

## Original Research Article

# Prevalence of intestinal parasites and its associated socio-demographic factors among the food handlers of Bagalkot city, Karnataka, India

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**Received:** 18 November 2016

**Accepted:** 24 November 2016

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## ABSTRACT

**Background:** Growing urbanization and lifestyle changes lead people to dine away from home more often, contributing to the unregulated opening of eating establishments that often have inadequate hygiene conditions. Hence a study was undertaken to know prevalence and determinants of intestinal parasitic infections among food handlers of Bagalkot city, Karnataka, India.

**Methods:** A cross-sectional study was done among food handlers of 46 food establishments enlisted in Bagalkot hotel and refreshment association. A total of 266 food handlers were interviewed using proforma regarding socio-demographic data and personal hygiene followed by stool examination for intestinal parasites.

**Results:** Out of 266 food handlers, 39 (14.7%) were tested positive for intestinal parasitic infections. Most common parasite isolated was *A. Lumbricoides* (5.3%) followed by *E. Histolytica* (1.5%), *Giardia* (1.5%), *T. Solium* (0.8%), *T. Trichura* (0.8%) and *H. Nana* (0.8%). Mixed infections constituted 4.1%. Female gender, rural residence and socio-economic status and personal hygiene was significantly associated with intestinal parasitic infections.

**Conclusions:** Strict hygienic practices, complete treatment of infected persons and regular surveillance is important for controlling intestinal parasitic infections.

**Keywords:** Food handlers, Intestinal parasites, Personal hygiene

## INTRODUCTION

During the early 21<sup>st</sup> century, food borne diseases can be expected to increase, especially in the developing countries, because of environmental and demographic changes.<sup>1</sup> Growing urbanization and lifestyle changes lead people to dine away from home more often, contributing to the unregulated opening of eating establishments that often have inadequate hygiene conditions.<sup>2</sup> Food contamination may occur at any point during production, processing, distribution, and preparation. The risk of food getting contaminated depends largely on the health status of the food handlers, their personal hygiene, knowledge and practice of food hygiene.<sup>3</sup> It is estimated that 3.5 billion people are

affected and that 450 million people are ill as a result of intestinal parasites and protozoan infections, majority of being children.<sup>4</sup>

High prevalence of intestinal parasitic infections and polyparasitism affect the health status of individuals mainly affecting physical and mental developments causing malnutrition, anaemia, stunting, cognitive impairment, lowered educational achievement and interfering with productivity.<sup>5,6</sup> It was estimated and indicated by different researchers; high prevalence of intestinal parasites is largely due to lack of personal and environmental sanitation, lack of safe water supply, human behaviour, poverty, ignorance of health promotion practices and impoverished health services.<sup>7,8</sup>

Bagalkot is a place with many educational institutions and large student population as a result of this food catering is booming business in the city since last one decade. As the student population is at risk of intestinal parasites, this study was carried out to find the prevalence of intestinal parasites and its associated sociodemographic factors among food handlers of Bagalkot city, Karnataka, India.

## METHODS

This study was carried out for a period of one and half year January 2013 to June 2014 in 46 food establishments enrolled in Bagalkot Hotel & Refreshment Association. Before undertaking this study, prior approval was taken from food safety officer, department of health and family welfare, and the president of the Bagalkot Hotel & Refreshment Association. Study protocol was approved by the Institution's Ethical Committee. Out of total 445 food handlers in 46 food establishments, 266 food handlers consented for the study.

Data collection was done using pre-designed and pretested proforma by interviewing food handlers regarding various socio-demographic variables followed by stool examination. Arbitrary weighted scoring system was devised for assessing the personal hygiene of food handlers.

13 points such as cleanliness of hairs, eyes nose, nails and usage of hand gloves, head cap etc. were taken for assessing personal hygiene. Each was been given a score of 0, 1 and 2 as required and total score of personal hygiene was 19. For those who had scored 13 and above was termed as having good personal hygiene. For those who had scored 7-12 termed as fair personal hygiene and those who had scored 6 and less have poor personal hygiene.

Each subject was asked to collect 2gm fresh stool sample in a wide mouth plastic container and immediately processed for stained and unstained preparation. In unstained preparation, a drop of normal saline was taken on the centre of the slide.

The collected stool sample was thoroughly mixed with the stick in the container and then a portion of it was picked up with stick and mixed with normal saline on the slide. Cover slip 60 was put and observed under low power and high power objective lenses in the microscope for ova, cysts and trophozoites. In stained preparation method the stool sample was subjected to the above said procedure except that instead of normal saline, Lugol's iodine was the solution used. Live motility of trophozoites is appreciated by saline wet preparation and characteristics are revealed by Lugol's iodine preparation.<sup>9</sup>

Data was entered in MS Excel 2013 and analysed using open epi software. Chi square test was used where

relevant to find association between exposure and presence of infection.

## RESULTS

### Sociodemographic data

Out of 266 food handlers, majority of the food handlers were males 73.7%. Most of food handlers (44.7%) were young between 21-35 years age group, 59.4% were from urban area, 75.6% were literates and waiters constituted largest group with 35.3%. About 46.3% were having work experience between 1-5 years and majority (66.2%) of subjects were married. 66.5% of food handlers were belonging to Class II and III of modified B G Prasad socio-economic classification. Most of food handlers (57.9%) had "fair score" in personal hygiene followed "good score" (31.6%) and "poor score" (10.5%).

**Table 1: Distribution of food handlers according to stool microscopy.**

	Number	Percentage
<i>A. Lumbricoides</i>	14	5.3
<i>E. Histolytica</i>	4	1.5
<i>G. Lamblia</i>	4	1.5
<i>T. Solium</i>	2	0.8
<i>T. Trichura</i>	2	0.8
<i>H. Nana</i>	2	0.8
Mixed	11	4.1
Positive	39	14.7
Negative	227	85.3
Total	266	100

### Prevalence of intestinal parasites

Out of 266 stool specimens, 39 (14.7%) were tested positive for intestinal parasites. Most common parasites was *A. Lumbricoides* (5.3%) followed by *E. Histolytica* (1.5%), *Giardia* (1.5%), *T. Solium* (0.8%), *T. Trichura* (0.8%) and *H. Nana* (0.8%). Mixed infections constituted 4.1%.

### Associated factors

In this study, the presence of intestinal parasites was significantly higher among female food handlers (31.4%) as compared to males (8.7%). Food handlers belonging to rural areas (24.1%) constituted significantly higher infection rates as compared to that of urban areas (8.2%). Highest prevalence of intestinal parasites were present in class V (43.8%) of socio-economic status followed by class II (13.6%), class IV (12.7%), class III (12.4%) and least in class I (10%). The differences in the prevalence of intestinal parasites among different socio-economic status were statistically significant. The personal hygiene score was significantly associated with presence of intestinal parasites. Highest prevalence of intestinal parasites were present in food handlers with poor score

(35.75) on personal hygiene followed by fair score (12.3%) and good score (11.9%). Prevalence of intestinal parasites was not statistically associated with age,

religion, literacy and work experience and marital status of food handlers.

**Table 2: Distribution of food handlers according to socio-demographic data.**

Stool Microscopy									
		Positive (39)		Negative (227)		Total (266)		X <sup>2</sup> Value	P Value
Gender	Male	17	8.7	179	91.3	196	73.7	21.35	<0.001
	Female	22	31.4	48	68.6	70	26.3		
Age group	<20years	3	7.9	35	92.1	38	14.3	3.55	0.31
	21-35years	19	16	100	84	119	44.7		
	36-50years	15	18.3	67	81.7	82	30.8		
	>51years	2	7.4	25	92.6	27	10.2		
Religion	Hindu	34	15.2	189	84.8	223	83.8	0.37	0.54
	Muslim	5	11.6	38	88.4	43	16.2		
Place	Rural	26	24.1	82	75.9	108	40.6	12.87	<0.001
	Urban	13	8.2	145	91.8	158	59.4		
Literacy	Illiterate	12	18.5	53	81.5	65	24.4	0.99	0.31
	Literate	27	13.4	174	86.6	201	75.6		
Occupation	Manager	10	19.2	42	80.8	52	19.5	4.04	0.25
	cook	5	8.5	54	91.5	59	22.2		
	Waiter	17	18.1	77	81.9	94	35.3		
	Cleaner	7	11.5	54	88.5	61	22.9		
Work Experience	<1years	9	12	66	88	75	28.2	1.7	0.79
	1-5years	17	14.7	99	85.3	116	43.6		
	6-10years	10	19.6	41	80.4	51	19.2		
	11-20years	2	15.4	11	84.6	13	4.9		
	>20years	1	9.1	10	90.9	11	4.1		
Socio-economic status	Class I	1	10	9	90	10	3.8	11.64	0.02
	Class II	12	13.6	76	86.4	88	33.1		
	Class III	11	12.4	78	87.6	89	33.5		
	Class IV	8	12.7	55	87.3	63	23.7		
	Class V	7	43.8	9	56.2	16	6.0		
Marital status	Married	30	17	146	83	176	66.2	2.36	0.12
	Unmarried	9	10	81	90	90	33.8		
Personal Hygiene Score	Good	10	11.9	74	88.1	84	31.6	11.09	0.003
	Fair	19	12.3	135	87.7	154	57.9		
	Poor	10	35.7	18	64.3	28	10.5		

## DISCUSSION

Bagalkot harbours large number of educational institutions and consequently large student population. One of the important health determinants of student population in any region is the intestinal parasitic infection rates of food handlers in that area. This study revealed prevalence of intestinal parasitic infection to be 14.7% which is similar to studies done by Mohan et al (12.9%), Sharif et al (15.5%), Motazedian et al (10.4%).<sup>10-12</sup> However higher prevalence was seen by Tafera et al (44.1%) and Mama et al (36%).<sup>13,14</sup> In this study the most common parasite was *A. Lumbricoides* followed by *E. Histolytica*, *Giardia Sp.*, *T. Solium*, *T.*

*Trichura* and *H. Nana*. However most common organism was found to be *E. Histolytica* in studies done by Takalkar et al, Ramakrishnaiah et al, Bobhate et al.<sup>15-17</sup> Whereas *Giardia sp.* was common organism in studies done by Motazedian et al, Sharif et al, and Khurana et al.<sup>11,12,18</sup> Variation in prevalence rates and frequency of different parasites may be due to variable cultural factors, food habits and geographical conditions. In this study females were infected significantly more than the male food handlers. Similar results were seen by Motazedian et al whereas Gelwa et al showed no association between gender and intestinal parasitic infection.<sup>12,19</sup> Higher prevalence of intestinal parasitic infection more commonly in rural areas and in lower

socio-economic strata may indicate poor awareness about hygienic practices and lesser availability of water. Shariff et al noted even though the prevalence was higher in food handlers from rural areas as compared that of urban areas but it was not statistically significant.<sup>11</sup> The age group and religion was not statistically associated with intestinal parasitic infection in present study. Similar observations were made by Gelwa et al & Mama et al.<sup>14,19</sup> In present study personal hygiene score was negatively associated with parasitic infections. Studies done by Tafera et al, Mama et al also showed similar results.<sup>13,14</sup>

## CONCLUSION

This study revealed high prevalence of intestinal parasite infection among asymptomatic food handlers in Bagalkot city. These food handlers can transmit the infection to students and general population. Preventive measures like regular epidemiological surveillance of food handlers, raising awareness about personal hygiene and usage of hand gloves, head caps and aprons during food handling are necessary steps for prevention of infections. Early diagnosis by parasitological examination and complete treatment of those infected are important for controlling infections.

*Funding: No funding sources*

*Conflict of interest: None declared*

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

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**Cite this article as:** Anjum W, Kalasker PS, Bhaskar K. Prevalence of intestinal parasites and its associated socio-demographic factors among the food handlers of Bagalkot city, Karnataka, India. Int J Community Med Public Health 2017;4:1-4.