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PREVALENCE OF PROTOZOAN AND HELMINTHS PARASITIC INFECTION IN PALPA, NEPAL

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Abstract

In rural areas of underdeveloped countries, the parasitic infestation is a major public health issue for children and the elderly. The purpose of this study was to determine the prevalence of parasite infestations and risk variables related to Palpa parasitic infestations. The population sample was selected from the Tansen area's usual population, as determined by randomized cluster sampling. A total of 700 samples were collected, with 280 persons from urban regions and 420 from rural areas, for a total of 100 people from various categories in each health center. Data were collected for each person based on their age, gender, and place of residence (urban or rural), as well as through a semi-structured questionnaire and a personal interview. Each health center's laboratory technician team conducted the microscopic investigation of samples (blood, urine, and feces). Five protozoal and six helminth parasites were found among the 11 parasites, with eight kinds of gastrointestinal parasites and three species of blood parasites. The most frequent parasites were discovered to be *Entamoeba histolytica*, *Giardia lamblia***,** and *Ascaris lumbricoides*. Females and those who live in rural areas are more likely to be parasite-infested. Prevalence was highest among children under the age of 15 and the elderly. Administrators, health experts, and the community need to approve improvements in the living environment and cleaning practices to break the transmission cycle of parasitic illnesses, health education, and community approval.

***Keywords*:** Age group, infection, parasites, rural area, urban area

Introduction

A parasite is an organism that lives in or on other organisms (host) and benefits by deriving nutrients and others. Parasitic infections are high prevalence in poor and socio-economically deprived communities depending on social, geographical, economical, and inhabitant customs. Among them, Amebiasis, Ascariasis, hookworm infection, and Trichuriasis are the most common infections in the world (Norhayati, et al., 2003; Zambrano-Villa, 2002) and parasitic infection is more prevalent in those countries which, face problems of poverty, malnutrition, high population density, unavailability of clean water and low health status, etc. (Sayyari et al., 2005).

Parasitic infections are caused by helminths and protozoa that colonize the intestines of vertebrates and represent a major public health problem (Santos et al., 2017). The major protozoan diseases are caused by *Toxoplasma gondii*, *Plasmodium*, *Balantidium coli*, *Trichomonas vaginalis*, *Giardia lamblia*, *Trypanosoma*, *Entamoeba histolytica.* Among them, the most prevalent and deadly human diseases are African sleeping sickness, amoebic dysentery, and malaria. Only a few species of helminths are widespread in humans but together, they infect billions of persons. They produce eggs or larvae to infect new hosts and establish stable chronic infections that can tolerate for surprisingly long in an individual host (Maizels, & McSorley, 2016; McSorley et al., 2013). The most common helminthiases of humans are *Ascarias lumbricoides*, *Trichuris trichiura*, and hookworms (*Ancylostoma duodenale*), followed by Schistosomiasis and lymphatic filariasis (Lustigman, et al., 2012).

Intestinal nematodes such as *Ascaris lumbricoides, Enterobius vermicularis, Trichuris trichiura, Strongyloides stercoralis, Necator americanus, Ankylostoma duodenale, trematodes*

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or flukes like *Schistosoma*, tissue roundworms (*Trichinella spiralis, Dracunculus medinensis*) and hydatid tapeworm (*Echinococcus* species) are live in human body parts and live in the gastrointestinal tract, liver and other organs or host's tissues (Manke, 2015; Dale, 2008).

The ecology of intestinal parasitism is very wide in Nepal (Tiwari et. al., 2013). Overall helminthic infections only rank fourth in the top ten lists of diseases in Nepal (Gurung et al, 2019). Although people of all ages may be infected by these organisms, children are more often infected due to compromises in sanitary habits (Wiwanitkit et al, 2003).

Many studies had been carried out by many researchers in Nepal such as Subedi et al. (2020), Tiwari et al.(2013), Sharma et al. (2004) on intestinal parasitic diseases among children at the school level but few studies on the elderly population (Santos, 2017) because of the low relevance of this problem to this population. Enteroparasite infections impair the nutritional status of such individuals through intestinal obstruction, malnutrition, anemia, diarrhea, and malabsorption (Ely et al., 2011; Larré et al., 2015) due to reduced quality of life among this age group. The elderly are more likely to be predisposed to these diseases than young people, due to the decline in their immune system functions, which occur naturally during the aging process (Ely et al., 2011).

Parasitic infestation leads to nutritional deficiency and impaired physical development, which will have negative consequences on cognitive function and learning ability. This study was designed to measure the prevalence of parasitic infestation in different age groups areas, and the sex of the Palpa district. It encourages the use of various deworming schedules in schools regularly to cure children, break the transmission cycle of parasitic disorders, and notifies of the need to investigate parasitic diseases in the elderly population, allowing the magnitude of the problem, and appropriate therapeutic measures to be adopted.

Methods Study area

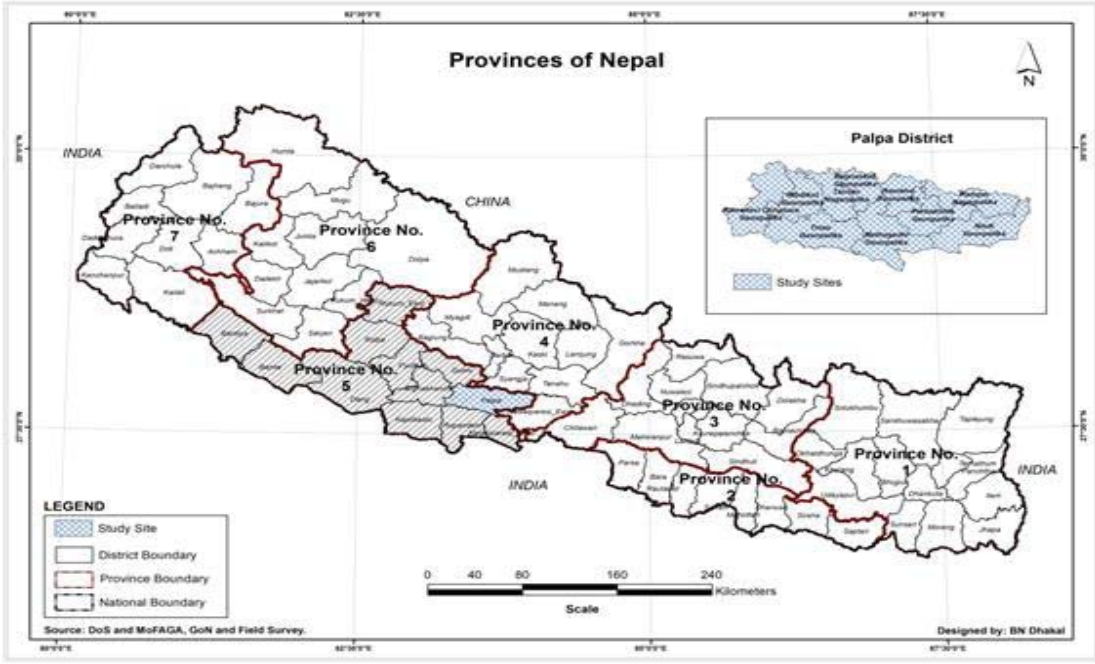

Fig.1 Study area

This study was carried out between May 2017 and February 2019. The population sample was chosen by randomized cluster sampling from the normal population covered by health centers in the Tansen area. The data were collected from the District hospital, United Misson Hospital, Lumbini Medical College, Subham Pharma Tansen, Bhattarai medical clinic, Prasamsa clinic, and Prashanti medical clinic of Palpa. The required sample size was taken from the different age and sex groups (Agbolade et al., 2007). In this study, a total of 700 samples were taken including which 280 persons from the urban area and 420 persons from rural areas such that each health comprised 100 persons of a different group. Data were obtained according to age, sex, site of residence (urban/rural) for each person, and also from a semi-structured questionnaire with a personal interview. The microscopic examination of samples (blood, urine, and stools) was observed with the laboratory technician team of each health center. Samples were collected in clean, dry, screw-capped, and leak-proof plastic containers prepared by the laboratory technical team. Adult parasites were identified morphologically and ova, cyst, trophozoites, etc. with the help of different literature published in Chatergii (1980), Chiodini, et al., (2001), Pearson and Gillespie (2001), Kotpal (2012). The data were entered and statistical analyses were done using Microsoft Excel.

Results

Five protozoal parasites and six helminth parasites were among the 11 parasitic infections that occurred (Table 1). The majority of these (8 species) were gastrointestinal parasites, while three species were blood parasites. In comparison to helminths, protozoa were seen less commonly in the population. *Ascaris lumbricoides* were found to be the most common helminth, whereas *Entamoeba histolytica* and *Giardia lamblia* were shown to be more common than other protozoans. Females had a higher prevalence of parasite infestation than males, although the difference was not significant. Similarly, the rural people were more infected than urban areas (Table 1). In the study area, children under the age of 15 were more likely to be infected however populations between the ages of 16 and 40 were found less infected (Table 2).

Table 1. Parasites represented by sex and area

Parasites	**Male**	**Female**	**Rural area**	**Urban area**	**total infection in the area**	**%**
Entamoeba histolytica	39	49	56	31	88	38.33
Giardia lamblia	27	32	38	21	59	25.99
Balantidium coli	2	1	2	1	3	1.32
Plasmodium vivax	6	4	2	8	10	4.41
Leishmania donovani	1	0	0	1	1	0.44
Ascaris lumbricoides	16	22	29	9	38	16.74
Enterobius vermicularis	1	2	2	1	3	1.32
Ancyclostoma duodanalis	3	1	3	1	4	1.76
Hymenolopsis nana	1	0	0	1	1	0.44
Taenia saginata	7	9	15	2	17	7.49
Wuchereria bancofti	2	2	3	1	4	1.76
Total	105	122	150	77	227	

Table 2. Parasitic infection by age group

Area	Age	Positive N (%)	Negative N (%)	Total
Rural	Below 15	49 (46.67 %)	56 (53.33%)	105
	16-40	27 (25.71%)	78 (74.29%)	105
	41-60	33 (31.43%)	72 (68.57%)	105
	61 above	41 (39.04%)	64 (60.09%)	105
Urban	Below 15	26 (37.14%)	44 (62.86%)	70
	16-40	12 (17.14%)	58 (82.9%)	70
	41-60	17 (24.29%)	53 (75.71%)	70
	61 above	22 (31.43%)	48 (68.57%)	70

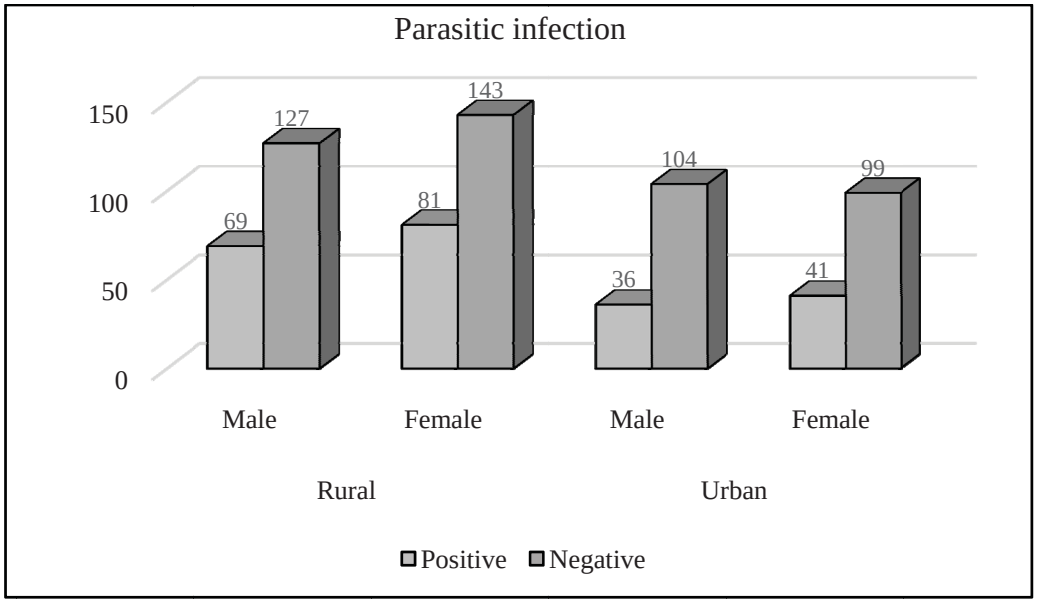

Fig. 2. Total parasitic infection by sex and area

Out of the 420 samples analyzed in rural areas, 150 people (69 males and 81 females) tested positive for parasitosis, while from 280 samples analyzed in urban areas, 77 people (36 males and 41 females) tested positive for parasitosis (Fig. 2). Rural areas had a marginally greater prevalence of protozoan and helminth parasites (35.71 %) than urban areas (27.5 %). *Entamoeba histolytica* (38.33%) and *Giardia lamblia* (26%) were the most common protozoan parasites, while *Leishmania donovani* was only affected by 0.44 %. In helminth parasites, *Ascaris lumbricoides* (16.74%) were the most infectious, while *Hymenolopsis nana* (0.44%) was the least infectious (Table 1). Many infections were associated with parasitosis, which indicated mainly waterborne infection. Elderly people above 61 years were also at high risk of these parasites. Few species of blood parasites like *Plasmodium vivax, Leishmania donovani*, and *Wuchereria bancofti* were observed in both rural and urban areas.

Discussion

The prevalence of intestinal parasites in children varies in different regions of the world. It is particularly high in poor and developing countries due to the use of contaminated drinking water, inadequate sanitary conditions, and poor personal hygiene (Tiwari et. al., 2013). For a long time, intestinal parasitosis has been a major public health concern in Nepal (Smith, 2018). *E. histolytica* and *G. lamblia* were the most frequent parasite, followed by *A. lumbricoides,* with children and their farmers' parents being at increased risk of infection. Intestinal protozoa and helminth were most commonly found; the two predominant pathogenic intestinal protozoan and one helminth species in the two study regions under investigation. The prevalence of these parasites was greater in this study, and Gupta et al. (2020); Erismann et al. (2016) found a similar finding.

This high prevalence in the present study may be due to the fecal-oral route by ingesting eggs from contaminated hands, poor personal hygiene, and poor environmental hygiene that contribute to the result of such high prevalence among the children. But in adults, the prevalence of parasitic infection was low. It was due to their higher education level, care for hygienic food, and cleanliness. However, other gastrointestinal infections were lower as compared to *E. histolytica*, *G. lamblia*, and *A. lumbricoides* as compared to previous results reported by Agbolade et al. (2007). Regular deworming, which reduces both the illness produced by these infections and the occurrence of severe problems, may be one reason for the decreased prevalence of fecal-oral spread helminth infections among children with low infection intensity (WHO, 2011).

Shakya et al. (2006) indicated that intestinal parasites represent a threat to elderly people living in underdeveloped regions. The results of the present study demonstrate the profile of parasitosis in the elderly in a small town, highlighting its high prevalence. Therefore, the present study notifies of the need to investigate parasitic diseases in the elderly population, allowing the magnitude of the problem to be identified, and appropriate therapeutic measures to be adopted. In addition, the results of this study can be used by health authorities to guide the creation of public and social policies that improve socio-economic, health, and educational conditions, reflecting the health and quality of life of the elderly population.

This study showed a relatively high prevalence of *Taenia saginata* (7.5%) compared with that reported by Merid et al. (2001) in South Ethiopia (1.4%). However, the prevalence of *Taneia* infestation in this study was lower than the study conducted by Joshi et al. (2001) in Nepal which showed the prevalence of taeniasis among the ethnic groups surveyed. But it has a low prevalence in the general public and clinical samples (Devleesschauwer et al., 2014). Children of rural areas and other populations were infested by intestinal parasites with the list of *A. lumbricoides,* Hookworms, *T. trichiura,* and *Taenia* species in this study and Subedi et al. (2020) found similar findings in children in school. Some people who came from the Terai region and India were shown blood parasites. Leishmaniasis, malaria, and filariasis were less common in this area.

The current study shows that children's health was affected by relatively inadequate cleanliness and sanitary conditions. The females were more infected than males, it may be due to the exposure to fieldwork, personal contact with marketing, and poor hygiene. Such type finding was recorded by Agbolade et al. (2007). As a result, immediate preventive measures, such as public health education, clean water supply, improved sanitation, and personal hygiene habits, should be adopted to eliminate excessive infestation rates. A component is the gradual loss of self-care independence, which leads to problems with personal hygiene and eating (Matos et al., 2005).

Conclusion

In Palpa, the frequency of overall protozoal and helminth parasite infestation was high, especially among youngsters and the elderly. Females and people in rural regions were more infected than men and those in urban areas. Poor hygiene and sanitary conditions, a lack of safe drinking water, and a lack of information are all thought to have a role in the spread of parasitic illnesses. Administrators, health professionals, and the community must approve prevention and control measures through improvements in the living environment and cleanliness habits. It also promotes the use of various deworming schedules in schools regularly to cure children and break the transmission cycle of parasitic disorders, as well as health education regarding hygienic practices in schools.

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Authors' contributions

This work was carried out in collaboration with three authors. Author PBN had searched different related literature, performed the statistical analysis, and wrote the first draft of the manuscript. Author SS managed sample analyses and did grammatical corrections. Similarly, author HBR designed the study and sample management. All authors read and approved the final manuscript.

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