Retrospective analysis of intestinal parasitic infections diagnosed at a University Hospital in Central, Saudi Arabia

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ABSTRACT

Objective: To review the intestinal parasites diagnosed in a university hospital in Riyadh, Kingdom of Saudi Arabia (KSA).

Methods: This is a retrospective analysis of intestinal parasitic infections reported in patients visiting at King Khalid University Hospital (KKUH), Riyadh, KSA from 1996 to 2003. Information regarding positive cases detected during the study period was collected from the hospital records, using the Hospital Information System database of KKUH. The Statistical Package for Social Sciences was used for the statistical analysis.

Results: During this period, stools examination was carried out for a total of 63,892 patients, 1480 (2.3%) were positive for different intestinal parasites. *Giardia lamblia* was the most commonly reported parasite. The annual positivity rate for parasitic infections has decreased from 2.9-1.1%.

Conclusion: Although this study was limited to hospital patients, comparison with previous reports indicates an overall decrease in the prevalence of intestinal infections in the study area.

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Intestinal parasites are among the most common human infections and have been associated with wide spread morbidity and malnutrition and considerable economic loss in areas where they are endemic.[1-3] Transmission of these parasites is associated with poor personal hygiene (which encourages person-to-person transmission), poor food hygiene (particularly in handling and storing of raw vegetables), the presence of flies and drinking contaminated water. The prevalence of intestinal parasites shows variations in the different parts of the world. Previous reports have dealt with the prevalence of intestinal parasites in patients visiting different hospitals in the Kingdom of Saudi Arabia (KSA) .

Al-Saud[4] reported that the prevalence of parasites in native-born Saudi Arabian males and females of different ages attending the Riyadh Military Hospital from 1978 to 1979 was 9.3%. An overall positivity rate of 25.5% for parasites from stool specimens collected from patients at King Abdul-Aziz Teaching Hospital, Riyadh, KSA.[5] Abdel-Hafez et al,[6] found 24.4% of stool specimens collected from the patients attending 3 medical centers in Riyadh were positive for intestinal parasitic infections. Qadri and Khalil[7] examined for presence of intestinal parasites during 1985 at King Faisal Specialist Hospital in Riyadh, intestinal parasites were found in 27.8% of patients examined. Khan et al,[8] reported that the intestinal parasites prevalence rate was 29.4% among patients in the Abha Region, KSA. Al-Fayez and Khogheer[9] studied the prevalence of intestinal parasitic infections in patients attending King Abdul-Aziz University

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Hospital Jeddah, KSA and found it to be 27.7% in Saudis and 35.3 in other nationalities. The fecal parasites in non-Saudi catering and domestic staff at the Riyadh Military Hospital was 41.4% none of the workers is Saudi.[10] Khan et al,[11] found that parasitic infections among food handlers in Dammam and Al-Khobar, KSA were 7.6%. The prevalence of intestinal parasitic infestation in Saudis and non-Saudis in the Armed Forces Hospital, Riyadh was investigated, the result was 16.7% in Saudis and 16.6 % in non-Saudis.[12] Al-Shammari et al,[13] assessed the prevalence of intestinal parasitic diseases in Riyadh, they found 32.2% were infected.

Studies on the trend of infectious diseases, in general, and parasitic diseases in particular in KSA are scarce. In this paper, we present a review of data on the prevalence of all intestinal pathogenic parasites reported in a university hospital in Riyadh, KSA. The study investigates possible changes in the prevalence of different intestinal parasitic infections diagnosed in this hospital.

Methods. The present study is a retrospective analysis of all intestinal parasitic infections reported in patients visiting King Khalid University Hospital (KKUH), Riyadh, KSA from 1996 to 2003. The routine method for stool analysis in KKUH during the period covered by this study was as follows: The specimens were received in the laboratory in wide-mouthed, watertight plastic containers. Upon receipt of stool samples in the laboratory, the samples were grossly examined for consistency and for the presence of worms or worm segments. Each stool specimen was sedimented, using saline in a conical centrifuge tube, and centrifuge at 2000 rpm for 2 minutes. The supernatant was then discarded, and the sediment well shaken before a smear was made. The smears were examined under the microscope. To demonstrate intestinal protozoa, fresh smears were stained with Lugol's iodine. Permanent stools smears were stained with trichrome or iron-hematoxylin to confirm doubtful protozoa.[14]

Information regarding positive cases detected during the study period was collected from the hospital records. The variables available from the records include age, gender and nationality of patients. Data were retrieved from the Hospital Information System database of KKUH. The Statistical Package for Social Sciences version 10 was used for the statistical analysis. Frequency distributions of positive cases were tabulated according to nationality, gender, year and type of parasites. The chi-square test was employed to test differences between proportions. A p-value <0.05 were considered significant.

Results. During this period, a total of 63,892 stools specimens were examined, among which 1,480 were positive for one or more intestinal parasites. This gives a total prevalence rate of 2.3% among this hospital sample (**Table 1**). The annual parasitic infection rate decreased from 2.9-1.1% during these years (**Table 2**). There is a statistically significant difference in the number of positive cases over this period, with the number of positive cases decreasing significantly over time (χ^2=143.22, p<0.0001). *Giardia lamblia* is the most frequently reported intestinal parasite, accounting for 48.6% of all the positive stools specimens examined. The proportion of specimens positive for *Entamoeba histolytica* was 5.5% (**Table 2**).

Table 3 shows the distribution of cases tested in each year by nationality. Approximately half of the positive cases (48.7%) were Saudis, the rest were other nationalities.

Table 4 shows proportion of intestinal parasites among different age groups. Approximately half of the positive cases (49.6%) fall under the age groups of 21-40 years.

During the year 2003, a total of 5505 patients were examined for intestinal parasites. Intestinal parasites were detected in 59 (1.1%), including 30 males and 29 females. *Giardia lamblia* was the most common parasite, being detected in 39 cases, followed by *Ascaris lumbricoides* (*A. lumbricoides*), hookworm, and *Trichuris trichiura*, 5 cases of each. Double infection was seen in 2 cases; namely, hookworm with *Trichuris trichiura* and hookworm with *A. lumbricoides* in Indonesian and Filipino nationals each. Most positives were Saudi nationals 33 (55.9%), out of whom 20 were males and 13 were females.

Discussion. It is important to emphasize that KKUH is accessible only for Saudi citizens plus limited number of foreigners who work for the government. For example in the year 2003, the proportion of non-Saudis among patients attending KKUH was 9.4%.[15] In general, the pattern of parasitic infection in Saudis tends to differ from that in non-Saudi expatriates.[10,13]

This study has indicated that 2.3% of the patients tested were infected with one or more intestinal parasites as detected by single stool examination. In Saudi Arabia, previous stool surveys have indicated that approximately 7-55% of various groups of people studied were infected with intestinal parasites.[4,6-8,10-13] The much lower prevalence of parasitic infection reported in KKUH could partially be explained by the fact that we only report pathogenic parasites

Table 1 - Distribution of positive cases between 1996-2003 by nationality and gender.

Nationality	Total positive N (%)	Positive males N (%)	Positive females N (%)
Saudi Arabia	**721 (48.7)**	468 (64.9)	253 (35.1)
Indian Sub-continent	**268 (18.1)**	181 (67.5)	87 (32.5)
Middle East	**35 (2.4)**	23 (65.7)	12 (34.3)
Far East	**338 (22.8)**	49 (14.5)	289 (85.5)
Africa	**110 (7.4)**	72 (65.5)	38 (34.5)
Europe and Americas	**8 (0.5)**	8 (100)	0 (0)
Total	**1480 (100)**	**801 (54.1)**	**679 (45.9)**

Table 2 - Distribution of patients by main parasites detected.

Year	Total patients	Total positive N (%)	Males	Females	GLC	EH	AL	HWS	TT	HN	SSL	EV	SM
1996	10059	295 (2.9)	153	142	126	27	45	44	37	12	6	11	9
1997	9661	273 (2.8)	133	140	117	16	40	46	37	11	3	10	4
1998	9306	237 (2.5)	129	108	116	17	27	24	37	7	7	13	4
1999	7968	164 (2.1)	90	74	90	6	18	12	20	10	4	6	6
2000	7390	197 (2.7)	127	70	92	7	21	31	26	7	13	9	5
2001	6904	155 (2.2)	85	70	76	3	22	20	22	5	7	10	5
2002	7099	100 (1.4)	54	46	63	2	9	13	10	4	3	3	0
2003	5505	59 (1.1)	30	29	39	3	5	5	5	0	1	2	0
Total	**63892**	**1480 (2.3)**	**801**	**679**	**719**	**81**	**187**	**195**	**194**	**56**	**44**	**64**	**33**
% to total positive			**54.1%**	**45.9%**	**48.6%**	**5.5%**	**12.6%**	**13.2%**	**13.1%**	**3.8%**	**3%**	**4.3%**	**2.2%**

χ^2= 143.22, p<0.0001

GLC - *Giardia lamblia,* EH - *Entamoeba histolytica*, AL - *Ascaris lumbricoides*, HWS - hookworm, TT - *Trichuris trichiura,* HN - *Hymenolepis nana,* SSL - *Strongyloides stercoralis*, EV - *Enterobius vermicularis*, SM - *Schistosoma mansoni*.

Table 3 - Positive cases: distribution by nationality and year.

Nationality	1996	1997	1998	1999	2000	2001	2002	2003	Total (%)
Saudi Arabia	148	129	115	90	84	68	54	33	**721 (48.7)**
Other nationals	147	144	122	74	113	87	46	26	**759 (51.3)**
Total positive	**295**	**273**	**237**	**164**	**197**	**155**	**100**	**59**	**1480 (100)**
Total tested	**10059**	**9661**	**9301**	**7968**	**7390**	**6904**	**7099**	**5505**	**63887**

Table 4 - Distribution of patients by age and gender.

Year	Total patients	Total positives	Males	Females	0-10	11-20	21-30	31-40	41-50	51->60
1996	10059	295	153	142	51	38	35	84	56	31
1997	9661	273	133	140	36	38	38	105	32	24
1998	9306	237	129	108	42	26	33	87	26	23
1999	7968	164	90	74	22	25	43	46	15	13
2000	7390	197	127	70	43	18	35	70	15	16
2001	6904	155	85	70	33	21	35	41	18	7
2002	7099	100	54	46	18	20	26	24	10	2
2003	5505	59	30	29	16	7	13	19	3	1
Total	**63892**	**1480**	**801**	**679**	**261**	**193**	**258**	**476**	**175**	**117**

while others report commensals as well. In addition, we think the type of patients seen at KKUH tend to be at a lower risk of having parasitic infections as they are mostly urban dwellers with a high socioeconomic status.[7,8,13,6]

Similar to other reports from this country and other countries in the region, *Giardia lamblia* was the most prevalent infection encountered in Riyadh. This could be attributed to the similarity in the socio-economic conditions and health status in these countries. The prevalence of infection with helminths in Riyadh region is remarkably low.[16,17] The lower prevalence of helminthic infection is in agreement with previous reports.[16,17] This could be due to unfavorable ecological and other socio-cultural factors that influence survival and transmission of soil-transmitted helminths. In Riyadh area, the combination of such factors as regular utilization of sanitary toilets for defecation by adults and children, habitual use of foot wears, a general good nutritional state and health of the people plus the lengthy dry season may account for the reduced risk of infection and re infection.

The present data did not include results of scotch tape preparations for pinworm. Therefore, it probably under-estimates the prevalence of *Enterobius vermicularis* as routine examination of fecal samples is not sensitive for the diagnosis of this infection.[18] The prevalence of *Schistosoma mansoni* (*S. mansoni*) has been markedly reduced in endemic areas in the Central Region of Saudi Arabia and in all foci in the Western Region. Although, *S. mansoni* infections are not known to occur in Riyadh area, the infection of *S. mansoni* detected in patients have been probably acquired from lowland Tehemat-Asir or in neighboring Yemen, where *S. mansoni* is a common infection.[19,20]

Many factors influence the prevalence of parasitic infections in Saudi Arabia. Hygienic conditions may be one of the most important factors responsible for higher prevalence of parasites in the developing world.[3] Immigrants may also be partially responsible for spreading intestinal parasites among local population. The majority of expatriates in Saudi Arabia comes from endemic countries such as Indonesia, India, Pakistan, Sri Lanka, Bangladesh, and Philippines. A higher percentage of these expatriates are working in restaurants and in homes as housemaids. Similarly, reports in other Gulf countries have indicated that the proportion of parasitic infection was high among foreign workers.[10,21] Previous stool surveys in the Kingdom have indicated parasite prevalence rates of 9.3%,[4] 25.5%,[5] 24.4%,[6] 27.8%,[7] 29.4%,[8] 41.4% (all expatriates),[10] 7.6%,[11] 16.7% among Saudis, and 16.6% among non-Saudis,[12] 32.2%.[13] However, the overall rates of infection with intestinal parasites in the present study is much lower than those reported in previous comparable hospital samples. This may be due to general improvement in health services and sanitary conditions in the country. Further investigations are needed before such conclusion can be authenticated. Although Riyadh is relatively a dry city, intestinal parasitic diseases are still found in the city population. This is mainly as much of the population have moved to Riyadh in the last few years, coming originally from other parts of the country. Some of the Riyadh residents frequently visit their native localities from time to time and so get exposed to infection.

References

1. World Health Organization Scientific Group. Soil transmitted helminths. ***World Health Organ Tech Rep Ser*** 1964; 277: 1-70.
2. World Health Organization Scientific Group. Control of ascariasis. ***World Health Organ Tech Rep Ser*** 1967; 379: 1-39.
3. World Health Organization. Prevention and control of parasitic infections. Geneva. ***World Health Organ Tech Rep Ser*** 1987; 749: 7-18.
4. Al-Saud ASA. A survey of the pattern of parasitic infestation in Saudi Arabia. ***Saudi Med J*** 1983; 4: 117-122.
5. Bolbol AHS, Mahmoud AA. Laboratory and clinical study of intestinal pathogenic parasites among the Riyadh population. ***Saudi Med J*** 1984; 5: 159-166.
6. Abdel-Hafez MMA, El-Kady N, Bolbol AS, Baknina MH. Prevalence of intestinal parasitic infections in Riyadh District, Saudi Arabia. ***Ann Trop Med Parasitol*** 1986; 80: 631-634.
7. Qadri SMH, Khalil SH. Intestinal parasites: incidence and etiology in over 1000 patients at King Faisal Specialist Hospital in Riyadh. ***Ann Saudi Med*** 1987; 7: 207-211.
8. Khan MU, Amir SE, Eid OM, Aggerwal S. Prevalence of intestinal parasites among patients in the Abha Region. ***Ann Saudi Med*** 1989; 9: 471-474.
9. Al-Fayez SF, Khogheer AY. A follow up study on prevalence of parasitic infections among patients attending King Abdul Aziz University Hospital Jeddah. ***Saudi Med J*** 1989; 10: 193-197.
10. Al-Saud ASA. Fecal parasites in non-Saudi catering and domestic staff at the Riyadh Military Hospital. ***Saudi Med J*** 1983; 4: 259-262.
11. Khan ZA, Al-Jama AAA, Madan I. Parasitic infections among food handlers in Dammam and Al-Khobar, Saudi Arabia. ***Ann Saudi Med*** 1987; 7: 47-50.
12. Al-Saud ASA, El-Zaher F, Oni GA, Osopa AO. Intestinal parasitic infestation in Saudis and non-Saudis in the Armed Forces Hospital, Riyadh. ***Saudi Med J*** 1995; 16: 242-247.
13. Al-Shammari S, Khoja T, El-Khwasky F, Gad A. Intestinal parasitic diseases in Riyadh, Saudi Arabia; Prevalence, Socia-demographic and environmental associates. ***Trop Med Int Health*** 2001; 6: 184-189.
14. Beaver PC, Jung RC, Cupp EW. Clinical parasitology. 9th ed. Philadelphia (PA): Lea & Febiger; 1984. p. 735-750.
15. King Khalid University Hospital, Department of Medical Records and Statistics. Annual Statistics Report of the year 1424 H., Riyadh: King Khalid University Hospital. p. 32.

16. Al-Madani AA, Omar MS, Abu-Zeid HA, Abdulla SA. Intestinal parasites in urban and rural communities of Abha, Saudi Arabia. ***Ann Saudi Med*** 1989; 9: 182-185.
17. Omar MS, Abu-Zeid HA, Mahfouz AA. Intestinal parasitic infections in schoolchildren of Abha (Asir), Saudi Arabia. ***Acta Tropica*** 1991; 48: 195-202.
18. Neva FA, Brown HW, editors. Intestinal nematodes of human beings. Chapter 6. Basic clinical parasitology. 6th ed. Norwalk, Connecticut: Appleton-Century-Croft; 1994. p. 113-151.
19. Arfaa F. Studies on *Schistosomiasis* in the Yemen Arab Republic. ***Am J Trop Med Hyg*** 1972; 21: 421-424.
20. Arfaa F. Studies on *Schistosomiasis* in Saudi Arabia. ***Am J Trop Med Hyg*** 1976; 25: 295-298.
21. Al-Madani AA, Mahfouz AA. Prevalence of intestinal parasitic infections among Asian female housekeepers in Abha District, Saudi Arabia. ***Southeast Asian J Trop Med Public Health*** 1995; 26: 135-137.