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PRAZIQUANTEL EFFICACY IN THE TREATMENT OF *SCHISTOSOMA HAEMATOBIUM* IN DARDOOG VILLAGE

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ABSTRACT

Praziquantel (PZQ) is the drug of choice for treatment of all human schistosomes. It is used in population based targeted or mass deworming strategies in several countries. The objective of this study was to determine the efficacy of PZQ against S. haematobium in Dardoog village, eastern Khartoum north, Sudan. A cohort study was conducted from May to Jun, 2014. Urine samples from 50 residents were collected and screened for haematuria and proteinuria using urinalysis dipstick. S. haematobium eggs were detected and quantified using filtration techniques and viability of excreted eggs. The participants who were positive for haematuria were treated with a standard dose of PZQ (40 mg/kg). Data on pre and 24 hours post treatment symptoms were collected via questionnaire. Urine samples were also collected 5 weeks after treatment and examined to assess the cure and the egg reduction rates. The prevalence of S. haematobium among the study participants was 94%. Five weeks post treatment, the extent of haematuria and proteinuria gradually decreased. The cure and the numbers of egg reduction rates in the first week post treatment were 6% and in the 4^{th} and 5^{th} weeks were 92%, none of these eggs was viable, indicating the efficiency of (PZQ) followed by slow release of dead eggs from host tissues. No signs of PZQ resistance could be detected in the population under study. There were marked cure and egg reduction rates, together with mild and short lived side effects of PZQ for treatment of S. haematobium, in this study.

Key words: *S. haematobium*, Efficacy, Praziquantel, Egg viability.

INTRODUCTION

Schistosomiasis is the second most prevalent tropical disease next to malaria in the world. It affects about 200 million people worldwide with more than 650 million people living in endemic areas [1,3]. From the estimated global burden of 50 million DALYs (disability adjusted life years) for the cluster of neglected diseases, schistosomiasis accounts for 1,760,000 DALYs [4]. Since no vaccine is available at this time, reduction of morbidity has become the most important goal for all schistosomiasis control programs. Currently, the standard first line treatment is praziquantel (PZQ). This drug is easy to administer and is active against all Schistosoma species. However, low cure rates have been observed in several regions throughout Africa after Praziquantel treatment [5, 6]. Schistosomiasis can be controlled via chemotherapy, snail control, improved sanitation, and health education. Currently, a population based target/mass chemotherapy with Praziquantel (PZQ) is a major controlling strategy in several countries [7,9] (PZQ) is the drug of choice for schistosomiasis control due to its effect on the adult stages of the five species of human schistosomes, minimal side effects [10,12], easy administration and tolerability [13-15. On the other hand, it lacks efficacy against the immature stages of schistosomes which is thought to be a risk for resistance development [6]

The efficacy of PZQ on schsitosomes has been studied in many countries. Most of the studies made are on its efficacy in the treatment of S. mansoni and have reported different cure and egg excretion reduction rates [17,26].

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In the treatment of S. haematobium, low cure rates are reported from Ghana [27] and Senegal [28], while higher cure and egg reduction rates are obtained from Côte d'Ivoire [29] Cameroon [30] Zimbabwe [31] and South Africa [32]. The explanations forwarded for this variation in efficacy includes the issue of drug resistance [19]and presence of pre-patent infections existing at the time of treatment [33] in high transmission areas and the inadequacy of single dose of 40 mg/kg under conditions of extremely high intensity of *S. haematobium* infection [33].

METHODS

Study design, area and period

A cohort study was conducted from MAY to JUN, 2014 in Dardoog, a village located in eastern Khartoum north.

Sample size and sampling techniques

Sample size 50 urine samples were collected from the children.

Urine collection and analysis

Initially the socio-demographic and clinical data were collected from study participants. Then, they were given a wide, clean, labeled container to provide terminal urine between 10.00 a.m. and 2.00 p.m. Since haematuria is the best indicator of urinary

Schistosomiases in an endemic area [8], the participants were tested on the spot using reagent strips (URS-11, Teco diagnostics, USA). the urine samples examined using Centrifugation technique and filtration technique for *S.haematobium* eggs. The intensity of infection was assessed according to guideline developed by Montresor et al [8]. To assess the cure and the egg reduction rates urine samples were collected from the study participants whose urine samples were positive for ova of S. haematobium before treatment, who were treated with PZQ and who were able to report for re-examination, five weeks post-treatment.

Samples collected after treatment, when positive were also analyzed for egg viability using trypan blue.

Treatment

The study participants were treated with single dose of PZQ (Biltricide®, Bayer AG, Germany), 40 mg/kg body weight which is a standard treatment dose in Sudan.

Clinical diagnosis

Compliance about symptoms and side effects of the drug were collected pre and 24 hrs post treatment, using questionnaires.

Ethical consideration

Approval was taken from the Faculty. Narrative consents were also taken from the school children under study.

RESULTS

From 50 human urine samples collected from Dardoog village and examined microscopically after using filtration and concentration technique. 47 samples (94%) were found positive and 3(6%) were found negative.

One week after treatment using PZQ, 44(88%) human were reported positive and 3(6%) reported negative after using viability test.

Two week after treatment 18(36%) patients were reported positive and 26(52%) patients reported negative.
In the third week 6(12%) positive and 12(24%) human were found negative.
In the 4^{th} and 5^{th} week, 1(2%) person was found positive and 0(0%) human found negative.

The participant enrolled in this study had haematuria whereas 92% had proteinuria when examined using reagent strip tests before treatment. The prevalence of haematuria and proteinuria after 5 weeks of treatment declined to 26%and 18%.

DISCUSSION

When considering the high reduction in egg counts together with the absence of viable eggs, it can be concluded that PZQ has maintained its effectiveness against *s. haematobium* in Dardoog village. In this study, a cure rate of 92% was found 5 weeks post- treatment. Dead eggs that may be present for 5 weeks in the urine of treated patients infected with *S. haematobium* [10].

When using PZQ within first week it was obvious that the detection rate of viable egg was higher in urine. On the other hand PZQ efficiency within 4th and 5th weeks was greater. This, in our opinion might probably reflect the sensitivity of PZQ should be systematically assessed in the field this finding was in contract with the finding of Montresor A, et al [8].

In this study, a cure rate of 92% was found 5 weeks post-treatment , which is comparable to the finding of similar studies conducted in Cameroon [30], Zimbabwe [31] north-east Ethiopia [25],. The egg count reduction observed 5 weeks after treatment was 85% this is lower than those observed in Cameroon [30], Zimbabwe [31], and north-east Ethiopia [25]. This might have been due to the presence of pre-patent infections [33], and lack of PZQ efficacy against the immature stages of schistosomes [16],

In response to treatment with single dose of praziquantel, haematuria fell from 100% to 26% and proteinuria from 92% to 18% five weeks post-treatment. Most studies conducted have assessed effect of PZQ on haematuria and proteinuria over a period of months not in weeks as in the present study in Kenya has found a decline of haematuria from 75% to 17% and proteinuria from 73% to 27% 12 months after treatment [34].

A study from Ghana on the other hand has reported the reduction of haematuria by 77% in children less than 15 years of age and by 68% in adults at six month follow up [27].

Increased rates of straining, diarrhea, fatigue, drowsiness, fever and itching were observed 24 hours after treatment. On the other hand, uncommon side effects such as joint pains, joint swellings, myalgia and peri-tibial/ ankle oedema were not reported in this study.

Most of the post-treatment symptoms manifested soon after drug therapy and the majority were mild and short-lived. On the other hand, the presence and degree of haematuria and proteinuria before treatment were correlated with the presence of *S.haeamtobium* eggs and count in urine, which is similar finding with the study conducted in Kenya [34].

CONCLUSION

No signs of PZQ resistance could be detected in the population under study. There were marked cure and egg reduction rates, together with mild and short lived side effects of PZQ for treatment of S. haematobium, in this study.

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