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Research Paper

Chemotherapeutic Trials of Praziquantel and Ivermectin on victims of Urinary Schistosomiasis in Taraba North Senatorial District; Nigeria.

Agere Hemen[1], **Kela** SL[2] and **Istifanus** WA[2]

1.Biological Sciences Department, Federal University Wukari; Taraba State-Nigeria.
2.Biological Sciences Department, Abubakar Tafawa Balewa University;Bauchi-Nigeria.

* Corresponding Author E-mail: agere.hemen@gmail.com

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ABSTRACT

Chemotherapeutic trials of two antihelminthic drugs, namely praziquantel and ivermectin were carried out for urinary schistosomiasis control in Jalingo and Ardo-kola LGAS of Taraba State. Three children with the highest worm burden in each school were selected and in the order of decreasing intensity; the first child was given praziquantel, the second child was given ivermectin and to the third child the placebo, dependol (panadol which shapes like praziquantel) was administered. 13(76.47%) of the 17 children in Jalingo treated with praziquantel shed no eggs after the administration of the first dose. The remaining four children shed no eggs after the second dose of praziquantel. Using the Chi-square statistic, a significant difference(X^2_{16}= 230.15, P<0.01) was observed in the egg burden before and after treatment with praziquantel. Pupils treated with ivermectin, MSD showed a slight decrease in the egg burden after the second dose, but the decrease was not significant(X^2_{16}=31.47, P>0.001). A similar trend to that observed in Jalingo was the case in Ardokola; with 12(85.71%) of the children shedding no eggs after the first dose of praziquantel and the remaining 2 children becoming worm free after the second dose. Therefore, in Ardokola too there was a significant difference(X^2_{13}=357.24, P<0.001) in the egg burden after treatment with praziquantel. In Ardokola, though the chemotherapeutic trial showed a reduction in egg burden, it was not statistically significant(X^2_{13}=31.17, P>0.001). The high cure rates of praziquantel observed in both Jalingo and Ardokola portend that the drug remains the drug of choice for the treatment of urinary schistosomiasis. On the contrary, though ivermectin is known to have good cure rates against Onchocerca species, and some other gastrointestinal helminthes and protozoans, the result of this study does not conclusively show it is suitable for the treatment of schistosomiasis. However, there is need for further investigation of the efficacy of ivermectin on schistosomiasis since in the study slight reduction in worm burden was observed in the two areas studied.

Key Words: Chemotherapy, Ivermectin, Praziquantel, Placebo, Urinary Schistosomiasis

INTRODUCTION

Schistosomiasis is caused by several species of trematodes, a parasitic worm of the genus-*Schistosoma.* Although, it has a low mortality rate, schistosomiasis often is a chronic illness that can damage internal organs; and in children, impair growth and cognitive development. The urinary form of schistosomiasis is associated with increased risk of carcinoma of the bladder in adults. Earlier schistosomiasis control measures were directed at the snail host. However, WHO (1985) had endorsed a global plan of action to reduce morbidity following the manufacture of safe and effective oral schistosomicides. The World Health Body also noted that molluscicide and habitat modifications as control measures bring about a slow reduction in the prevalence and intensity of schistosomiasis hence slow reduction in morbidity. However, the global health body observed that chemotherapy has a direct impact on the disease and can quickly reduce its prevalence and intensity and therefore its transmission. In further support of morbidity control, Madsen and Christensen (1992), stated that formerly, snail control was the key factor in the control of schistosomiasis. However, due to the development of simple and rapid diagnostic techniques and increased emphasis on Primary Health-Care approach, the former trend has changed giving more impetus to chemotherapy.

Of the many drugs that display antischistosomal activity, WHO (1985) recommended three for large-scale chemotherapeutic trials. WHO (1985) explained that, Praxiquantel, Oxamniquine and Metrifonate are safe, highly

effective, easily administered orally at the community level, hence provide the basis for a feasible strategy for morbidity control. This same source assured that even if egg excretion persists after treatment, the intensity is greatly reduced and the risk of developing disease among those who were previously heavily infected is greatly reduced.

Schistosomicides have been co-administered with other antihelminthic drugs for quick reduction of morbidity from such helminthic infections within a short time. This study, apart from assessing the efficacy of praziquantel in schistosomiasis treatment, it also made trials to find out if Mectizan(Ivermectin,MSD) has any schistosomicidal activity; so that it could be used alone for the control of the two or more helminthic infections.The chemotherapeutic trial of ivermectin in this study is prompted by the work of Anosike and Abanobi(1995) in Isuocha community of Abia State,Nigeria in which they claimed Ivermectin's effectiveness in the treatment of gastro-intestinal helminthes. Similarly, Njoo,et.al(1993) had reported significant reduction in *Ascaris lumbricoides* egg counts and *Entamoeba coli* cyst load in an investigation they carried out.

Ivermectin is a macrocyclic lactone derived from *Streptomyces avermitilis* with anti-parasitic activity against several parasitic worms and arthropods. It has a broad spectrum activity against several nematodes (*Ascaris, Trichuris, Ancylostoma*); Cestodes (*Taenia*) and Trematodes (*Fasciola* and *Schistosoma*). In a study conducted in Ghana, by Dunyo, et.al (2000), they also reported that Ivermectin has particularly potent activity against onchocerciasis and lymphatic filariasis, which are important endemic diseases in Africa and South America. Ivermectin has proved for use in the United States in 1996 for strongyloides and onchocerciasis. In other countries it is also approved for use in scabies, lice infestation and ascariasis. According to McCarthy, et.al (2011), ivermectin exerts its anti-helminthic activity by causing the neurons or muscle cells of helminth parasites to remain hyperpolarized or depolarized; thereby resulting in paralysis and death of the parasites.

MATERIALS AND METHOD

During a prevalence survey in Primary Schools in Jalingo and Ardokola; Taraba State, Nigeria; in 2001, pupils with 20 schistosome eggs and above were selected for chemotherapeutic trials with praziquantel and ivermectin. 34 infected pupils were selected from Jalingo and 28 infected pupils from Ardokola. A health personnel authorized by the Taraba State Ministry of Health administered and monitored the patients. A placebo (dependol), a brand of panadol whose tablet resembles those of praziquantel was used as control. 3 children with the highest worm load from 17 schools in Jalingo and 14 schools in Ardokola. In the order of decreasing intensity the first child was given praziquantel, the second child was given ivermectin and the third child was placed on dependol.

Praziquantel: To each child selected for treatment with this drug, a single dose of two 20mg tablets was administered. Urine samples of all children under praziquantel treatment were observed forth-nightly for 2 months for reduction in egg count from urine as well as the level of haematuria. However, if after 2months there was no reduction in the number of eggs and level of haematuria another dose was administered as recommended by WHO (1993).

Table 1: Ivermectin, MSD Dosage Administration Guide (WHO, 1993)

Body Weight(kg)	Height(cm)	Dosage	
		6mg	3mg
15-25	90-119	0.5	1
26-44	120-140	1.0	2
45-64	141-158	1.5	3
65-84	Above158	2.0	4

Those under 15kg by weight or 90cm by height were excluded as directed by WHO (1993).

To all the children selected for ivermectin treatment, the normal dosage given to onchocerciasis victims was administered. The drug was taken by each selected child on empty stomach. No food was taken 2hours before or after the dose. The children were monitored every month for the disappearance of eggs. Patients whose eggs per 10ml urine was not reduced following the administration of the drugs after 6months were given another dose as recommended by WHO(1993).

The Placebo: This is not an antihelminthic drug, but an analgesic that has its shape similar to that of praziquantel. The placebo group acted as a control. The group was monitored exactly like the other two groups. After 6months however, together with the ivermectin group were treated with praziquantel and subsequently referred to health facilities for further care.

RESULTS

Results of the chemotherapeutic trials in table.2 reveal that 13(76.47%) of the 17 children in Jalingo treated with praziquantel shed no eggs after the administration of the first dose. The remaining 4 children after the second dose showed no egg count. The Chi-square analysis of the result in table 2 showed a significant difference(X^2_{16}=230.15, P<0.01) in the egg load before and after treatment of the patients with praziquantel.

Table.3 shows the results of pupils treated with ivermectin in Jalingo. The results show an initial increase in the egg load of the children after the first dose. However, a decrease is observed after the administration of the second dose. The decrease in egg count after the second dose is however not significant(X^2_{16}=31.47%, P>0.01)

In Ardokola, the results of children with urinary schistosomiasis treated with praziquantel; as shown in table.4 follow a similar trend with that of Jalingo. 12(85.71%) of the 14 children treated with the drug, discharged no eggs after the first dose.The remaining 2 children however, after the second dose shed no eggs. Similarly, there was a significant difference(X^2_{13}=357.24, P<0.001) in the egg reduction after treatment with praziquantel. The ivermectin treatment in Ardokola is shown in table.5.The result shows a reduction in the egg count after each subsequent dose of the drug. However, there was no significant difference(X^2_{13}=31.17, P>0.01) in the reduction of the eggs.

Table 2: Response of Pupils Infected with Urinary Schistosomiasis to Praziquantel Treatment in Jalingo.

PUPIL	ELBD1	ELAD1	ELAD2	REMARK
1	50	0	-	No eggs
2	50	0	-	‘’
3	500	20	0	‘’
4	220	0	-	‘’
5	700	130	0	‘’
6	530	80	0	‘’
7	60	0	-	‘’
8	180	0	-	‘’
9	50	0	-	‘’
10	90	0	-	‘’
11	70	0	-	‘’
12	60	0	-	‘’
13	100	0	-	‘’
14	120	0	-	‘’
15	150	0	-	‘’
16	200	0	-	‘’
17	800	120	-	‘’
Total	4230	330	0	

ELBD1=Egg Load before Dose1 **ELAD1**=Egg Load after Dose1 **ELAD2**=Egg Load after Dose2. The time lag between the doses was 2months.

Table 3: Response of Pupils Infected with Urinary Schistosomiasis to Ivermectin Treatment in Jalingo.

PUPIL	ELBD1	ELAD1	ELAD2	REMARK
1	30	39	34	Eggs Discharged
2	20	16	41	‘’
3	118	200	180	‘’
4	140	131	128	‘’
5	580	490	550	‘’
6	160	182	179	‘’
7	40	120	81	‘’
8	460	410	400	‘’
9	20	26	23	‘’
10	60	128	130	‘’
11	20	4	9	‘’
12	50	63	68	‘’
13	80	73	58	‘’
14	90	110	109	‘’
15	140	133	124	‘’
16	70	136	121	‘’
17	40	62	80	‘’
Total	2118	2353	2315	

ELBD1=Egg load before dose1. **ELAD1**=Egg load after dose1. **ELAD2**=Egg load after dose2. The time lag between doses was two months.

Table 4: Response of Pupils Infected with Urinary Schistosomiasis to Praziquantel Treatment in Ardokola.

PUPIL	ELDB1	ELAD1	ELAD2	Remark
1	50	0	-	No egg
2	50	0	-	‘’
3	30	0	-	‘’
4	200	0	-	‘’
5	180	0	-	‘’
6	150	0	-	‘’
7	120	0	-	‘’
8	180	0	-	‘’
9	800	180	0	‘’
10	180	0	-	‘’
11	80	0	-	‘’
12	530	0	-	‘’
13	60	0	-	‘’
14	960	201	0	‘’
Total	3570	381	0	

ELBD1=Egg load before dose1. **ELAD1**=Egg load after dose1. **ELAD2**=Egg load after dose2. The time lag between doses was two months.

Table5: Response of Pupils Infected with Urinary Schistosomiasis to Ivermectin Treatment in Ardokola.

PUPIL	ELBD1	ELAD1	ELAD2	Remark
1	50	36	40	Eggs Discharged
2	40	42	39	‘’
3	20	17	23	‘’
4	150	100	98	‘’
5	100	101	109	‘’
6	120	133	121	‘’
7	65	50	35	‘’
8	160	153	159	‘’
9	110	91	91	‘’
10	90	86	67	‘’
11	30	22	36	‘’
12	130	103	122	‘’
13	40	40	28	‘’
14	160	153	158	‘’
Total	1265	1130	1126	

ELBD1=Egg load before dose1. **ELAD1**=Egg load after dose1. **ELAD2**=Egg load after dose2. The time lag between doses was two months.

DISCUSSION/RECOMMENDATION

The high cure rates of praziquantel observed in Jalingo and Ardokola, strongly support WHO (1985)’s position that praziquantel is the drug of choice for treating all forms of schistosomiasis. From the results of this study therefore, praziquantel has been confirmed to remain the best drug for the treatment of *Schistosoma haematobium* infection. On the other hand, though ivermectin has been known to have good cure rates against *Onchocerca species,* and some other gastro-intestinal helminthes, the results of this study showed that it is not suitable for the treatment of schistosomiasis. The fact that egg output from the infected pupils is either slightly reduced or kept constant, however, calls for the need for further investigation of the efficacy of this drug on schistosomiasis on a larger scale. It is probable that the drug has some effect in affecting further egg production of the worm or probably inducing the patients to secrete enzymes that will immobilize the parasites in the affected hosts. These therefore, require further elucidation.

REFERENCES

Anosike JC. and Abanobi OC. (1995). Efficacy of Mectizan(Ivermectin) in the treatment of gastro-intestinal helminthes in Isuocha community, Abia State, Nigeria. *Nig.J.Parasitol. Abstract*.No.40.

Dunyo SK, Nkrumah FK and Simonson PE(2000). A randomized double-blind placebo-controlled field trial of ivermectin and albendazole alone and in combination for the treatment of lymphatic filariasis in Ghana. *Trans.Roy.Soc.Trop.Med & Hyg*.94:205-211.

McCarthy J, Loukas A, Hotez PJ. Chemotherapy of Helminth Infections. In Brunton LL, Chabner KA, Knollman KC; eds.Goodman and Gilman’s The Pharmacological Basis of Therepeutics.12th ed.Amsterdam: Elsevier; 2011, pp.1443-1461.

Madsen H., and Christensen NO (1992). Intermediate hosts of Schistosomes: Ecology and Control.*Bull.Soc.Vector, Ecol*.17 (1):2-9.

Njoo FL, Belling GA, Oosting J, Vetters JC, Stilma JS and Kijlstra A (1993). Concurrent Parasitic Infections in Onchocerciasis and the occurrence of adverse reactions after ivermectin treatment. Am.J.Trop.Med.Hyg.48(5):652-657

World Health Organization (1985). *The Control of Schistosomiasis.* Expert Committee Technical Report Series No.728. 50pp. Geneva: WHO.

World Health Organization (1993).*The Control of Schistosomiasis*. Technical Report Series.No.830.86pp. Geneva: WHO.