ORIGINAL ARTICLE

# Knowledge, Attitudes and Deworming Practice Regarding Soil-Transmitted Helminthiaisis among the Parents of School Going Children

Maheen Nazir[1], Aqiba Malik[2], Faizania Shabbir[3]

**ABSTRACT**

**Objective:** To assess the knowledge, attitudes and deworming practice regarding soil-transmitted helminthiasis among parents of school-going children in Rawalpindi.

**Study Design:** Descriptive cross sectional study.

**Place and Duration of Study:** The study was conducted at General Out- Patient Department (OPD) of Holy Family Hospital, Rawalpindi, from 20th February 2019 to 15th July 2019.

**Materials and Methods:** A pilot-tested, self-structured interview sheet was used to collect data from 350 parents who had at least one school going child. Non-probability consecutive sampling technique was used. Associations between socio-demographic variables and knowledge and between treatment beliefs and deworming practice were explored. The data analysis was done using statistical software program SPSS version 25.0.

**Results:** Most of the participants (71.7%) had adequate overall knowledge about soil-transmitted helminthiasis. Majority (84.3%) believed soil-transmitted helminthiasis to be harmful for children's health and wanted more awareness to be raised about the topic. Significant associations were found between the better educational status of parents ($p$=0.040), family/friends as sources of information ($p$=0.000) and adequate knowledge about soil-transmitted helminthiasis. Parents who said it was safe to give deworming medicines to children without STH had significantly higher odds (4.513, $p$=0.000) of giving deworming medicines to their children than those parents who believed it to be unsafe.

**Conclusion:** This study shows that most parents have adequate overall knowledge and correct attitude towards soil-transmitted helminthiasis. However, many parents have a misconception regarding the safety of deworming medicines and this significantly affects their deworming practice.

**Key Words***: Children's health, Helminthiasis, Parents, Public health.*

## Introduction

Soil-transmitted helminthiasis (STH) is a term referring to a group of parasitic diseases caused by nematode worms that are transmitted to humans by soil contaminated with feces. Soil-transmitted helminths infect almost 2 billion people worldwide. School-age children (5-14 years) are one of the three high risk groups for STH (along with preschool age children and women of reproductive age).[1] The World Health Organization (WHO) advocates the use of Albendazole and Mebendazole as safe, efficacious and cost effective antihelminthic drugs.[1]

According to global estimates, roundworm infections are the most prevalent (*Ascaris lumbricoides*; about 820 million) followed by hookworm (*Necator americanus and Ancylostoma duodenale;* about 460 million) and whipworm infections (*Trichuris trichuria;* about 440 million).[1,2] According to Pakistan's first nationwide STH survey conducted in late 2016,19 million school age children were in need of annual treatment throughout the country. Rawalpindi and Gujrat represented the areas of highest prevalence (56% and 31%, respectively).[3,4]

Chronic STH of heavy intensity leads to anemia, malnutrition and impaired mental and physical development, especially among children, resulting in low school attendance and poor school performance.[5,6] As a more far reaching consequence, STH can reduce economic productivity and trap

[1,2]*MBBS Student*
*Rawalpindi Medical University, Rawalpindi*
[3]*Department of Physiology*
*Gujranwala Medical College, Gujranwala*
*Correspondence:*
*Maheen Nazir*
*3rd Year MBBS Student*
*Rawalpindi Medical University, Rawalpindi*
*E-mail: maheennazir32@gmail.com*

*Funding Source: NIL; Conflict of Interest: NIL*
*Received: February 21, 2020; Revised: August 18, 2020*
*Accepted: August 27, 2020*

countries in poverty cycles.[6]

The prevalence rate of STH in Pakistan has not decreased over the last two and a half decades.[7] There can be several reasons for this. Insufficient knowledge about STH among parents was a predominant reason for the high prevalence among children in China.[8] Deficient knowledge is likely to be an easier causative agent to ameliorate compared to other factors linked to STH. These other factors, such as low socioeconomic status, insufficient sanitation and waste disposal, and a lack of clean water, require a much greater input of time and finances to improve.[9] Despite this, no study has been conducted so far in the Rawalpindi region to evaluate the various aspects of knowledge about STH among parents and the misconceptions regarding this disease that need to be overcome. Furthermore, the Government of Pakistan has recently launched a school-based deworming program in Islamabad and Rawalpindi to counter the prevalence of STH.[10] A study that explores the awareness and possible misconceptions of parents regarding STH can be used by the concerned authorities to devise an effective awareness campaign, which may then lead to better results from the actual deworming campaigns. Thus, this study was planned with an objective to assess the knowledge, attitudes and deworming practice regarding soil-transmitted helminthiasis among parents of school-going children in Rawalpindi.

## Materials and Methods

This was a descriptive cross-sectional study conducted from 20th February 2019 to 15th July 2019 at General Out-Patient Department (OPD) of Holy Family Hospital, Rawalpindi, after the institutional ethical approval was taken from Institute Research Forum (IRF). Parents of both genders, willing to participate, with at least one school-going child falling under the age group of 5-14 years, were included in the study. Parents working as doctors, nurses, and health workers were excluded from the study. Sample size was calculated to be 350, for a confidence level of 95% and margin of error 5%, based on the prevalence of knowledge about STH (65.3%) from a similar study conducted in Bangladesh.[11] Non-probability consecutive sampling technique was used. Every patient who arrived at the OPD between 8:00 am to 12:00pm and met the aforementioned criteria to be a participant was approached for the interview by the administrators. The interviews were conducted over a period of about 6 months till data from 175 mothers and 175 fathers had been collected. Verbal informed consent was obtained from all participants and confidentiality was assured.

The data collection tool was a 10-15 minute, pilot-tested, self-structured interview sheet in Urdu with questions that were adopted from related studies conducted in Bangladesh and Malaysia.[11,12] The interview sheet contained questions on demographic variables (age, highest level of education, socioeconomic status, number of children) and on knowledge regarding transmission, signs and symptoms, prevention and treatment of STH. In the attitudes section, parents were asked about whether they believed STH to be harmful for their children and wanted more awareness to be spread about STH. Lastly, parents were asked if they had ever administered deworming medicines to their child. The questions on knowledge were open-ended. Participants were not given options so as to eliminate the bias due to guessing. Instead, several possible responses to the questions were pre-recorded from previous studies and an initial pilot study. The answers to the knowledge questions during the actual data collection were usually one of these pre-recorded answers.

In knowledge about transmission, signs and symptoms and prevention, a maximum score of 2 was awarded for more than one correct pre-coded answer given by the parent; 1 mark was awarded for 1 correct answer and 0 marks were awarded for no correct answer. For knowledge about treatment, a correct response to each of the 3 questions was worth 1 mark. Thus, the highest achievable score was 9. Parents with a score of 5-9 were categorized as having adequate knowledge, whereas parents having scores below 5 were categorized as having inadequate knowledge.

To assess various aspects of knowledge, frequencies and percentages were calculated. Chi-square test was used to check for any significant associations. Binomial logistic regression was applied on the significant association found between treatment beliefs and deworming practice. *P*-value ≤0.05 was considered significant. The data analysis was done

using statistical software program SPSS version 25.0.

## Results

The mean age of the parents was 36.2 ± 9.2 years. Most parents 263(75.1%) had received some degree of formal education, while 87(24.9%) had received no formal education. Most participants belonged to low socio-economic status (165, 47.1%), followed by middle (128, 36.6%) and high socio-economic status (57, 16.3%). The majority of parents (223, 63.7%) had less than 3 children whereas 127(36.3%) had more than 3 children. Out of the 350 parents, 314 (89.7%) had heard about STH, whereas only 36 parents (10.3%) had never heard of the disease before. The most common sources of information about STH for participants were friends and family members (187, 53.4%). Table I shows that educated participants and those who heard about STH from friends or family were significantly more likely to have adequate knowledge about STH.

Table II indicates that out of 314 parents who had at least heard about STH, the majority correctly stated that ingestion of soil led to STH. Only about 17% incorrectly stated that eating sweet things led to STH. The common signs and symptoms told by the parents were mostly abdominal pain, anemia, pallor, and reduced growth despite overeating. The most commonly stated means of prevention by the participants was taking deworming medicines

**Table I: Association between Demographic Characteristics and Knowledge of Respondent about STH (N=350)**

| Demographic Characteristics | Knowledge Score | | Chi Square (df) | P-value |
|---|---|---|---|---|
| | Adequate | Inadequate | | |
| **Age** | | | | |
| Mean and below mean | 136(72.3%) | 52(27.7%) | 0.079(1) | 0.779 |
| Above mean | 115(71.0%) | 47(29.0%) | | |
| **Gender** | | | | |
| Father | 122(69.7%) | 53(30.3%) | 0.690(1) | 0.406 |
| Mother | 129(73.7%) | 46(26.3%) | | |
| **Socio-Economic Status** | | | | |
| Low(≤15k PKR) | 115(69.7%) | 50(30.3%) | 2.725(2) | 0.256 |
| Middle(16k-25k PKR) | 90(70.3%) | 38(29.7%) | | |
| High(>25k PKR) | 46(80.7%) | 11(19.3%) | | |
| **Education** | | | | |
| Educated | 196(74.5%) | 67(25.5%) | 4.120(1) | 0.042* |
| Uneducated | 55(63.2%) | 32(36.8%) | | |
| **Number of Children** | | | | |
| Three or less | 163(73.1%) | 60(26.9%) | 0.577(1) | 0.461 |
| More than three | 88(69.3%) | 39(30.7%) | | |
| **Source of information about STH** | | | | |
| Friends/Family | 153(81.8%) | 34(18.2%) | 50.530(4) | 0.000* |
| Clinic/Hospital | 51(73.9%) | 18(26.1%) | | |
| Health worker | 35(63.6%) | 20(36.4%) | | |
| Mass media | 5(71.4%) | 2(28.6%) | | |
| Do not remember | 7(21.9%) | 25(78.1%) | | |

**STH = Soil Transmitted Helminthiasis**

**Table II: Knowledge about Various Aspects of STH.**

| Knowledge Aspects | Number of Parents (N=314) | Percentage (%) |
|---|---|---|
| **Transmission** | | |
| Children eating soil | 158 | 50.3 |
| Eating contaminated food | 92 | 29.3 |
| Eating sweet things | 53 | 16.9 |
| Drinking contaminated water | 22 | 7.0 |
| Eating with dirty hands | 14 | 4.5 |
| Poor personal hygiene | 12 | 3.8 |
| Walking barefoot | 9 | 2.9 |
| Do not know | 66 | 21.0 |
| **Signs and Symptoms** | | |
| Abdominal pain | 112 | 35.7 |
| Anemia and pallor | 105 | 33.4 |
| Over-eating (but no weight gain) | 100 | 31.8 |
| Stunted/slow growth | 33 | 10.5 |
| Abdominal distension | 33 | 10.5 |
| Appetite loss | 33 | 10.5 |
| Worms seen in stool | 20 | 6.4 |
| Weight loss | 17 | 5.4 |
| Do not know | 34 | 10.8 |
| **Prevention** | | |
| Taking deworming medicines | 116 | 36.9 |
| Maintaining personal hygiene(cutting nails, regular bathing) | 87 | 27.7 |
| Not letting children play in soil | 48 | 15.3 |
| Washing hands | 42 | 12.0 |
| Not letting children eat sweet things(like toffees and sugar) | 31 | 9.9 |
| Avoid drinking contaminated water | 22 | 7.0 |
| Do not know | 43 | 13.7 |

**STH = Soil Transmitted Helminthiasis**

Fig. 1 shows knowledge about treatment of STH. Of the 314 participants, 285(90.8%) knew that medicines were available in pharmacies to treat STH. Only 85(27.1%) parents correctly stated that it was safe to give deworming medicines even to those children who do not have STH. Only 60(19.1%)

parents were of the incorrect opinion that a life time cure is provided by administering the medication only once. Overall, 251(71.7%) of the 350 participants had adequate knowledge about STH while 99(28.3%) had inadequate knowledge.

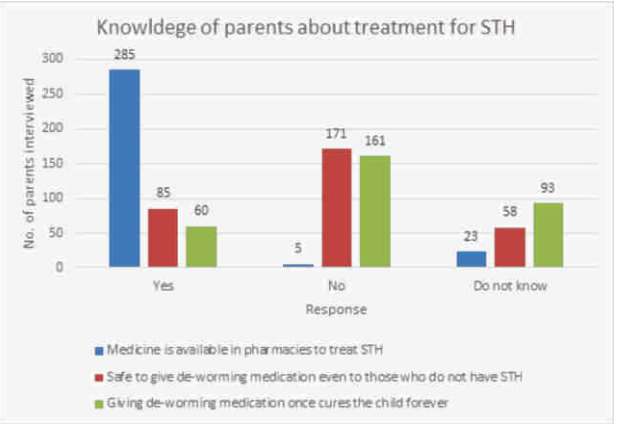


**Fig 1: Knowledge of Parents about Treatment of STH (N=314). STH: Soil-Transmitted Helminthiasis**

Out of the 350 parents, 295(84.3%) held the correct attitude that STH was harmful for children's health, 46(13.1%) did not know whether it was harmful and 9(2.6%) did not think it was harmful. Most participants (329, 94.0%) wanted more awareness to be spread about STH via mass media.

Slightly more parents had previously given deworming medicine to their child (178, 50.9%) than those who had not (172, 49.1%). In table III, binomial regression analysis shows that parents who said it was safe to give deworming medicines to children without STH had significantly higher odds (4.513, *p*-value=0.000) of giving deworming medicines to their children than those parents who believed it to be unsafe.

**Table III: Binomial Logistic Regression Analysis of Treatment Beliefs and Deworming Practice**

| Is It Safe To Give Deworming Medicines To Children Who Do Not Have STH? | Parents Have Given Deworming Medicines to Their Children | | |
|---|---|---|---|
| | Odds | 95% Confidence Interval (Lower-Upper) | *p* value |
| Yes | 4.513 | 2.299-8.860 | 0.000 |
| Don't Know | 1.426 | 0.804-2.530 | 0.225 |
| No | Reference | Reference | Reference |

## Discussion

In this study, the knowledge, attitudes and deworming practice regarding STH among parents from varied socio-demographic backgrounds was assessed. Education was found to be significantly associated with adequate knowledge. This is in accordance with a study conducted in South Africa.[13] An educated person is compelled to learn more about diseases from reliable sources such as internet articles and pamphlets. Most parents in our study obtained their information from friends or relatives and this was significantly associated with adequate knowledge. This is probably because, as shown by our study, most parents have sufficient knowledge about STH and can serve as reliable dissemination channels themselves. In South Africa, where below 50% of the participants had adequate knowledge about STH, parents who accessed health information through mass media were more likely to have adequate knowledge.[13]

Although most parents in our study (71.7%) were found to have adequate knowledge, only one other study, conducted in Kenya, reported that a reasonable proportion of participants had sufficient knowledge.[14] The rest of the surveys from China, Bangladesh, Malaysia, South Africa, western Côte d'Ivoire, Islamabad (Pakistan) and Nigeria reported poor knowledge about STH.[8,11,13,15,7] Misconceptions about STH were common in these studies. For example, 90% of the participants in a western Côte d'Ivoire village incorrectly stated that the consumption of particular eatables such as sweetened foods was the main cause of STH.[15] In our study, only 16.9% of the parents incorrectly mentioned eating sweet things as a cause of STH and 9.9% mentioned avoidance of eating sweet things for prevention.

Contact with soil as a cause for STH was correctly stated by very few of the participants (8.7% ) in Bangladesh, whereas in present study, children eating soil was the most commonly cited cause (50.3%).[11] Fatima et al reported that among the 151 mothers living in urban slums of Islamabad, 50% respondents did not know about the source of worm infection and only 13.9% knew about the medicine for worm infestation.[16] In contrast, only 21% of the participants in our study did not know about the source of infection and almost 91% knew about the medicine. In Nigeria, 88.4% of the study population did not know what preventive measures could be adopted for STH whereas only 13.7% of our study

population did not know any means of prevention for STH.[17]

To summarize, most other studies reported inadequate knowledge about transmission, signs and symptoms, and prevention of STH as opposed to our study which showed adequate knowledge in these areas. This may be attributed to the better education level of the parents in our study (75.1% were educated), compared to other studies (as in the survey conducted by Fatima et al in Islamabad, where 64% of the mothers were illiterate). Some of the surveys, such as the one in South Africa, also tested knowledge about the life-cycle of helminths, which was not tested in our survey. The difference in study setting could also have contributed to the discrepancy of results; in the other studies, parents were interviewed in a location other than the hospital, for example, in their households or in schools. In our study, they were interviewed in a tertiary hospital, where it is more likely that they had acquired knowledge about the disease from other patients or health professionals.

The most commonly stated means of prevention was taking deworming medicines (36.9%), but this percentage was lower in comparison to Bangladesh (94.2%).[11]Over the years, Bangladesh has had several more mass deworming campaigns compared to Pakistan, so it is understandable why more parents there knew that anti-helminthic drugs can serve as preventive chemotherapy. About 81% of the participants in our study agreed that administration of deworming medicines once was not enough to provide a lifetime cure. This suggests that most parents would approve of the WHO recommended biannual administration of antihelminthic medicines in areas where baseline prevalence is more than 50%.

Despite the overall adequacy of knowledge, a large majority (72.9%) had the misconception that it was unsafe to administer deworming medicines to school-age children who did not have STH. This is possibly due to lack of confidence in the efficacy of the drugs used and widespread fear of adverse side effects.[18]A similar mindset was reported in rural China where deworming medicines were thought to be unsafe for children and to cause infertility, despite the safety of medicines like Albendazole for school-age children being extensively confirmed in literature.[8]Our study showed that parents who believed it to be unsafe to administer deworming medicines to children without STH were less likely to administer deworming medicines to their children. In WHO recommended deworming programs, children are given deworming medicines irrespective of whether they have a diagnosed worm infection or not. If parents consider these medicines to be unsafe, they may not allow their children to take part in such programs. Therefore, targeted campaigns to clear any misconceptions regarding the safety of deworming medicines before the launch of deworming programs may lead to maximum participation of children in school-based as well as door- to- door health worker based deworming programs.

The limitation of this study is that the study setting is restricted to a single tertiary-care hospital and does not provide insight into level of knowledge about STH based on area of residence (rural or urban). Further studies should be conducted, especially in rural areas of Pakistan, to have a broader view on adequacy of knowledge and misconceptions regarding STH.

## Conclusion

This study shows that most parents have adequate overall knowledge and correct attitude towards soil-transmitted helminthiasis. However, many parents have a misconception regarding the safety of deworming medicines and this significantly affects their deworming practice.

## REFERENCES

1. World Health Organisation. Guideline: Preventive chemotherapy to control soil-transmitted helminth infections in at-risk population groups 2017. Report No.: 9241550112.
2. Pullan RL, Smith JL, Jasrasaria R, Brooker SJ. Global numbers of infection and disease burden of soil transmitted helminth infections in 2010. Parasit Vectors. 2014; 7:37.
3. Monohagan P. Pakistan's first nationwide STH survey: determining the intensity and prevalence of worm infections. [Internet]: Evidence Action; 2017 [cited 2019 March 27]; Available from: https://www.evidenceaction.org/blog-full/first-sth-survey-pakistan.
4. World Health Organization, IRD Pakistan, Indus Health Network, Institute of Development and Economic Alternatives, Evidence Action (2017) Baseline survey report of soil-transmitted helminthes prevalence in Pakistan;2017 [cited 2019 March 27]; Availablefrom:https://pndajk.gov.pk/uploadfiles/downloads/Baseline%20STH%2

0Survey_Pakistan_Final%20%20%20Survey%20Report.pd.

5. Al-Mekhlafi HM, Azlin M, Aini UN, Shaik A, Sa'iah A, Fatmah MS, et al. Protein-energy malnutrition and soil-transmitted helminthiases among Orang Asli children in Selangor, Malaysia. Asia Pac J Clin Nutr. 2005;14(2):188-94.
6. Hotez PJ, Fenwick A, Savioli L, Molyneux DH. Rescuing the bottom billion through control of neglected tropical diseases. The Lancet. 2009;373(9674):1570-5.
7. Blum AJ, Majid MF, Hotez PJ. Pakistan: A nation held back by NTDs. PLoS Negl Trop Dis. 2018; 12(10):e0006751.
8. Lu L, Liu C, Zhang L, Medina A, Smith S,Rozelle S. Gut Instincts: Knowledge, Attitudes, and Practices regarding Soil-Transmitted Helminths in Rural China. PLoS Negl Trop Dis. 2015; 9(3): e0003643.
9. de Silva NR, Brooker S, Hotez PJ, Montresor A, Engels D, Savioli L. Soil-transmitted helminth infections: updating the global picture. Trends Parasitol. 2003;19(12):547-51.
10. The Express Tribune. 17m children targeted for mass-deworming. [Internet]; 2019 [cited 2020 July 27]; Available from: https://tribune.com.pk/story/2123851/17m-children-targeted-mass-deworming
11. Nath TC, Padmawati RS, Alam MS, Das S, Murhandarwati EH. Elimination of soil-transmitted helminthiasis infection in Bangladesh: knowledge, attitudes, and practices regarding mass drug administration. J Glob Health Rep 2018; 2: e2018017.
12. Nasr NA, Al-Mekhlafi HM, Ahmed A, Roslan MA, Bulgiba A. Towards an effective control programme of soil-transmitted helminth infections among Orang Asli in rural Malaysia. Part 2: Knowledge, attitude, and practices. Parasit Vectors. 2013;6(1):28.
13. Sacolo-Gwebu H, Kabuyaya M, Chimbari M. Knowledge, attitudes and practices on schistosomiasis and soil-transmitted helminths among caregivers in Ingwavuma area in uMkhanyakude district, South Africa. BMC infectious diseases. 2019;19(1):734.
14. Masaku J, Mwende F, Odhiambo G, Musuva R, Matey E, Kihara JH, et al. Knowledge, practices and perceptions of geo-helminthes infection among parents of pre-school age children of coastal region, Kenya. PLoS Negl Trop Dis. 2017; 11(3): e0005514.
15. AckaCA, Raso G, N'Goran EK, Tschannen AB, Bogoch II, Seraphin E, et.al. Parasitic worms: knowledge, attitudes, and practices in western Côte d'Ivoire with implications for integrated control. PLoS Negl Trop Dis. 2010;4(12): e910.
16. Fatima SR, Qureshi AH, Kumar R, Naveed I, Khushik IA, Ronis K. Assessment of knowledge attitude and practice (KAP) about worm infestation and deworming among mothers of children under-5years of age living in the slum of Islamabad Pakistan. Isra Med J. 2016;8(1):23-19.
17. Oyebamiji DA, Ebisike AN, Egede JO, Hassan AA. Knowledge, attitude and practice with respect to soil contamination by Soil-Transmitted Helminths in Ibadan, Southwestern Nigeria. Parasite Epidemiol Control. 2018;3(4): e00075.
18. Lorenzo PJ, Manzanilla DR, Cortel DK, Tangog E. Community perceptions of mass drug administration for soil-transmitted helminthiasis and schistosomiasis in selected schools in the Philippines. Infectious diseases of poverty. 2019;8(1):87.