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## EFFECT OF INTEGRATED SCHOOL PROGRAM IN CONTROL OF URINARY SCHISTOSOMIASIS AMONG BASIC SCHOOLS CHILDREN IN ELRAHAD TOWN, ELRAHAD LOCALITY, NORTH KORDOFAN STATE, SUDAN (2014 - 2017)

**<sup>1</sup>Dr. Ahmed Subahi Ahmed Kassar\***

<sup>1</sup>Department of Public and Environmental  
Health,  
Faculty of Medicine and Health Sciences,  
University of Kordofan,  
Sudan.

**<sup>2</sup>Dr. Mohammed Elmukhtar Saad  
Eldin**

<sup>2</sup> Community Medicine Department,  
Faculty of Medicine,  
University of Gezira.

**<sup>3</sup> Omar Hafiz HajAli**

<sup>3</sup> Faculty of Applied Medical Sciences  
University of Hail,  
Saudi Arabia

**<sup>4</sup>Dr. Kamal Elbssir Mohammed**

<sup>4</sup>Associate professor,  
Alzaiem Alazhari University,  
Sudan

### ABSTRACT

*Background: Schistosomiasis refers to human disease resulting from infection by any of the parasitic blood flukes of Schistosoma spp. An interventional study was conducted in Elrahad town, Elrahad locality, North Kordofan State, Sudan during the period from (May2014 - March 2017). Study aimed to assess impact of integrated school program on the prevalence of schistosomiasis among basic school children, to assess different factors related to schistosomiasis among basic school children, and to determine effect of integrated school program on knowledge attitude and practice (KAPs) of basic school children towards schistosomiasis control. Methodology: Urine samples were collected from 310 pupils (160 boys, 150 girls) before and after intervention to determine the prevalence of urinary schistosomiasis among basic schoolchildren. The main results are: The prevalence of S. haematobium infection had been reduced from 41.6% to 18.1%, this reduction was significant p- value= 0. 001. There was reduction in using "turda" for bathing among basic schoolchildren from 52.8% to30.5percentage, (p=0.001). The knowledge of schistosomiasis among basic schoolchildren was increasing from 68.7% to (100%) (p=0.001). Knowledge of basic schoolchildren for the practices that lead to schistosomiasis transmission was increased by 60.1% from 9% to 69.1%. A significant increase in knowledge about the possibility of Schistosomiasis prevention (P value=0.001) among basic schoolchildren from 44.8% to 95. 1%).There was a significant increase (P value =0.001) in knowledge among basic schoolchildren about the prevention methods and practices of schistosomiasis from 3.1% to 61.7% after the intervention. There was a reduction in the practice of visiting "turda" among the basic schoolchildren from (88.1%) to (45.1%) and their friends from 61.6% to23.1%, (P value=0.001). Conclusion: integrated school program is important to control schistosomiasis among basic schoolchildren.*

**KEYWORDS:** Haematobium, ,School Children; North Kordofan, Sudan.

## INTRODUCTION

Schistosomiasis refers to human disease resulting from infection by any of the parasitic blood flukes of *Schistosoma* spp. Worldwide, it is estimated that over 239 million people are acutely or chronically infected with one or more of these species (King et al., 2014). Humans are usually infected when they come into contact with contaminated fresh water such as collecting water, washing, bathing, playing, fishing, or cultivating crops. In general, children, women, fishermen, and farmers are the high risk groups in schistosomiasis, also other people can be infected in the irrigation channels or rivers (Young et al., 2015). Therefore, poverty leads to a greater risk of *Schistosoma* infection as a consequence of inadequate sanitation and limited household access to clean water (King et al., 2014). The disease is associated with renal and bladder infection (*Schistosoma haematobium*) in endemic area (Walker et al., 2011). The estimated annual deaths due to schistosomiasis infection, was in range of 155000 to 280000 almost all of these were reported in developing countries (Jamison et al., 2006). In Sudan schistosomiasis is the most prevalent parasitic disease, with 24 million people at risk, 5 million case of infection and a prevalence rate 20% (WHO, 2009). Health education is an important measure in the control of Schistosomiasis, especially when considering the characteristics of the disease during childhood, such as high prevalence, high percentage of treatment resistance, and high rates of eggs elimination, and high level of re-infection. All these facts indicated that children play a role in the maintenance and transmission of Schistosomiasis (Abd Elbasit, 2009). Sudan is one of the endemically infected sub-Saharan countries in which both the Urogenital and intestinal forms of schistosomiasis are prevalent in populations along the Nile River (WHO, 2009). *S. haematobium* infection is dominant and the prevalence range from 1.7% to 56.0% in different localities, whereas the prevalence for *S. mansoni* is very low (Ahmed et al., 1996). However, there have been no further integrated programs to control schistosomiasis in Sudan thereafter. In 2000, the Sudanese government established a national schistosomiasis control program to reduce the prevalence of *S. haematobium* to less than 10% by 2013 (Young et al., 2015).

## MATERIALS AND METHODS

### Study Area:

**Location and Climate:** Locality of Elrahad - North Kordofan State. The Location and Border for Locality of Elrahad lies between longitude 15, 30- 31, 15° E and between latitude 12, 15 – 13, 30 ° N. The estimated area of the locality is about 140.287 km<sup>2</sup>. Climate has a long rainy season, which lasts for six months (April- Sept.). The annual rainfall was 600 mm, the annual mean temperature 22.5 degree centigrade in winter and 34.5 degree centigrade in summer and the annual relative humidity 55 percent. The total of human population is 26.263. Most of the people work as farmers, fishers, in trade or in animal Breeding. The most activities are grazing, agriculture, trade and fishing (Elrahad locality record, 2015).

**Study design:** Community based an interventional study pre and post.

**Study Population:** The groups targeted by the study are basic schools children with a total number of 9016 pupils distributed in the schools (18school) both males and females of the Town in Schistosomiasis affected areas (Elrahad locality record, 2015).

### Inclusion criteria:

Basic schoolchildren in the age (8 to 16 years old), those lived in the study area from 3<sup>rd</sup> to 8<sup>th</sup> grade.

**Exclusion criteria:** Non-student, Children younger than (8 years old), and above than, (16 years old) 1<sup>st</sup> and 2<sup>th</sup> grade in schools of study, and other schools not included

### Sample size:

A total of 310 schoolchildren were selected as a study subject. The sample size calculated with Cochran's formula;  $n = z^2 \cdot pq / d^2$  (Singh and Masuku, 2014).

### Sampling technique:

The school children in the schistosomiasis affected area in the town are affected by turda Elrahad selected by using lottery method. The schools of boys and girls listed in two groups, group for boys school and the other for girls schools .schools will be selected using simple random sample ending up four schools tow schools from boys school list these are (Elshati boys and Musab ibn Omaid) ,and two girls schools these are (Elshati girls, and Alamal girls).

### Data collection:

A pre-coded questionnaire was carefully prepared, tested and directed to the schoolchildren it covers pupil's age, sex, and the classroom. In addition also it tackles monthly income of the family, source of water supply and latrine in the

house there, and to obtain data regarding knowledge, attitude, and practices (KAPs) as regards Schistosomiasis in both pre and post intervention phases. Socioeconomic factor was included. From each subject (310 pupil), a 10 ml sample of terminal urine was collected in a labeled clean specimen container. The samples were collected between 10h: 00 and 14h: 00, after exercise to ensure maximum excretion of eggs (Deribe et al., 2011). The collected samples were tested for haematuria, using a reagent strip within approximately 10 minutes (WHO, 2010)

#### Data processing & analysis:

Data were analyzed using Statistical Package for Social Sciences (SPSS) version (11.5).

#### Ethical consideration:

- Approval from the appropriate management authority obtained.
- The purpose and procedures of the study were also explained to the key informants prior to the interviews and were informed that their involvement was voluntary. Informed verbal consent was obtained from each key informant prior to the interview, and free treatment for infection cases.

## RESULTS AND DISCUSSION

This study refiled that after eight months post-intervention (health education and mass treatment), the rate of *S. haematobium* infection had been reduced from 41.6% to 18.1%, this reduction was significant  $p$ - value= 0.001(table 1), therefore, wide-scale and sustainable chemotherapy is essential to successfully control schistosomiasis, Mass chemotherapy plus health education were feasible and effective methods for reducing *S. haematobium* infection, which was similar to previous reports, Mass chemotherapy with praziquantel has been employed by many national control programs for schistosomiasis, Praziquantel treatment reduced the prevalence of *S. haematobium* infection, Young et al., 2015. However, the educational method employed succeeded in significantly decreasing the prevalence of schistosomiasis infection Abd Elbasit, 2009 .Mass chemotherapy plus health education were feasible and effective methods for reducing *S. haematobium* infection Godfrey et al., 2015. But Chizuko et al., 2005 mentioned that no clear correlation, however, was shown between the education effect and the infection rate of the subject groups.

**Table (1) the distribution of pupils according to result of investigation for schistosomiasis, Elrahad town.**

Examination	Pre		Post	
	No	%	No	%
Positive	129	41.6	56	18.1
Negative	181	58.4	254	81.9
Total	310	100	310	100

Before intervention, there was 52.8% of pupils use "turda" for bathing. This was reduced to 30.5% after the intervention, which is a highly significant result ( $p=0.001$ ) (table 2). A habit for bathing in "turda" put pupils at a higher risk to be infected with *S. Haematobium*, and this reduction

in practicing bathing in "turda" protected them from risk of infection. This situation was similar to that stated by Ligabaw et al., 2014, there was significant association between having a current schistosomiasis infection and participating in swimming, bathing in the dam.

**Table (2) the reasons behind pupils' visiting "turda", Elrahad town.  
n=310**

Reason	Pre		Post	
	No	%	No	%
Swimming and bathing	122	39.3	53	17
Defecation and urination	23	7.4	10	3.2
Wading and washing	25	8.1	14	4.6
Playing and fishing	50	16.1	21	6.8
Plant irrigation	33	10.6	28	9
Animal drinking	20	6.5	13	4.5
Not applicable	37	12	171	54.9
Total	310	100	310	100

The overall knowledge of Schistosomiasis among the pupils was that the knowledge among the pupils increased from 68.7% to 100% (table 3). This situation reflected the efficiency of intervention. This increase in knowledge among the pupils was similar to the findings of an interventional study was conducted in East Nile Locality, Khartoum, Sudan by Mohamed, 2014,

there was increasing knowledge among pupils for schistosomiasis from 58% to 100%. Also Addisu et al., 2016), said that, most mothers were reasonably aware of the mode of transmission of ascariasis, while they had very limited knowledge of bilharzia.

**Table (3) Pupil's knowledge of schistosomiasis, Elrahad town.  
n = 310**

Knowledge	Pre		Post	
	No	%	No	%
Yes	213	68.7	310	100
No	97	31.3	0	0
Total	310	100	310	100

The majority of the pupils (69.1%) mentioned all the practices that lead to schistosomiasis transmission after intervention, there was (9%) before the intervention (table 4). There was an increase in the knowledge, as regards the practices of transmission which was found to be significant ( $P$  value =0.001). The result was similar to the findings of a study carried

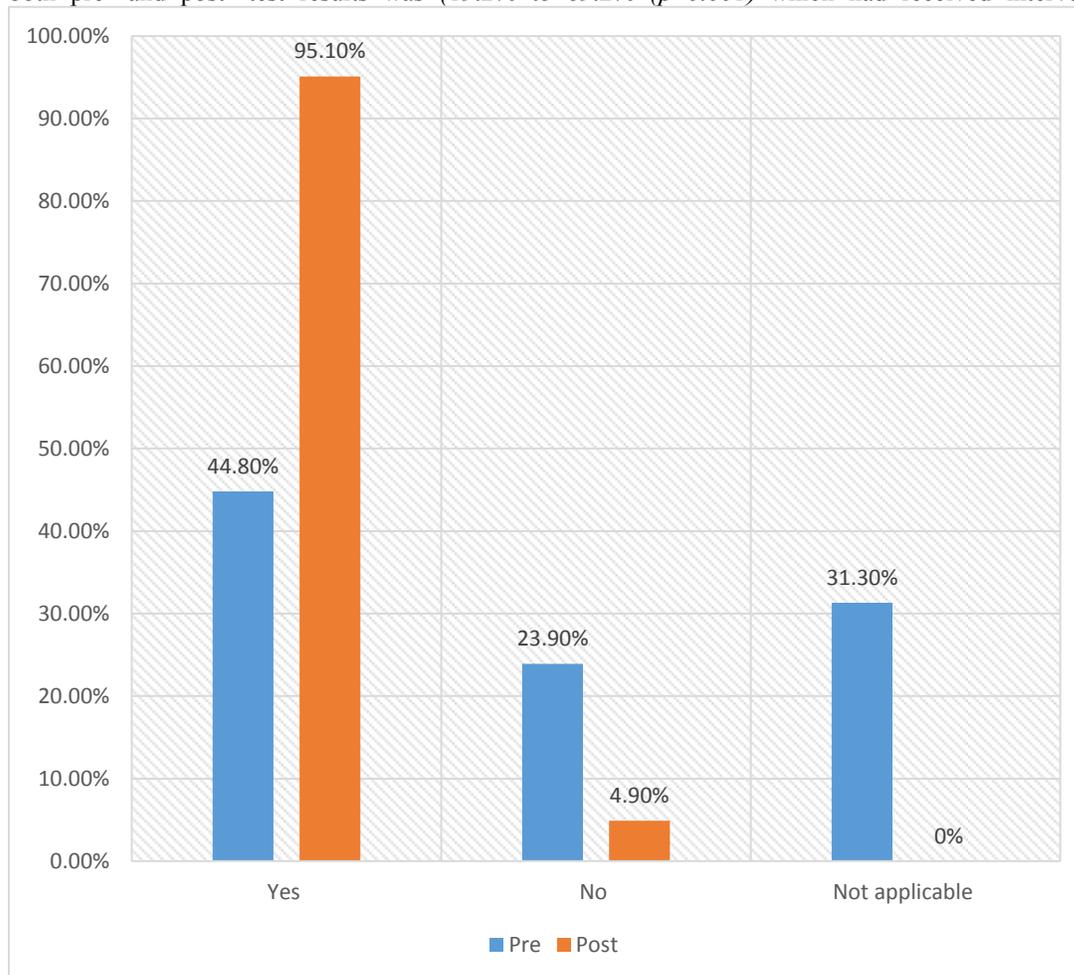
out by Gazzinelli et al., 2006 who mentioned that children in all three groups of the study showed a higher level of practice of transmission knowledge after the educational intervention. However the increase was statistically significant in group (1)  $p < 0.038$ , so students related transmission to such activities as swimming and bathing in streams.

**Table (4) the practices that lead to schistosomiasis transmission as mentioned by the pupils, Elrahad town.**

n=310

Ways	Pre		Post	
	No	%	No	%
Swimming and bathing in polluted water	15	4.9	20	6.5
Wading in polluted water	17	5.6	23	7.6
Drinking polluted water	10	3.1	13	4.1
Fishing	25	8	30	9.6
All mentioned	28	9	214	69.1
Not know	118	38.1	10	3.1
Not applicable	97	31.3	0	0
Total	310	100	310	100

A significant increase in knowledge about the possibility of Schistosomiasis prevention ( $P$  value=0.001) among the pupils from 44.8% to 95.1%(in fig1)) which meant intervention efficiency . The situation was similar to that found in a study carried out by Midzi et al., 2014 ;Mohamed, 2014, who said that the only group that showed a significant increase in knowledge related to prevention when comparing both pre- and post- test results was (19.2% to 69.2% ( $p=0.001$ )) which had received intervention .



**Figure (I) the knowledge among the pupils regarding the possibility of schistosomiasis prevention, Elrahad town. n=310**

There was a significant increase (P value <0.001) in knowledge among the schoolchildren in relation to the practices and methods of Schistosomiasis prevention( table 5). The schoolchildren who said all the mentioned options for prevention were only a small group (3.1%) before the intervention; they reached (61.7%)

after the intervention. This indicated the role of school health education. The result comply with the findings in a study carried out by Midzi et al., (2014), awareness and appropriate behaviour were strengthened in all the three study groups along with a significant increase in the level of knowledge on how to avoid Schistosomiasis.

**Table (5) the prevention (methods and practices) of schistosomiasis as mentioned by the pupils, Elrahad town.**

n=310

prevention	Pre		Post	
	No	%	No	%
Avoiding bathing and swimming in "turda"	28	9.2	22	7.2
Avoiding urination and defecation in "turda"	24	7.7	11	3.5
Control snails	8	2.5	8	2.5
Treating patient	7	2.2	4	1.4
All mentioned	10	3.1	191	61.7
Not know	62	20.1	59	18.9
Not applicable	171	55.2	15	4.8
Total	310	100	310	100

There was a reduction in the practice of visiting "turda" from (88.1%) to (45.1%) of the pupils after the intervention and their friends from 61.6% to 23.1% after intervention, pupils' friends (61.7%) visited "turda" for bathing and swimming, where as a group of (23.1%) visited "turda" for the same reason before and after the intervention respectively. The practice of visiting "turda" daily was 59.3% to 9% after the intervention. There was a reduction in e.g. swimming and bathing (water-contact) reduced from 39.3% to 17% after the intervention and so on ,this was found to be

significant (P value =0.001). The pervious study was confirmed that, CDC,2012;Abou-zeid et al., 2013, Ligabaw et al., 2014 ;2014;Ismail et al., 2014, health education sessions resulted in a significant decrease in the frequency of water contact and greater adherence to prevention measures. But Simon and Donath, 2014, and jack et al, 2014, said that MDA campaigns had not significant impact on avoidance of contact with unsafe water bodies (p= 0.06).

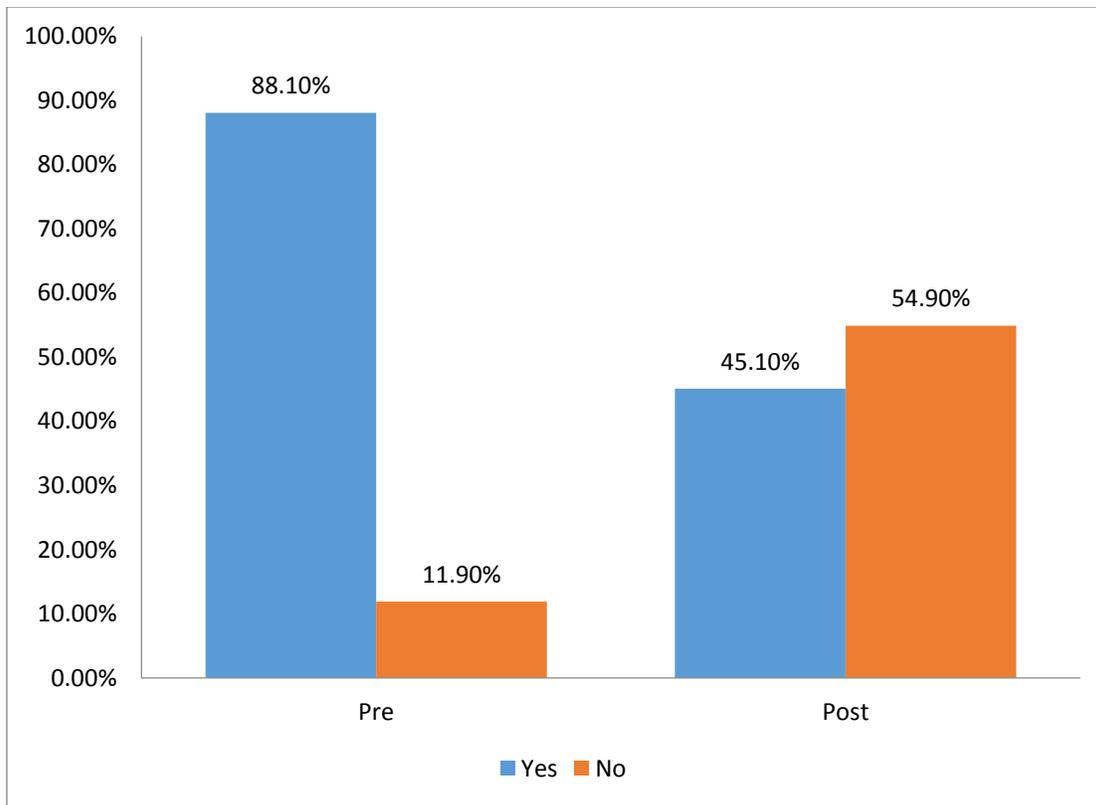


Figure (2) the practice of visiting "turda" by the pupils, Elrahad town. n=310

## CONCLUSION

Integrated school program is important to control schistosomiasis among basic schoolchildren. The prevalence of *S. haematobium* infection had been reduced from 41.6% to 18.1%, this reduction was significant p- value= 0.001.

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