Original Article

SURVEY OF URINARY SCHISTOSOMIASIS IN IRAN

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ABSTRACT

Objective: To determine the present status of urinary schistosomiasis in Khuzestan Province, southwestern Iran.

Methodology: Urine samples were collected from 3400 villagers residing in the high risk areas in Khuzestan Province, mainly from school children (80%) from 2005-2007. During a sequential visit by our team urine specimens were collected between 10:00am and 14:00pm. Each person was given a prenumbered bottle in the field, and the name of the person including age and sex was entered against the appropriate number on a form kept by the investigating team.

Results: In this province, the transmission of *Schistosoma haematobium* is being successfully interrupted as none of the samples were found positive.

Conclusion: Total elimination of urinary schistosomiasis appears to be possible if the health authorities in neighboring areas can be persuaded to adopt a similar strategy of integrated control. The plan for the future is to continue monitoring transmission, by passive surveys in local health centers and active case-finding among schoolchildren, and to continue snail sampling and focal molluscicide.

KEYWORDS: Urinary Schistosomiasis, Schistosoma haematobium, Prevalence.

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INTRODUCTION

Urinary schistosomiasis or bilharzia is a tropical parasitic disease caused by blood-dwelling fluke worm *Schistosoma haematobium.* The schistosomes live within the perivesical venous plexus. The females produce eggs which are excreted in the urine and on contact with water, the egg releases the miracidium. It searches for the intermediate host, freshwater snails and after penetrating and passing some developmental cycles starts leaving the snail as cercariae. Cercaria penetrates the skin of human, migrates in the blood via the lungs to the liver and transform into young worms which eventually reside in associated destination.[1]

According to WHO, 200 million people are infected worldwide, leading to the loss of 1.53 million disability-adjusted life years, although these figures need revision.[1] Infectious agents

have a major influence on bladder cancer risks in the areas of the world where *S. haematobium* infestation is endemic[2] but relatively less important causes of bladder cancer are the schistosomes (0.1%).[3]

Urinary schistosomiasis (there are no cases of intestinal schistosomiasis in Iran) was formerly endemic in Khuzestan Province, southwestern Iran reported as 11.3%.[4] In 1976 the rate of infection decreased to 0.7%.[5] Another survey in detail reported the incidence of infection as 0.653% in 1980, 0.021% in 1988 and 0.042% in 1989.[6] The study of Mombeini and Motlagh reported the number of positive cases of bilharziasis in 1981 as 331 while this rate shrunk to 16 in 1993.[7] During these years altogether 1212 cases were diagnosed. This report was completed later and stated that from 1981 to 1990 there were 1158 positive cases in Khuzestan Province, while from 1991 to 2000 only 98 cases were reported and from 2000 to 2001 no positive cases were detected.[8] According to WHO, Iran is amongst the countries which are nearing elimination of schistosomiasis.[9]

A demand to determine the last data on urinary schistosomiasis in Khuzestan Province, southwestern Iran, the only region susceptible to the disease, motivated the authors to conduct a comprehensive survey in the region to obtain the prevalence of the disease.

METHODOLOGY

Urine examinations were collected from 3400 villagers residing in the high risk areas in Khuzestan Province, southwestern Iran, mainly from school children (80%). The urine samples were concentrated by sedimentation and the eggs were easily detected and identified by microscopy due to their size (130-150 ul) and shape, and especially their terminal spine.[10] It is worth mentioning that all samples were taken between 10:00am and 14:00pm because it is recommended that sampling must be conducted after physical exercise.[1]

RESULTS

Examination of all collected urine samples showed that in the Khuzestan region none of the samples were found positive with urinary schistosomiasis.

DISCUSSION

Urinary schistosomiasis for a long time has been established in Khuzestan Province and lots of studies witness this.[4,5] However the present study encompasses a result which brings enough promise to commence the end phase of elimination, some thing which is not far beyond reality based on the current data and documents. Achieving such a superlative point indebted some crucial factors, being of most concerns were health education at the forefront of measures; malacological monitoring, determination of incidence and prevalence of the disease annually, establishment of an organization specified to monitoring this disease solely and mass chemotherapy. In this arena, maintenance of this situation is more difficult than reaching it, so all global experiences must be taken into consideration.

Surveys on bilharziasis in Iran were established in 1949 and extended onwards.[4] Accordingly it was confirmed that urinary bilharziasis exists in the province of Khuzestan in southwest of Iran. The number of people infected was timidly estimated as 25,000 - 35,000. The peak prevalence rate was reported in children aged 11-15 year and eventually *Bulinus truncatus* was determined as the only intermediate host.[4] Reducing overall prevalence of infection from 8.3% in 1970 (1822 of 21878 urine samples) to 0.05% in 1986 (45 of 85053) cemented the data.[5] During a ten-year field survey conducted from 1980 to 1989; 1518 human cases infected with *S. haematobium* were detected in this province.[6] The incidence of infection was 0.653% in 1980, 0.021% in 1988 and 0.042% in 1989. The 20-29 year-old age group was the most infected and no sex difference was reported. In another inclusive study conducted there from 1981 to 2001 the rate of positive cases of schistosomiasis revealed a decreasing trend as follows: 1158 positive cases from 1981 to 1990; 98 cases from 1991 to 2000 and no positive cases from 2000 to 2001.[8] As it is obvious, the result of the present study is

along the lines of previous studies and shows an approaching step to eliminate the disease.

Some studies in other countries show preferably a similar consequence. Al Ghahtani and Amin have reported a very low prevalence of *S. haematobium* infection in the Jazan region of Saudi Arabia.[11] They believe that the success originated from a sustained control efforts including case finding, the treatment of infected individuals and the chemical and environmental control of freshwater snails. Even the authorities were encouraged in mid-2002, to commence a strategy to eliminate human infection with the parasite from Jazan which apparently encompassed successful results and no infected snails could be found. Prevalence of bilharzia reduced from over 50% in 1980 to below 10% in 2000 in Hippo Valley Sugar Estates.[12] In sub-Saharan Africa, 112 million people are infected with *S. haematobium*, with the most intense infections in children 5-15 years old. Significant reductions in the prevalence and intensity of *S. haematobium* infection one year after treatment were, however, observed.[13] In 1994, a programme was initiated by the Moroccan Ministry of Health to eliminate schistosomiasis from Morocco by the year 2004. In 1997, this objective had been achieved in three out of 20 affected provinces.[14] An interventional study was conducted in Khamir, north of Sana'a Yemen, for control of urinary schistosomiasis using chemotherapy and health education. Prevalence of *S. haematobium* infection 14 months post-intervention fell from 58.9% to 5.8% and frequency of heavy infection from 40.0% to 18.9%. Health education sessions resulted in significant decrease in the frequency of contact with water sources and greater adherence to preventive measures.[15] The prevalence of urinary schistosomiasis in Tanzania was reduced by 71.4%.[16] All these studies show that a global inclination is under way to control the bilharzia as much as possible and our study has proved this.

As opposed to aforementioned studies some reports pronounce that urinary schistosomiasis is still a public health problem and the global authorities must tackle it. In Egypt, the prevalence of *S. haematobium* has reported from 0% to 27.1% and averaged 13.7% in different parts in 1992.[17] Another report form the Agneby region (south-east Cote-d'Ivoire) from 2000 to 2001 shows 12.6% carriers of *S. haematobium* eggs.[18] Epidemiological studies on urinary schistosomiasis in Nigeria from 2005 to 2006 showed a prevalence 0.6%,[19] in Ghana it ranged between 54.8 and 60.0%,[20] in four governorates in Upper Egypt ranged from 4.8% to 13.7% and averaged 7.8%,[21] in Zimbabwe 59.7%,[22] in Cameroon 53.6% [23] and in Tanzania 47.6%.[24]

Agricultural issues could be considered as the most important factor in prohibiting society to control and eliminate bilharzia. The relation between agricultural land development and health population has been studied using urinary schistosomiasis as an indicator, in which schistosomiasis risk was higher in the areas where rice cultivation was more developed.[25] The importance of the increase in irrigated land has been shown in Senegal as well.[26] Khuzestan Province encompasses the longest river in Iran, called Karoon River. Large sugarcane fields and subsidiary industries are on hand merely in this province. These factors besides expansion of irrigating system in some parts of the province, demands a monitoring system to maintain the present negative prevalence situation of urinary schistosomiasis.

Although this study shows that at this point in time no positive cases of urinary schistosomiasis are detected but some factors must be considered as potential sources which might result in reemergence of the disease in the region:

* Persistence of biological life cycle of *Bulinus truncates* as the intermediate host in some parts of Khuzestan province;
* Vicinity with Iraq where urinary schistosomiasis is prevalent in some eastern and southeastern parts;
* Persistent traffic between two countries;
* Increasing exploitation of surface waters in this province;
* Superfluity and diversity of immigrant birds in the region.

Succinctly, a work plan, which seems to be the most pragmatic and workable approach embraces the following proposals:

* Creating a heath folder for all passengers to Iraq and following up their heath situation after coming back.
* Heath education via pamphlet and the same for all passengers to introduce them the way of transfer and manifestation of the disease.
* Preparing a map of all surface waters in the province and all borderlines with Iraq followed by persistent monitoring to control the population of the intermediate host.
* Sensitize all rural sanitary and school health centres to the potential hazards of the disease where the chances of disease incidence is present.
* Malacological study in the region to gather all data related to snail faunae and epidemiological records.
* Following all cases of micro and macro hematuria to reach a decisive result;
* Continues education of all technicians engaging in the issue.
* Establishment of system of GIS in monitoring the malacological surveys.

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REFERENCES

1. Gryseels B, Polman K, Clerinx J, Kestens L. Human schistosomiasis. Lancet 2006;368(9541):1106-18.
2. Jankovic S, Radosavljevic V. Risk factors for bladder cancer. Tumori 2007;93(1):4-12.
3. Parkin DM. The global health burden of infection-associated cancers in the year 2002. Int J Cancer 2006;118(12):3030-44.
4. Arfaa F, Bijan H, Farahmandian I. Present status of urinary Bilharziasis in Iran. Trans R Soc Trop Med Hyg 1967;61(3):358-67.
5. Massoud J, Arfaa F, Farahmandian I, Ardalan A, Mansoorian A. Progress in the national schistosomiasis control programme of Iran. Bull World Health Organ 1982;60(4):577-82.
6. Kejbafzadeh AM, Hoghooghi-Rad N, Shenyari I, Nemat R. Progress in urinary schistosomiasis control measures in Iran. J Trop Med Hyg 1995;98(2):131-5.
7. Mombeini H, Motlagh M. Survey of the rate of success in control of bilharziasis. Iranian J Urology 1994;1(3):39-43.
8. Mombeni H, Kheradmand A. Schistosoma haematobium control in Khoozestan province in Iran: Prosperities and failures. Med J Islamic Repub Iran 2005;19(1):19-22.
9. WHO. Report of the Informal Consultation on Schistosomiasis in Low Transmission Areas: Control Strategies and Criteria for Elimination, London, 10-13 April 2000. Geneva; 2001.
10. Feldmeier H, Poggensee G. Diagnostic techniques in schistosomiasis control: a review. Acta Trop 1993;52:205-20.
11. Al Ghahtani AG, Amin MA. Progress achieved in the elimination of schistosomiasis from the Jazan region of Saudi Arabia. Ann Trop Med Parasitol 2005;99(5):483-90.
12. Chimbari MJ, Ndlela B. Successful control of schistosomiasis in large sugar irrigation estates of Zimbabwe. Cent Afr J Med 2001;47(7):169-72.
13. Koukounari A, Gabrielli AF, Toure S, Bosque-Oliva E, Zhang Y, Sellin B, et al. Schistosoma haematobium infection and morbidity before and after large-scale administration of praziquantel in Burkina Faso. J Infect Dis 2007;196(5):659-69.
14. Laamrani H, Mahjour J, Madsen H, Khallaayoune K, Gryseels B. Schistosoma haematobium in Morocco: moving from control to elimination. Parasitol Today 2000;16(6):257-60.
15. Nagi MA. Evaluation of a programme for control of schistosoma haematobium infection in Yemen. East Mediterr Health J 2005;11(5-6):977-87.
16. Magnussen P, Ndawi B, Sheshe AK, Byskov J, Mbwana K, Christensen NO. The impact of a school health programme on the prevalence and morbidity of urinary schistosomiasis in Mwera Division, Pangani District, Tanzania. Trans R Soc Trop Med Hyg 2001;95(1):58-64.
17. Abdel-Wahab MF, Esmat G, Ramzy I, Narooz S, Medhat E, Ibrahim M, et al. The epidemiology of schistosomiasis in Egypt: Fayoum Governorate. Am J Trop Med Hyg 2000;62(2 Suppl):55-64.
18. Adoubryn KD, Ouhon J, Yapo CG, Assoumou EY, Ago KM, Assoumou A. [Epidemiological profile of the schistosomiasis in school children in the Agneby Region (south-east of Cote-d'Ivoire)]. Bull Soc Pathol Exot 2006;99(1):28-31.
19. Agbolade OM, Agu NC, Adesanya OO, Odejayi AO, Adigun AA, Adesanlu EB, et al. Intestinal helminthiases and schistosomiasis among school children in an urban center and some rural communities in southwest Nigeria. Korean J Parasitol 2007;45(3):233-8.
20. Aryeetey ME, Wagatsuma Y, Yeboah G, Asante M, Mensah G, Nkrumah FK, et al. Urinary schistosomiasis in southern Ghana: 1. Prevalence and morbidity assessment in three (defined) rural areas drained by the Densu river. Parasitol Int 2000;49(2):155-63.
21. El-Khoby T, Galal N, Fenwick A, Barakat R, El-Hawey A, Nooman Z, et al. The epidemiology of schistosomiasis in Egypt: summary findings in nine governorates. Am J Trop Med Hyg 2000;62(2 Suppl):88-99.
22. Brouwer KC, Ndhlovu PD, Wagatsuma Y, Munatsi A, Shiff CJ. Epidemiological assessment of *Schistosoma haematobium*-induced kidney and bladder pathology in rural Zimbabwe. Acta Trop 2003;85(3):339-47.
23. Ndamukong KJ, Ayuk MA, Dinga JS, Akenji TN, Ndiforchu VA, Titanji VP. Prevalence and intensity of urinary schistosomiasis in primary school children of the Kotto Barombi Health Area, Cameroon. East Afr Med J 2001;78(6):287-9.
24. Ndyomugyenyi R, Minjas JN. Urinary schistosomiasis in schoolchildren in Dar-es-Salaam, Tanzania, and the factors influencing its transmission. Ann Trop Med Parasitol 2001;95(7):697-706.
25. Fournet F, N'Guessan NA, Cadot E. [Land-use and urinary schistosomiasis in Daloa (Cote d'Ivoire)]. Bull Soc Pathol Exot 2004;97(1):33-6.
26. de Clercq D, Vercruysse J, Sene M, Seck I, Sall CS, Ly A, et al. The effects of irrigated agriculture on the transmission of urinary schistosomiasis in the Middle and Upper Valleys of the Senegal River basin. Ann Trop Med Parasitol 2000;94(6):581-90.