Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 2, Issue 3, pp: (91-97), Month: September-December 2015, Available at: www.noveltyjournals.com

Association between Urinary Schistosomiasis and Prostate Cancer in Al-Shajara Area Khartoum, Sudan

[1]Tayseer Elamin Mohamed Elfaki, [2]Mohamed Hassan Ahmed Kebayer, [3]Mohieldin Elsayid

[1]Department of Parasitology and Medical Entomology, College of Medical Laboratory Science, Sudan University of Science and Technology, Khartoum, Sudan
[2]Department of Parasitology and Medical Entomology, School of Medical Laboratory Science, Sharg Elnil College, Khartoum, Sudan
[3]Department of Clinical Laboratory Sciences, College of Applied Medical Sciences, King Saud Bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia

Abstract: **This study was conducted to determine the association between urinary schistosomiasis and prostate cancer in Al-Shajra area in Khartoum State-Sudan. Cross-sectional study was carried out during the period December 2012 to April 2013. One hundred and forty one subjects were included in this study (age between 15-55 years old) all of them were males. One hundred and forty one urine samples and 141 blood samples were taken from subjects. Parasitological data were obtained and recorded. The urine samples were examined to detect the eggs of *Schistosoma haematobium* by using wet preparation technique. Out of 141, 50 (35%) were found positive and 91(65%) were found negative. Sedimentation technique was used to determine the intensity of infection. Out of 50, 11 (22%) were presented as light infection and 39 (78%) were presented as heavy infection. The prostate cancer was identified by detection of prostate specific antigen (PSA) in blood samples of (50) positive subjects by using Immunochromatography test device. When the results were analyzed, the study showed that no association between urinary schistosomiasis and prostate cancer.**

Keywords: **Immunochromatography test, Prostate cancer, Prostate specific antigen, *S. haematobium*, Sedimentation technique.**

1. INTRODUCTION

Schistosomiasis is caused by a worm of the trematode family. All of these flukes (flat worms) require a fresh water snail as an intermediate host and do not replicate in their definitive human host. The prevalence of infection and its clinical consequence depend on interactions between the distribution of the intermediate hosts, and the social and cultural behaviour of humans [1]. Urinary schistosomiasis is caused by *S.haematobium* which initiated toxic and allergic symptoms are marked, but the bladder and ureter are typically involved with hyperaemia, terminal haematuria, dysuria and frequency of micturition, papules, papillomata and ulceration [2]. Obstruction of ureteral openings or of the neck of the bladder may lead to back pressure and a predisposition to ascending bacterial infection. The subsequent involvement of ureters and kidneys is similar to that seen in urinary tract obstruction from any source [3]. The uterine cervix is the most common site of *S.haematobium* infectin in women, and granulomatous inflammation of the cervix is a common manifestation [4]. In males, heavy infections may involve the urethra, prostate, seminal vesicles, and even the spermatic cord and penis [3]. Diagnosis is aided by a history of exposure, but depends on the finding of eggs or a positive serological result [1]. Eggs of *S.haematobium* are often excreted in the urine, maximal excretion occurs around midday, so a midday sample is ideal for egg detection. Urine filtration and centrifugation increase the yield. Biopsy of affected

tissues can also demonstrate eggs. Eggs may also be seen when bladder biopsy is performed in suspicious cases, and in liver and skin biopsy samples [1]. Serological tests are based on the detection of circulating antibodies using egg antigens in an enzyme-linked immuno sorbent assay (ELISA). These tests are sensitive, but remain positive for long time after infection. They are not useful for diagnosis of active infection in endemic areas, where many individuals have been infected in the past, but are useful for detecting infection in returning travelers. Newer serological tests to detect adult worms may distinguish active from past infection, but are still under development [1]. Many infected returning traveler have peripheral blood eosinophilia (non specific marker) and some have dipstick-positive haematuria. Plain abdominal radiographs showing'egg-shell'calcification of the bladder are highly suggestive of schistosomiasis [1]. Prostate cancer is a form of cancer that develops in the prostate, a gland in the male reproductive system. Most prostate cancers are slow growing; however, there are cases of aggressive prostate cancers [5]. Early prostate cancer usually has no clear symptoms. Sometimes, however, prostate cancer does cause symptoms, often similar to those of diseases such as benign prostatic hyperplasia. These include frequent urination, nocturia (increased urination at night), difficulty starting and maintaining a steady stream of urine, hematuria (blood in the urine), and dysuria (painful urination). A study based on the 1998 Patient Care Evaluation in the US found that about a third of patients diagnosed with prostate cancer had one or more such symptoms, while two thirds had no symptoms [6]. Prostate cancer is associated with urinary dysfunction as the prostate gland surrounds the prostatic urethra. Changes within the gland, therefore, directly affect urinary function. Because the vas deferens deposits seminal fluid into the prostatic urethra, and secretions from the prostate gland itself are included in semen content, prostate cancer may also cause problems with sexual function and performance, such as difficulty achieving erection or painful ejaculation [6]. Prostate cancer is diagnosed by biopsy. Medical imaging may then be done to determine if the cancer has spread to other parts of the body. Prostate cancer screening is controversial. Prostate-specific antigen (PSA) testing increases cancer detection but does not decrease mortality [7]. The United States Preventive Services Task Force recommends against screening using the PSA testing, due to the risk of over-diagnosis and over-treatment as most cancer diagnosed would remain asymptomatic. The USPSTF concludes that the potential benefits of testing do not outweigh the expected harms [7]. While 5α-reductase inhibitors appear to decrease low grade cancer risk they do not affect high grade cancer risk and thus are not recommended for prevention. Supplementation with vitamins or minerals does not appear to affect the risk [8]. The main objectives of this study were to determine an association between urinary schistosomiasis and prostate cancer in Al-Shajara area, to detect the prevalence of *S.haematobium* in study area, to detect the intensity of infection by using sedimentation techniques, to detect PSA by using immunochromatography test (ICT), to determine relationship between intensity of infection and haematuria, to determine relationship between intensity of infection and age groups and to determine relationship between intensity of infection, treatment and complete dose of treatment.

2. MATERIALS AND METHODS

Study design:

This was cross-sectional study conducted to determine an association between urinary schistosomiasis and prostate cancer among patients who attended Al-Shajara Health Centre.

Study area:

This study was carried out in Al-Shajara area, Khartoum State, Sudan, during the period from December 2012 to April 2013.

Study subjects:

The studied populations included in this study were males with different residential area (Al-Lamab, Bahar Abiad, Alray Almasry, Eleshlag and Alhamadab) who were come to Al-Shajara to work and swim those participants with different education levels and age ranging from 15 to 55 years with the mean age was 25 year. Random samples were collected from them after their agreed to participate in this study. The age of study subjects included in the present study was divided into 4 groups 15-24, 25-34, 35-44 and 45-55 year.

Sampling:

A total of 141 questionnaires were administered. A total of 141 urine samples and blood samples were collected, from those filled the questionnaire.

Design of questionnaire:

The design of questionnaire include gender, age, observation of blood in the urine, visit to water bodies (risk factor), history to previous infection and previous treatment, presence of latrines in the houses, source of drinking water and a simple knowledge on the sign and symptoms of the diseases and also employs the activities that put an individual at the risk of infection.

Methods:

1- Urine examination:

After well mixing, 10ml of urine were transferred into conical tube and centrifuged at medium speed of approximately 5000 RPM for 3 minutes. Supernatant was discharged and the sediment was mixed and then transferred to slide and covered with cover glass, the preparation was examined microscopically using 10x objective lenses for search end 40x for identification, examined all the sediment and the number of egg were counted per 10 ml of urine.

2- Blood examination for PSA:

Blood samples were collected in plain container by standard procedure, by using 5 ml sterile syringe after disinfected area of collection by 70% alcohol, samples were separated within 2 hours in centrifuge at 3000rpm for 5 minutes and transferred serum in Eppendorf tubes and refrigerated at -20°C. Then procedure was done by using ICT for PSA, test devices were removed from the foil pouch, then were placed on flat dry surface, 100µl (3 drops) of serum were added to the sample well, the test result was read within 5-10 minutes.

Statistical analysis:

Data were analyzed using Statistical Package for Social Sciences (SPSS) under windows, version 15.0. Frequencies, mean, Chi square test statistical analysis were performed and the *p* values of less than 0.05 were considered statistically significant. Data were presented in tables using Excel after analysis using SPSS.

Ethical clearance:

Ethical clearance for this study was obtained from College of Medical Laboratory Science- Sudan University of Science and Technology and an informed consent was obtained from all subjects included in this study.

3. RESULTS

The study was conducted on 141 subjects from Al-Shajara area with an age ranging between 15-55 years old and the mean age of 25 years, all of them were males. The surveyed populations were categorized into four age groups: (15-24), (25-34), (35-44) and (45-55) year. The frequency of each age group was 27 (36%), 32 (42.7%), 7 (9.3%), 3 (4%), 5 (6.7%) and 1 (1.3%) of the total population respectively. For detection of *S.haematobium* eggs 141 urine samples were collected, within these samples, 50 (35.46%) were found positive by wet preparation technique while 91(64.54%) were negative (table 1). The intensity of infection was obtained by counting the number of *S.haematobium* eggs per 10ml of urine by using sedimentation technique (table 2). ≤ 50 eggs per 10ml of urine presented as light infection and > 50 eggs per 10ml of urine as heavy infection (table 3). Out of 141studied population, 46 (32.6%) had blood in their urine, among them, 42 (29.97%) were positive and 4 (2.84%) were negative and among 95 (61.4%) had no blood in their urine 8 (5.67%) were found to be positive and 87 (61.7%) were negative (table 4). Chi-squire test was used to determine the relationship between intensity and haematuria (p=0.000) (table 5) and to determine the relationship between intensity of infection and age groups of patients (p=0.337) (table 6). Out of 50 positive cases, 32 (64%) with low level of education, 16 (32%) with medium education level and 2 (4%) with high education level (table 7). Out of 50 positive cases, 31 (62%) had previous infection while 19 (38%) were infected for first time previous infection (table 8). Chi-squire test was used to determine the relationship between intensity of infection and treatment (p=0.000) (table 9) and to determine the relationship between intensity of infection and complete dose of treatment (p=0.000) (table 10). Out of 50 positive cases, 39 (78%) had knowledge about disease while 11(22%) had no knowledge about disease (table 11). From the 50 positive cases for *S.haematobium*, 50 serum samples were examined for prostate cancer by using ICT device for PSA and the result was showed 50 (100%) of samples were negative to PSA and there is no positive result in these samples (table 12).

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 2, Issue 3, pp: (91-97), Month: September-December 2015, Available at: www.noveltyjournals.com

Table 1: Overall prevalence of *S.haematobium* in study area

S.haematobium	Frequency	Percentage (%)
Positive	50	35.46%
Negative	91	64.54%
Total	141	100%

Table 2: Results of sedimentation technique

Range of eggs	Frequency	Percentage (%)
1-100	19	38%
101-200	21	42%
201-300	6	12%
301-400	2	4%
401-500	1	2%
501-600	0	0%
601-700	1	2%
Total	50	100%

Table 3: Intensity of infection

Intensity of infection	Frequency	Percentage (%)
Light	11	22%
Heavy	39	78%
Total	50	100%

Table 4: Prevalence of *S.haematobium* among studied population with blood in their urine

Result	Haematuria				Total
	Absent		Present		
	Number	Percent (%)	Number	Percent (%)	
Positive	8	5.67%	42	29.97%	50
Negative	87	61.7%	4	2.84%	91
Total	95	67.4%	46	32.6%	141

Table 5: Relationship between intensity of infection and haematuria

Haematuria	Intensity of infection		Total
	Heavy	Light	
Present	37	5	42
Percent (%)	74.0%	10.0%	84.0%
Absent	2	6	8
Percent (%)	4.0%	12.0%	16.0%
Total	39	11	50
Percent (%) of total	78.0%	22.0%	100.0%

Table 6: Relationship between intensity of infection and age groups

Intensity	Age groups				Total	p value
	15-24	25-34	35-44	45-55		
Light infection	10	1	0	0	11	0.337
Percent (%)	20.0%	2.0%	.0%	.0%	22.0%	
Heavy infection	25	6	6	2	39	
Percent (%)	50.0%	12.0%	12.0%	4.0%	78.0%	
Total	35	7	6	2	50	
Percent of total	70.0%	14.0%	12.0%	4.0%	100.0%	

Table 7: Overall prevalence of *S.haematobium* according to level of education

Schistosomiasis	Education level			Total
	Low	medium	high	
Positive	32	16	2	50

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 2, Issue 3, pp: (91-97), Month: September-December 2015, Available at: www.noveltyjournals.com

Percent (%)	64.0%	32.0%	4.0%	100.0%

Table 8: Overall prevalence of *S.haematobium* according to history of previous infection

Previous infection	Frequency	Percentage (%)
Yes	31	62
No	19	38
Total	50	100

Table 9: Relationship between intensity of infection and treatment

Treatment	Intensity		Total
	Light	Heavy	
Yes	8	3	11
Percentage (%)	16.0%	6.0%	22.0%
No	3	36	39
Percentage (%)	6.0%	72.0%	78.0%
Total	11	39	50
Percentage (%)	22.0%	78.0%	100.0%

Table 10: Relationship between intensity and complete dose of treatment

Complete dose	Intensity		Total
	Light	Heavy	
Yes	5	0	5
Percentage (%)	10.0%	.0%	10.0%
No	6	39	45
Percentage (%)	12.0%	78.0%	90.0%
Total	11	39	50
Percentage (%)	22.0%	78.0%	100.0%

Table 11: Overall prevalence of *S.haematobium* according to knowledge about schistosomiasis

Knowledge	Frequency	Percentage (%)
Yes	39	78%
No	11	22%
Total	50	100%

Table 12: Frequency of prostate cancer

Prostate cancer	Frequency	Percentage (%)
Negative	50	100%
Positive	0	0%
Total	50	100%

4. DISCUSSION

Schistosomiasis is one of the water-associated diseases. It is far more prevalent in irrigation agricultural schemes than other places. The endemic areas always characterized by man-made reservoirs and irrigation system that have contributed to the spread of the infection. Schistosomiasis has long been associated with certain types of neoplasia. The association of *S. haematobium* with bladder cancer in patients from regions in which the disease is endemic (part of Africa, particularly along the River Nile, and in the Middle East) is a frequent and well-known fact [9]. *S.haematobium* lives in the perivesical venous plexus and in the veins of the bladder. It deposits its eggs in the bladder wall, provoking untreatable chronic cystitis associated with hyperplasia of the bladder mucosa and squamous metaplasia [10]. Less frequently, it is found in the uterus, vaginal wall, prostate and other organs [11]. High levels of beta-glucuronidase have been found in patients with schistosomiasis, this enzyme being known to produce carcinogenic agents [12]. One important aspect observed in several studies concerns the age of the patients in whom schistosomiasis in which the prostate was affected, age varied between 14 and 40 years. Further studies carried out in areas that are endemic for *S. mansoni*, such as South America, may provide further information with respect to this parasite and may confirm a possible association between schistosomiasis and prostate cancer, since the habitat of this parasite is known to be close to the prostate [13]. Despite the

relative frequency of infestation of the prostate in endemic areas, the association of schistosomiasis and prostate cancer has rarely been reported. This study was conducted in Al-Shajara area, Khartoum State, Sudan to determine the association between urinary schistosomasis and prostate cancer. For this purpose, 141 urine samples were collected to detect the eggs of *S.haematobium* sedimentation technique. From the same patients blood samples were collected to detect PSA of prostate cancer in their serum. The infection of *S.haematobium* was highly concentrated in age group 12-24 years. This was partially explained by the increase of water contact with this age group. Although, Al-Shajara area is considered as an endemic area of *S.haematobium* infection due to the presence of many irrigation canals heavily infested with snails of *S.haematobium*, so that, the intensity of *S.haematobium* infection was presented as light in 11 (22%) samples and heavy infection in 39 (78%) sample. When using ICT for PSA of prostate cancer, 50 serum samples were examined; there is no positive result in these samples. In this study the Chi-squire test was used. The *p* value is 0.05 and less than 0.05 is significant and more than 0.05 is insignificant. So, all *p* value gets from results compare with (0.05). There is no relationship between intensity of *S.haematobium* infection and age groups (p=0.337) that mean the intensity of infection not affected by age groups. There is no association between infection of *S.haematobium* and prostate cancer. These results were in disagreement with the previous study done by Cohen [14] which reported 3 cases of prostate cancer in South Africa and other study done by Albert [15] which reported 1 case in Brazil. Thirty nine (78%) have knowledge about infection with *S.haematobium* while 11 (22%) have no knowledge about infection although the majority of them with low level education this due to they are living in endemic area with *S.haematobium*. There is no association between urinary schistosomiasis and prostate cancer in the study area was reported in this study among patients affected with urinary schistosomiasis.

5. CONCLUSION

This study concluded that there is no association between urinary schistosomasis and prostate cancer in Al-Shajara area, Khartoum State, Sudan.

6. RECOMMENDATIONS

The results of the present study recommended:

1. PSA and other marker of prostate cancer should be administrated in the laboratory for urinary schistosomiasis patients especially in chronic cases.
2. Further studies should be done with other marker of prostate cancer.
3. For detection of the egg of *S.haematobium* in urine sample by using wet preparation more than one slide must be prepared and examined.
4. Further studies should be done by other more sensitive method.
5. Further studies should be done with other tests to exclude other causes of prostate cancer.

ACKNOWLEDGEMENT

I am grateful for inhabitants of Al-Lamab, Bahar Abiad, Alray Almasry, Eleshlag and Alhamadab in Al-Shajara area in Khartoum State, Sudan for permission to collect samples. Also, for the staff of Al-Shajara Health Centre.

REFERENCES

[1] C. P. Conlon,"Medical Education Resource Africa (*Mera*) with financial support from DFID", Issue 24, pp. 27-30, Jul. 2006.

[2] P. L. Chiodini, A. H. Moody and D. W. Manser, "Atlas of Medical Helminthology and Protozoology", 4th edition, pp. 29, 2001. Available at w.w.w.harcourt- international.com.

[3] D. T. John and W. A. Petri, "Medical Parasitology", 9th edition, United State of America, pp.191-194, 2006.

[4] G. Poggensee, "Diagnosis of genital cervical shcistosomiasis", Comparison of cytological, histopathological and parasitological examination, Am J Trop Med Hyg, vol. 65, pp. 233-236, 2001.

[5] S. Lister, "Urine test could speed treatment of prostate cancer", London: the Sunday times, retrieved 9 Agu. 2010.

[6] D.C. Miller, K. S. Hafez, A. Stewart, J. E. Montie and J. T. Wei, "Prostate carcinoma presentation, diagnosis, and staging: an update form the National Cancer Data Base", Cancer, vol. 98, No. 6, pp. 1169-78, Sep. 2003. doi:10.1002/cncr.11635.PMID 12973840.

[7] M. Djulbegovic, R. J. Beyth, M. M. Neuberger, T. L. Stoffs, J. Vieweg, B. Djulbegovic and P. Dahm, "Screening for prostate cancer: systematic review and meta-analysis of randomized controlled trials", BMJ, vol. 341, 2010. c4543.doi:10.1136/bmj. c4543. PMC 2939952. PMID 20843937.

[8] J. Stratton and M. Godwin, "The effect of supplemental vitamins and minerals on the development of prostate cancer: A systematic review and meta-analysis", Family practice, vol. 28, No. 3, pp. 243-52, 2011. doi:10.1093/fampra/cmq115.PMID 21273283.

[9] R. Alexis and J. Domingo, "Schistosomiasis and adenocarcinoma of prostate: a morphologic study", Hum Pathol, vol. 17, pp. 757-60, 1986.

[10] F. Von Lichtenberg , G. M. Edington and I. Nwabuebo, "Pathologic effects of schistosomiasis in Ibadan, Western State of Nigeria, Pathogenesis of lesions of the bladder and ureters", Am J Trop Med Hyg, vol. 20, pp. 244-54, 1971.

[11] C.A.Basílio-de-Oliveira, A. Aquino, E. F. Simon and W. A. Eyer-Silva, "Concomitant Prostatic Schistosomiasis and Adenocarcinoma: Case Report and Review", Braz J Infect Dis, vol. 6, pp. 45-9, 2002.

[12] M.S. Al Adnani, "Schistosomiasis, metaplasia and squamous cell carcinoma of the prostate: histogenesis of the squamous cancer cells determined by localization of specific markers", Neoplasma, vol. 32, pp. 613-22, 1985.

[13] M. Gelfand, C. M. D. Ross and D. M. Blair, "Schistosomiasis of the male pelvic organs. Severity of infection as determined by digestion of tissue and histologic methods in 300 cadavers", Am J Trop Med Hyg, vol. 19, pp. 779-84, 1970.

[14] R. J. Cohen, S. G. Edgar and K. Cooper, "schistosomiasis and prostate cancer", pathology, vol. 27, pp. 115-6, 1995.

[15] B. Albert, G. M. Larissa, and C. Eduardo, "Association between prostate cancer and schistosomiasis in young patients", Braz J Infect Dis, vol.11, No. 5, pp. 520-522, 2007.