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Quantitative Assessment of Helminthiasis Despite Anthelmintic Chemoprophylaxis and Assessment of Contributing Factors in School Children

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Abstract:

Introduction: *There is a higher incidence of parasitic infestation in the developing countries due to the use of contaminated drinking water, inadequate sanitary conditions and poor personal hygiene and it is the common cause of morbidity in our country. Hence the governmental authorities have begun an anthelmintic chemoprophylaxis programme twice a year. The objectives of our study were (a) frequency of ova/ cyst positive in stool test of school children and (b) quantifying factors enhancing parasitic infections*

Subjects and methods: *A cross sectional descriptive study was conducted on 280 school children from 3rd to 7th standards. Students were assembled, questionnaires filled, examined, and specimen bottles were given with appropriate instructions. The next day bottles were collected to be analysed in the microbiology laboratory, Father Muller Medical College. The assessment was done before the next dose of chemoprophylaxis.*

Results: *In our study, 280 school children were examined for helminthic infections and 23% showed positive stool report.The stool report showed positivity for Ascaris lumbricoides, Hymenolepis nana, Enterobious vermicularis, Trichuris trichura and Entamoeba histolytica. 30% of children without footwear and 26.8% of those with anal pruritis had stool report positive. Those with pica and nail biting showed 20% and 21.6% stool positivity, respectively. About 22% with history of passage of worms and 24.2% with pain abdomen had reported with stool positive for helminthes.*

Conclusion: *In the present study of 280 school children who have received anthelmintic chemoprophylaxis showed stool positivity rates that are low. The significance should not be lost as the contributory factors have been quantified that can have a bearing to make the statistics even better.*

Keywords: *Helminth ,Anthelmintics, Sanitation, Hymenolepis nana ,Source of water*

1. INTRODUCTION

The parasitic infestation is a common cause of morbidity & rarely mortality in pediatric population in tropical countries. The prevalence of intestinal parasites in children varies in different regions of the world. It is particularly higher in developing countries due to the use of contaminated drinking water, inadequate sanitary conditions and poor personal hygiene. Effective anthelmintic drugs are available and mass chemoprophylaxis would curb this menace leading to better health, growth and school attendance.

There is a pertinent need for this study as the numbers of cases of parasitic infection are common in third world countries like India. Moreover, effective anthelmintic therapy available and given every 6 months according to governmental regulations in schools. The assessment of anthelmintic activity can be conducted. It was also undertaken to quantify factors that lead to parasitic infections, thus optimizing deworming pattern in the present day society

The implications of this study would be:

1. Providing statistics as yet there is no reliable quantification of incidence of worm infestation in children in the third world country
2. Even though there is effective anthelmintic therapy available, it is best to assess the effectiveness of such therapy when mass administered.
3. Relevant interventional measures can be taken according to the data obtained.

The government of Karnataka supplies anthelmintic for all government aided schools twice a year (i.e. June and January each year).The usual chemoprophylaxis is carried out with albendazole 400mg once. The school children that we investigated had undergone anthelmintic chemoprophylaxis the previous year. Our present study looks into the frequency rate of stool positivity and to quantify the factors that could lead to this problem.

2. SUBJECTS AND METHODS

Type of study cross sectional descriptive study

Sample size 280

Selection criteria girls and boys from 3rd to 7th standard.

Two visits were made to the schools .In the initial visit the students were assembled, questionnaires filled out, examined both generally and systemically, and specimen bottles were given with appropriate instructions. In the second visit the specimens were collected and analysed in the microbiology laboratory of Father Muller Medical College**.** The assessment was done before the next dose of chemoprophylaxis had to be given. The questionnaires and the positive stool reports were entered into master sheets and analysis was made therefrom.

3. RESULTS

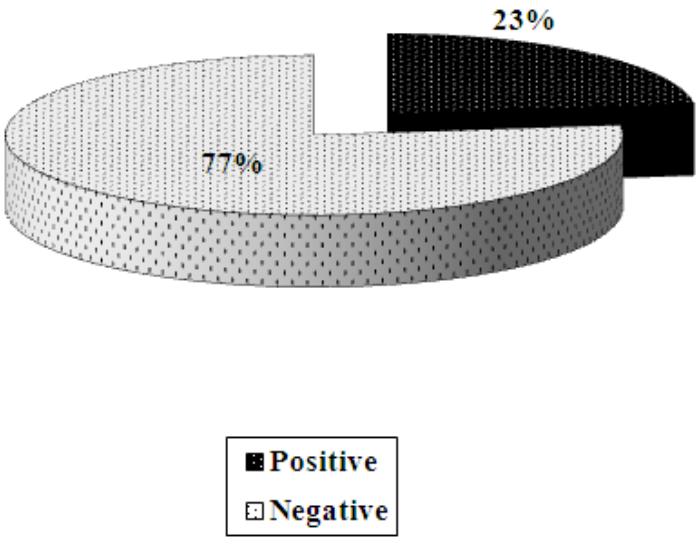

Figure 1. *Stool Report.*

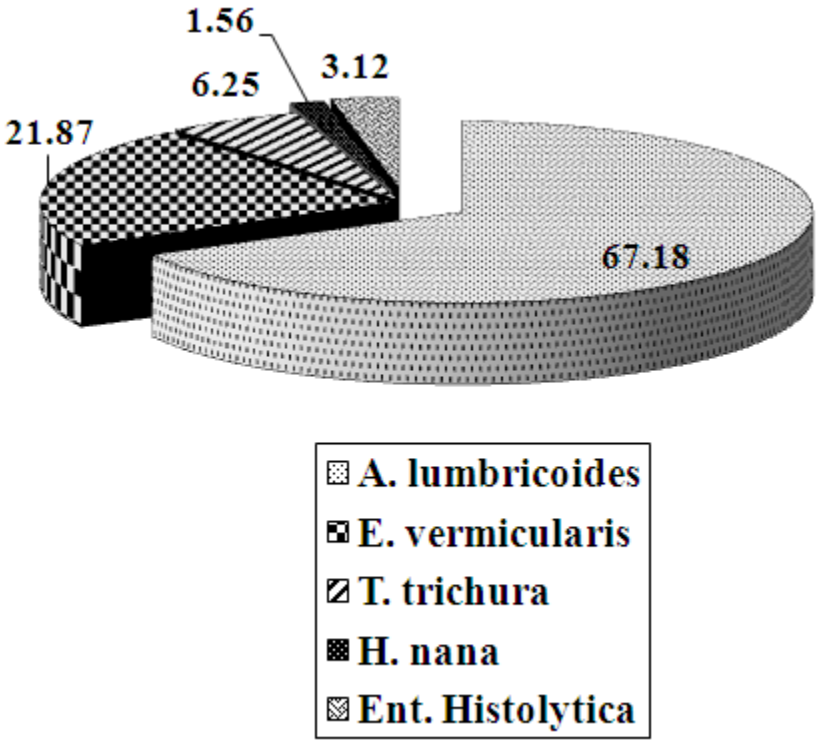

Figure 2. *Frequency of specific helminthiasis*

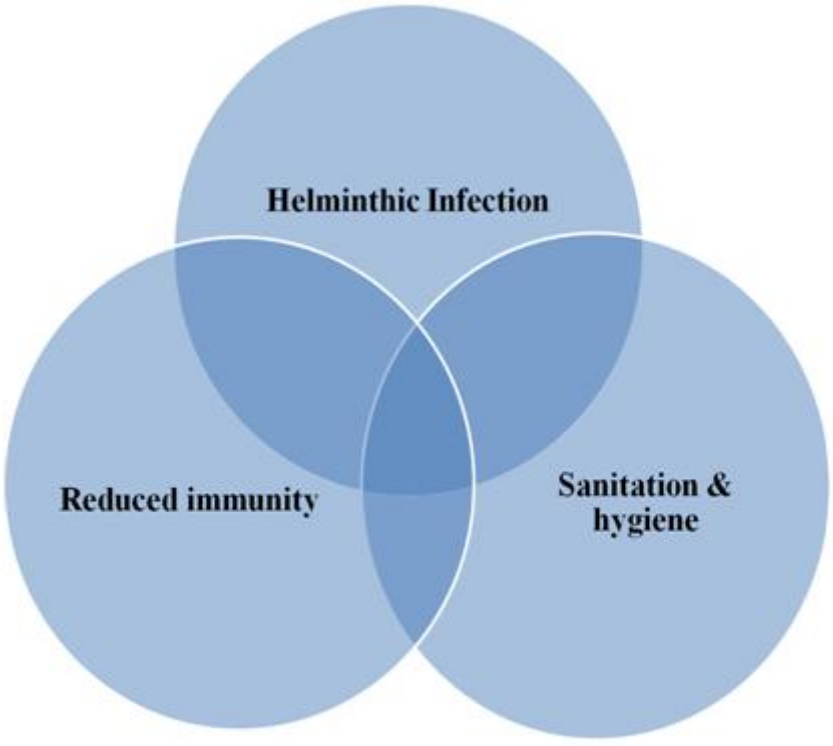

Figure 3. *Factors in causation of multiple diseases.*

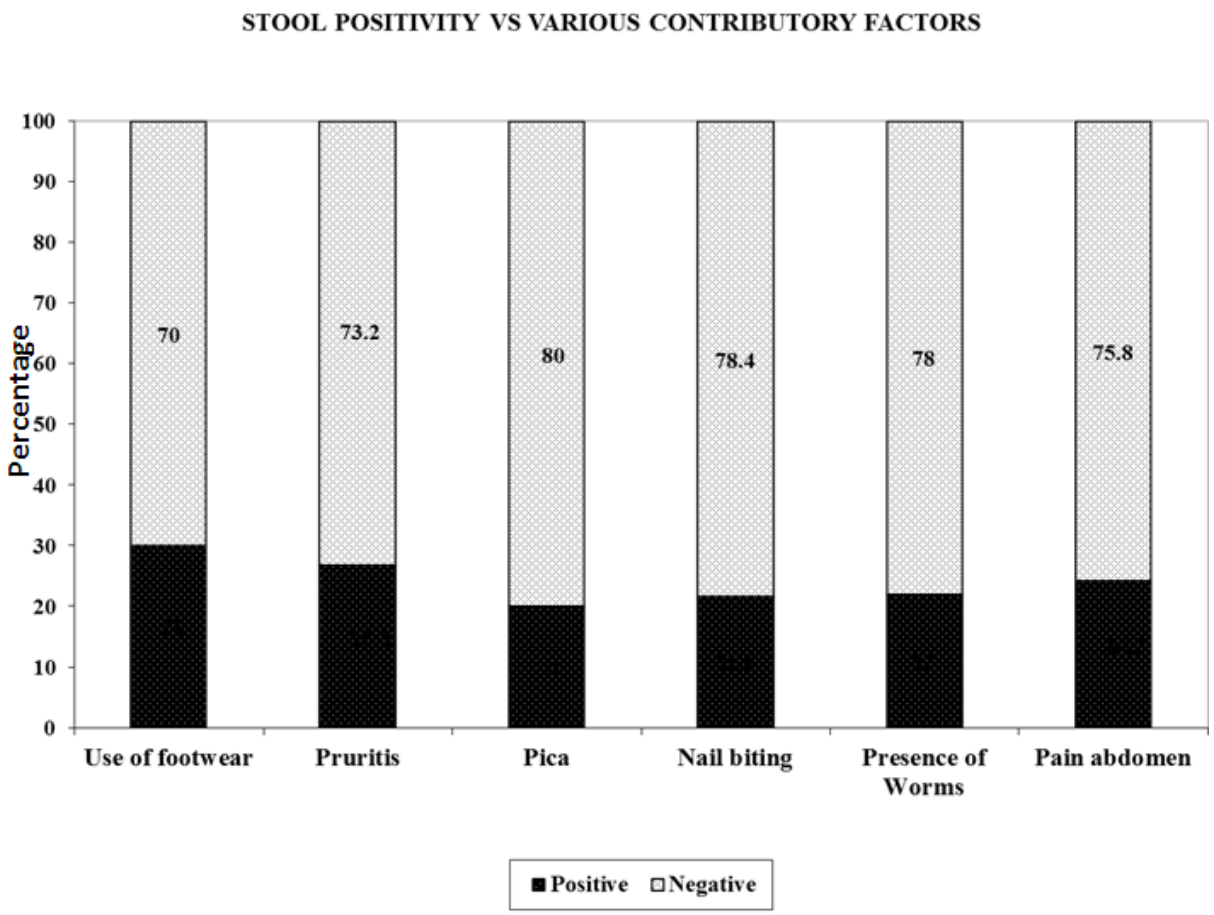

Figure 4. *Stool positivity versus various contributory factors.*

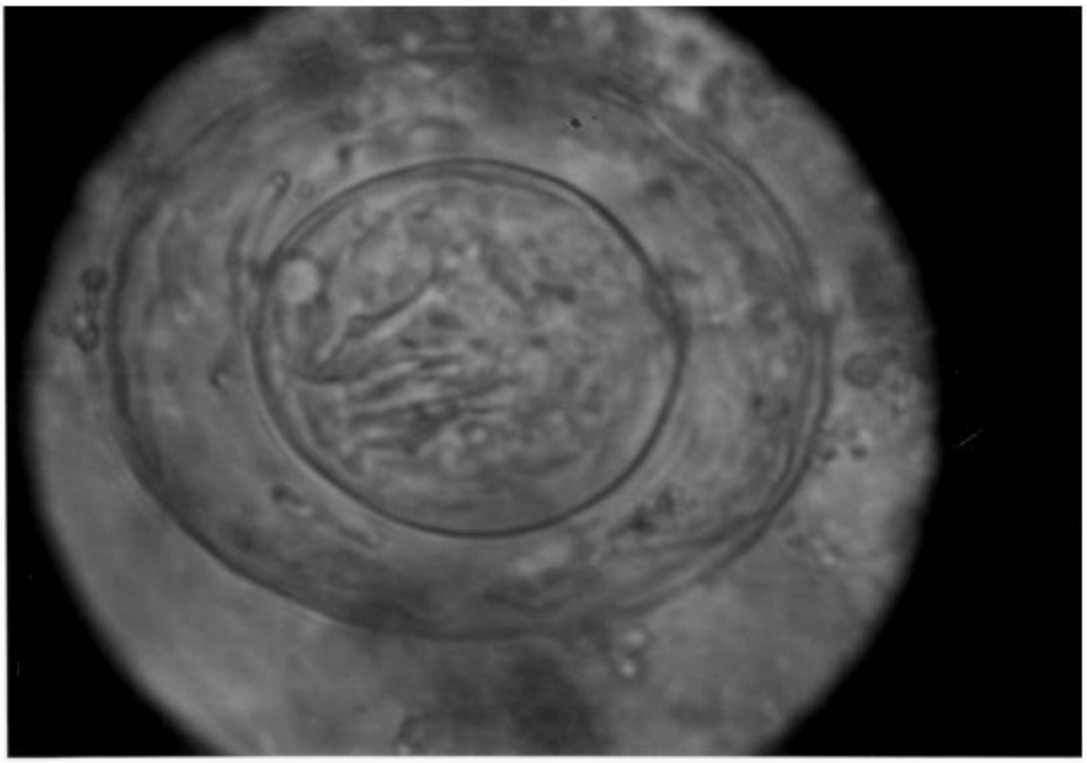

Figure 5. *Microscopic picture of H.nana.*

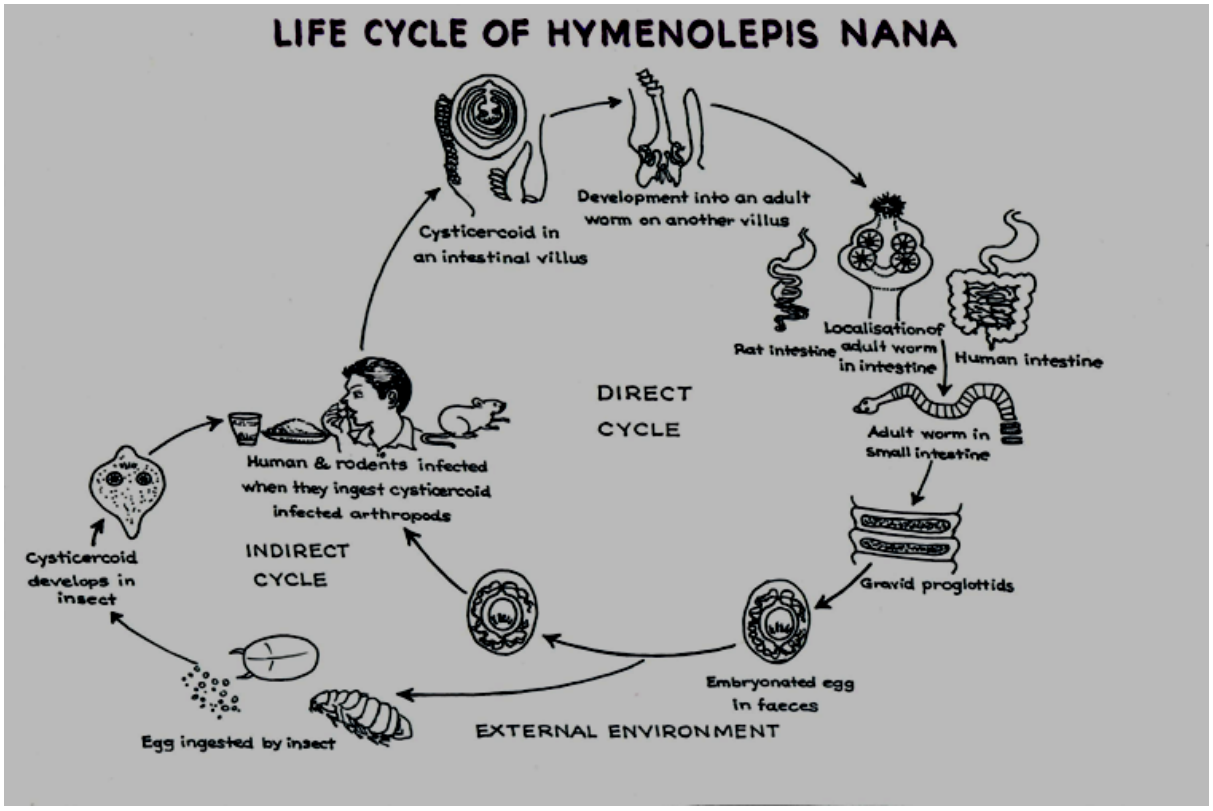

Figure 6. *Life cycle of H.nana.*

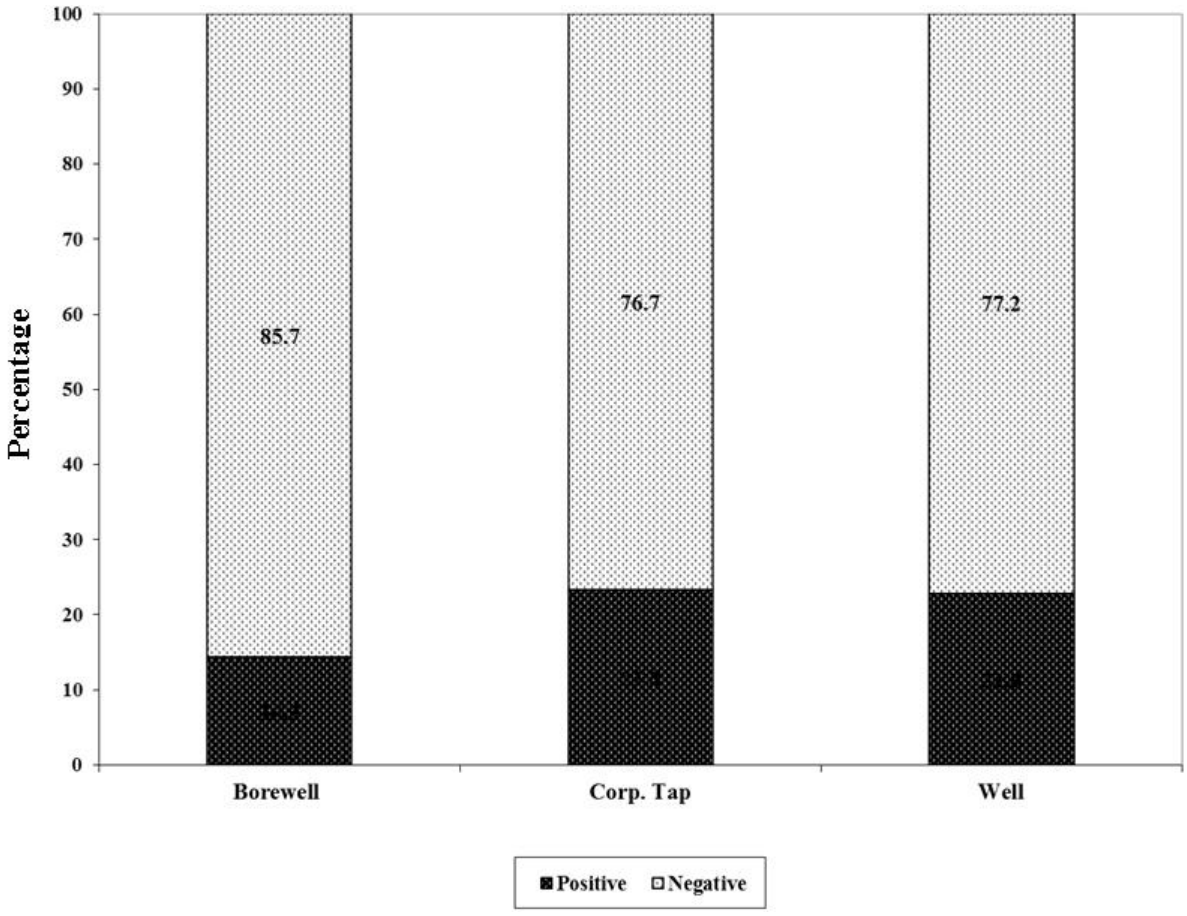

Figure 7. *Stool positivity versus sources of water.*

4. DISCUSSION

In our study, 280 school children were examined for helminthic infections and 64 of them showed positive stool report(i.e 23%) vide Figure 1.The individual breakup of stool positivity report were 67.18% for *Ascaris lumbricoides*,21.87% for *Enterobius vermicularis*, 6.25% of *Trichuris trichura* , 1.56% of *Hymenolepis nana* and 3.12% of *Entamoeba histolytica* vide Figure 2.

A clinical trial conducted by Muchiri EM etal showed cure rates for albendazole as 92.4% for hookworm infection, 83.5% for *ascaris lumbricoides* , and 67.8% *Trichuris trichura*. Mebendazole given either 2 or 3 times in a year had cure rates of 50 and 55% (respectively) for hookworm , 79.6 and 97.5% for *Ascaris lumbricoides*, and 60.6 and 68.3% for *T.trichura* infection in primary school children. These results indicate that the treatment with albendazole at a 6- month interval was more effective than mebendazole regimens and may be the best choice for use in the control of the 3 common geohelminths.The school children in our study had received in the previous year 2 doses of anthelmintic at 6 month interval. The stool positivity report almost parallels Muchiri EM et al. (Muchiri EM et al., 2001; Dada-Adegbola HO et al., 2005)

A parasitological survey carried out by the National Malaria Center (CNM) during the period of January to December 1998, in Cambodia, found that the prevalence of soil-transmitted helminthic infections in school children was between 10-40% for *Ascaris*,2-17% for *Trichuris* and 5-65% for hookworm. An intervention in an urban area showed that after repeated treatment with mebendazole 500mg single dose every 6 months, the prevalence of all parasites had dropped to about one third of the initial level.(Stephenson LS,2001; Sinuon M et al., 2003; Adams VJ et al., 2004; Scherrer et al., 2008)

The government of India to administer six monthly intervals to government school children and anthelmintic is laudable, but the menace of worm infestation as seen in our study has only reduced, definitely but not eradicated helminths. This is due to the multifactorial dimensions in the causation of helminthiasis vide figure 3.As seen in the schematic representation, the confluence of circles indicate the scholastic backwardness, multiple diseases and reduced weight.

From Figure 4, 30% of children without footwear and 26.8% of those with anal pruritis had stool report positive. Those with pica and nail biting showed 20% and 21.6% stool positivity, respectively. About 22% with history of passage of worms and 24.2% with pain abdomen had reported with stool positive for helminthes

Poor conditions of sanitation especially in the slums are an important deterrent to achieve eradication of helminthes. Source of potable water supply is also compromised and leads to the development of helminthic infestation Traditional practice of not using footwear aggravate the problem further. Repeated outdoor activities like playing in mud enhance the risk of helminthic infections. Poor hygiene practices at home like not washing hands before meals and after using toilets, not washing vegetables properly, eating food uncovered etc leads to maintenance of faeco-oral contamination. The absence of toilet facilities with running water supply in and around the house and using a common toilet or the outdoors hamper the eradication of helminthiasis . Unhygienic tendencies of nail biting, anal pruritis, pica further compound the development of worm infections. The one exceptional case of presence of *Hymenolepis nana* which was obtained in one child who was found to be living in a slum area that is infested with rats, is only the tip of iceberg. Figure 5.

It is worthwhile to recapitulate the life cycle of *H.nana* (the dwarf tapeworm) vide figure 6 which has a direct and an indirect phase in its lifecycle which is characterized by faeco-oral contamination. The cysticerca develop in the intestinal villus which quickly develops into adult tape worms measuring 4-5cm in length and 1mm in diameter. In the human intestine, the worm affects the upper part of gastrointestinal tract, while in the rat intestine the lower half is affected. The gravid proglottids release embryonated eggs in the faeces which may directly go back by faeco-oral contamination or enter the indirect cycle where the eggs are ingested by the grain- and flour eating beetles such as species of *Tribolium* and *Tenebrio*, fleas such as *Xenopsylla cheopis, Pulex irritans* and *Ctenocephalides canis* and moths which develop into cysticercoids which can contaminate human food and drink.

This random observance of *H.nana* requires to be notified in the local Municipal Corporation and effective measures to be implemented, to do away with rat menace.

The present study undertaken showed stool positivity of 23.4% for those using open fields and common outside lavatories.

According to a study carried out in Bangladesh,the stool samples revealed that more than half (53%) of study sample was still infected with one or more intestinal parasites even after 4 years of intervention. Ascariasis was found to have the highest prevalence rate (36.2%) and hookworm the lowest(10.7%).Intestinal parasitic infection was significantly lower among those who used a sanitary latrine and received health education. This result is consistent with observations that the effect of sanitation and health education is slow to develop. (Hosain GM et al., 2003)

In a study by Nematian J et al in 2004, the prevalence rate of intestinal parasitic infection among the students was 18.4%.Coinfection with two or three parasites was seen in 2%.With increase in educational level of parents (especially mothers), the infection rate of children was decreased. Nematian J etal and our study results show similar results and we have not resorted to any interventional measures that could pin point the various powerful determinants of parasitic infections as source of water, gender, educational and socioeconomic status. (Nematian J et al., 2004; Ndamukong KJ, 2005).

From Figure 7, with respect to source of water, the stool report positivity was 14.3% for bore well, 23.3% for corporation tap and 22.8% for well from amongst the 280 school children. It could be opined that there is higher tendency for corporation water to be contaminated.

Optimal use of anthelmintics in children is of major public health importance because the parasites involved probably infect over 2 billion persons, and most are especially common and debilitating in children. The world over at least 2 billion children are affected with parasitic infection which is a major health problem .there is a definite increase in morbidity and mortality of school children affected by parasitic infection. They have compromised growth rate, appetite, RBC count, physical fitness, school performance and cognitive functions. The incidence of parasitic infection mirrors the general health and hygiene of population, at large.

Anthelmintic chemoprophylaxis is advocated not only in school children but also their mothers. Interventions like community delivery of anthelmintic at appropriate dose and repeated intervals are mandatory. Geo helminthic infection is an indicator of hygienic practices, sanitation and potable water supply in an area. Hence, it is the paramount interest for a country to maintain the parasitic infection to sub minimal level.

5. CONCLUSION

In the present study of 280 school children who have received anthelmintic chemoprophylaxis showed stool positivity rates that are low. The significance should not be lost as the contributory factors have been quantified that can have a bearing to make the statistics even better. The factors leading to geo helminthic infections in our study were poor sanitation, contaminated water supply, poor hygienic practices non use of foot wear etc. The findings in our study almost paralleled observations of Muchiri etal in the year 2001and Nematian J etal in the year 2004. Appropriate interventional measures and continued chemoprophylaxis could alleviate this helminthic problem with health education specially to mothers, teachers and school children.

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