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Prevalence of Intestinal Parasites among Patients of Al-Noor Specialist Hospital, Makkah, Saudi Arabia

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Abstract

Objectives: To determine the prevalence of intestinal parasites among patients of a tertiary care hospital.

Methods: A total of 12,054 samples received from the outpatient as well as inpatient departments from January 1, 2004 to December 31, 2009 in Al-Noor Specialist Hospital, Makkah, Saudi Arabia. Stool examinations were performed by direct method and concentrated Techniques for all patients.

Results: Overall, the prevalence of intestinal parasites was 6.2% (740 cases). Majority of patients were infected by *Entamoeba histolytica* (4.7%) followed by *Giardia lamblia* (1.3%), while *Ankylostoma duodenal* (0.02%) exhibited the minimum prevalence. Parasitic infections were more frequent in non-Saudis than Saudis patients (7.1% *vs*. 5.8%; $p<0.05$). There was no significant difference between males and females regarding parasitic infections, with a female:male ratio of 1:1.08. There was a higher prevalence in patients under five years of age (9.1%), followed by patients aged 5-14 years (7.5%).

Conclusion: The notable finding from this study is the high prevalence of *E. histolytica*. Overall, parasitic infections were more prevalent in patients under five years of age and in non-Saudi nationals.

Keywords: Intestinal parasites; Prevalence; Stool; Infection.

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Introduction

It is estimated that some 3.5 billion people are affected, and that 450 million are ill as a result of Intestinal parasites and protozoan infections worldwide, the majority being children, as they cause iron deficiency anemia, growth retardation in children and other physical and mental health problems.[1,2] The developing countries are more prone to intestinal and extra-intestinal parasitic diseases causing important public health problems.[3] Stool analysis is a common laboratory test used for screening of parasites in cases of diarrhea and other gastrointestinal disorders. Sometimes the test is used to confirm the presence of specific parasites related to a specific clinical condition.[4] The Kingdom of Saudi Arabia has experienced a rapid socio-economic development in recent years that led to a large influx of expatriate workers from developing countries and hence, one should expect parasitic infections among them.[5] Transmission of intestinal parasites is associated with poor personal hygiene which also encourages person to person transmission, poor food hygiene and the presence of flies as well as drinking contaminated water.[6]

Parasitic causes of diarrhea are common in pediatric patients and have important public health implications. Therefore, diagnosis should be pursued vigorously in the appropriate clinical settings.[7] As mentioned in the study by Al-Shammari, previous studies in Saudi Arabia discovered high prevalence rates of infection with intestinal parasitic diseases among specific populations including; food handlers (14%), Riyadh school children (14.2%), expatriates (55.7%), the Abha community (13.2%) and patients attending hospitals (31.3%).[8]

This study aims to determine the prevalence of intestinal parasites in the settings of Al-Noor Specialist Hospital, Makkah, Saudi Arabia.

Methods

A total of 12,054 samples from the outpatient as well as inpatient departments during the period of six years from 1st January 2004 to 31 December 2009 were received at the department of parasitology, central laboratory, Al-Noor Specialist Hospital, Ministry of Health, Makkah, Saudi Arabia, and were included in the current study. Al-Noor Specialist Hospital is a 550-bedded referral teaching hospital delivering tertiary care throughout the Makkah region of Saudi Arabia. Subjects were divided into age

groups (<5, 5-14, 15-24, 25-44, >45 yrs), nationality (Saudi/Non-Saudi) and gender (Male/female). Stool examinations were performed by direct method and concentrated Techniques for all patients.

Using the direct methods by taking direct smears,[9] two preparations were made for examination. A drop of saline was placed at the center of one slide and a drop of 1% lugols and iodine 50% on a second slide for detection of protozoan trophozoites and cysts. A small amount of fecal specimen was taken and the stool was thoroughly emulsified in saline and iodine using an applicator stick. A homogeneous thin film was prepared on each slide by mixing the stool with a drop of normal saline or iodine 50%. And a cover glass was placed on each preparation. The preparations were examined systematically using low (x10) and high (x40) power microscope.

With the concentration technique using fecal parasite concentrator,[10] one spoon of stool was added to 9 ml and 5% formalin provided at the flat-bottom tube. The specimen was mixed thoroughly. Three drops of Triton were added to the mixed specimen. Then 3 ml of ethyl acetate were added. The FPC strainer was tightly attached to the flat-bottomed tube containing the fecal specimen and shaken vigorously for 30 seconds. Pointing the conical end downward; the specimen was shaken through the strainer into a 15 ml centrifuge tube. The FPC strainer was then unscrewed with the flat-bottomed tube still attached and the transport tube and strainer were discarded in an appropriate manner. The 15 ml tube was capped and centrifuged at 500 x *g* for 10 mins. After centrifugation, the specimen was clearly separated into four layers. The debris layer was rimmed using an applicator stick and the debris and supernatant fluid were poured out. With the tube still inverted, a cotton-tipped applicator stick was used to clean and remove the remaining debris and ethyl acetate, and the tube was returned to an upright position and two to three drops of 5% or 10% formalin, saline were added and the sediment was mixed thoroughly. The slides were prepared with a transfer pipet, cover slip, and were examined using low (x10) and high (x40) power microscope.

The study protocol was approved by our institutional review board. We declare that we have no financial or personal relationship(s) which may have inappropriately influenced us in writing this paper. The results were analyzed by using Microsoft Excel version 7.0 on a personal computer.

Results

The study showed that the 12054 stool samples, 6282 (52%) and 10125 (84%) were collected from females and Saudis nationals respectively. Overall, positive stool results for intestinal parasites were 740 (6.2%), with non-Saudis predominance of 145 (7%) out of total 1929 specimens, while 595 (5.8%) of the infected specimens were from Saudi nationals. The prevalence of *Entameoba histolytica* was 561 (4.7), which accounted for 75.8% of the infected samples followed by *Giardia lamblia* which accounted for 21.8% of the infected samples. (Table 1)

Table 1: Parasitological analysis of the specimens received

Identified Parasites	n	% (n=740)*	% (n=12054)
Entameoba histolytica	561	75.8	4.7
Giardia lamblia	161	21.8	1.3
H. nana	7	0.9	0.06
Ascaris lumbriciods	6	0.8	0.05
Trichuiris trichuira	4	0.5	0.03
Ankylostoma duodenal	1	0.1	0.02
Total infected	740	100	6.2

**The data reflects the % out of only positive specimens.*

The infection was more prominent in the <5 years age group accounting for 221 (9.1%) cases, followed by the 5-14 years age group which accounted for 137 (7.5%) cases. The specimens of subjects aged >45 years were infected to a lesser extent, accounting for 128 (3.7%) cases. The prevalence of *Entameoba histolytica* and *Giardia lamblia* was highest among the samples of patients less than five years of age which accounted for 166 (6.9%) and 55 (2.3%) cases respectively, followed by the 5-14 years age group which accounted for 104 (5.7%) and 33 (1.8%) cases respectively. (Table 2)

Table 2: Distribution of patient infections related to age, gender and type of parasite

Age Groups in Years	Specimens Received			Specimens Infected by *Entameoba histolytica*			Specimens Infected by *Giardia lamblia*			Specimens Infected by Others$	Overall Prevalence
	Total n(%)	Male n(%)*	Female n(%)*	Male n(%)**	Female n(%)**	Total n(%)*	Male n(%)**	Female n(%)**	Total n(%)*	Total n(%)*	Total n(%)*
< 5	2416(20)	1151(47.6)	1205(49.9)	88(7.6)	78(6.2)	166(6.9)	8(0.7)	47(3.9)	55(2.3)	0	221(9.1)
5-14	1819(15.1)	1020(56.1)	799(43.9)	48(4.7)	56(7)	104(5.7)	15(1.5)	18(2.2)	33(1.8)	0	137(7.5)
15-24	1502(12.5)	603(40.1)	899(59.9)	37(6.1)	36(4)	73(4.8)	9(1.5)	15(1.7)	24(1.6)	10(0.7)	107(7.1)
25-44	2899(24)	1270(43.8)	1629(56.2)	47(3.7)	54(3.3)	101(3.5)	12(1)	28(1.7)	41(1.4)	6(0.2)	147(5.1)
> 45	3418(28.3)	1728(50.6)	1690(49.4)	80(4.6)	38(2.2)	118(3.5)	2(0.1)	7(0.4)	8(0.2)	2(0.05)	128(3.7)
Total	12054(100)	5772(47.9)	6282(52.1)	300(7.7)	261(4.2)	561(4.7)	46(0.8)	115(1.8)	161(1.3)	18(0.15)	740(6.15)

**% is calculated from respective total specimens in each age group, e.g. total specimens received for males (1151/2416=47.6%)*
***% - calculated from respective total specimens of male & female in each age group, e.g. total specimens of males infected by E. histolytica (88/1151=7.6%)*
$ Others are H. nana, Ascaris lumbriciods, Trichuiris trichuira, Ankylostoma duodenal

Discussion

The results found that 6.2% samples were infected with intestinal parasites; this value is inconsistent with other community based studies conducted in Saudi Arabia in different geographical areas which indicated that intestinal parasites infection is an important public health problem in Saudi Arabia.[8,11-13]

Globally, very high prevalence rates have been reported from developing countries. In a study in rural southern India, the overall period prevalence of intestinal parasites was 97.4% per month.[14]

Another study in Sierra Leone showed a prevalence rate of 73.5%. The higher rates in these communities may be attributed to improper hygiene and agricultural backgrounds.[15]

Entamoeba histolytica (4.7%) and *Giardia lamblia* (1.3%) were the most common intestinal parasites among in our study participants. Both can be transmitted orally by drinking water and both are environmental contaminants of the water supply[16]; they are also the most common in Saudi Arabia.[17,18] A study in Australia reported the prevalence rate of G. *lamblia* to be 33.6%.[19] In a peri-urban community in the province of Buenos Aires, G. *lamblia* affected 26.3% of the population.[20] Our findings on the prevalence of *E. histolytica* and G. *lamblia* showed an agreement with the results of a study by Abdel-Hafez, where *E. histolytica* accounted for 8.8% of the studied cases followed by 6.3% cases infected by G. *lamblia* in Riyadh.[21]

Children under the age of five years were the most affected group in the studied sample followed by 6-14 years age group. This could be due to poor hygiene among these individuals. In Al-Baha region, the most affected age group was 5-9 years and the sex distribution was almost equal in all age groups. The parasites most commonly encountered were; G. *lamblia* (9%), *E. histolytica* (5%), *Hymenolepis nana* (2%), and *Enterobius vermicularis* (2%).[22] In Brazil, the reported overall seropositivity of intestinal parasites was 24%, but it reported to be 40% among 6-14 years old. The high rate among children may be attributed to defecation practices of young children and outdoor feeding in the higher age groups.[23]

There were no cases of *Taenia spp*. since the consumption of pork and pork products are forbidden for Muslims. This may account for the absence of *T. solium* cases in the studied population.

The low infection prevalence observed in the present study may be due to the fact that the stool samples were also obtained from the hospitalized patients while other studies were mainly community based surveys including high risk groups such as school children and rehabilitation centers. There was a sufficient possibility that a part of the samples in the current study could have been from the patients who were already on treatment and in recovery phase, hence low parasite density was observed.

Conclusion

The overall low prevalence of intestinal parasitism has reflected the improvement in living conditions and hygiene. The combined efforts of the health care workers and authorities in Makkah over the past 30 years in the fight against parasites have led to a great reduction in the prevalence of classical intestinal parasites.

Study Limitations

This was a hospital based report rather than a community based report. Data eliciting sociodemographic information such as residence location, educational level, monthly income and environmental factors such as water supply and sewage disposal could not be collected, which may have produced a very precise description of prevalence of intestinal parasites in the community.

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