ejpmr, 2017,4(3), 98-108.

SJIF Impact Factor 4.161

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

THE IMPACT OF HEALTH EDUCATION PROGRAMS ON KNOWLEDGE,ATTITUDES & PRACTICES OF BASIC SCHOOLS STUDENTS TOWARDS SCHISTOSOMIASIS IN, GULI AREA, KOSTI LOCALITY, WHITE NILE STATE, SUDAN.

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Article Received on 08/01/2017 **Article Revised on 28/01/2017** **Article Accepted on 19/02/2017**

ABSTRACT

This was a quasi-experimental study conducted at Guli area, Kosti locality, White Nile State. The main objective of the study was to determine the effect of health education programs in increasing the knowledge, attitudes and practices among Guli basic school students towards Schistosomiasis. The population targeted for this Study comprised of School children, male & female in the selected villages, all the pupils were interviewed (intact sampling). The total number of interviewed children was 4046 school child from the seven schools in Guli area, the examined school children ranged between 5-19 years. The collected data were analyzed by using the SPSS package (Statistical Package for Social Sciences), the data depicted in tables and figures (pies).It has been resulted that the student's knowledge about Schistosomiasis increased to 98.6% and their practicing of bathing in canals, river were decreased to 51.6% for males and 36% for females, also students' attitudes and perceptions were changed as a result of the health education program The study recommended that there was a great need to conduct further researches needed in other similar areas infected by schistosomiasis, KAP studies should precede any control program efforts towards Schistosomiasis, in addition to that health education programs were needed to develop awareness towards Schistosomiasis in study area for the whole community members not only the targeted group.

Key words; Schistomiasis, White Nile, Health Education

1.1 INTRODUCTION

Schistosomiasis is a parasitic disease of mammals, including man, caused by trematode worm of the genus schistosoma. It is considered the second major parasitic disease after malaria from the socioeconomic and public health points of view.[1]

The human disease is caused by six species these are: - *S.mansoni, S.heamatobium, S.japonicum, S.intercalatum, S.mekongi* and *S.malaysian*. Schistosomiasis acquired through contact with water infested with infected stage of the parasite.[2]

This disease is closely associated with agricultural and water resources development projects, it is endemic in 74 developing countries, WHO (1993). It is estimated that there are more than 200 million cases of Schistosomiasis and more than 600 million people who are constantly at risk of infection in the endemic countries. Schistosomiasis has a long history.[3] As early as 950 BC, Egyptian pharaohs wrote of urinary bladder disturbances. A schistoma ova found in a cirrhotic from a mummy dated around 1200 BC. A German pathologist named Theodor Bilharz found the causal parasite in 1851 at Kasr El-Eini Hospital in Cairo. In 1915, Lieper, an

In the Sudan, Schistosomiasis has been known since early times,. The diseases began to attract medical attention in Sudan when the construction of Sinnar Dam was finished. The annual report of Sudan Medical Services, published in1925 stated that the most urgent sanitary problem facing Sudan was the prevention of the Gazira canals from becoming infested with Bilharzia, Omer, A (1978).

In northern and southern Kordofan in the western part of Sudan a prevalence of S. haematobium infection among schoolchildren of 14% was reported by El-tom (1979) and more recently prevalence of S.haemtobium infection among schoolchildren was found to be 8.5% in Kadugli, 29.5% in Dalang, 35.8% in Rahad and 32.7% in Um Rwaba. Schistosomiasis has also demonstrated to be endemic in New Halfa and Kashm Elgirba in eastern Sudan, Daffalla & Suleiman (1988).[5]

Schistosomiasis, as with many communicable diseases, is a result of inequity and poverty, Web site No16 (2004). People infected because they do not have access to safe potable water, and maintain transmission because of the absence of proper excreta disposal system. Infection acquired during the course of routine domestic,

agricultural or occupational duties. It estimated that at least 200 million people currently infected with Schistosomiasis and other 600 million are at risk of infection from the six species affecting man.

Estimates suggest that 85% of all Schistosomiasis cases are now in sub-Saharan Africa, Chitslo, (2000). Mortality due to Schistosomiasis estimated at 11000 deaths per year and the burden of disease at 1.7million DALYs lost per year, WHO, (2001). Chronic morbidity is the major impact of Schistosomiasis on ill health. Schistosomiasis[6] provides an opportunity to study how people's behavior over time relates to their health. People infected with schistosomiasis by contact with contaminated water. People could be infected while swimming or doing personal or domestic cleaning. It is also prominent in the fishing industry cultivation of developing countries. Due to the lack of information and sanitation facilities, individuals contaminate their environment. Eggs released in urine and feces of an infected person, WHO, (1999). To survive, the parasite known as a miracidium must find a host snail to live with. There are only a few species of snails that can act as a host, restricting this disease to tropical and subtropical areas. When the parasite leaves the snail, it and thousands of new parasites (cerariae) enter the water. Here it can survive for forty-eight hours before finding a new human host or dying. Schistosomiasis parasites can penetrate the skin of someone in contaminated water, web site, No 16 (2005). Most of the eggs excreted within a few weeks, but some will stay and cause damage to[7] the body's vital organs. Some of the symptoms of schistosomiasis include fever, chills, cough, and muscle aches. WHO's (1993) report said that part of the reason for the increase of schistosomiasis was the construction of large-scale water projects. Dams and irrigation canals created the ideal environment for snails to thrive, Amin, (1982). The focus of the WHO's reports was Egypt and other parts of Africa. Egypt irrigated through surface water from the Nile River and its branches. The smaller water channels that run through rural lands allow for close contact and a high rate of infection. The people who live near these channels will use the water for all daily activities since clean water is insufficient. The channel's water moves slowly through, helping the growth of vegetation and creates snail traps. Therefore, there is also an increase in schistosomiasis, WHO (1993). The widespread health problems with schistosomiasis in Africa include infected people moving to areas that have no previous experience with the disease. Health units and pharmacies are usually lacking in these areas making it difficult to control.

In recent years the disease has increased in geographic distribution, prevalence as result of the expansion in water resource development projects and the increase in the population movement, Blue Nile Health Project, (1988) central, including White Nile State, is an area where most of the irrigation schemes in the country have been constructed. This are harbors two species, the intestinal form S.mansoni and the urinary form S, haematobium the prevalence of schistosomiasis is was thought to be very high in the irrigations schemes in the area, more than 50% among the school children, Federal SCP, report , (2003). Most of the infected population ranged between 6and 35 years old. These age groups include the children and the productive age groups in the country. The infection leads to a decrease in the productivity of these schemes and thus a reduction in the nation income.[8]

1.2 Rationale

Sudan is the largest country in Africa, with three rivers and its branches, the main activity is agricultural work, and the condition of safe water sanitation system was ranged between inadequate and polluted in many parts of Sudan, which causes spread of many diseases, related to water and unhealthy practices, Ahmed (1994). In the last three years, the Federal Ministry of Health (FMOH) in collaboration with Schistosomiasis Research Laboratory (SRL), University of Khartoum, has conducted many epidemiological surveys of schistosomiasis. Unfortunately, the finding recapitulated that the situation is bleak and desolate. The prevalence rates of intestinal schistosomiasis in sugar cane schemes are very high, 50% Asalaya and 80% Kenana (located in White Nile State, near Guli area). In March 2003 a survey for Schistosomiasis disease was conducted in Guli area with the following activities: Epidemiological survey, mass chemotherapy, snail control, and health education sessions for both[9] schoolchildren and community members. The most important results, identified by that project, was the high prevalence rate of Schistosomiasis and the type of schistosomiasis existing in the area, the prevalence rate is ranged from 38 – 59% among schoolchildren and the two types of Schistosomiasis were found, Final report of Schistosomiasis control project. Guli area, (2003). For the mentioned situation and because Schistosomiasis is a disease closely related to individuals behavior, the malbehavior and bad habits of people, e.g. swimming in canals and/or urination & defecation near fresh water was the main cause of transmission of the disease. Therefore, to avoid the transmission and the infections, pupils must be taught what specific behaviors are likely to result in schistosomiasis. In addition, other information were needed to encourage students to adopt healthy practices. Information about beliefs and attitudes that may influence behaviors and conditions associated with schistosomiasis can be obtained from pupils by KAP survey .It is hoped that the KAP (10) survey would reflect the behavior of the pupils towards the disease, Final report of Schistosomiasis control project. Guli area, (2003).

1.3 OBJECTIVES

General objective

To determine the role of health education program on increasing the knowledge, attitudes and practices among Guli basic school pupils before and after intervention.

Specific objectives

• Determine the role of health education on pupil's knowledge and perceptions about schistosomiasis.
• Promote pupil's attitude towards schistosomiasis.
• Determine pupil's practices that lead to the infection by schistosomiasis.

2. MATERIALS AND METHODS

2.1 Study area

Guli area is an area that consists of four villages - Guli, Fashashoia, Husai and Taweela- situated at Kosti locality -Guli Administration Unit, lies on the west side of the White Nile River, north to kosti town. In Guli, Fashashoia and Taweela there are two basic schools and two secondary schools (for girls and boys) in each village, in Husai just one basic school for both girls and boys. The distribution of health facilities at the mentioned villages was as follow: rural hospital in Fashashoia and health center in Guli and Taweela while there is absence of health services in Husai village.

There is public water net in Guli and Taweela and absence of this service in Husai and Fashashoia, they use the water from White Nile directly without sedimentation or filtration. Agricultural schemes located surrounded by these villages, they depend on it as main source of income, irrigation is based on water pumped from the White Nile River into main canals, from it, and the 52 water is distributed to the fields through a system of minor and smaller canals, the irrigation season lasts from August to April. The research carried out in seven basic Schools "two schools from Guli, Taweela and Fashashoia and one from Husai village".

2.2 Study population

According to the 1993 population census, the human population consisted of 12000 individuals in Guli area; most of them are farmers (35.6%), laborers (32.4%), free workers (19.4%) and the fishermen are only (4.8%) from the four villages. The population targeted for this Study comprised of Schoolchildren, male & female in the selected villages, all pupils interviewed. The schoolchildren selected because the children are most exposed for schistosomiasis infection and will give a good indication about the magnitude of the disease in the community. The total number of interviewed children was 4046 school childern from[7] schools before intervention of this study and 3765 childern found during distribution of the questionnaire of after intervention study.

2.3 Study design

This is a descriptive study consisted of three parts:
1- The first KAP survey (before intervention)
2- Health education program (intervention)
3- The second KAP survey (after intervention)

1- The first KAP survey (before intervention)

The data collected from the pre test of KAP survey were used as base line data, it was used to design health education program - sessions & activities - which were implemented in the seven schools, a comprehensive questionnaire consisted of questions to assess the schoolchildren knowledge, attitudes and practices towards schistosomiasis.54.

2- Health education program

A comprehensive health education program was carried out in the seven schools to influence health related behaviors and conditions by stimulating pupil's interest in and guiding their efforts to improve their own health and that of their families and communities. The designing of this program was done on base of pre test of KAP survey, the methods used to implement this program is about 20 lectures in each school, distribution of 300 posters and 1000 booklets in addition to 60 T-shirts, which were distributed as a gifts during conduction of competitions conducted to assess the understanding of awareness messages.

3- The second KAP survey (after intervention)

The questionnaire used at the end of the study to determine knowledge enhancement, attitudes improvement and the practice change of the schoolchildren.55.

2.4 The sampling method

To determine the knowledge, identify the attitude and practices of the schoolchildren in the seven schools. The study of child information separately done, so the sample method used is full converging, for all schoolchildren in the four villages (intact sampling).

2.5 Data analysis and statistics

The data were analyzed using the "Statistical Package for Social Sciences", SPSS version 10), and X^2 statistics was selected.

2.6 Data depiction

The data were depicted in tables and figures (pies).

3. RESULTS

3.1 The knowledge and perceptions of schoolchildren in Taweela, Husai, Fashashoia and Guli about schistosomiasis

As appears in table 1, the knowledge about schistosomiasis cause among examined schoolchildren were ranged between 74.6% and 98.6% before intervention and after intervention, respectively, among pupils who know Schistosomiasis cause. While, there are 25.4% did not know the cause before intervention, reduced to 1.4% after intervention.

Table 1: Knowledge of Schistosomiasis cause among Schoolchildren in Guli area.

Knowledge of The Disease Cause	Before Intervention		After Intervention	
	#	%	#	%
Yes	3017	74.6 %	3713	98.6 %
No	1029	25.4 %	53	1.4 %
Total	4046	100%	3766	100%

Table 2
Represent the knowledge about methods of transmission among pupils, 3, 26.2% before intervention did not know disease methods of transmission, after intervention only 1.4% were unknown. The method of bathing in river/canal found 40.4% and 6.3%, drinking method was 3.5% and 0.3%, bathing in river/ canal and drinking as method was 10.2% and 1.8%, while the method of bathing plus entering into river/canal water was 19.8 and 90.2 before and after intervention respectively.

Table 2: Knowledge of schoolchildren in Guli area about method of transmission of Schistosomiasis.

METHOD OF TRANSMISSION	BEFORE INTERVENTION		AFTER INTERVENTION	
	#	%	#	%
Didn't know	1029	26.2%	51	1.4%
bathing in river/canal	1645	40.4%	237	6.3%
Drinking	140	3.5%	11	0.3%
bathing in river /canal+drinking	420	10.2%	69	1.8%
bathing+entering	812	19.8%	3398	90.2%
Total	4046	100%	3766	100%

Table 5 and **table 6** represent the results about knowledge of Schistosomiasis prevention methods among pupils and in different age groups of schoolchildren. Before intervention, 55.7% of pupils know the disease prevention methods, increased to 94.7% after intervention, while 44.3% of them did not know the disease prevention methods before intervention and after intervention found only 5.3%.

P value showed significant value (.584) between schoolchildren sex and the knowledge about prevention methods of Schistosomiasis in pretest, in post test P value showed non- significant value (<.05). 89.3% of schoolchildren of age 5-9 do not know the prevention methods, only 18.2% of 10-14 age group don't know and 18.5% of 15-19 age group don't know the prevention methods in pretest, this percentage was decreased to 5.7%, 5.3%, 3.3% respectively in the posttest.

P value showed non-significant value (<.05) between different categories of schoolchildren and the knowledge about Schistosomiasis prevention methods in pretest, in posttest P value showed significant value (.533).

Table 5: Knowledge of Schistosomiasis prevention methods among schoolchildren in Guli area

KNOWLEDGE OF DISEASE PREVENTION	BEFORE INTERVENTION		AFTER INTERVENTION	
	#	%	#	%
Yes	2254	55.7%	3565	94.7%
No	1792	44.3%	201	5.3%
Total	4046	100%	3766	100%

- **In pretest N = 4046** • **In posttest N = 3766**
- **P value = .584** • **P value = .000**

Table 6: Knowledge of Schistosomiasis prevention methods among schoolchildren of age groups (5-9, 10-14 & 15-19) in Guli area.

AGE GROUPS	KNOWLEDGE OF DISEASE PREVENTION				TOTAL	
	Know		Don't know			
	#	%	#	%	#	%
Before Intervention						
5-9	158	10.7%	1324	89.3%	**1482**	**100%**
10-14	1915	81.8%	427	18.2%	**2342**	**100%**
15-19	181	81.5%	41	18.5%	**222**	**100%**
Total	**2254**	**55.7%**	**1792**	**44.3%**	**4046**	**100%**
After Intervention						
5-9	1281	94.3%	78	5.7%	**1359**	**100%**
10-14	2081	94.7%	116	5.3%	**2197**	**100%**
15-19	203	96.7%	7	3.3%	**210**	**100%**
Total	**3565**	**94.7%**	**201**	**5.3%**	**3766**	**100%**

- **In pretest N = 4046** • **In posttest N = 3766**

- **P value = .000**
- **P value = .347**

Table 7 represents the results about knowledge about the infection source of schistosomiasis among pupils of schoolchildren, before intervention, 35.9% of pupils know the infection source of schistosomiasis and 64.1% do not know it, this percentage changed to 99.5% after intervention.

P value showed significant value (.592) between schoolchildren sex and the knowledge about infection source of Schistosomiasis in pre-test and in post-test.

Table7: Knowledge of infection source of schistosomiasis among schoolchildren in Guli area.

KNOWLEDGE OF INFECTION	BEFORE INTERVENTION		AFTER INTERVENTION	
SOURCE	#	%	#	%
Yes	844	35.9%	2198	99.5%
No	1508	64.1%	12	0.5%
Total	2352	100%	2210	100%

4.2 The attitudes and practices of schoolchildren in Taweela, Husai, Fashashoia and Guli towards Schistosomiasis.

Figure 2 represents Attitudes of examined school children towards defecation during their fieldwork, in the pre-test 89.2% of school children said they defecate in the field itself and 7.44% of them said far away from the field.

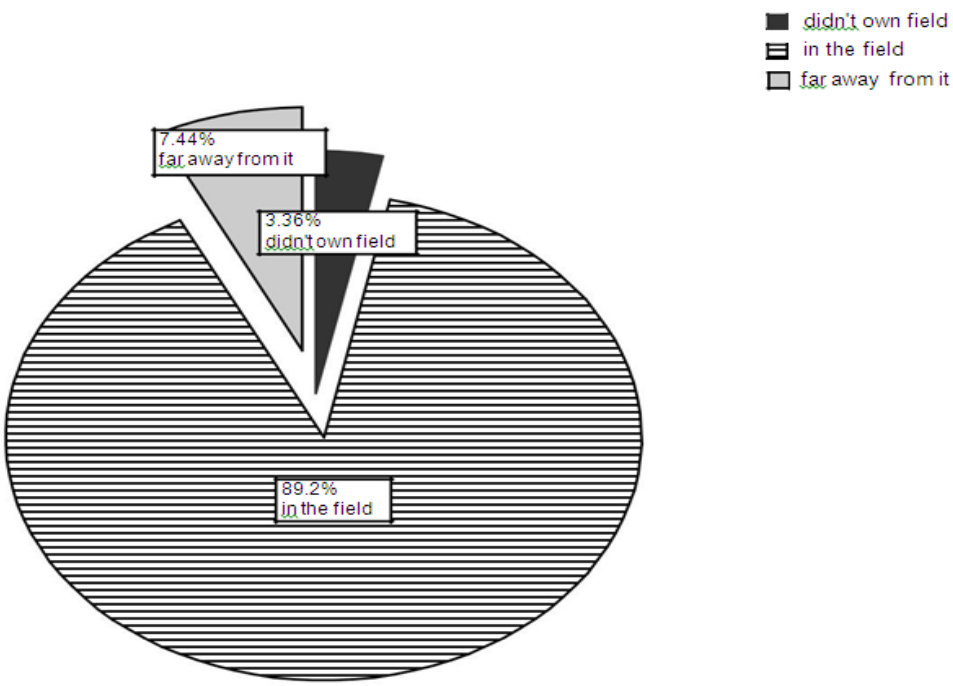

Figure 1: Attitudes of examined schoolchildren towards defecation in their field work, before intervention.

Figure 3 represents Attitudes of examined schoolchildren towards defecation during their fieldwork, in the posttest 59.03% of schoolchildren said they defecate in the field itself and 37.6% of them said far away from the field.

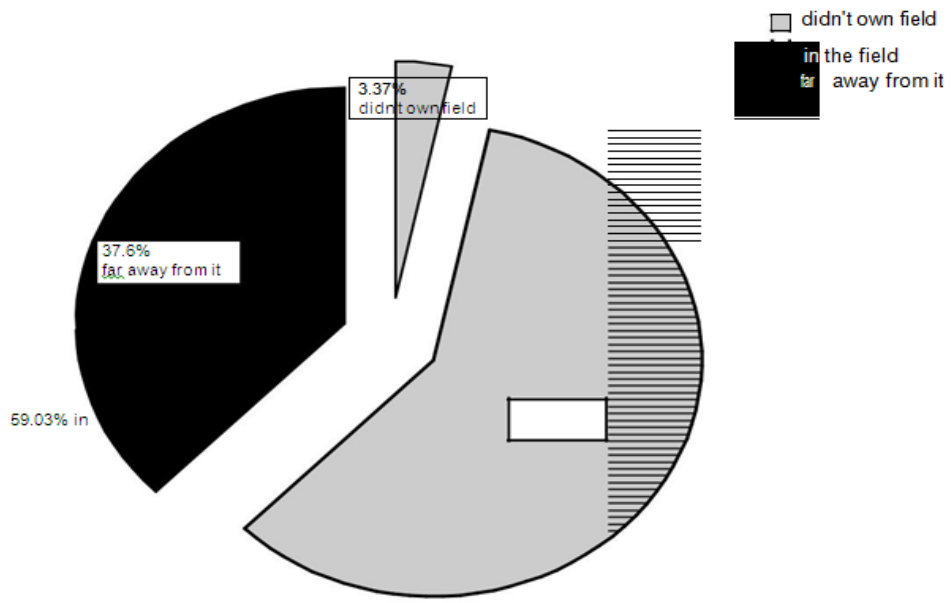

Figure 3: Attitudes of examined schoolchildren towards defecation in their field work, after intervention.

Table 9 demonstrates the results about attitudes of schoolchildren towards water contact as a practice lead to direct contact with the intermediate host and the parasite. Before intervention, 44.3% of males and 43.6% of females, always in direct contact with water sources and 55.7% of males and 56.4% of females, sometimes in direct contact with water sources. After intervention, 29.5% of males and 40.7% of females, always in direct contact with water sources, 62.3% of males and 54.4% of females, sometimes in direct contact with water sources and only 8.2% of males and 5% of females, have rarely contact with water sources (river or canals).

Table 9: Attitudes of examined schoolchildren (males and females) towards water contact before and after intervention program.

ATTITUDE TOWARDS WATER CONTACT	BEFORE INTERVENTION						AFTER INTERVENTION					
	male		female		total		male		female		total	
	#	%	#	%	#	%	#	%	#	%	#	%
Always	933	44.3%	845	43.6%	**1778**	**43.9%**	575	29.5%	739	40.7%	**1314**	**34.9%**
Some times	1175	55.7%	1093	56.4%	**2268**	**56.1%**	1214	62.3%	988	54.4%	**2202**	**58.5%**
Rarely	0	0.0%	0	0.0%	**0**	**0.0%**	160	8.2%	90	5.0%	**250**	**6.6%**
Total	**2108**	**100%**	**1938**	**100%**	**4046**	**100%**	**1949**	**100%**	**1817**	**100%**	**3766**	**100%**

Table 10 illustrates the results about attitudes of schoolchildren in different age groups (5-9, 10-14 and 15-19) years, towards water exposure as a practice leading to direct contact with the intermediate host and the parasite. Before intervention, 24.8% of (5-9 years) group and 54.8% of (10-14 years) and 57.7% of (15-19) years group, were always in direct contact with water sources, 75.2% of (5-9 years) group, 45.2% of (10-14 years), and 42.3% of (15-19) years group, were sometimes in direct contact with water sources.

After intervention, 23.3% of (5-9 years) group, 41.9% of (10-14 years) and 36.7% of (15-19) year's group were always in direct contact with water sources. 71.2% of (5-9 years) group, 50.9% of (10-14 years), and 55.7% of (15-19) years group, were sometimes in direct contact with water sources. Only 5.6% of (5-9 years) group, 7.2% of (10-14 years), and 7.6% of (15-19) year's group, have rarely contact with water sources (river or canals).

Table 10: Attitudes of examined schoolchildren of age groups (5-9, 10-14 & 15-19) Towards water contact before and after intervention program.

AGE GROUPS	ATTITUDE TOWARD WATER CONTACT						TOTAL	
	always		sometimes		rarely			
	#	%	#	%	#	%	#	%
Before Intervention								
5-9	367	24.8%	1115	75.2%	0	.0%	**1482**	**100%**
10-14	1283	54.8%	1059	45.2%	0	.0%	**2342**	**100%**
15-19	128	57.7%	94	42.3%	0	.0%	**222**	**100%**
total	**1778**	**43.9%**	**2268**	**56.1%**	**0**	**.0%**	**4046**	**100%**
After Intervention								
5-9	316	23.3%	967	71.2%	76	5.6%	**1359**	**100%**
10-14	921	41.9%	1118	50.9%	158	7.2%	**2197**	**100%**
15-19	77	36.7%	117	55.7%	16	7.6%	**210**	**100%**
Total	**1314**	**34.9%**	**2202**	**58.5%**	**250**	**6.6%**	**3766**	**100%**

- **In pretest N = 4046**
- **P value = .000**
- **In posttest N = 3766**
- **P value = .000**

Table 11 demonstrates the results about schoolchildren (males and females) practices towards their reasons for water contact. Befor intervention, 57.6% of males and 40.5% of females, bathing in water sources, 1.6% of males and 24.7% of females said that their reason was washing clothes, 10.8% of males and 17% of females, said that their reason was to bringing water to their homes. Bathing plus washing clothes was the reason for 4.9% of males and 15.1% of females, in addition the reason of bathing plus bringing water 21.4% of males and 6.5% of females.

After intervention, 51.6% of males and 36% of females, bathing in water sources, 1.4% of males and 18.1% of females said that their reason is washing clothes, 6.3% of males and 12.4% of females, said that their reason is to bringing water to their homes. Bathing plus washing clothes was the reason for 4.6% of males and 7.1% of females, in addition the reason of bathing plus bringing water 16.5% of males and 11.3% of females, 18.4% of males and 13.2% of females mentioned that they changed their practices to rarely contact with water sources. P value showed significant value (.992) between school children sex and their reason of water contact as a practice in pre-test, P value showed non- significant value (<.05) and in post-test.

Table 11: Practices of schoolchildren about their reason for water contact before intervention program (pretest) and after it (posttest).

THE REASON OF WATER CONTACT	BEFORE INTERVENTION						AFTER INTERVENTION					
	male		female		total		male		female		total	
	#	%	#	%	#	%	#	%	#	%	#	%
bathing	1214	57.6%	785	40.5%	**1999**	**49.4%**	1005	51.6%	654	36%	**1659**	**44.1%**
washing	33	1.6%	480	24.7%	**513**	**12.7%**	27	1.4%	328	18.1%	**355**	**9.4%**
Brining water	227	10.8%	329	17%	**556**	**13.8%**	122	6.3%	226	12.4%	**348**	**9.3%**
irrigation	79	3.8%	27	1.4%	**106**	**2.6%**	25	1.3%	22	1.2%	**47**	**1.2%**
bathing+ washing	104	4.9%	292	15.1%	**396**	**9.8%**	90	4.6%	135	7.1%	**225**	**5.9%**
Bathing + bringing water	451	21.4%	125	6.5%	**576**	**14.2%**	321	16.5%	212	11.3%	**533**	**14.2%**
Rarely exposure	0	0%	0	0%	**0**	**0%**	359	18.4%	240	13.2%	**599**	**15.9%**
Total	**2108**	**100%**	**1938**	**100%**	**4046**	**100%**	**1949**	**100%**	**1817**	**100%**	**3766**	**100%**

Table 12 demonstrates the results of schoolchildren practices towards health education methods, which used in awareness programs.

Before intervention, 55.8% of males and 56.3% of females didn't attended any health education program for schistosomiasis, 38% of males and 37.8% of females said that they attended lectures while there are 6.2% of males and 5.9% of females, said that they attended panels towards schistosomiasis. P value showed significant value (.881) between schoolchildren sex and the health education methods, which used in the past before intervention. After intervention, 100% of males and females were attended the comprehensive multiple methods (intervention program) to raise their awareness

towards schistosomiasis, composed of Lectures, papers, posters and role-play with competitions.

Table 12: Methods used to raise awareness towards schistosomiasis among schoolchildren in Guli area.

HEALTH EDUCATION METHODS	BEFORE INTERVENTION					
	male		female		total	
	#	%	#	%	#	%
Didn't attend	1176	55.8%	1092	56.3%	**2268**	**56.1%**
lectures	801	38.0%	732	37.8%	**1533**	**37.9%**
panels	131	6.2%	114	5.9%	**245**	**6.1%**
Multiple methods	0	100%	0	100%	**0**	**100%**
Total	**2108**	**100%**	**1938**	**100%**	**4046**	**100%**

- **In pretest N = 4046 • P value = .881**
- **Program interventions are Lectures, papers, posters and role-play with competitions.**

Table 13 demonstrates the majority of schoolchildren seek treatment (77.9%, 78.5% respectively) in before intervention data. However, after intervention the percentage become 100% in both sex.

P value showed significant value (.853) between schoolchildren sex and their attitude towards seeking treatment in after intervention data.

Table 13: Attitudes of schoolchildren towards schistosomiasis treatment in Guli area.

ATTITUDE	BEFORE INTERVENTION						AFTER INTERVENTION					
	male		female		total		male		female		total	
Seek treatment	#	%	#	%	#	%	#	%	#	%	#	%
	1643	77.9%	1521	78.5%	**3164**	**78.2%**	1908	97.9%	1917	100%	**3725**	**98.9%**
May Seek treatment	101	4.8%	95	4.9%	**196**	**4.8%**	12	0.6%	0	.0%	**12**	**0.3%**
Didn't Seek treatment	364	17.3%	322	16.6%	**686**	**17.0%**	29	1.5%	0	.0%	**29**	**0.8%**
Total	**2108**	**100%**	**1938**	**100%**	**4046**	**100%**	**1949**	**100%**	**1817**	**100%**	**3766**	**100%**

- **In pretest N = 4046 • In posttest N = 3766**
- **P value = .853 • P value = .000**

Table 14 shows the distribution of water sources across Guli area. In Fashashoia and Husai the main source of drinking water is White Nile, while in Guli and Taweela, there is a public water net 67.1% and 76.4% of population were benefited from it respectively, also 26.8% of Guli population and 16.8% of Taweela population were bring their water directly from White Nile.

Table 14: Distribution of drinking water sources in Guli area, where study was conduct.

WATER SOURCE	VILLAGE NAME								TOTAL	
	Taweela		Husai		Fashashoia		Guli			
	#	%	#	%	#	%	#	%	#	%
public net	883	76.4%	0	0%	0	0%	882	67.1%	**1765**	**43.6 %**
River	194	16.8%	579	100.0%	997	**100%**	352	26.8%	**2122**	**52.4%**
Public net +river	39	3.4%	0	0%	0	0%	40	3.0%	**79**	**2.0%**
Public net +river +canal	40	3.5%	0	0%	0	0%	40	3.0%	**80**	**2.0%**
Total	**1156**	**100%**	**579**	**100%**	**997**	**100%**	**1314**	**100%**	**4046**	**100%**

*** N = 4046**

Table 15 represents that the majority of fathers' occupations in Guli area are farmers 35.6%, and 32.4% of them are labors and only 19.4% are free workers.

Table 15: Fathers' occupations for the study population (schoolchildren).

FATHER OCCUPATION	VILLAGE NAME								TOTAL	
	Taweela		Husai		Fashashoia			Guli		
	#	%	#	%	#	%	#	%	#	%
farmer	412	35.6%	207	35.8%	365	36.6%	458	34.9%	1442	35.6%
free workers	224	19.4%	112	19.3%	205	20.6%	243	18.5%	784	19.4%
fisherman	56	4.8%	28	4.8%	51	5.1%	61	4.6%	196	4.8%
labor	374	32.4%	187	32.3%	294	29.5%	454	34.6%	1309	32.4%
other	90	7.8%	45	7.8%	82	8.2%	98	7.5%	315	7.8%
Total	1156	100%	579	100%	997	100%	1314	100%	4046	100%

*** N = 4046**

Table 16 shows that in Guli area, 68% of the examined pupils own home latrine, while 32% of them did not own.

Table 16: Distribution of the home latrine in the four villages.

HOME LATRINE	VILLAGE NAME								TOTAL	
	Taweela		Husai		Fashashoia			Guli		
	#	%	#	%	#	%	#	%	#	%
found	786	68.0%	394	68.0%	656	65.8%	915	69.6%	2751	68.0%
Didn't found	370	32.0%	185	32.0%	341	34.2%	399	30.4%	1295	32.0%
Total	1156	100%	579	100%	997	100%	1314	100%	4046	100%

*** N = 4046**

Tables 17 and 18 showed the ownership of radio and television, 60% of males and females own a radio and 50.3 of them own a television in their houses.

Table 17: Families Ownership of radio for all school children.

OWNERSHIP OF RADIO	SEX				TOTAL	
	male		female			
	#	%	#	%	#	%
own	1254	59.5%	1175	60.6%	**2429**	**60.0%**
Didn't own	854	40.5%	763	39.4%	**1617**	**40.0%**
total	**2108**	**100.0**	**1938**	**100.0**	**4046**	**100.0**

*** N = 4046**

Table 18: Families Ownership of Television for all school children.

OWNERSHIP OF TV	SEX				TOTAL	
	male		female			
	#	%	#	%	#	%
own	1049	49.8%	988	51%	**2037**	**50.3%**
Didn't own	1059	50.2%	950	49%	**2009**	**49.7%**
Total	**2108**	**100%**	**1938**	**100%**	**4046**	**100%**

*** N = 4046**

Table 19 shows the attendance of health education sessions, only 0.9% of males and females attended always, 58.7% attended sometimes and 40.5% of males and females rarely attend sessions of health education towards schistosomiasis.

Table 19: Attendance of health education sessions towards schistosomiasis among examined schoolchildren.

ATTENDANCE OF HEALTH EDUCATION SESSIONS	SEX				TOTAL	
	male		female			
	#	%	#	%	#	%
always	18	0.9%	17	0.9%	**53**	**0.9%**
Sometimes	1229	58.3%	1144	59%	**2373**	**58.7%**
rarely	861	40.8%	777	40.1%	**1638**	**40.5%**
Total	2108	100%	1938	100%	**4046**	**100%**

*** N = 4046**

Table 20 represents males and females with current or previous infection by schistosomiasis, 58.8% of males and 57.4% of females affected by schistosomiasis, while 41.2% and 42.6% not affected by the disease of males and females respectively.

Table 20: Previous or current infection by schistosomiasis among examined school children.

AFFECTED BY SCHISTOSOMIASIS	SEX				TOTAL	
	male		female			
	#	%	#	%	#	%
affect	1240	58.8%	1112	57.4	**2352**	**58.1%**
Didn't affect	868	41.2%	826	42.6%	**1694**	**41.9%**
Total	**2108**	**100%**	**1938**	**100%**	**4046**	**100%**

*** N = 4046**

Table 21 Represents the occurrence of current or previous infection by schistosomiasis, among three age groups categories (5-9), (10-14) and (15-19), which was found, 24.4%%, 77.1% and 83.3%, respectively, while 75.6%, 22.9%, and 16.7%, not affected by the disease.

Table 21: Previous or current infection by schistosomiasis among examined schoolchildren of age groups (5-9, 10-14 & 15-19)

AFFECTED BY SCHISTOSOMIASIS	AGE GROUPS						TOTAL	
	5-9		10-14		15-19			
	#	%	#	%	#	%	#	%
affect	362	24.4%	1805	77.1%	185	83.3%	**2352**	**58.1%**
Didn't affect	1120	75.6%	537	22.9%	37	16.7%	**1694**	**41.9%**
Total	**1482**	**100%**	**2342**	**100%**	**222**	**100%**	**4046**	**100%**

*** N = 4046**

5. DISCUSSION

In the present study, the knowledge about schistosomiasis cause among examined schoolchildren was 74.6%, increased to 98.6% after implementation of the interventions, among pupils (table No 1).

In addition, their knowledge about methods of transmission showed different distribution; only 26.2% from examined students did not know the method of transmission. The remaining, 73.8% of them, their knowledge showed differs, 40.4% said that the method of transmission is bathing in river / canal and 19.8% say both bathing and entering in river/canal, (table No 2).

Knowledge about prevention methods found 55.3% among examined students, only 10.7% with age group 5-9 known the prevention methods (tables No 5 & 6).

After implementation of the comprehensive program of interventions the knowledge about schistosomiasis symptoms, complications and prevention methods increased to 95%, 91.3% and 94.7% respectively.

This findings was in favour with facts motioned on **(web site 19),** which determined the symptoms, signs & tests, complications and prevention methods for schistosomiasis and the importance of raising awareness through using different tools and methods.

In this study, only 35.9% of examined males and females knew the infection source, this percentage changed to 99.5% after intervention (tables No 7). The results of pre-test and post-test represents that there is an important link between the sex of examined schoolchildren and their knowledge about the infection source of schistosomiasis. WHO (1993) mentioned that the knowledge of school students about the schistosomiasis, it is cause, transmission, complications and how to protect against its infestation was significantly associated with schistosomiasis occurrence and distribution. Increase knowledge about it decrease infections its rates.

The different results that found in this study were probably due to poor compliance as families order them to do activities such as bringing water and washing clothes, or may be due to unreal replies or giving wrong answers.

The distribution of water sources across the four villages, in Fashashoia and Husai the main source of drinking water is White Nile. While in Guli and Taweela, there is a public water net 67.1% and 76.4% of population were benefited from it respectively, also 26.8% of Guli population and 16.8% of Taweela population were bring their water directly from White Nile (table No 14).

One of the most important findings in this study, that 58.8% of males and 57.4% of females were having current or previous infection by schistosomiasis (table No 20). These results coincides with study done by Blue Nile Health Project (1989), also **(web site 19)** and Ahmed (1994) were stated that health education on schistosomiasis has greater importance than ever before and the introduction into schools of diagnosis, treatment and awareness has made children and parents much more aware of the problem connected with disease.

In the present study, the attitudes of examined schoolchildren towards defecation during their fieldwork, before intervention 89.2% of schoolchildren said that they defecate in the field during their work and only 7.44% of them said they do far away from their field (Figure No 2). These percentages changed to 59.03% and 37.6% respectively after intervention program (Figure No 3).

The attitudes of schoolchildren towards water contact as a practice leading to direct contact with the intermediate host and the parasite, before interventions, 43.9% from them, were always in direct contact with water sources and 56.1% from examined students, were some times in direct contact with water sources. The findings of the pretest showed that there is a great link between the sex of the examined schoolchildren and their attitudes towards water contact.

While in the findings of the post-test, there is no link between them. After interventions these percentages changed and we found 34.9% of students always in direct contact with contaminated water, and 58.5% of them were sometimes in direct contact with water sources (Table No 9).

The results of schoolchildren (males and females) practices towards reasons for water contact. Before intervention program, 57.6% of males and 40.5% of females, bathing in water sources, while after intervention the results changed to 51.6% of males and 36% of females, bathing in water sources as main practice. WHO (2001) motioned that all control program require a wide knowledge of attitudes and practices of community in relation to personal hygiene and perception of schistosomiasis. The findings of the pretest (before intervention), showed that there is a great link between the sex of the examined schoolchildren and their reasons of water contact as a practice. While in the findings of the posttest (after intervention), there is no link between them (Table No 9).

The attendance of awareness sessions towards schistosomiasis before program intervention was, 55.8% of males and 56.3% of females those who did not attend any health education program for schistosomiasis. The findings of the pre-test showed a great link between sex of the examined schoolchildren and method of health education that used before the pre-test (Table No 19). The ownership of radio and television, 60% of males and females own a radio and 50.3 of them own a television in their houses (Table No 17 & 18). **Gryseels (1990)** mentioned that adequate designs adapted to the needs and attitudes of population are essential, and proper maintenance must be assured, any action should be obliviously be reinforced by health education.

The occupation of fathers of the examined students varying between farmers 35.6%, labours 32.4%, free work 19.4%, fishermen 4.8% and other occupations were 7.8% (Table No 15), so these different occupation may reflect the educational level which effects behavioral and attitudinal pattern. WHO (1993) mentioned that behaviours is often determined by local cultural.

7. Recommendations

1. KAP studies should precede any control program efforts towards Schistosomiasis.
2. Health education programs should be conducted to raise the awareness in Guli area for all community members.
3. Implementation of an integrated control program for Schistosomiasis, with high concentration on health education part.
4. Further researches are needed in other similar areas.

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