Intestinal Parasitic Infections Among The Children Of Siddhanath Amar Secondary School of Kanchanpur District

Ramchandra Ojha

T.U. Registration No.: 18529-93

T.U. Examination Roll No.: 416

Batch: 2056/57

Central Department of Zoology

Institute of Science and Technology

Tribhuvan University

Kirtipur, Kathmandu

Nepal

A dissertation submitted in partial fulfilment of the requirements for the award of the degree of Master of Science in Zoology with special paper Parasitology.

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Entry Parasitology
M.Sc. Zoo Dept.
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Ramchandra Ojha

T.U. Registration No. 18529-93

M.Sc. Zoology (Parasitology)

T.U. Examination Roll No. 416

Supervisor

Dr. Kishor Pandey

Associate Professor

Central Department of Zoology

Institute of Science and Technology

Tribhuvan University

Kirtipur, Kathmandu

Nepal

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E-mail: ramchandraojhaOl@gmail.com

Central Department of Zoology
Institute of Science and Technology
Tribhuvan University
Kirtipur, Kathmandu, Nepal
Website: https://www.cdz.tu.edu.np/

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Declaration

I hearby declare that the work presented in this dissertation "Intestinal parasitic infections among children of Siddhanath Amar Secondary School of Kanchanpur District " has been done by myself, and has not been submitted elsewhere for the award of any degree. All sources of information have been specifically acknowledged by reference to the author(s) or institution(s).

.....

Ramchandra Ojha
Exam roll No.: 416
Email: ramchandraojha01@gmail.com

Date 2082/05/09

त्रिभुवन विश्वविद्यालय
TRIBHUVAN UNIVERSITY
प्राणी शास्त्र केन्द्रीय विभाग
CENTRAL DEPARTMENT OF ZOOLOGY
कीर्तिपुर, काठमाडौं, नेपाल ।
Kirtipur, Kathmandu, Nepal.
Central Department of Zoology T.U., Kirtipur
☎ ०१-४३३१८९६
01-4331896
Email: info@cdztu.edu.np
URL: www.cdztu.edu.np

पत्र संख्या :-
च.नं. Ref.No.:-

Recommendation

This is to recommend that the dissertation entitled "Intestinal parasitic infections among children of Siddhanath Amar Secondary School of Kanchanpur District" has been carried outby Ramchandra Ojha for the partial fulfilment of Master's Degree of Science in Zoology with special paper Parasitology. This is his original work and has been carried out under my supervision. To the best of my knowledge, this dissertation work has not been submitted for any other degree in any institutions.

.....

Supervisor
Kishor Pandey, PhD
Associate Professor
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

Date 2025·09·03

त्रिभुवन विश्वविद्यालय
TRIBHUVAN UNIVERSITY
प्राणी शास्त्र केन्द्रीय विभाग
CENTRAL DEPARTMENT OF ZOOLOGY
कीर्तिपुर, काठमाडौं, नेपाल ।
Kirtipur, Kathmandu, Nepal.
☎ ०१-४३३१८९६
01-4331896
Email: info@cdztu.edu.np
URL: www.cdztu.edu.np

पत्र संख्या :-
च.नं. Ref.No.:-

Letter of approval

On the recommendation of supervisor Dr. Kishor Pandey this dissertation submitted by Ramchandra Ojha entitled "Intestinal parasitic infections among children of Siddhanath Amar Secondary School of Kanchanpur District" is approved for the examination in partial fulfilment of the requirements for Master's Degree of Science in Zoology with special paper Parasitology.

.....

Prof. Kumar Sapkota, PhD
Head of Department
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

Date .....

त्रिभुवन विश्वविद्यालय
TRIBHUVAN UNIVERSITY
प्राणी शास्त्र केन्द्रीय विभाग
CENTRAL DEPARTMENT OF ZOOLOGY
कीर्तिपुर, काठमाडौं, नेपाल ।
Kirtipur, Kathmandu, Nepal.
Central Department of Zoology T.U., Kirtipur
☎ ०१-४३३१८९६
01-4331896
Email: info@cdztu.edu.np
URL: www.cdztu.edu.np

पत्र संख्या :-
च.नं. Ref.No.:-

Certificate of acceptance

This dissertation work submitted by Ramchandra Ojha entitled"Intestinal Parasitic infections among children of Siddhanath Amar Secondary School of Kanchanpur District" has been accepted as a partial fulfilment for the requirements of Master's Degree of Science in Zoology with special paper Parasitology.

Evaluation committee

Supervisor
Kishor Pandey, PhD
Associate Professor

Head of Department
Prof. Kumar Sapkota, PhD
Professor

External examiner
Prof. Dr. Ranjana Gupta
Professor

Internal Examiner
Prof. Dr. Mahendra Maharjan
Assistant Dean

Date of examination: 2082/05/16

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Ramchandra Ojha

Exam Roll N0- 416

T.U.Regd. N0 18529-93

Abstract

Nepal is the country where still some areas were untouched by the advancements of development. In Bhimdatt municipality of Kanchanpur district, there is a community of residents near riverside, particularly the Dalit community facing unsanitary living conditions and lack of proper toilets. This research was conducted from December 2004 to December 2005 at Siddhanath Amar Secondary School. A total of 224 stool samples were collected by sampling a group of 448 children and examined under a microscope. Among these 80 samples, a staggering 35.71% tested positive for intestinal parasitic infections ranging singleto multiple infections. During the research, the study found that 63.75% of the observed intestinal parasites were *Ascaris* sp., while *Trichuris* sp. (6.25%). "*Hookworm* and *Hymenolepis* sp. make up 10% each, with another 10% *Entamoeba* sp. The current investigation included 1.25% *Cryptosporidium* sp. and 1.25%*Cyclospora* sp. Higher prevalence of 42.14% was showed by the age group of 10-15year group whereas the least prevalence of (12.50%) was found among 0–5year age group. Caste-wise prevalence of parasitic infection revealed that Bhote children (60%) had a higher infection rate than other different caste. The following castes were Dalit (59.09%), Brahmin (34.14%), Tharu (35.34%), and Chettri (22.50%).The distribution of intestinal parasites were maximum (62.96%) in class 6 and minimum (21.42%) in class 10. The strikingly high incidence of intestinal parasite infections in children from the Bhimdatt municipality in Gaddachauki was discovered to be closely linked to unsanitary eating practices, ignorance, poor sanitation, and poverty.

शोध सारांश

कंचनपुर जिल्लाको भीमदत्त नगरपालिकामा खोला नजिकै बसोबास गर्ने मानिसहरु धेरै छन्। कंचनपुर जिल्लामा बसोबास गर्ने दलित समुदाय संग सम्बंदित मानिसहरु अव्यवस्थित अवस्था र उचित शौचालयको अभावको कारणले गर्दा धेरै मानिसहरु रोग संग लड्नु परेको अवस्थामा छ । यो अनुसन्धान डिसेम्बर २००४ देखि डिसेम्बर २००५ सम्म सिद्धनाथ अमर माध्यमिक विद्यालयमा गरिएको थियो। ४ सय ४८ बालबालिकामा जम्मा २२४ वटा स्टूलको नमूना संकलन गरि माइक्रोस्कोपमा परीक्षण गरी अनुसन्धान गरिएको थियो । यी ८० नमूनाहरू मध्ये, ३५.७१% आन्द्राको परजीवी संक्रमणहरूको लागि एकदेखि बहु संक्रमणहरूको लागि सकारात्मक परीक्षण गरिएको थियो। अनुसन्धानको क्रममा, अध्ययनले पत्ता लगाएका र अवलोकन गरिएका आन्द्राका परजीवीहरूमध्ये ६३.७५% *Ascaris* sp., भने *Trichuris* sp. (६.२५%) Hookworm and *Hymenolepis*sp. प्रत्येक १०% छ, अर्को १०% *Entamoeba* sp. सँगदेखा परेको थियो। हालको अनुसन्धानमा १.२५% *Cryptosporidium* sp. र *Cyclospora* sp. १.२५% समावेश थियो। १०-१५ वर्ष उमेर समूहमा ४२.१४% को उच्च प्रसार देखिएको थियो भने ०-५ वर्ष उमेर समूहमा सबैभन्दा कम (१२.५०%) को प्रसार देखिएको थियो। परजीवी संक्रमणको जातीय आधारमा व्यापकताले भोटे बालबालिका (६०%) मा अन्य विभिन्न जातिको तुलनामा संक्रमण दर बढी रहेको देखाएको छ भने अन्य जातिहरू दलित (५९.१०%), ब्राह्मण (३४.१४%), थारु (३५.३४%), र क्षेत्री (२२.५०%) थिए। कक्षा ६ मा आन्द्राका परजीवीहरूको वितरण अधिकतम (६२.९६%) र कक्षा १० मा न्यूनतम (२१.४२%) थियो। गड्डाचौकीको भीमदत्त नगरपालिकाका बालबालिकामा आन्द्राको परजीवी संक्रमणको अत्याधिक घटना अस्वच्छ खाने बानी, अज्ञानता, कम सरसफाइ र गरिबीसँग जोडिएको पाइएको छ ।

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List of abbreviations

Abbreviated form	Details of abbreviations
DOHS	Department of Health Services
SAEHN	Situational Analysis of Environmental Health in Nepal.
ADD	Acute Diarrheal Diseases
WHO	World Health Organization
+Ve	Positive
CBS	Central Bureau of Statistics
NGO	Non-Government Organization

1. Introduction

1.1 Background

Parasites are living things that get food and shelter from other living things. The definition of parasitism is an intimate, required interaction in which two heterospecific organisms are metabolically dependent on one another.

In both biology and ecology, parasites and their hosts continue to be tightly related. There are many different kinds of parasites in our community, including ecto, endo, facultative, accidental, transient, permanent, and required parasites. In Nepal, over 70% diseases are associated with infectious diseases and worm infestation is also reflected in the "top ten diseases" of Nepal. Worm infestation contributes a major role in morbidity in school going children (Dar *et al.*, 2013). Of these, endo parasites are responsible for a variety of intestinal diseases that are widespread throughout the world and pose a serious threat to health in developing nations where poverty, ignorance, and disease are intertwined. Food-borne disease and roundworms are related. Around 70% are not visible to human eye while some worms can reach over 30 meters in length (Biggers, 2018). *Ascaris, Trichuris, Entamoeba*, and food-borne parasites like *Hymenolepis* are among the visible *cestodes* in humans. *Giardia* and *Entamoeba* are two examples of protozoa that produce a lot of foodborne illness outbreaks that could result in a potentially lethal dysentery-like sickness, Among school-age children in underdeveloped nations, intestinal parasite infections are a leading cause of illness and mortality (WHO, 1987). Protozoan infection and STHs have been included as "Neglected Tropical Diseases" (WHO, 2016). More than one billion people were estimated to chronically infect with intestinal helminthes (WHO, 1998).

Many elementary school children have a substantial correlation between intestinal parasite infection and malnutrition (Loewenson et al., 1986). This correlation may be attributed in part to unclean fingers and untrimmed nail (Soulsa, 1975). Within the far western region of Sudurpaschim province sits the well-known Kanchanpur district. It is renowned for having distinctive customs and cultures, which highlight the individuality of its people. However, it is not a good idea to adhere to archaic customs that impede progress. If every Kanchanpur district resident gives this some thought that it may be one of the district serving as an example for growth throughout Nepal. Due to their poor

hygenic habits, and other risk factors, inhabitants in the village areas of Kanchanpur district are particularly affected by parasite illnesses. Contagious illnesses like dysentery and diarrhea have a profoundly negative impact on one's health. These are the main causes of illness and death in our nation, particularly among young children and babies. In addition to low economic status, growing water pollution is one of Nepal's main public health concerns when it comes to parasite infections. However, one of the main problems with Nepal's public health is also due to the rising level of water pollution. Water contamination is the cause of parasite diarrheal diseases of the gastrointestinal system. In Nepal, tainted water is the cause of diarrhea (1090) (DOHS, 1998 & SAEHN, 2002) ascariasis, giardiasis, amoebiasis, ancylotomiasis, and taeniasis are among the common intestinal infections in Nepal (Acharya, 1979). Adult infections were observed to occur less commonly in children (Rai et al., 1994).

Numerous local schools have implemented a routine stool examination program to reduce intestinal parasites and maintain student health. In light of this, a study on intestinal parasites in children in the Bhimdatt municipality of the Kanchanpur district has been conducted for the first time in order to determine the prevalence of infection based on factors such as age, sex, and occupation, all of which help to raise public awareness of intestinal disorders. In the near future, this will aid in reducing the incidence of various intestinal disorders in children and in carrying out such implementation on a yearly basis. Additionally, the current study may aid future researchers in expanding this understanding and shedding light on many issues raised by rural areas reporting the burden of illnesses.

1.2 Significance of the study

This survey can play a major role in realizing the national dream by raising awareness among the children of Siddhanath Amar Secondary School of Kanchanpur District. As survey on intestinal parasites has been done yet, people in this region are always plagued enough to involve in this study. Severe infections affect the host’s growth, weakening the body, leading to death and cause mortality.

Basically, due to a lack of knowledge about sanitation, children in rural areas are more likely than adults to get infected. They play in dirt and other unclean areas for the majority of the day, which aids in the parasite's spread. Because different communities or castes of people have distinct traditional habits and habitats, the infection rates of certain

intestinal parasites may vary. Acute diarrheal diseases (ADD) outbreaks are common in many of Nepal's districts. According to WHO estimates, a child dies worldwide from a disease related to water every eight seconds. Over five million people die each year from illnesses connected to contaminated drinking water, dirty homes, and inappropriate excreta disposal. Moreover, the present study may help future investigators to advance their knowledge.

1.3 Objectives of the study

1.3.1 General objective

- To determine the prevalence of intestinal parasite infection among children at Siddhanath Amar Secondary School in Gaddachauki, BhimDatt municipality, Kanchanpur district.

1.3.2 Specific Objective

- To determine the genera-wise prevalence of intestinal parasite.
- To point out the concurrency of parasites.
- To find out the sex-wise, age-wise, class-wise and caste-wise prevalence.
- To find out the prevalence of gastrointestinal parasites in relation to factors such as occupation, drinking water and place of defecation.

2. Literature review

Gastrointestinal helminth infection is a serious public health concern particularly in low- and middle-income nations. These infections, which can result in a number of health issues like malnourishment, anemia, and the development of cognitive impairment, are brought on by a variety of parasites, including protozoa and helminthes (worms). Intestinal illnesses such as *giardiasis*, *amoebiasis*, *ascariasis*, *ancylostomiasis*, *fascioliasis,* and *taeniasis* were frequent in Nepal, according to (Acharya, 1979).

2.1 Intestinal parasitic infections among children

Different types of protozoan and helminth resides in gastrointestinal tract of human such as *Giardia lamblia, Entamoeba histolytica, Balantidium coli, Trichuris trichuria, Hymenolepis nana, Taenia solium and Ascaris* sp. In a study on the prevalence of intestinal helminthiasis in Nigeria, 43% were found to be infected (Alo et al., 1993). Similarly, a study of prevalence of intestinal parasites in Shahjahapur, Uttar Pradesh, and the rural areas of the district showed 111 individuals were infected among 381 samples (Virk et al., 1994). Sugunan et al., (1996) investigated intestinal parasite infection in several Andaman and Nicobar Island population groups. A total of 1384 stool samples from adults and preschool-aged children living in rural and urban communities belonging to two tribal groups the Nicobarese and the Onges were studied. 47% of intestinal parasite prevalence was found overall based on the results of the microscopic inspection. Toma et al., (1999) investigated the prevalence of intestinal helminthes infections in Barru by conducting a questionnaire study. Sulawesi in Indonesia. 654 fecal samples in all were gathered and analyzed. The intestinal parasite infection in a rural, hilly region of western Nepal was investigated by Rai et al., (2001) and the prevalence was found to be 76.4%.

Maldani et al., (1995) conducted study among the Asian female housekeepers employed in Saudi Arabia's Abha district with a sample of 5518 Asian women housekeepers who worked in the Abha area of Saudi Arabia were studied and found 45.6% overall prevalence in the study.

The following are the annual reports of the intestinal at the national level over the last four years. (Teku, Division of Epidemiology and Disease Control)

Table 1. Infection of Diarrhoea diseases in four different years.

1999/00	2000/01	2001/02	2003/04
713463	787567	816481	949630
3.12%	3.35%	2.76%	3.87%

Table 2. Infection of intestinal worms in four different years.

1999/00	2000/01	2001/02	2003/04
651308	663629	666362	659582
2.85%	2.82%	2.76%	2.73%

2.2 Genera-wise prevalence of gastrointestinal parasites

Children are susceptible to different genera of protozoan and helminth parasites. The different genera of intestinal parasites where *Ascaris lumbricoides* displayed a positive of 17.85%, which was followed by the following parasites: Giardia *lamblia* 0.26%, *Entamoeba histolytica* 2.36%, *Hymenolepis nana* 3.15%, Hookworm 7.87%, Tapeworm 3.41%(Virk et al., 1994). The study done by Kobayashi et al., (1995) showed prevalence i.e. 8.64% had *Trichuris trichiura,* and 5.49% had *Ascaris lumbricoides* had 10.4% of *Strongyloide stercoralis* 10.4%of G. *lamblia*, 0.9% of *Hymenolepis nana*, and 1.4% of *Enterobius vermicularis.* In order to identify the helminthes infections, Suguri etal., (1985) examined 737 Nepalese residents of the Gandaki, Dhaulagiri, Lumbini, and Sagarmatha zones of Nepal as well as 26 Japanese residents of Kathmandu. Between February and April of 1975, the "thick smear method" was used. The total helminthes infection rate was 36.8%, including of *Taenia* species (0.1%), whipworm (47.6%), roundworm (~50.3%), hookworm (~44.1%), and pinworm (1.2%). Bhairahawa had the lowest positive rate (3.8%), while Darbang had the highest (98.8%). The highest rate of roundworm infection (70.3%) and lowest rate of hookworm infection (~0.2%) were found in Namchhe Bazar with a total of 5 species of nematodes (*Ascaris lumbrcoides*, *Toxocara sp*., *Trichuris trichura, Capillaria* sp., and *Trichostronglylus* sp.) and 2 species of cestoda (*Hymenolepis. nana* and *Hymenolepis diminuta*) were recorded (Rai et al., 2000). Rai et al. (1986) collected 200 feces samples and used the direct smear technique to evaluate

them. Roundworms had the highest incidence (35%) and hookworms the second lowest (14%).

2.3 Concurrency of parasitic infection

Children are particularly affected by different parasites and were infected with single, double, triple and sometimes more than three (multiple) infections. The study done by Virk et al., (1994) showed 111 individuals, or 29.2%, out of 381 total sex tests tested positive for one or more intestinal parasites.

2.4 Factors affecting the gastrointestinal parasitic infection

Dorea et al. (1996) in the periurban neighborhood of Botecatu, Sao Paulo, Brazil collected stool samples from 219 schoolchildren, ages 7 to 18, were gathered as a group to find out the prevalence. Toma et al. (1999) investigated the prevalence of intestinal helminthes infections in Barru by conducting a questionnaire study and found the most prevalent endoparasites were *T. trichiura* and *A. lumbricoides*. Infections with hookworm, *S. sterecoralis,* and *H. nana* were also confirmed. *T. trichiura* was the most prevalent, followed in both the 4–14 and over–15 age groups by Hookworm and *A. lumbricoides*. Compared to older females, males had a much higher frequency of hookworm infection. The infection rate of *A. lumbricoides* and *Trichuris trichiura* was much lower in the resident with a better educational background. While the prevalence of *Ascaris* and *Trichuris* varied significantly, the prevalence of Hookworm infection did not differ significantly between residents with and without latrines.

Sherchand et al., (1997) investigated intestinal parasite infection in the Dhanusha district of southern Nepal, a rural location. Of the 604 kids ages 0 to 9 that were tested, 63.1 tested positive for one or more intestinal parasites. Paul et, al, (1999) carried out a study to determine the prevalence and intensity of intestinal helminth infections among the children between 7-13 years of age and belonged to lower socio economic status. Stool samples collected were processed by modified formalin ethyl acetate sedimentation technique in order to find out how common soil-transmitted helminthes parasites are in youngsters in Abeokuta, the capital city of Ogun State, Nigeria.

Poor environmental sanitation, inadequate personal hygiene, education status, and unfavorable socioeconomic conditions that encourage the spread of parasites, a significant prevalence was discovered in this rural area. Research initiatives among

children in different schools addressing the gap related to parasitic infections in relation to different socio-economic and socio-demographic factors are important to minimize the risk and potential threats.

3. Materials and methods

3.1 Study area

The Siddhanath Amar Secondary School, located in Ward No. 11 of the Bhimdatt municipality at Gaddachauki, is situated in the southwest region of the Kanchanpur district, which is located in the Terai plain and is a part of Sudurpashchim Province. Tdistrict, which has the Bhimdatta town as it's district seat, has 134,868 residents as of 2001. It covers 1,610 square kilometers (620 sq mi). It is situated in Nepal's southwest. It shares borders with Dadeldhura District in the north, Kailali District in the east, and India in the west and south. Doteli (57.9%), Tharu (25.41%), Nepali (16.1%), Baitadeli (5.2%), and Others (15.4%) are the districts in question. The people who have migrated from the northern mountainous region make up minor groupings, but the ethnic Tharu Community makes up the majority of the population. The Suklaphanta Wildlife Reserve and the 1,456.97-meter (4,780-foot) multi-span suspension bridge over the Mahakali River are the district's most well-known features.The additional tourist destinations are Jhilmila Lake, Bedkot Lake, Bandatal, Shovatal, the Vishnu temple and Ranital.

Figure 1. Map showing study area

Figure 2 . Study area

3.2 Research design

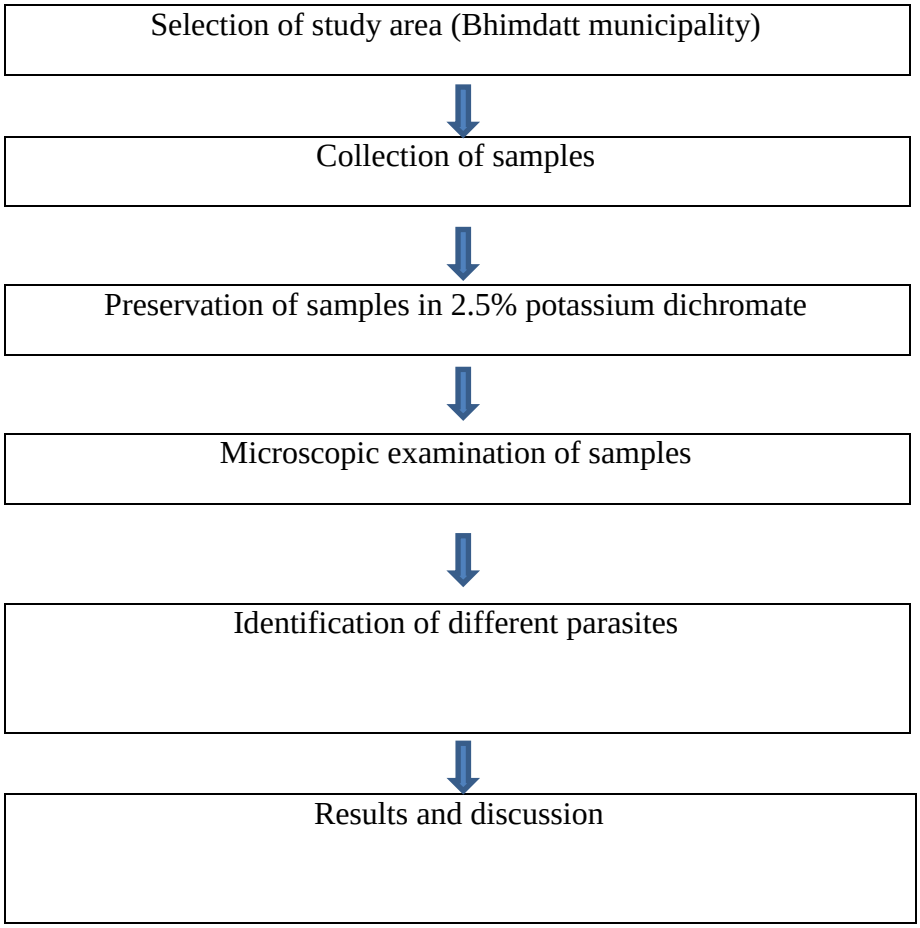

Figure 3. Flowchart showing the entire study

3.2.1 Study period

The study was conducted from December 2004 to January 2005.

3.2.2 Sample size

A total of 224 stool samples from the 448 total school children by random sampling method.

3.2.3 Sample collection

224 stool samples from the school children were collected in sterile sample collection containers along with instructions on how to collect the samples. Each container was labeled with sample number and other details.

3.2.4 Preservation of samples

All the collected samples were preserved in 2.5% potassium dichromate ($K_2Cr_2O_7$) solution after collection.

3.2.5 Sample examination

First, helminth parasite worms (adult *Ascaris, Trichuris,* hookworm, and other intestinal flukes) or portions of them (*Taenia solium a*nd *saginata* segments), as well as mucus, blood, and consistency, were visually inspected in the stools.

3.2.5.1 Microscopic examination

- Stool smear preparation without staining: Using a stick, a portion of the stool was emulsified with regular saline on a clean glass slide. A cover slip was then placed over the slide, and any surplus fluid was wiped away using filter paper.
- Stool smear stained preparation: The identification and investigation of the nuclear character required stained preparation. This was done using the preparation that was dyed with iodine.

First, preparations with and without staining were inspected using a low power microscope with a 10X objective. Starting from one end of the slide to the other, observations were made. In order to provide a thorough diagnosis, objects were centered and focused under the high power.

3.2.6 Questionaire survey

Structured questionnaires were prepared and interviewed among schoolchildren. The questionnaires includes data related to their name, gender, age, class, source of drinking water, parent's occupation and the place of defecation.

4. Results

4.1 Overall prevalence of intestinal parasites

The study includes students from the "Siddhanath Amar Secondary School" in the Bhimdatt Township. The school has 448 enrolled students, spanning from class one to class ten. Eighty (35.71%) of the 224 students were found to have one or more intestinal parasitic infection (Figure 4).

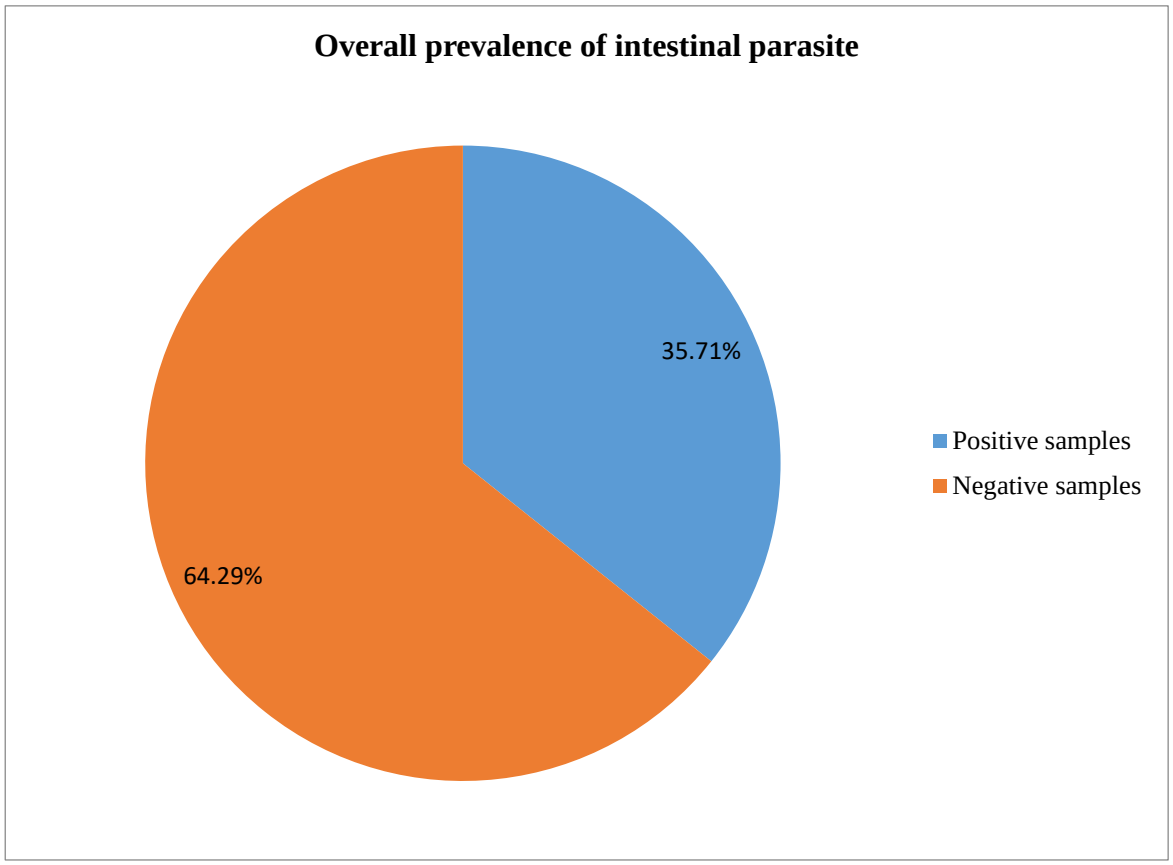

Figure 4. The overall prevalence of intestinal parasitesamong schoolchildren

4.2 Genera-wise prevalence of intestinal parasite

Out of 80 positive samples, 51 samples (63.75%) were infected with *Ascaris* sp., 5 (6.25%) with *Trichuris* sp., 5 (6.25%) with hookworm, 1 (1.25%) with *Hymenolepis* sp., 8 (10%) with *Giardia* sp., 8 (10%) with *Entamoeba* sp, 1 (1.25%) with *Cyclospora* sp., and 1 (1.25%) with *Cryptosporidium* sp (Table 3).

Table 3. Prevalence of specific genera of parasites

Parasite	Total infected cases		No. of infected Male	No. of infected female
	No.	%		
Ascaris sp	51	63.75	23	28
Trichuris sp	5	6.25	3	2
Hookworm	5	6.25	3	2
Hymenolepis sp	1	1.25	1	0
Entemoeba sp	8	10	5	3
Giardia sp	8	10	3	5
Cryptosporidium sp	1	1.25	1	0
Cyclospora sp	1	1.25	0	1
Total	80	100	39	41

4.3 Concurrency of parasites

Single infection was more common than the double or triple parasite infections. Of the 80 confirmed instances, 61 students had a single parasite species infection, 15 had a double parasite species infection, and 4 had a triple parasite species infection. In terms of double infections, the most common infections were of *Ascaris*sp+*Trichuris*sp, *Ascaris* sp+Hookworm, and *Giardia* sp+*Entamoeba* sp whereas in triple combination, *Giardia* sp+*Entamoeba* sp+*Ascaris* sp, *Giardia* sp+*Cyclospora* sp+*Ascaris* sp and *Ascaris* sp+ *Trichuris* sp+*Cyclospora* sp were found (Table 4).

Table 4. Parasitic infection pattern among infected children.

Parasitic Infection	Total infected cases	
	No.	%
Single Infection	61	76.25
Double Infection	15	18.75
Triple Infection	4	5
Total	**80**	**100**

4.4 Sex-wise, age-wise, class-wise and caste-wise prevalence

55 (62.15%) of the 113 male feces samples that were tested turned out to be positive. Similarly, 50 (55.5%) of the 111 female stool samples that were tested turned out to be positive for intestinal parasites.

Male children (30.00%) were less infected than female children (39.93%) in the Tharu community. Male children (44.44%) were more infected than female children (26.08%) in the Brahmin community. In the Chhetri village, male children had a higher infection rate (42.85%) compared to female children (11.53%). Male children (71.42%) in the Dalit group were more contaminated than female children (20.00%). Male children (50%) in the Bhote community had lower infection rates than female children (66.66%). Overall, Bhote children (60%) were found to be more contaminated than children from other castes, with Dalit (59.09%), Tharu (35.34%), Brahmin (34.14%), Chhetri (22.50%), following closely behind.

Table 5. Sex and caste-wise distribution of intestinal parasites

Caste	**Tharu**		**Brahman**		**Chettri**		**Dalit**		**Bhote**	
Total	116		41		40		22		5	
	+ve cases		+ve cases		+ve cases		+ve cases		+ve cases	
	No.	%	No.	%	No.	%	No.	%	No.	%
Male	15	30.00	08	44.44	6	42.85	8	36.36	1	50.00
Female	26	39.93	06	26.08	3	11.53	5	22.73	2	66.66
Total	**41**	**35.34**	**14**	**34.14**	**9**	**22.50**	**13**	**59.09**	**3**	**60.00**

The distribution of intestinal parasites was lowest (12.50%) in the 0–5 age group and largest (42.14%) in the 10-15 age group.

Table 6. Age wise prevalence of intestinal parasites.

Age	Observation	+ve cases	
		No.	%
0-5	008	01	12.50
5-10	042	13	30.95
10-15	121	56	46.08
Above15	053	10	18.86
Total	224	80	35.71

The distribution of intestinal parasites were maximum (62.96%) in class 6 and minimum (21.42%) in class 10.

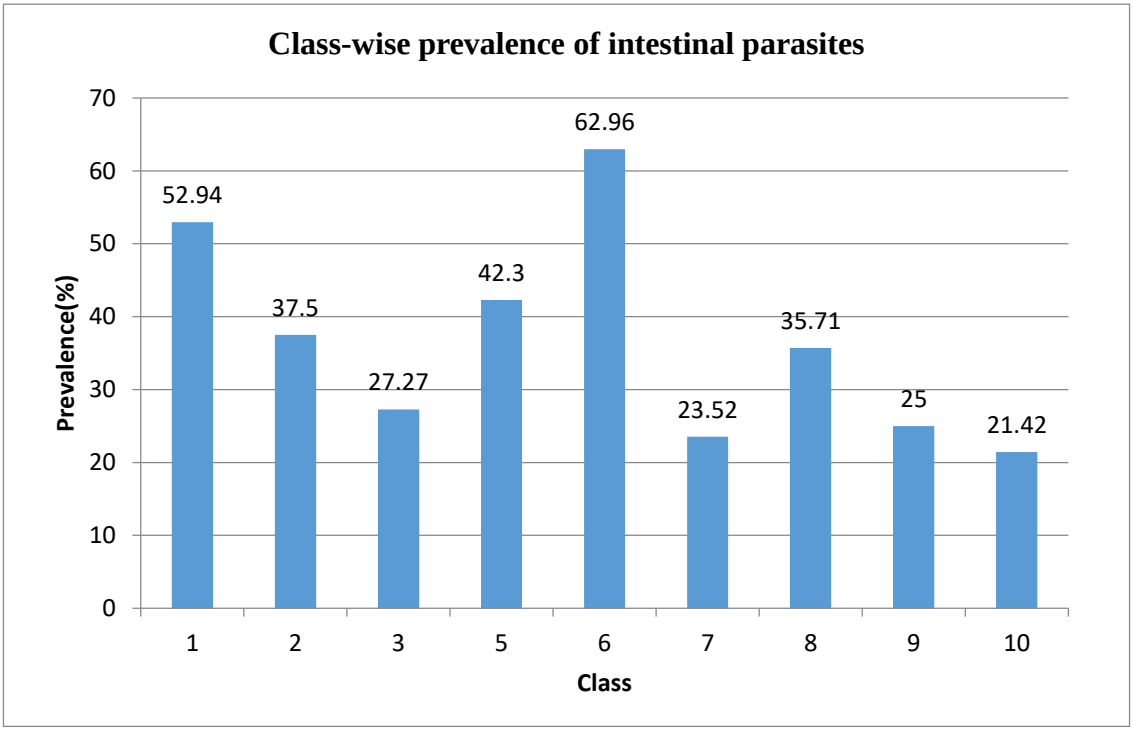

Figure 5. Bar graph showing class-wise prevalence of intestinal parasite

4.5 Sociodemoghrapic characteristics with respect to prevalence of intestinal parasite among school children

Children whose parents occupation is laboring had the highest prevalence of parasite infection (40.00%) followed by farming, while parents having business occupation had the lowest infection rate (15.38%). Children who drank underground water had the highest distribution of parasite infection (39.25%), whereas children who drank boiled water had the lowest infection rate (28.00%). The distribution of parasite infection was lowest (26.98%) in children who used safe toilets as their place of defecation, and the highest (73.33%) in children who used to urinate close to open field water resources.

Table 7. Sociodemographic characteristics with respect to prevalence of parasite among children.

Variables	**Classification**	**Observation**	**Positive cases**	**Prevalence**
Occupation	Farmer	115	47	39.83
	Service Holder	028	09	32.14
	Carpenter	020	05	25.00
	Mason	005	00	00.00
	Business	013	03	23.27
	Labour	040	16	40.00
	Total	224	80	35.71
Drinking water	Underground water	135	53	39.25
	Boiled water	28	8	28.57
	Chlorinated Water	30	09	30.00
	River	31	10	32.25
	Total	224	80	35.71
Defecation place	Open field	15	13	73.33
	Near water resource	20	11	65.00
	Toilet	189	56	29.62
	Total	224	80	35.71

5. Discussion

Intestinal parasites are widespread throughout the world and pose a major threat to public health among schoolchildren. In undeveloped nations, the parasitic infestation is caused by poverty, ignorance, illiteracy, and conservative thought patterns. The prevalence is higher in the world's economically poor areas, particularly in developing nations (Gupta et al., 2004).

According to an analysis of surveillance data, 35.71% of the 224 youngsters in Bhimdatt Municipality 80 harbored various intestinal parasites. Comparable parasite prevalence's of 72.4% by Ishiyama et al., (2001) and 76.4% by Rai et al., (2001) were found among schoolchildren from remote areas in the Far-West region's Accham district and a suburban neighborhood in the Kathmandu Valley, respectively. Due to poor environmental sanitation, inadequate personal hygiene, low levels of education, and unfavorable socioeconomic conditions that encourage the spread of parasites, a significant prevalence was discovered in this rural area.

In comparison to protozoans, helminthes had a greater prevalence rate. Altogether eight different genera of intestinal parasites were found. Of the intestinal parasites, helminthes parasite *Ascaris lumbricoides* had the highest prevalence (62%) which is transmitted through contamination of soil followed by *Trichuris* sp and Hookworm. The higher prevalence of *Ascaris* sp. might be due to the reason that most of the parent's occupation includes outdoor works such as farming and laboring. It is consistent with the WHO study from 1993, which states that soil-transmitted helminthes infections are becoming more widely acknowledged as a serious public health issue, especially in poor and undeveloped nations. The least prevalence of 1.25% was showed by *Cryptosporidium* sp. and *Cyclospora* sp.Therefore, this result also aligns with the research published by Rai, et al., (1994), which stated that the highest prevalence rate was observed in the annual rate of positivity for soil-transmitted helminthiasis 4 *(Ascaris lumbricoides*), compared to *Trichuris trichiura* and hookworm.

Comparably, out of all the protozoa, *Entamoeba* and *Giardia* the greatest prevalence rate (10.66%), followed by *Cyclospora* (1.25%), and *Cryptosporidium* (1.25%). The use of drinking water from open streams could be the cause. River and well, heavily polluted by waste and feces from wind or rainwater; water supply is tainted by worm infective stage and may be contaminated with soil too.

Of the 80 cases, 61 children had a single parasitic infection, 15 had a double parasite species infection, and 4 had a triple parasite species infection. In terms of more than one single infection the most common infections were of *Ascaris+Trichuris*, *Ascaris*+Hookworm, and *Giardia+Entamoeba* in triple combination, *Giardia+Entamoeba+Ascaris*, *Giardia+Cyclospora+Ascaris* and *Ascaris+Trichuris+Cyclospora* were found. Sewage from urban areas seeps into water near hand pump, while waste disposal deposits in Nepal's rural areas contaminate open water sources such wells, ponds, springs, and rivers. This is corroborated by the current study, which also found that due to opening sawage and toilet intake near the hand pump, intestinal parasite prevalence in children who used hand pumps was highest (45.26%) and lowest (0.5%) in those who used underground water. Notably, there was no variation in the incidence of parasites amongst the various users of drinking water resources (x2-15.16, P>0.05). The current study indicated that drinking water and unorganized defecation areas are potential sources of infection in the Kanchanpur district, while further research is required to establish a clear connection between parasite infection and other sources. Defecation close to wells, khola, and streams contaminates the water supply that parasites use to get sick. Due to the highest potential for contamination and transmission, drinking straight water speeds up the infection process (Sherchand et al, 1997-2001).

The age range of 10-15 years was found to have the highest overall prevalence of parasites (46.28 %). This finding is consistent with a investigation by Rai et al., (1991) that indicated intestinal parasites were more common in children under the age of 15 than in people over the age of 15. Class 6 children had a greater prevalence rate of intestinal parasites (44.44%) than students in other classes, whereas class 10 students had the lowest prevalence rate (21.42%). The spread of this type of sickness is brought on by negligence, playing in unclean areas, and riskless eating practices found among under 15 schoolchildren. Since their parents provide them with enough care up until class 5, the infection rate in those classes was shown to be negligible, following class 7, the kids had some degree of self-responsibility for their own obligations and health. Similar fast acquisition of A*scaris lumbricoides* was discovered in infants, and by the time children became 10 years old, the incidence had reached 100%, according to reports from Kightlinger et al. (1995) and Xu et al. (1995). A nationwide survey conducted in China revealed that individuals aged 6-14 years old had a greater prevalence of both

Trichuriasis and *Ascariasis*. Therefore, the greater frequency in younger kids seems linked to their less hygienic habits, ignorance of personal hygiene, and age at which they are most active. According to the current investigation, there was no discernible variation in the prevalence of parasites between age groups. ($P>0.05$, 22-11.168) Given that the illness can strike anyone of any age, The age group older than 18 months has the highest attack rate. Re-infection can happen at any age, and there is no apparent protection to infection Connat et al., (1993). Bhote had the greatest prevalence (60%) of all the ethnic castes, followed by, Magar(42.10%), Tharu(35.34%), Brahmin(34.14%) and Chettri(22.50%), De Silva et al., (1996) confirm the finding that the prevalence was substantially correlated with factors such as economic position, education, living circumstances, drinking water quality, and personal cleanliness. It was discovered that the monthly income was substantially correlated with the incidence of parasites. Low-income individuals have less money to spend on food and clean water, which increases the risk of malnutrition and parasitic illnesses, as shown by studies by cutting (1988) and Loewenson et al. (1986) Those that followed unsanitary eating practices, had no toilets in their homes, and were negligent about personal prophylaxis had a noticeably greater incidence of parasites. Sorensen et al., (1996) provide evidence that congested dwelling situations and inadequate sanitary facilities may contribute to the spread of parasites. The prevalence in relation to drinking water is particularly related to higher prevalence with those children that use underground water resources as it may have chance to contaminate with sewage contact. In some conditions the prevalence was found among those who had habit of boiling as in some cases improper handling of water may lead to some causes of infection. The children whose parents are laborers have the highest prevalence (40.00%). Lack of time to care for their kids could be the cause of this. Less infection was discovered in kids whose parents are Business. Since this activity may be done while sitting at home, it may be the result of parents providing their children with appropriate care.

6. Conclusion and Recommendations

6.1 Conclusion

The present study revealed 35.71% of prevalence of intestinal parasitic infections with 80 out of 224 school children being infected with parasites belonging to eight different genera. *Ascaris* sp was reported as a dominant genera with 63.75% prevalence followed by different parasites. Single infection was found higher in comparison to multiple infections. Overall male children were highly infected than female children. Bhote children were found to be more infected than children from other castes such as Dalit Tharu, Brahmin and Chettri.10-15 age group showed higher prevalence than other age groups. Class-wise prevalence was found higher among class 6 and least among class 10. This study emphasizes the need of parasitic control among schoolchildren by administrating antiparasitic drugs and better personal hygienic practices along with better drinking water quality.

6.2 Recommendations

- Underground water should be processed properly for drinking purpose.
- Proper management of latrines in rural areas should be carried out and open defecation must be prohibited.
- It is important to support research on intestinal parasite prevalence and prevention.

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ANNEX I

Photo 1. Microscopic examination

Photo 2. Discussion of questionaire

Photo 3. Distributing questionnaire

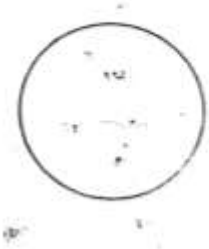

Photo 4. Trophozoite of Giardia lamblia

Photo 5. Egg of *Trichuris trichuria*

Photo 6. Egg of Hookworm

Photo 7. Cyst of *Entamoeba* sp.

Photo 8. Egg of *Ascaris* sp

Photo 9. Oocyst of *Cryptosporidium* sp.

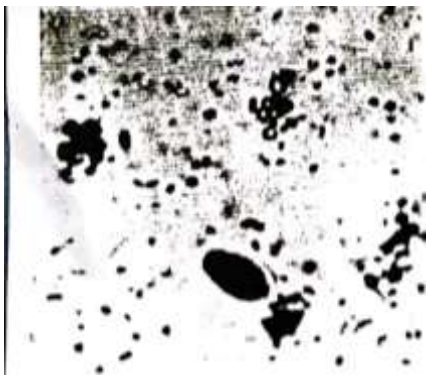

Photo 10. Cyst of *Giardia lamblia*

ANNEX II

Questionaires

1. Sample number:
2. Date of collection:
3. Name:
4. Gender:
5. Age:
6. Grade:

7. What is the occupation of your parent?

Ans:-……

8. Where you defecate?

Ans:- a) Used latrine……

b) Open places……

9. What is the source of drinking water?

Ans:-……