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**Original Research Article**

# Epidemiological determinants of parasitic infestation among 6-12 years old children in peri-urban area of Rohtak, Haryana, India

**Murti Devi[1], Vinod Chayal[2]***

[1]College of Nursing, Pt. B. D. Sharma PGIMS Rohtak, Haryana, India
[2]Department of Community Medicine, Pt. B. D. Sharma PGIMS Rohtak, Haryana, India

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***Correspondence:**
Dr. Vinod Chayal,
E-mail: drvinodchayal@gmail.com



## ABSTRACT

**Background:** Intestinal parasitic infestation is one of the commonest causes of chronic infection in humans in developing countries and is responsible for considerable morbidity and mortality. Despite the improved socio-economic conditions and elevated living standards, surprisingly it is still a public health problem even in developed countries, like the United States. Objectives of the study were to determine the association of factors associated with parasitic infestation among children of 6-12 years age.
**Methods:** A cross sectional survey approach was adopted to collect the data and 200 children (6-12 years) and their parents were finally included as per research criteria. Data was collected by interviewing the parents and children using structured interview schedule. Microscopic examinations of stool samples were also done for detection of ova and cysts of intestinal parasites.
**Results:** Out of 200 study subjects 65 (32.5%) were found to be positive for parasitic infestation namely *Giardia lamblia* (18.0%) *E. histolytica* (8.5%), *Taenia* (4.5%) and *H. nana* (1.5%). Majority of parasitic infestation i.e. (58.7%) was found among the children of illiterate mothers, (44.6%) in case of joint families and (44.8%) belonging to families having a monthly income less than Rs. 5,000.
**Conclusions:** In this study, it was found that mother's education, family income, type of family are significantly associated factors with parasitic infestation. The present study opens an area for the further planning such as improving the low socio-economic status, regular deworming of the children, promotion of usages of toilets and up gradation of water supply system as preventive measures in this setting.

**Keywords:** Parasitic infestation, Children, 6-12 years, Peri-urban area

## INTRODUCTION

Intestinal parasitic infestation is one of the commonest causes of chronic infection in humans in developing countries and is responsible for considerable morbidity and mortality. Despite the improved socio-economic conditions and elevated living standards, surprisingly it is still a public health problem even in developed countries, like the United States.[1] According to WHO (2009) It is estimated that as much as 60% of the world's population is infected with gut parasites, which may play a role in morbidity due to intestinal infections. 3.5 billion people are infected by intestinal parasites and around 450 million children are ill due to these infections and out of those, at least 50% are school-age children.[2] Parasitic infestation is more common in 5-14 years of age as they constitute 12% of total disease burden in children.[3] IPIs can affect the child development, educational achievement, reproductive health, and social and economic development.[4]

Parasitic infestation is one of the major public health problems in developing India. Children below the age of 15 years are the most highly affected group. Intestinal parasites are so wide spread that infections are often not even recognized as a medical problem. The high prevalence of this infestation is closely correlated to poverty, impure drinking water, and low socio-economic status, poor sanitation, coupled with low literacy rates of parents particularly the mothers and impoverished health services.[5]

Children are one of the most valuable groups in the society. Economic, social, political and environmental changes in society have maximum impact on children. Their development and wellbeing are influenced by a variety of factors including economic condition of family, education status of parents especially the mother, availability of safe drinking water and sanitary facilities, accessibility to health care services and availability of education.[6]

### *Conceptual framework*

Community as a client model which is an adaptation of Betty Newman's health care model was adopted for this study.

Aim of the study was to find out factors associated with parasitic infestation among children of 6-12 years age in peri-urban area, Ambedkar colony, Rohtak (Haryana). Objectives of the study were to find out prevalence of parasitic infestation among children aged 6-12 years and to determine factors associated with parasitic infestation among children aged 6-12 years.

## METHODS

The study was undertakenperi-urban area Ambedkar colony, Rohtak which serves as the urban field practice area of department of community medicine Pt. Bhagwat Dayal Sharma post graduate institute of medical sciences, Rohtak. Total population of Ambedkar colony is 1511 and there is one Anganwari center in this area. As per record of the Anganwari center, there are 200 children from 6-12 years of age. The permission from institutional ethical committee was taken before the commencement of study.

It was an interview based descriptive type of epidemiological study. The design adopted for the study was cross-sectional. A semi-structured and pre-tested interview schedule was used for interviewing the study subjects. The Performa administered to the study subjects was in local, vernacular language. The sample size was calculated by assuming prevalence of parasitic infestation as 30% (based upon different studies) at 90% level of significance and an allowable error of 10% in the study. The sample size calculated was 193, so total 200 subjects were enrolled. Total children of Ambedkar colony were 200, so all these children were selected by using universal sampling technique. These 200 children of 6-12 years of age were selected after taking their consent from their parents. The stool specimen of selected study subjects was taken after visiting their homes and their parents were considered for the study. All children and their parents were included in the study those were available and willing to participate during data collection. The health education to mothers and children regarding prevention and control of parasitic infestation was given. the study was conducted from May 2012 to June 2012

### *Data collection tools and stool sample collection technique*

As the study was done among children of 6-12 years age, hence the detailed information about the child and socio-demographic variables/factors was aggregated from the parents. Stool examination for parasitic infestation was carried out microscopically. At the time of interview, clean, wide-mouthed, leak proof and a sterile plastic stool container without any preservative were given to each subject's parents/guardians to collect a fresh morning stool specimen. A piece of stick (wooden specula) along with toilet tissue paper was also provided to them. The mothers were also guided as to how to collect the stool samples. Each individual container was labelled with the name and identification number of each stool specimen at the time of sample collection in the morning. Stool samples were examined within 2 hours of collection for the cysts and ova of intestinal parasites by direct microscopic examination. The tests were conducted in microbiology laboratory (for stool examination) of the Pt B. D Sharma PGIMS, Rohtak, and Haryana. Saline wet mount, saturated salt flotation technique and Lugol iodine wet mount preparation were examined for the detection of ova and cysts under the low power (10x) and high power (40x) of microscope. Macroscopic examination was carried out for each and every stool specimen for the detection of adult intestinal Helminths such as *Ascaris lumbricoides*, *Enterobius vermicular* is or segments of tape worm and others.

### *Data analysis*

The data was collected, compiled and entered in MS excel sheet and was analysed using SPSS software. Chi square test of association was used. The data was represented in form of proportions, tables and charts.

## RESULTS

The study was undertaken peri- urban area Ambedkar colony of district Rohtak, Haryana. A total of 200 students were enrolled in the study. Stool sample all the study subject was collected and examined as per protocol.

It can be deduced from the Figure 1 that the prevalence was found to be maximum i.e., 38.2% among the study subjects in the age-group 8-10 years. whereas a minimum prevalence of 30.2% was observed in the age-group 10-12

yrs. No significant association between the age-group and parasitic prevalence (p value=0.572).

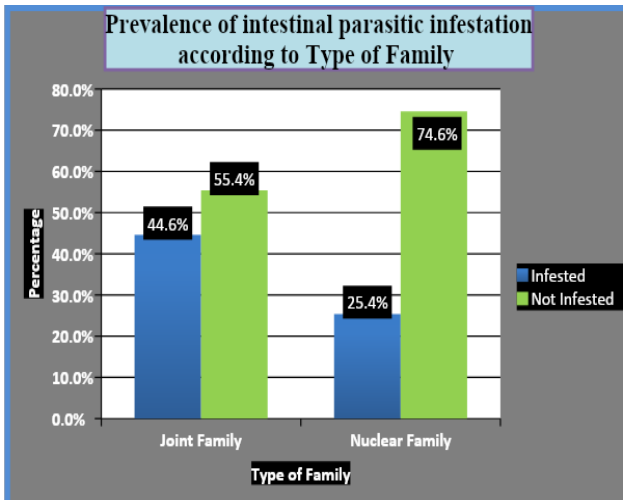


**Figure 1: Prevalence of intestinal parasite infestation according to type of family.**

**Table 1: Prevalence of intestinal parasitic infestation as per age-groups (n=200).**

| Age-group (year) | Infested (%) | Not infested (%) | Total children (%) |
|---|---|---|---|
| **6-8** | 28 (30.4) | 64 (69.6) | 92 (100.0) |
| **8-10** | 21 (38.2) | 34 (61.8) | 55 (100.0) |
| **10-12** | 16 (30.2) | 37 (69.8) | 53 (100.0) |
| **Total** | 65 (32.5) | 135 (67.5) | 200 (100.0) |
| | $\chi^2$=1.117, df=2, p=0.572 | | |

A total of 115 male children were examined, out of which, 36.5% were found to be infested with parasites. Out of the 85 female children, only 27.1% were found to be infested. No significant correlation between the gender and corresponding infestation (p value=0.158).

**Table 2: Association of parasitic infestation as per mother's education.**

| Mother's education | Infested (%) | Not infested (%) | Total examined |
|---|---|---|---|
| **Illiterate** | 37 (58.7) | 26 (41.3) | 63 (100.0) |
| **Primary** | 17 (37.0) | 29 (63.0) | 46 (100.0) |
| **6th-12th** | 10 (13.2) | 66 (86.8) | 76 (100.0) |
| **Graduate and above** | 1 (7.7) | 12 (92.3) | 13 (100.0) |
| **Total** | 65 (32.8) | 133 (67.2) | 198* (100.0) |
| | $\chi^2$=36.583, df=3, p=0.000 | | |

*2 mothers were not alive.

Table 2 shows that only 198 study subjects have been taken into account out of the total sample of 200 since 2 mothers were not alive and the dead mothers had no role in child care.

The majority of parasitic prevalence i.e., 58.7% was found to be common among the children of illiterate mothers while the minimum infestation i.e., 7.7% was recorded in case of mothers who were graduates or had obtained further qualifications.

The parasitic prevalence was 37.0% in case of mothers educated up to the primary level followed by 13.2% among the children belonging to the mothers educated up to the classes in the range 6th-12th. Association of mother's education with worm infestation of child was found to be significant with p value<0.01

**Table 3: Association of IPIs in relation to the type of family (n=200).**

| Type of family | Infested (%) | Not infested (%) | Total examined |
|---|---|---|---|
| **Joint** | 33 (44.6) | 41 (55.4) | 74 100.0) |
| **Nuclear** | 32 (25.4) | 94 (74.6) | 126 (100.0) |
| **Total** | 65 (32.5) | 135 (67.5) | 200 (100.0) |
| | $\chi^2$=7.832, df=1, p=0.005 | | |

The parasitic prevalence was found to be 44.6% in case of joint families while only 25.4% in case of nuclear families. The association between type of family and parasitic infestation was found to be statistically significant with more prevalence in joint families as described in Table 3.

**Table 4: Association of intestinal parasitic infestation among children in relation to family income (n=200).**

| Total family income (Rs.) | Infested (%) | Not infested (%) | Total examined |
|---|---|---|---|
| **<5000** | 39 (44.8) | 48 (55.2) | 87 (100.0) |
| **5001-10,000** | 12 (29.3) | 29 (70.7) | 41 (100.0) |
| **10,001-15,000** | 11 (31.4) | 24 (68.6) | 35 (100.0) |
| **15,001-20,000** | 1 (10.0) | 9 (90.0) | 10 (100.0) |
| **>20,000** | 2 (7.4) | 25 (92.6) | 27 (100.0) |
| **Total** | 65 (32.5) | 135 (67.5) | 200 (100.0) |
| | $\chi^2$=16.297, df=4, p=0.003 | | |

It is evident from Table 4 that the parasitic infestation was found to be maximum (44.8%) among the children belonging to families having a monthly income less than Rs. 5,000 (<5,000) whereas a minimum infestation of 7.4% was observed in case of families with a monthly income of Rs. 20,000 and above.

The prevalence of parasitic infection was recorded to be 31.4% in case of families with monthly income in the range of Rs. 10,000-15,000 followed by 29.3% in families with a monthly income between Rs. 5,000-

10,000 and only 10.0% among the children from families with an income in the range Rs. 15,000-20,000.

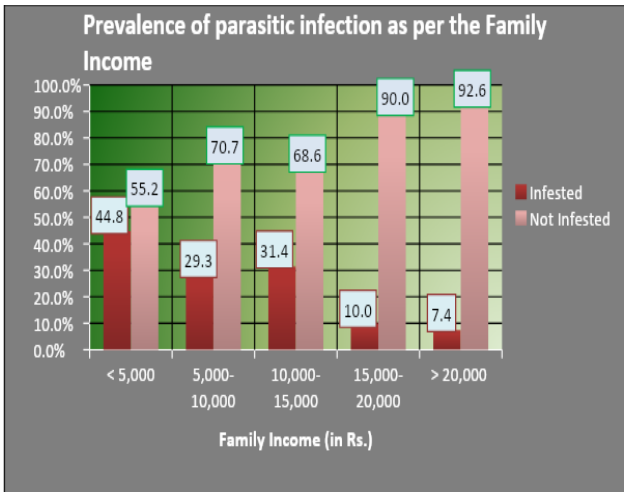


**Figure 2: Prevalence of parasite infection as per the family income.**

It is quite obvious from the statistics stated above that the parasitic infestation varies greatly with the family income. There is significant association between the parasitic prevalence among the study subjects and their family income (p value<0.05).

## DISCUSSION

The present cross-sectional study was conducted to determine the association of factors associated with parasitic infestation among children of 6-12 years age in peri-urban area Rohtak. Descriptive survey approach was adopted to collect the data and 200 children (6-12 years) and their parents were finally included as per research criteria. Data was collected by interviewing the parents and children using structured interview schedule. Microscopic examinations of stool samples were also done for detection of ova and cysts of intestinal parasites.

Out of 200 study subjects 65 (32.5%) were found to be positive for parasitic infestation namely *Giardia lamblia* (18.0%) *E. histolytica* (8.5%), *Taenia* (4.5%) and *H. nana* (1.5%). Protozoa contributed to 81.5% of the total parasitic infestation, while the helminthic infestation was only 18.5%. All the samples contained a single parasite and no case of mixed infection was found**.** Studies carried out in various parts of India have reported a prevalence of IPIs from 30 to 50% among school going children.[7,8] Bora et al also found a prevalence of 31.5% in school children.[3] The prevalence of intestinal protozoa found in this study was higher than that of helminths. Similar results have been reported in previous studies conducted in this area, in and around Rohtak, in or around Chandigarh by Arora, Bansal, Sehgal et al.[4,5,9] This is in contrast with the few reports conducted in other parts of India like Awasthi, Fernandez and Wani et al.[10,11,16] Out of 115 male children, 42 (36.5%) were found to be infested with parasites and Out of the 85 female children, only 23 (27.1%) were found to be infested. Ages, gender, parents' occupation, standard of class and father's education were not significantly associated with the parasitic infestation. A direct dependence of parasitic prevalence on the family income was found significant. Majority of parasitic infestation i.e., 37 (58.7%) was found to be common among the children of illiterate mothers while the minimum infestation i.e., 1 (7.7%) was recorded in case of mothers who were graduates or above qualification (p value=0.000). There was a highly significant correlation between parasitic infestation and mother's education. According to the type of family (joint/nuclear), the parasitic infestation was found to be 33 (44.6%) in case of joint families while only 32 (25.4%) in case of nuclear families (p value=0.005). Therefore, a significant correlation was found out between parasitic infestation and types of family. Maximum infestation 39 (44.8%) among the children belonging to families having a monthly income less than Rs. 5,000 (<5,000) whereas a minimum infestation of 2 (7.4%) was observed in case of families with a monthly income of Rs. 20,000 and above (p value=0.003) there was a significant correlation between parasitic infestation and family income. As per the statistics obtained in my study, family income had a significant impact on the prevalence of IPIs in the study area. Infestation curve decreased exponentially with respect to family income with a peak value in case of families having monthly income less than 5000. Financially status of family to be directly associated with the parasitic infestation. Age was not found to be the determining factor for IPIs among children which is in accordance with various studies conducted in other parts of the world.[12-14] Even though gender was not a significant risk factor for prevalence of IPIs, males (36.5%) were more likely to be infected than females (27.1%). These findings can be partially explained by the difference in gender behaviour, males in their early age are likely to acquire work responsibilities in outdoor environments and girls are likely to commence duties indoors because of social restrictions. Similar results were reported by a study conducted in Lalitpur district.[15] In this study, it was found that mother's education was a significant risk factor for the prevalence of parasitic infection. Mother's education has been found to be the most important risk factor of parasitism in other studies as well.[16] A high percentage of children of uneducated mothers were found positive for IPIs (58.7%). This revealed that mother's education was a significant risk factor for the prevalence of parasitic infestation. Findings indicate that prevalence of IPIs is significantly associated with mother's education i.e., prevalence of infestation decreases as the level of mother's education increases. Mother's education has been found to be most important risk factor of parasitism in other studies as well as observed that mother's education was important for bringing up of children in urban slum and rural or economically weaker sections of the society.[17] Educated mothers can train their children well and maintain better health than uneducated mothers. In this study, the findings revealed that children included in our study were

either from joint families or nuclear families. The prevalence of parasitic infestation was found to be significantly high i.e. 44.6% among children living in joint families, which might be due to relatively poor sanitation, and less parental care in case of joint families.

***Limitations***

Due to limitation of time**,** the single stool examination was conducted for detection of intestinal parasites which could have underestimated the prevalence as optimal laboratory diagnosis requires at least three stool specimen examinations for diagnosis of IPIs.

## CONCLUSION

The prevalence of Giardia lamblia was highest in the present study; it signifies the need for upgradation of water supply system in this area. As per the qualitative observations, poor pig husbandry practices were widespread in the study area. Hence, a small but significant prevalence of *Taenia* in the study was partially due to the habit of consumption of pork and partially due to the unhygienic rearing of pigs in front of some homes. A well-planned and effective health education campaigns should be organized for the masses with the mothers and their children being the targeted population.

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*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

1. Jamaiah I, Rohela M. Prevalence of intestinal parasites among members of the Public in Kuala Lumpur, Malaysia: Southeast Asian J Trop Med Public Health. 2000;36:68-71.
2. Schliessmann DJ. Diarrhoeal disease and environment. Bulletin of the World Health Organization. 1959;21:381.
3. Luong TV. De-worming school children and hygiene Intervention. Int J Environmental Health Res. 2003;15(9):8.
4. Adeyeba OA, Akinlabi AM. Intestinal Parasitic infection among school children in a rural community, south west Nigeria. Nigerian J Parasitol. 2002;23:11-8.
5. Nematian J, Gholamrezanezhad A, Nematian E. Giardiasis and other intestinal parasitic infections in relation to anthropometric indicators of malnutrition: a large, population-based survey of schoolchildren Tehran. Ann Trop Med Parasitol. 2008;102:209-14.
6. Marlow D. Textbook of Pediatric Nursing.6th ed. Philadelphia: W.B. Sounder's publications. 1988.
7. Stephenson LS, Latham MC, Ottesen EA. Malnutrition and parasitic Helminthic infections. Parasitol. 2000;121:S23-38.
8. Ramesh GN, Malla N, Raju GS, Sehgal R, Ganguly NK, Mahajan RC, et al. Epidemiological study of parasitic infestations in lower socio-economic group in Chandigarh (north India). Indian J Med Res. 2005;93:47-50.
9. Ekpenyong E. Prevalence of intestinal Helminths infections among school children in Tropical Semi Urban Communities. Anim Res Int. 2008;5:804-10.
10. Okyay P, Ertug S, Gultekin B, Onen O, Beser E. Intestinal parasites prevalence and related factors in school children, a western city sample- Turkey. BMC Public Health. 2004;22:4-64.
11. Sackey ME, Weigel MM, Armijos RX. Predictors and nutritional consequences of intestinal parasitic infections in rural Ecuadorian children. J Trop Pediatric.2003;49:17-23.
12. Paul I, Gnanamani G, Nallam NR. Intestinal helminth infections among school children in Visakhapatnam. Indian J Pediatric. 1999;66:669-73.
13. Naish S, McCarthy J, Williams GM. Prevalence, intensity and risk factors for soil-transmitted helminthic infection in a South Indian fishing village. Acta Trop. 2004;91:177-87.
14. Wani SA, Ahmad F, Zargar SA, Dar PA, Dar ZA, Jan TR et al. Intestinal Helminths in a population of children from the Kashmir valley, India. J Helminthol. 2008;82:313-7.
15. IPA's Deworm the World (DtW) initiative, collaboration with Partnership for Child Development, has exciting news to share. DtW released a statement reporting. Available from: www.poverty-action.org/node/4745 –. Accessed on 5 April 2020.
16. Park K. Text Book of Preventive and Social Medicine. New Delhi: Banarsidas Bharat Publishers, 2011:37.
17. WHO Software for assessing growth and development of the world Children. 2nded. Geneva. 2006.

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