

Association Between Age, Sex, Religion and Helminthic Infection Among Children Aged Between 5 to 13 Years: An Institutional Based Study

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ABSTRACT

Background: Worm infestation is a major Health problem in children of developing countries, its effective prevention and control requires identification of local risk factors particularly among high risk groups. The present study was conducted to study t various factors like age, sex, religion and helminthic infection among children aged between 5 to 13 years.

Material and Methods: A cross-sectional study on 352 children at Govt. Primary school, Rajapur was conducted from January 2007 to June 2008. Children were interviewed using pre-tested proformas to identify the risk factors and prevalence of Helminthic infestation. Stool examination was done by using the formal ether concentration technique in microbiology laboratory at M. R. Medical College. Statistical analysis was done by using the percentage, chi-square, SPSS statistical software.

Results: Out of 352 children 162 tested positive for various intestinal helminth's in the age group 5 to 13 years. The overall prevalence of Helminthic infestation was 46.02% the predominant parasites were *Ascaris Lumbricoides* 48.77% followed by *Hymenolepis Nana* 27.16% *Ancylostoma duodenale* 11.73%, *Trichuris Trichiura* 9.88% & *Enterobius vermicularis* 2.46%. 4.94% cases were of mixed infection. Helminthic infestation among males was 48.33% and females 43.60%. Religion, Sex, Type of family were not significantly

associated with Helminthic infestation ($p>0.05$). The association between prevalence of Helminthic Infestation and KAP of children was also found to be Significant.

Conclusion: This study concluded that the prevalence of Helminthic infestation among primary school children were high and need to be addressed.

Keywords: Prevalence, Risk Factors, Helminthic Infestation, *Ascaris Lumbricoides*, *Hymenolepis Nana*, *Ancylostoma duodenale*.


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Article History:

Received: 28-09-2019, Revised: 21-10-2019, Accepted: 17-11-2019

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.6.037	

INTRODUCTION

The word Helminthic is derived from the Greek and means worms. The disease produced by these worms is known as Helminthiasis. It is a major public health problem known to the mankind since ages. Yet Helminthic infections are indeed one of the most common and neglected of diseases.¹ In 1999 WHO estimated that Helminthic infections represented more than 40% of the disease burden caused by all tropical diseases excluding malaria.² Globally over 3.5 billion people are infected with intestinal worms of which 1.47 billion are with roundworm 1.3 billion people with hookworm and 1.05 billion with whipworm. About 400 million school age children are infected with roundworm, whipworm and hookworm worldwide a large Proportion of whom are from South

East Asian region.³ Intestinal Helminthic is more prevalent throughout the tropics, especially among poor communities and record shows increasing trends in Helminthic infection particularly in developing nations due to poverty poor sanitation inadequate personal hygiene and lack of knowledge of worm infestation.⁴ In India overall prevalence rate ranges from 12.5%⁵ to 76.51%⁶ with varying prevalence rate for Individual parasites. Among school children aged between 7 to 13 years the prevalence of Helminthic infection was 82%.⁷ The Government of India has launched various Programme to improve the water supply & sanitation like National water supply & sanitation Programme in 1954, Accelerated rural water supply programme in 1972-73⁸, Revised

Twenty point programme in 1986⁹ and SWASTHH programme (School water and sanitation towards health and hygiene in 2000).¹⁰ Total Sanitation campaign in 2002. Urban sanitation programme & national slum development programme.⁸ In spite of all these interventions the prevalence in India is high. Therefore to improve the present scenarios of worm infestation problem a change in the strategy are required, especially to reduce the prevalence rate.⁴ Hence this study was formulated with the intention to know about the prevalence of Helminthic infestation & associated risk factors among children studying at Govt. primary school Rajapur which is under the field practice area of Department of Community Medicine, M. R. Medical College Gulbarga.

MATERIALS AND METHODS

The present cross-sectional study was carried out to determine the prevalence of Helminthic infestation in children of Govt. Primary School of Rajapur which is under the field practice area of Department of Community Medicine, M. R. Medical College, Gulbarga. Rajapur from 1st January 2007 to 30th June 2008. Prior the commencement of the study ethical approval of Ethical Committee of the institute and administrative permission and support obtained from the Head mistress Govt. Primary School. Rajapur, Gulbarga to carry out the study. The study subjects comprised of 380, i.e. all children enrolled in the Govt. primary school of Rajapur from 1st to class 7th standard, during the course of study. All children attending Govt. primary school of Rajapur were included in the study. Children who are enrolled, taken transfer from the school or remained absent during the course of the study were excluded from the study. A pilot study on 40 subjects was conducted. With minor changes in the initial questionnaire a final proforma was designed and the study

continued. The questionnaire deals with general data and family particulars of children, general physical examination of the children, KAP of children about Helminthic infection. All the subjects were personally contacted and interviewed in their school. A general physical examination was done, the information was collected and recorded in the pre-tested proforma. For collection of stools samples, the subjects were explained the purpose & objectives of the study, and also how to collect the stool samples. The children were supplied with labelled sealed plastic containers with applicator and instructed to bring fresh stool samples the next day. All the specimen was checked for their label, quantity and immediately shifted to Microbiology laboratory at M. R. Medical College for examination. By Microscopic stool examination. Helminthic infections were diagnosed by detecting egg and larvae in the given stool sample by using formalin-ether concentration. The egg was identified according to the Key proposed by the WHO¹¹. Weight was taken in standing position without footwear measuring to an accuracy of 0.5 kg. Height was measured with a calibrated measuring tape marked in centimetres. The measurement was taken in erect standing position bore foot with feet together heels against the wall and looking straight ahead. Stool examination was done by using formalin-ether concentration technique One gram of faeces was suspended in 10ml of 10% formaldehyde solution and mixed with a glass rod the suspension was passed through a funnel covered with a gauze pad into a centrifuge tube, then 3ml of ether were added and the suspension was mixed for 1 minute. The tube was centrifuge for 1 minute at 4000RPM. After discarding the supernatant, the rudiment was examined by sampling a drop with a Pasteur pipette and depositing it on a glass slide. The eggs were identified according to the key proposed by the WHO¹¹. The data was analyzed and tabulated by applying chi-square test.

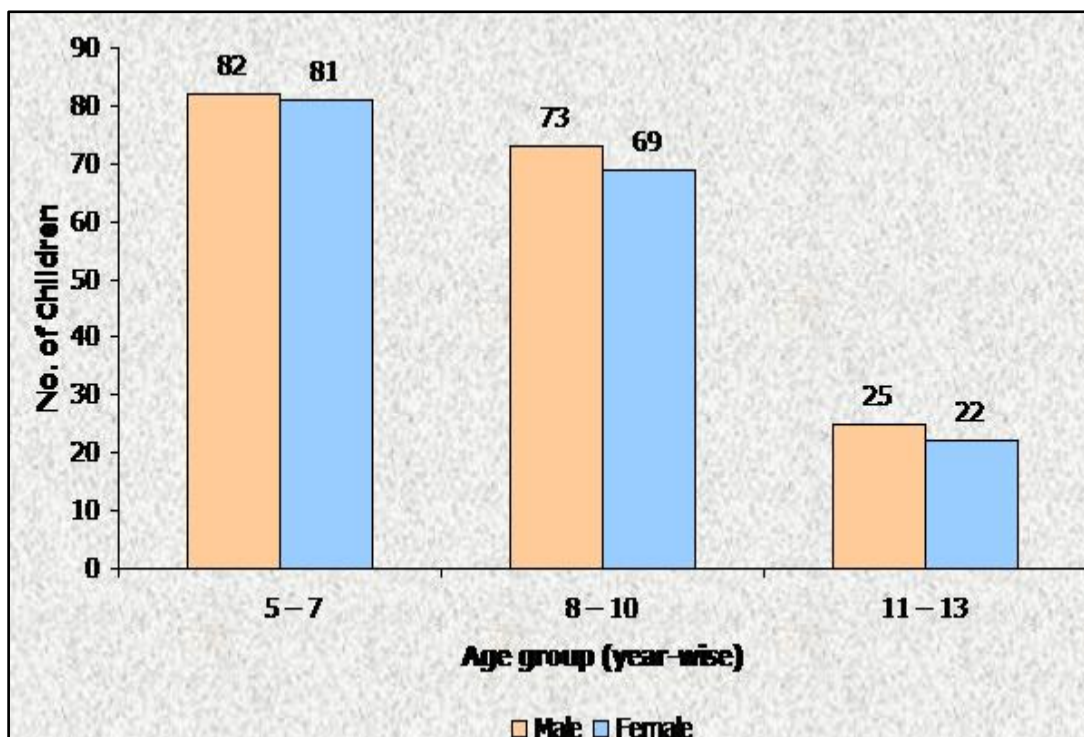


Figure 1: Age and sex wise distribution of children

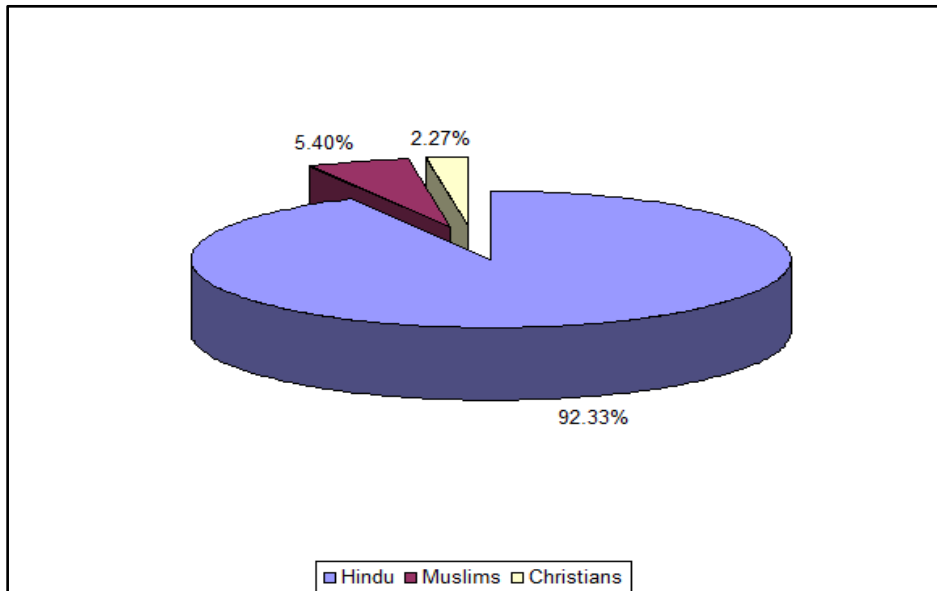


Figure 2: Distribution of children based on religion

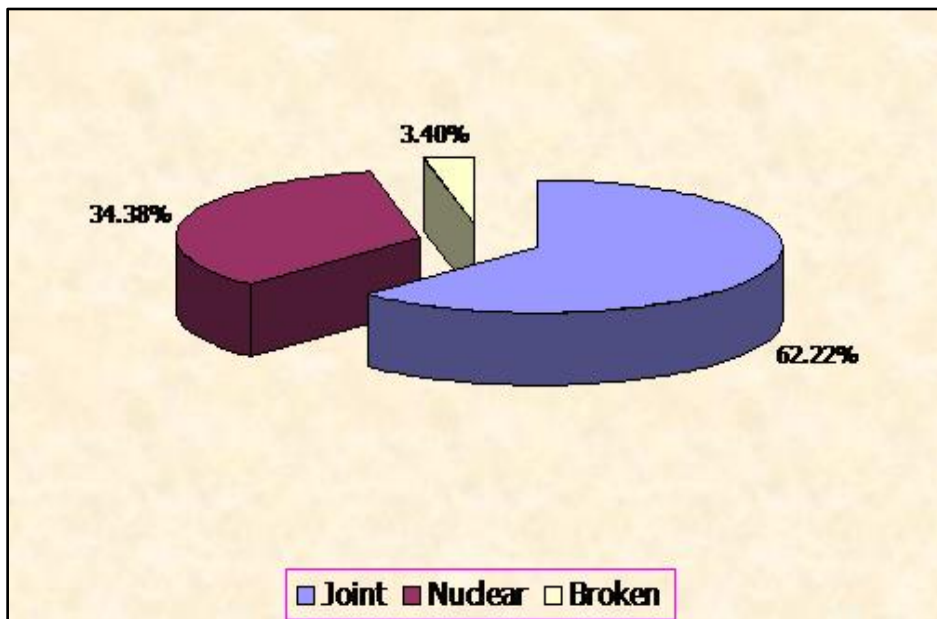


Figure 3: Distribution of children based on type of family

Table 1: Prevalence of Helminthic infestation

Helminthic infestation	Children	
	Number	Percent
Present	162	46.02
Absent	190	53.98
Total	352	100.00

Table 2: Prevalence of various intestinal Helminthic infestation in children

Helminth	Children	
	Number	Percent
Ascaris Lumbricoids	79	48.77
Hymenolepis Nana	44	27.16
Ancylostoma Duodenale	19	11.73
Trichuris trichiura	16	9.88
Enterobius Vermicularis	4	2.46
Total	162	100.00

Table 3: Mixed intestinal Helminthic infestation in children

Helminth	Children	
	Number	Percent
Ascaris Lumbricoids + Ancylostoma Duodenale	4	50
Ascaris Lumbricoids + Trichuris trichiura	3	37.50
Ascaris Lumbricoids + Hymenolepsis Nana	1	12.50
Total	8	100.00

Table 4: Association between Age and Helminthic infestation

Age	Helminthic infestation				Total	
	Present		Absent		Number	Percent
	Number	Percent	Number	Percent		
5-7	87	53.37	76	46.63	163	46.31
8-10	57	40.14	85	59.86	142	40.34
11-13	18	38.30	29	61.70	47	13.35
Total	162	46.02	190	53.98	352	100.00

$\chi^2 = 6.653$; $p < 0.05$ Significant

Table 5: Association between Sex and Helminthic Infestation

Sex	Helminthic Infestation				Total	
	Present		Absent		Number	Percent
	Number	Percent	Number	Percent		
Male	87	48.33	93	51.67	180	51.14
Female	75	43.60	97	56.40	172	48.86
Total	162	46.02	190	53.98	352	100.00

$\chi^2 = 0.79$; $p > 0.05$ Insignificant

Table 6: Association between type of family and Helminthic infestation

Type of family	Helminthic Infestation				Total	
	Present		Absent		Number	Percent
	Number	Percent	Number	Percent		
Joint	103	47.03	116	52.97	219	62.22
Nuclear	54	44.63	67	55.37	121	34.38
Broken	5	41.67	7	58.33	12	3.40
Total	162	46.02	190	53.98	352	100.00

$\chi^2 = 0.276$; $p > 0.05$ Insignificant

Table 7: Association between religion and Helminthic infestation

Religion	Helminthic Infestation				Total	
	Present		Absent		Number	Percent
	Number	Percent	Number	Percent		
Hindu	151	46.46	174	53.54	325	92.33
Muslim	8	42.11	11	57.89	19	5.40
Christian	3	37.50	5	62.50	8	2.27
Total	162	46.02	190	53.98	352	100.00

$\chi^2 = 0.376$; $p > 0.05$ Insignificant

Table 8: KAP among school children according to Age

KAP Score	Age of Children in years						Total	
	5 – 7		8 – 10		11 – 13		Number	Percent
	Number	Percent	Number	Percent	Number	Percent		
Good (9-12)	4	7.55	23	43.40	26	49.06	53	15.06
Fair (5-8)	28	34.57	41	50.62	12	14.81	81	23.01
Poor (0-4)	131	60.09	78	35.78	9	4.13	218	61.93
Total	163	46.31	142	40.34	47	13.35	352	100.00

$\chi^2 = 96.54$; $p < 0.001$ Highly significant

Table 9: KAP Vs Prevalence of Helminthic infestation

KAP Score	Helminthic Infestation				Total	
	Present		Absent		Number	Percent
	Number	Percent	Number	Percent		
Good (9-12)	3	5.66	50	94.34	53	15.06
Fair (5-8)	15	18.52	66	81.48	81	23.01
Poor (0-4)	144	66.06	74	33.94	218	61.93
Total	162	46.02	190	53.98	352	100.00

$\chi^2 = 94.639$; $p < 0.001$ Highly significant

RESULTS

Figure 1 shows that out of 352 children studied 51.14% (180) were males and 48.86% (172) were females. Maximum number of children 46.31% (163) were in the age group of 5 – 7 years followed by 40.34% (142) in the age group of 8 – 10 years and 13.35% (47) in the age group of 11 – 13 years. Approximately equal distribution of male and female was observed in all age group. The mean age of the children was 8.01 years.

Figure 2 shows that 92.33% (325) children were Hindus, 5.40% (19) were Muslim and only 2.27% (8) were Christians.

Figure 3 shows that majority of children, 62.22% (219) belonged to joint family, followed by 34.38% (121) from nuclear family and 3.40% (12) from broken family.

Table 1 shows that the overall prevalence of Helminthic infestation among study population was 46.02% (162 cases).

Table 2 shows that the maximum number of children were infested with *Ascaris Lumbricoids* 48.77% (79) followed by *Hymenolepis Nana* 27.16% (44), *Ancylostoma Duodenale* 11.73% (19), *Trichuris trichiura* 9.88% (16) and *Enterobius Vermicularis* 2.46% (4).

Table 3 shows that out of 162 Children positive for helminthic infestation 4.94% (8) were found to have mixed infestation. *Ascaris lumbricoids* and *Ancylostoma duodenale* was most predominant mixed infestation 50% (4).

Table 4 reveals that the prevalence of Helminthic infestation was maximum 53.37% (87) in children belonging to age group 5 – 7 years, followed by 40.14% (57) & 38.30% (18) in age group 8-10 & 11-13 years respectively. It shows that there was decrease in prevalence among children as age increases. The association between Age and prevalence of helminthic infestation was found to be statistically significant ($P < 0.05$).

Table 5 shows that there was not much difference of Helminthic Infestation between boys and girls. The prevalence of Helminthic Infestation in boys was 48.33% (87) and in girls 43.60% (75) respectively. Association between Sex and helminthic infestation was insignificant ($P > 0.05$).

Table 6 shows that helminthic infestation was maximum 47.03% (103) amongst children who were from joint family followed by nuclear family 44.63% (54) and broken family 41.67% (5) respectively. A statistically insignificant association was observed between type of family and helminthic infestation ($P > 0.05$).

Table 7 shows that out of 92.33% (325) children belonging to Hindu religion 151(46.46%) had helminthic infestation followed by 42.11% (8) and 37.50% (3) out of 5.40% (19) Muslim and 2.27% (8) Christian children respectively. The association between Religion and helminthic infestation was found to be statistically insignificant ($P > 0.05$).

Table 8 shows that KAP among children's in the age group of 5 – 7 years was good 7.55%, fair in 34.57% and poor in 60.09% children. Among the age group 8 – 10 years it was good in 43.40% children, fair in 50.62% and poor in 35.78% children. In contrast the age group 11 – 13 years shows a good KAP among 49.06% of children, fair among 14.81% and poor in 4.13% children. This age wise difference in KAP was found to be statistically highly significant ($p < 0.001$).

Table 9 shows that, KAP in the study population was poor in 61.93% (218) children and the prevalence of Helminthic infestation among them was 66.06% (144), 23.01% (81) children KAP score was fair the Prevalence of Helminthic infestation was 18.52% (15) and 15.06% (53) children whose KAP score was good the prevalence of Helminthic infestation was 5.66% (3). The association between prevalence of Helminthic infestation and KAP of children were found to be statistically highly significant ($p < 0.001$).

DISCUSSION

The study consisting of 352 subjects was undertaken with the objective to know the prevalence of helminthic infestation and various risk factors associated with prevalence of helminthic infestation.

A total of 352 children in the age group of 5 to 13 years from the Govt. Primary School of Rajapur, Gulbarga constituted the Study population.

The present study showed that the overall prevalence of Helminthic infestation among primary school going children was 46.02%. A study conducted by Singh AL et al.¹² in Manipur, revealed that prevalence of Helminthic infestation among primary school children was 24.5%. However, Vinod CS et al.¹³ in their study among school going girls in Gulbarga reported that the prevalence of Helminthic infestation was 71.73%. Similarly, a study conducted by Wani SA et al.¹⁴ among school children of Pulwama, Kashmir found the prevalence of Helminthic infestation was 73.36%.

Paul et al.⁷ in their study among primary school children in Relliveedhi a slum area in Visakhapatanam observed that the overall prevalence of Helminthic infestation was 82%. The overall prevalence of intestinal helminths recorded in the study done in Were-abay 12.22%¹⁵ and Babile town 13.8%.¹⁶

Out of 162 infested children maximum number of children were infested with *Ascaris Lumbricoides* 48.77% followed by *Hymenolepis Nana* 27.16% *Ancylostoma duodenale* 11.73%, *Trichuris Trichiura* 9.88% & *Enterobius vermicularis* 2.46% respectively.

The present study results could be compared with Vinod CS et al.¹³ study, which reported maximum infestation was of *Ascaris Lumbricoides* 23.73% followed by *Hymenolepis Nana* 16.34% *Ancylostoma duodenale* 4.76%, *Trichuris Trichiura* 6.34% and *Enterobius Vermicularis* 2.76% respectively.

But in another study conducted by Paul et al.⁷ showed *Ascaris Lumbricoides* was the most common infection with prevalence of 75% followed by *Trichuris Trichiura* 66% and Hookworm 9%.

In the present study mixed infection cases comprises 4.94% of the total number of infested cases most common mixed infection were of *Ascaris Lumbricoides* + *Ancylostoma duodenale* 50% and *Ascaris Lumbricoides* + *Ancylostoma duodenale* 37.50% respectively. Similarly, in a study done by Singh HL et al.¹² showed mixed infection of *Ascaris Lumbricoides* with *Trichuris Trichiura* 1.08%, *Trichuris Trichiura* with *Enterobius Vermicularis* 0.09% & *Trichuris Trichiura Strongyloides Stercoralis* 0.09% respectively. Hookworm was the most common species conducted in other settings.¹⁷ In rural settings Hookworm infection may be more prevalent than *A. Lumbricoides* and *T. trichiura*.¹⁸

The present study revealed that 46.02% (162 out of 352) children in the age group 5 to 13 years were infested with Helminthic infestation.

The distribution of children infested with Helminthic infestation against age revealed 53.37% in 5 to 7 years age group, 40.14% in 8 to 10 years, and 38.30% in 11 to 13 years age group respectively. It was observed that the prevalence of Helminthic infestation was highest in the age group of 5 to 7 and lowest in age group 11 to 13 years. It shows that there is decrease in prevalence of Helminthic infestation among children as age increases. It was found that age and prevalence of Helminthic infestation was significant ($P < 0.05$).

A study done by SA Wani et al.¹⁴ showed the prevalence of Helminthic infestation in the age group 0 to 5 years was 90% followed 64.17% in 6 to 10 years age group and 72.82% in 11 to 15 years age group ($P < 0.1$).

The result of present study could be compared to that from Chigozie J. uneke et al.¹⁹ study where children aged 4 to 6 years old had the highest prevalence of STH 27.0% followed by those in 10 to 12 years age group 19.7% and lowest prevalence was recorded among those aged 16 years old and above 10.0% ($P < 0.05$).

The present study showed a marginal difference in prevalence of Helminthic infestation among Males 48.33% and Females 43.60%. There was no significant association between Sex & Helminthic infestation ($P > 0.05$).

A study done by SA Wani et al.¹⁴ in Kashmir Valley found the prevalence of Intestinal Helminthic infestation in Male 69.17% & females 79.74% respectively ($P > 0.05$).

In a study conducted by Chandershekhar TS et al.²⁰ revealed the prevalence of Intestinal Helminthic infestation in males 21.5% & Females 21.0%. Similar was the case in Singh HL et al.⁴ study, where boys 24.6% had marginally higher prevalence than girls 24.5%. Yet another study by Chigozie uneke et al.¹⁹ among school children observed that Males were more infected than Females (18.3% VS 15.5%) but the difference was not statistically significant. ($P > 0.05$).

In the present study it was observed that the prevalence of Helminthic infestation was maximum in children 47.03% who are from Joint family and minimum in children 41.67% from broken

family. The association between type of family and Helminthic infestation was insignificant ($P > 0.05$). During the course of the literature review the investigator did not come across any studies which addressed this association.

The present study showed the prevalence of Helminthic infestation in children belonging to Hindu religion was 46.46% followed by Muslim 42.11% and Christians 37.50%. It was found that religion was not significantly associated with Helminthic infestation ($p > 0.05$). Similarly, no association between religion and Helminthic Infestation was observed in a study done by Girum Tadesse⁴ ($P > 0.05$). It was observed in the present study that majority of children whose KAP score was poor, fair and Good were from the age group 5-7, 8-10 & 11-13 years respectively. This age wise difference in KAP score was found to be highly significant ($P < 0.001$).

The present study showed that the prevalence of Helminthic Infestation was maximum 66.06% among children whose KAP score was poor, 18.52% whose KAP score was fair, and minimum 5.66% among children whose KAP score was good. The association between prevalence of Helminthic Infestation and KAP of children was found to be Highly Significant ($P < 0.001$).

CONCLUSION

In the present study the prevalence of helminthic infestation in school children are on the higher side which requires due attention and consideration despite helminthic control programme in school for all children. The importance of adopting and maintaining proper hygiene and sanitation practices should be emphasized to bring down the prevalence.

RECOMMENDATIONS

- Information about various risk factors which promote the transmission of helminthic infestation should be imparted to children on regular basis.
- Teachers and other school staff should serve as role models and mentors, modelling the behaviours and attitudes that reduce helminth infections in particular, and promote health in general.
- In various ways, schools should recognize and reward students who practise health- promoting behaviours
- Effective implementation of school health services especially periodic deworming and school environment.

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Source of Support: Nil.

Conflict of Interest: None Declared.

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Cite this article as: Mohd. Abdul Haleem Azhar, Sharad G. Tenglikar, S. R. Nigudgi. Association Between Age, Sex, Religion and Helminthic Infection Among Children Aged Between 5 to 13 Years: An Institutional Based Study. Int J Med Res Prof. 2019 Nov; 5(6): 167-73. DOI:10.21276/ijmrp.2019.5.6.037