia*, *Ascaris lumbricoides*, Hookworms, *Trichuris trichura*, *Hymenolepis nana*, *Schistosoma mansoni*, *Blastocystis hominis*, *Enterobius vermicularis*. The total number and percentage for each of these parasites are shown in Table-I.

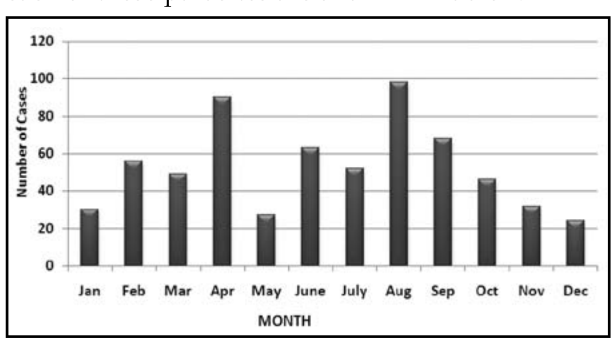

Fig.1: Seasonal distribution of IP during the year 2006.

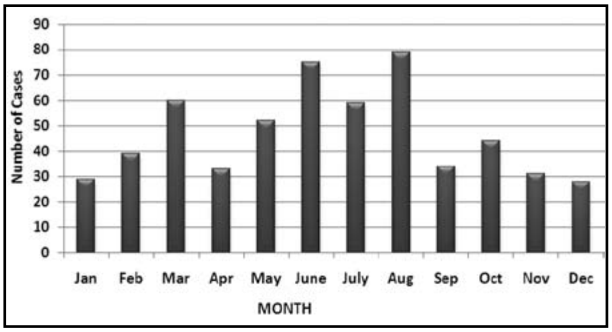

Fig.2: Seasonal distribution of IP during the year 2007.

(B) Seasonal Distribution: During the year 2006, the monthly distribution of intestinal parasitic infections was highest during August, and was lowest during December (Fig.1). The difference is significant statistically, $p < 0.05$.

During the year 2007, the monthly distribution of intestinal parasitic infections was highest during August and was lowest during January (Fig.2). The difference is significant statistically, $p < 0.05$.

During the year 2008, the monthly distribution of intestinal parasitic infections was highest during June, and was lowest during January (Fig.3). However, the difference is not significant statistically, $p > 0.05$.

DISCUSSION

Several studies have showed frequency rates of IP in different patient populations and regions of the Arabian Peninsula.[22-25] In this study we examined the frequency of IP as well as its seasonal distribution in a population from Qassim region in central part of KSA.

Intestinal parasites with simple life cycles, such as *Giardia lamblia* and *Entamoeba histolytica/dispar* usually have a world-wide distribution. This has been shown not only in this study but also in those reported in the literature.[4,27] We found *Giardia lamblia* and *Entamoeba histolytica/dispar* to be predominant in this study (Table-I), and this is comparable to many reports from KSA.[11,18,27] However, the risk factors for acquisition of these infections are probably not similar in the different regions within KSA. In our study we identified summer time as a potential risk factor for acquisition of IP (Fig 1, 2 and 3). The exact explanation for this finding is not clear. However, it could be attributed to frequent human exposure to valley water collections containing parasite transmission stages during outdoor activities in summer time.

During the years 2006 and 2007 of the study, the monthly distribution of intestinal parasitic infections was highest in August (Summer), and was lowest in December/January (Winter), with a statistically significant difference, $p < 0.05$. However during the year 2008 of the study, the monthly distribution of intestinal parasitic infections was highest in June (Summer), and was lowest in January (Winter), but the difference was not significant statistically, $p > 0.05$. This finding of the year 2008 of the study is not consistent with the findings of the years 2006 and 2007 of the study. The exact reason for these different rates is unclear. We assume that a factor such as outbreak cases might have occurred during the years 2006 and 2007, and thus contributed to the difference in rates. Such a probability had been considered in a report on giardiasis from Calgary region in Canada.[28]

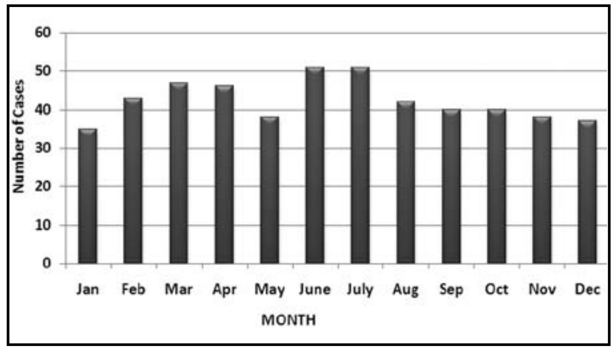

Fig.3: Seasonal distribution of IP during the year 2008.

Although our study is novel in Qassim region, KSA and provides important information, there are some important limitations. First, this was a laboratory based study and as a result we did not have clinical data on exposures to water collections or foodborne parasitic diseases. Such data is relevant for precise description of the pattern of seasonality of IP. Second, the pathogenic *Entamoeba histolytica* could not be differentiated from the non-pathogenic *Entamoeba dispar* since microscopy alone was the method of laboratory diagnosis. Consequently the frequency of the pathogenic *Entamoeba histolytica* is likely to be lower than the value shown in Table-I. Finally, socio-demographic data could not be collected which is important to reflect information on IP at the community level.

CONCLUSION

Giardia lamblia and *Entamoeba histolytica/dispar* were found to be the common aetiologic agents of intestinal parasitic diseases among the study population. The monthly distribution of intestinal parasitic infections was highest during June and August identifying summer time as a potential local risk factor for acquisition of infection in the study region.

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REFERENCES

1. The Millenium Development Goals and deworming. Report of the third global meeting of the partners for parasite control: deworming for health and development, 29–30 November 2004. Geneva: World Health Organization, 2005: 25–26.
2. World Health Organization. International statistical classification of diseases and related health problems. Geneva: WHO, 2006: E44. (http:// www.who.int/ classifications/apps/icd/icd10 online/, Accessed on 20 November 2011).
3. John DT, Petri WA. Markell & Voge Medical Parasitology, 9th edition, Saunders Elsevier:Missouri; USA, 2006: 6-21.
4. Ahsan–ul–Wadood, Bari A, Aziz–ur–Rahman, Qasim KF. Frequency of intestinal parasitic infestation in children hospital Quetta. Pakistan J Med Res. 2005;44(2):87–88.
5. Tang N, Luo NJ. A cross sectional study of intestinal parasitic infections in a rural district of west China. Can J Infect Dis. 2003;14(3):159-162.
6. Hakim SL, Gan CC, Malkit K, Chong CK, Sharri N,Chin CN et.al. Parasitic infections among Orang Asli (aborigine) in the camron highlands, Malaysia. Southeast Asian J Trop Med Public Health. 2007;38(3):415-419.
7. Gbakima AA, Konteh R, Kallon M, Mansaray H, Sahr F, Bah ZJ et. al. Intestinal protozoa and intestinal helminthic infections in displacement camps in Sierra Leone. Afr J Med Sci. 2007;36(1):1-9.
8. Arfaa F. Intestinal parasites among Indochinese refugees and Mexican immigrants resettled in Contra Costa County, California, USA. J Fam Prac. 1981;12(2):223-226.
9. Ekdahl K, Anderson Y. Imported giardiasis: impact of international travel, immigration, and adoption. Am J Trop Med Hyg. 2005;72(6):825-830.
10. Jong E. Intestinal parasites. Primary Care Clin Off Prac. 2008;29(4):857-877.
11. Alshammari S, Khoja A, Jad M,Gad A. Intestinal parasites in Riyadh: prevalence, socio-demographic and environmental associates. Trop Med Int Health. 2001;6(3):184-189.
12. Khan MU, Amir SE, Eid OM. Prevalence of intestinal parasites among patients in Abha region. Ann Saudi Med. 1989;9:471-474.
13. Alballaa SR, Alsekeit M, Alrashed RS, Alhedaithy MA, Alnasser MN. Prevalence of pathogenic intestinal parasites among preschool children in Madina region, Saudi Arabia. Ann Saudi Med. 1993;13(3):259-263.
14. Albraikan FA, Amin A, Beeching NJ, Hommel M, Hart CA. Detection of Cryptosporidium among diarrhoeic and asymptomatic children in Jeddah, Saudi Arabia. Ann Trop Med Parasitol. 2003;97(5):505-510.
15. Alfayez SF, Khogeer A. A follow up study on prevalence of intestinal parasites among patients attending King Abdulaziz University Hospital in Jeddah. Saudi Med J .1989;10(3):193-197.
16. Kalantan KA, Alfaris EA, Altaweel AA. Pattern of intestinal parasitic infections among foodhandlers in Riyadh, Saudi Arabia. Saudi Soc Fam Comm Med J. 2001;8(3):1-4.
17. Ali NS, Mostafa MM. Intestinal parasitic infections among a population of children in Tabuk, KSA. Aust J Appl Sci. 2010;4(9):4200-4204.
18. Zaglool DA, Khodari YA, Gazzaz ZJ, Dhafar KO, Shaker HA, Farooq MU. Prevalence of intestinal parasites among patients of Alnoor Specialist Hospital, Makkah, Saudi Arabia. Oman Med J. 2011;26(3):182-185.
19. Amin OM. Seasonal prevalence of intestinal parasites in the United States during 2000. Am J Trop Med Hyg. 2002;66(6):799-803.
20. Jagai JS, Castronovo DA, Monchak J, Naumova EN. Seasonality of cryptosporidiosis: a meta-analysis approach. Environ Res. 2009;109(4):465-478.
21. Conteas CN, Berlin OG, Lariviere MJ, Pandhumans SS, Speck CE, Forschen R, et.al. Examination of the prevalence and seasonal variation of intestinal microsporidiosis in the stools of persons with chronic diarrhea and human immunodeficiency virus infection. Am J Trop Med Hyg. 1998;58(5):559-561.
22. AbuMadi MA, Behnke JM, Ismail A. Patterns of infection with intestinal parasites in Qatar among foodhandlers and housemaids from different geographical regions of origin. Acta Tropica. 2008;106(3):213-220.
23. Iqbal J, Hira PR, Zaki M, ElSaleh A, AlAli F, Philip R. Cryptosporidiosis in Kwaiti children: seasonality and endemicity. Clin Microbiol Infet. 2001;7(5):261-266.
24. Idris MA, Shaban MA, Fatahallah M. Effective control of hookworm infection in school children from Dhofar, Sultanate of Oman: a four-year experience with albendazole mass chemotherapy. Acta Tropica. 2001;80(2):139-143.
25. Patel PK, Khandekar R. Intestinal parasitic infections among school children of the Dhahira region of Oman. Saudi Med J. 2006;27(5):627-632.
26. Peruzzi S, Gorrini C, Piccolo G, Calderaro A, Dettori G, Chezzi C. Prevalence of intestinal parasites in the area of Parma, Italy, during the year 2005. Acta Biomed. 2006;77(3):147-151.
27. Al Braikan FA. Is intestinal parasitic infection still a public health concern among Saudi children? Saudi Med J. 2008;29(11):477-482.
28. Laupland KB, Church DL. Population-based laboratory surveillance for Giardia sp. And Cryptosporidium sp. Infections in a large Canadian health region. BMC Infectious Diseases. 2005;5:72-77.