Assessing the Prevalence of Intestinal Parasitic Infections (IPIs) Among the Children of Geidam Central Primary Yobe State, Nigeria.

ABSTRACT

Background: Intestinal Parasitic infections (IPIs) is one of the preventable and avoidable public health problem that affects a significant portion of school-aged children and causes a lot of predominant physical and intellectual health challenges. Despite their significant public health importance, they remain largely neglected by the government, medical community and international health organisations. This neglect occurs due to several factors such as- the most affected people belongs to the poorest and less privileged communities who often live in remote rural areas or urban slums with little political voice and coupled with the nature of the infection as they are not highly visible and do not cause explosive outbreaks that attract public and media attentions to take necessary measures.

Aims: This research study is aimed at assessing the prevalence of intestinal parasitic infections (IPIs) among the children of Geidam Central primary school Yobe state, Nigeria.

Study Design: A cross-sectional research method was used.

Place and Duration of Study: Laboratory department**,** Yobe State Specialist Hospital (YSSH) Geidam and the study was conducted within months.

Methodology: A total number of 36 stool specimens were collected from primary 1-6 children, and six (6) children were randomly selected from each class, totaling 36 stools of 36 children. The stool samples were taken to YSSH, Geidam for microscopic examination to ascertained the presence of IPIs cysts larva or ova. The Data were analyzed using frequency and percentage with the aid of statistical package for Social Sciences (SPSS) version 20 statistical software and presented in tables and figures.

Results: Out of the 36 children that were examined for the prevalence of an intestinal parasitic infections (IPIs), 19 (52.65%) were infected with different intestinal parasitic infections (IPIs) identified and these IPIs identified were- Ascaris lumbricoides with total percentage of 16.63%, Hookworm with total percentage of 13.86%, Giardia with total percentage of 5.54%, Strongyloides stercoralis with total percentage of 8.31%, Trichuris trichiura with total percentage of 5.54 and Enterobius vermicularis with total percentage of 2.77%.

Conclusions: This research study established that there is prevalence of IPIs among children of Geidam central primary school. This may have connection with different potential risk factors such as walking bare foot, poor hand washing habit, open defection, absence of proper latrine utilization, etc. Therefore, government should put more efforts to reduce children morbidity and mortality associated with IPIs through health education at primary schools' level and the development of community awareness campaigns in order to improve environmental sanitation and personal hygiene, as well as free deworming programme, these three intervention tailored to suit prevention, control and chemotherapy measures towards curtailing IPIs.

Keywords: *Assessing, prevalence of IPIs, Children, Central Primary School, Geidam Yobe State, Nigeria.*

1. INTRODUCTION

Intestinal Parasitic Infections (IPIs) is one of the most common diseases in Nigeria, especially among children of school aged and IPIs is causing soil-transmitted helminths (STHs) and intestinal protozoa.

Intestinal Parasitic Infections (IPIs) is preventable and avoidable public health concern that causes predominant physical and intellectual health problems among school-aged children, the burden of intestinal parasitic infections is primarily related to the impact on health and quality of life. In infancy this is the consequence of a chronic infection, which may adversely affect growth, nutritional status and cognitive capacity and the consequences are not limited to growth retardation, decreased cognitive capacity, protein malnutrition, stomach cramps/pain, weight loss, nausea/vomiting, swollen lymph nodes, persistent diarrhea/gas, constipation, dehydration, bloating, headaches, and skin issues (rashes, eczema, hives, itching), as well as iron deficiency anaemia, blindness and seizure in long term complications among many more others. After the direct percutaneous invasion of infective larvae from contaminated soil, at the end of their life cycle, adult worm parasite inters the upper small intestine and use cutting organs to suck arteriolar and capillary blood of the intestinal mucosa. Alas, in spite this huge burden causes by intestinal parasitic infections, IPIs remains prevalent and constitute a public health problem in many part of developing countries, Africa in particular and Nigeria is subsumed due to consumption of contaminated water/food, poor personal hygiene and inadequate sanitation which is highly linked to corruption and poor policy in health sector of the developing countries. Nonetheless, despite their significant public health importance, they remain largely neglected by the government, medical community and international health organisations **(1).** This neglect occurs due to several factors such as the most affected people belongs to the poorest and disadvantages communities who often lives in remote rural areas or urban slums with little political voice and coupled with the nature of the infection as they are not highly visible and do not cause explosive outbreaks that attract public and media attentions to take necessary measures **(2,3).**

1.1 Global Prevalence of Intestinal Parasitic Infections (IPIs) and its Associated Risk Factors

The World Health Organization (WHO) has recognized soil-transmitted helminths (STHs) is causing Intestinal parasitic infections (IPIs) and related it as one of the neglected tropical diseases (NTDs) as it is ubiquitous and persisting exclusively among many worldwide communities **(2).** NTDs are a group of infectious diseases, with parasitic infections that occurs primarily among regions of poverty and malnourishment **(4,5).** Globally, there is an estimation of 895 million people infected with STH, with 447 million people infected with A. lumbricoides, 290 million with T. trichiura, and 229 million with hookworms **(6).** Apart from that, the global prevalence of S. stercoralis is estimated from a range of 30 million to more than 300 million **(7).** Intestinal protozoa, on the other hand, have a lower overall prevalence rate as compared to STHs, with approximately 184 million people infected with G. lamblia, 104 million with E. histolytica, and 64 million with Cryptosporidium spp **(8).** The high prevalence of IPIs is attributed primarily to lower educational level associated with inadequate knowledge and awareness regarding infection transmission and prevention, as well as limited access to safe drinking water, inadequate personal hygiene, poor environmental sanitation, and the widespread food contamination **(10, 10).** The risk factors of IPI have extensively been discussed by von Huth, Kofoed **(3)**, Terefe, Ross **(12),** and Forson, Arthur **(11),** and hence will not be elaborated in detail in this review. Briefly, demographic factors are closely associated with the high prevalence rate of IPIs **(13).** For examples, having large household members and having inadequate knowledge of health awareness are positively associated with Intestinal parasitic infections (IPIs) **(3, 14).** Large households are known to have more than seven members in a house, and this may increase the risk of IPIs due to over-crowdedness **(14, 15).** The lack of sanitation and health care knowledge increases their risk of disease transmission as most of them may not be aware of the key sources and communal behaviors that exacerbate infection prevalence among the population **(3, 16).** Communities who prefer to stay in close proximity to rivers as their water source for daily chores including bathing, washing, and consumption of untreated water may expose the community to contaminated water harboring different species of protozoa parasites **(17, 18).** Furthermore, due to the lack of functioning toilets in most homes, single pit latrine consisting a pit that is few meters deep into the ground to collect human feces is usually shared between several households among Intestinal parasitic infections (IPIs) susceptible communities **(19, 20).** The need to share latrines coupled with poor maintenance discourages members of the community from using it which thus encourages the practice of open defecation **(20, 21).** A previous study has found that pit latrines can be a direct source of water contamination as subterraneous water flows through the soil contaminated with human feces in the pit latrines, which could carry fecal runoffs into water streams **(22).** Young age has been found to be positively associated with IPI as compared to other age groups of the same population profile **(2,3,11).** Children are

natural-born explorers; their inquisitive nature propels them to explore their surroundings without proper footwear and supervision from adults **(17, 20).** Therefore, STH larvae are able to penetrate the host's primary protective barrier through direct skin-to-soil contact**.** Additionally, communities who lack veterinary and zoonotic awareness may be in contact with domestic animals that are not dewormed. As these domestic animals often roam freely and defecate in an open environment, contaminating the soil with feces, it may further exacerbate the risks of getting STHs causing IPIs **(11, 21).** Due to these risk factors, diseases including anemia, malnutrition, giardiasis, amoebiasis, and cryptosporidiosis caused by Intestinal parasitic infections (IPIs) can be developed over time. Thus, the next section will discuss the common diseases associated with Intestinal parasitic infections (IPIs) **(11, 21).**

1.2 Diseases associated with Intestinal parasitic infections (IPIs)

Diseases associated with T. trichiura, A. lumbricoides, A. duodenale and N. americanus are trichuriasis, ascariasis, ancylostomiasis, and necatoriasis, respectively. Anemia and malnutrition are two intertwined diseases that are strongly associated with IPI **(23-27).** STHs in specific, play a role in inducing intestinal bleeding and red blood cell destruction, leading to anemia **(24,26,28).** Specifically, co-infection of T. trichiura and hookworm may have synergistic effects on causing blood loss, impairing re-absorption and ingesting iron **(28, 29).** As STHs have designed appendages to attach to the host intestinal mucosa, impaired digestion and poor absorption of nutrients may occur in the infected individual with damaged gut epithelium, consequently leading to malnutrition **(25,28,30).** Malnutrition may then lead to underweight as well as stunted growth and development **(27, 28).** Rajoo et al. (2017) stated that the high prevalence rate of stunting (31.7%) is found among rural children infected with STHs in Malaysia, followed by a prevalence rate of 28.6% on those being underweight. STHs-causing IPIs may also lead to intestinal epithelial damage as these STHs can attach to the gut mucosa and disrupt the intestinal barrier, subsequently destroying the cell cytoskeleton and resulting in cell damage **(31).** This is often accompanied by intestinal inflammation as cell damage may enhance the intestinal infiltration of activated neutrophils **(32).** This is supported by a study conducted by Garzón et al. (2017) which showed that the production of fecal S100A12, a protein that regulates inflammatory responses and neutrophil infiltration, was upregulated in IPIs-infected individuals, implying an association between intestinal inflammation and Intestinal parasitic infections (IPIs). Giardiasis, amoebiasis, and cryptosporidiosis are common diseases caused by G. lamblia, E. histolytica, and Cryptosporidium spp., respectively **(33).** Individuals infected with E. histolytica may develop clinical symptoms such as dehydration, dysentery, and acute diarrhea **(34).** However, having been infected with G. lamblia will lead to abdominal cramping, bloating, and diarrhea among the populations **(35).** Healthy individuals who are infected with Cryptosporidium spp. may have self-limiting diarrhea, but cryptosporidiosis may contribute to chronic diarrhea in immunocompromised individuals **(33).** As diarrhea and dysentery are common among the individuals infected with intestinal protozoa, weight loss and malnutrition can be observed among the communities **(36).** Persistent diarrhea may result in increased loss of fluids and electrolytes, leading to weight loss and malabsorption of nutrients such as carbohydrate, protein, and fats, resulting in malnutrition **(37).** Reinfection of STHs may occur when there are no improvements in terms of environmental cleanliness and personal hygiene among the communities. STH prevalence often rebounds to the pre-treatment levels in a relatively short time frame of 6 to 12 months **(38, 39).** This showed that complete elimination of parasites cannot be achieved by relying solely on anti-helminthic treatments. Speich et al. (2016) reported that the reinfection rate in Tanzania for T. trichiura was 37.2% (42/113 treated children) after 18 weeks followed by treatment with anti-helminthic drugs. Furthermore, 57 of 165 (34.6%) children were found to be reinfected with A. lumbricoides, and 18 of 72 (25.0%) children were reinfected with hookworms. sanitation and personal hygiene may reduce the reintroduction of parasitic agents into the local environment, particularly by actively infected individuals, where such methods will be further reviewed in the following section Therefore, anti-helminthic drugs should be administrated alongside with sufficient awareness on the importance of hygienic practices in the susceptible community. Improved environmental **(54).** In view of above stated IPIs burdens was the reason behind this research study was conceived and aimed at assessing the prevalence of intestinal parasitic infections (IPIs) among the children of Central Primary School Geidam, Yobe state Nigeria.

2. MATERIALS AND METHODS

A specimen container, hand globes and facemasks were used while collecting the stool specimen and the selected children were guided on how to use hand globe, facemasks and how to defecates and insert some portion of the stool in to sample bottle without spoiling the sample bottle and the samples collected were taken to Yobe state specialist hospital (YSSH) Geidam for microscopic examination of the stool specimens to ascertained the presence of IPIs cysts larva or ova. A cross-sectional research method was used, a total number of 36 stool specimens were collected from primary 1-6 children, and six (6) children were randomly selected from each class totaling 36 children and the data was analyzed using percentage with the aid of statistical package for Social Sciences (SPSS) version 20 statistical software and presented in tables and figures.

2.1 Aims: This research study is aimed at assessing the prevalence of intestinal parasitic infections (IPIs) among children of Geidam Central primary school Yobe state, Nigeria.

2.2 Objectives: Is to sensitizing school-aged children about the causes and risk factors of intestinal parasitic infections (IPIs) through health education at school level and to develop general public awareness campaigns. The policymakers can utilize the findings of the research in making necessary actions towards eliminating intestinal parasitic infections (IPIs) through providing health education program at primary school level and free anthelminthic drugs policy to all school-aged children.

2.3 Study Area: The study was conducted in Geidam local Government area of Yobe state Nigeria at Central primary school Geidam.

2.4 Study population: the study population were children of Geidam central Primary school which comprised all classes ranging from class 1 to 6 and both genders were equally selected, i.e. three males and three males from each class totaling 36 children.

3. RESULTS AND DISCUSSION

3.1 Results

Out of the 36 children that were examined for the prevalence of an intestinal parasitic infections (IPIs) in Geidam central primary school, 19 (52.65%) children were infected with different sort of intestinal parasitic infections (IPIs). These intestinal parasitic infections (IPIs) identified were included- Ascaris lumbricoides with total percentage of 16.63%, Hookworm with total percentage of 13.86%, Giardia with total percentage of 5.54% Strongyloides stercoralis with total percentage of 8.31%, Trichuris trichiura with total percentage of 5.54, Enterobius vermicularis with total percentage of 2.77%. Among the 36 selected children males maintain a high prevalence of intestinal parasitic infections (IPIs) with total percentage of 36.11% and females hold lower with total percentage of 16.66%, and among the age group; children with 10-12 years (class 4-6) have high prevalence with total 33.33% while their counterpart of 6-9 years hold lower prevalence with total percentage of 19.44% respectively. And among the different classes- class 1 has 5.5%, class2 has 8.33%, class3 also has 5.55%, as well as class 4 has 11.11%, class 5 has 13.88% and class6 has 8.33% respectively. In this result, of all an intestinal parasites infections (IPIs) burdens- Ascaris has high prevalence with total percentage of (16.63%) and Hookworm with total percentage of (13.86%) and the other three with average prevalence while Enterobius vermicularis maintain a lower prevalence with total percentage of (2.77%). According to gender result-males have high prevalence (36.11%) than females (16.66%), as well as according to age group result-children with 10-12 years have high prevalence (33.33%) than children with age 6-9 years (19.44%) and according to the class groups result- children of class 5 (13.88%) and class 4 (11.11%) holds highest prevalence than the other classes, whereas class 3 (8.33%) and class 6 (8.33%) maintain average prevalence and then c1ass 1 (5.55%) and class 3 (5.55% have lowest prevalence respectively. (see below table and figures and figures for more details).

Table1: Shows Prevalence of Intestinal Parasitic Infections (IPIs) among 36 selected children, prevalence in Gender, prevalence in Age group, and prevalence I different classes.

Ascaris Lumbricoides		Hookworm Sp.		Giardia		Stronglyloides Stercolaris		Trichuris Trichiura		Enterobius Vermicularis	
Freq.	Perc.	Freq.	Perc.	Freq.	Perc.	Freq.	Perc.	Freq.	Perc.	Freq.	Perc.
6	16.63%	5	13.86%	2	5.54%	3	8.31%	2	5.54%	1	2.77%

Prevalence Of Intestinal Parasitic Infections (IPIS) By Gender		
MALE	Of the 36 selected children 13 males were infected (36.11%) and 6 females were infected (16.66%), totally 19 children with total percentage of (52.65%)	36.11%
FEMALE		16.66%

Prevalence of Intestinal Parasitic Infections (IPIs) Age		
6-9 Years	Of the 36 selected children 6-9 years 7 children were infected (19.44%) while from 10-12 years 12 children were infected (33.33%), totally 19 children with total percentage of (52.65%)	19.44%
10-12 Years		33.33%

Prevalence of Intestinal Parasitic Infections (IPIs) by Class							
CLASS	Class1	Class2	Class3	Class4	Class5	Class6	19 children
Percent.	5.55%	8.33%	5.55%	11.11%	13.88%	8.33%	**52.65%**

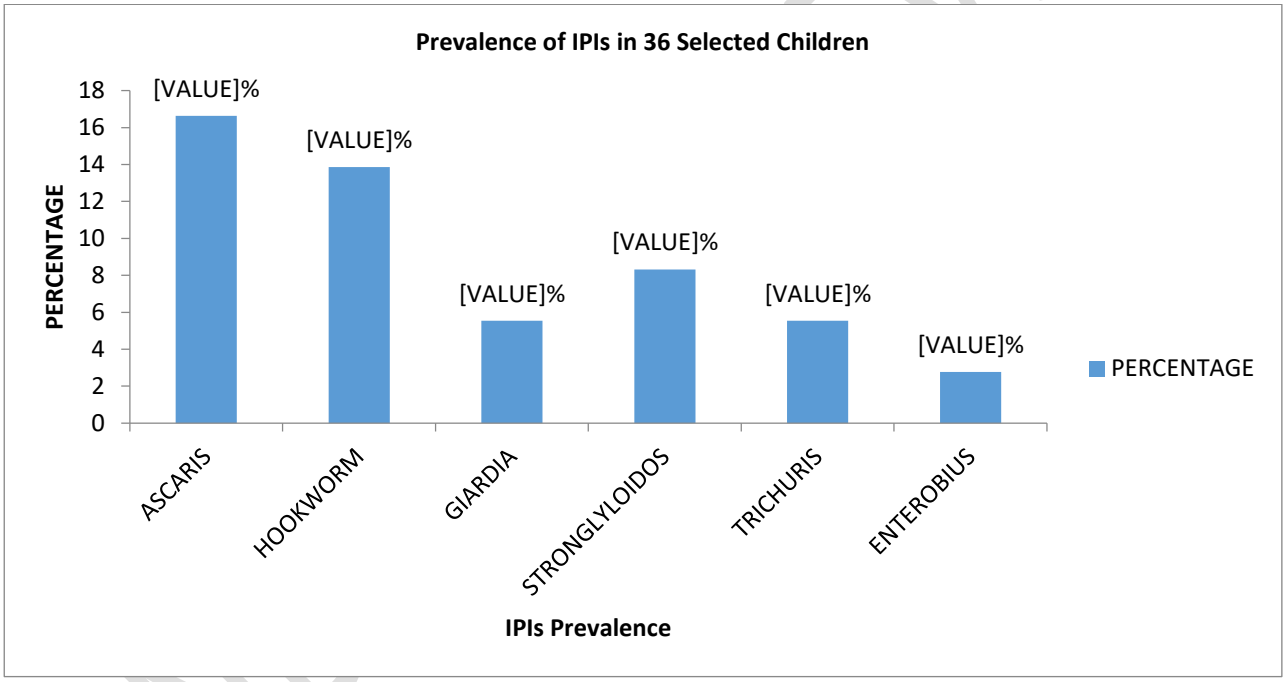

Figure. 1. Shows Prevalence of IPIs Among 36 Selected Children

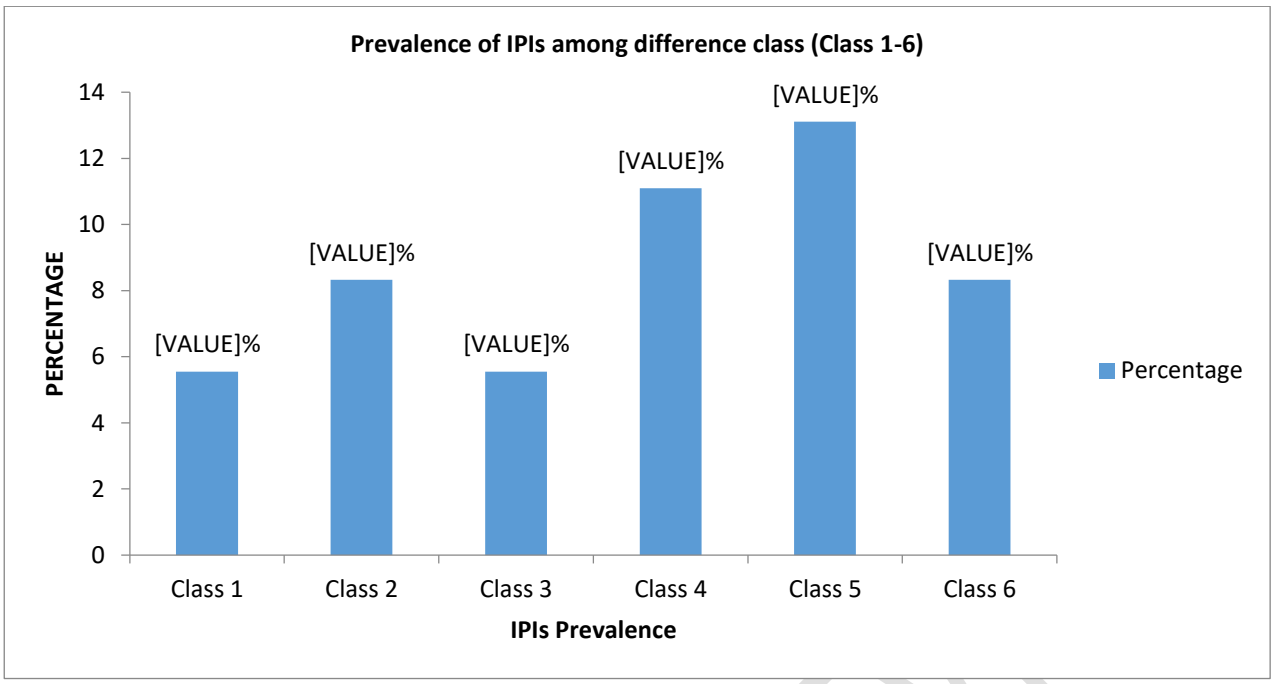

Figure. 2. Shows prevalence of IPIs Among Different Classes

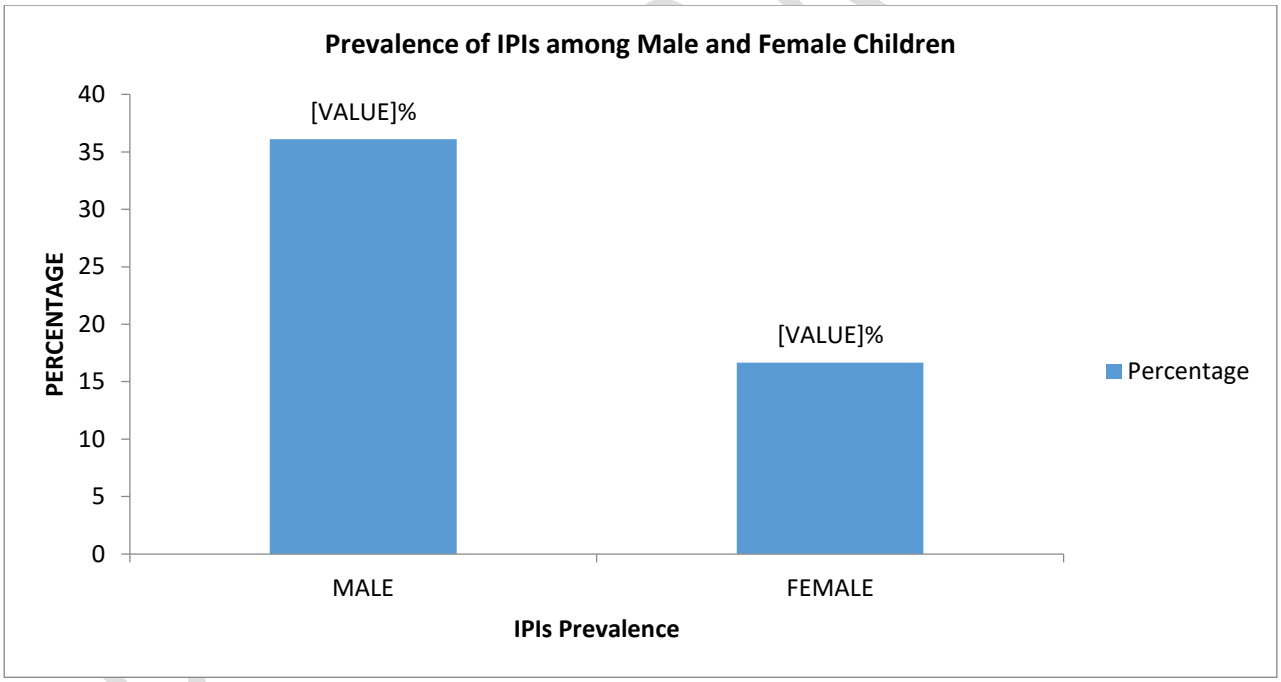

Figure. 3. Shows prevalence of IPIs by Gender (Male and Female).

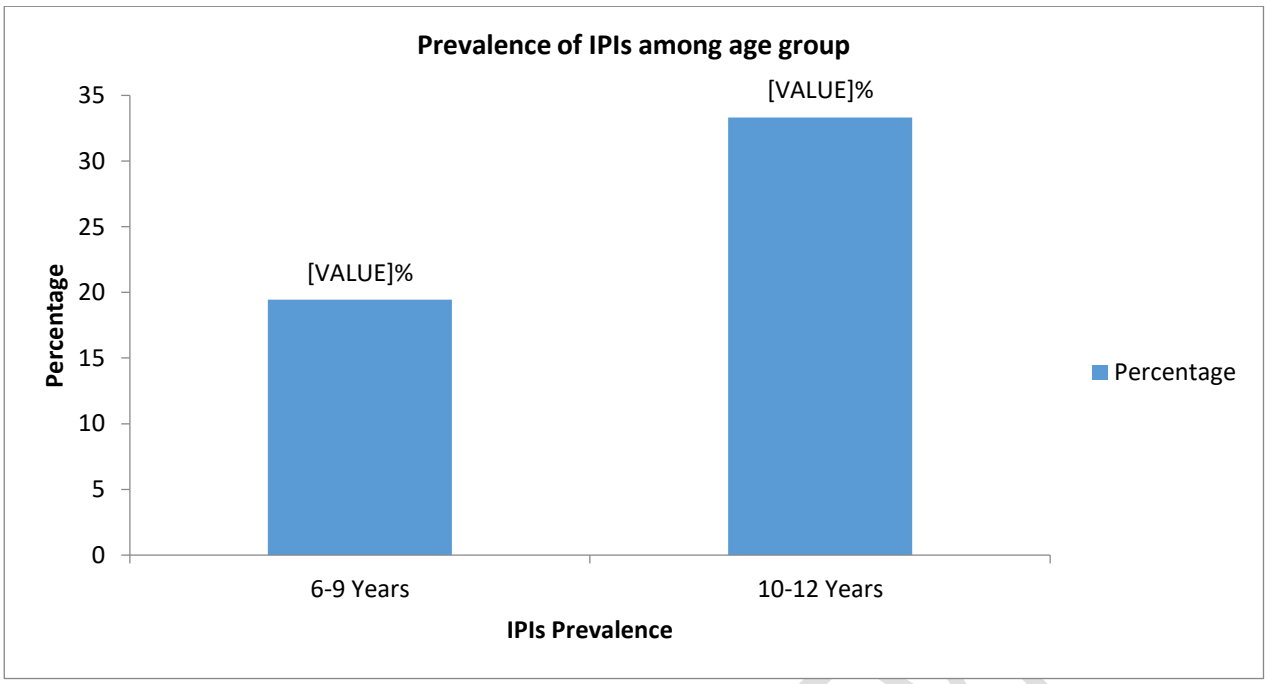

Figure. 4. Shows prevalence of IPIs Among Different Age Groups

4. CONCLUSIONS

This research study established that the prevalence of intestinal parasitic infections (IPIs) among children of Geidam central primary school Geidam. The prevalence is higher in males than in females and the older children than the younger. This may have connection that the older males have higher exposure to different potential risk factors such as walking bare foot, poor hand washing habit, open defection, absence of proper latrine utilization are the major determinant factors for the high prevalence of hookworm infection. Therefore, government should put more efforts to reduce children morbidity and mortality associated with IPIs through health education at primary schools' level and the development of community awareness campaigns in order to improve environmental sanitation and personal hygiene, as well as free deworming programme and these three interventions tailored to suit prevention, control and chemotherapy measures of IPIs.

RECOMMENDATIONS

The Intestinal Parasitic Infections (IPIs) can be control and prevent through three main intervention strategies for controlling and preventing of IPIs, namely: anthelminthic drug treatment, improved sanitation and health education

(i). Deworming: Deworming can significantly reduce the number of adult worms in the gastrointestinal tract which is also reflected in reduced egg counts. The World Health Organization (WHO) recommends both albendazole and mebendazole as the drug of choice to be used in public health program for controlling and preventing of IPIs.

(ii). Sanitation: Improvement of sanitation that intended at controlling transmission by reducing soil and water contamination is another way for IPIs interventions**.** Sanitation is the only definitive intervention to control IPIs. In order for this intervention to be fully effective, it should cover a high percentage of population at broad scale.

(iii). Health Education: Health education at school's level and general public awareness campaign programme is another major intervention in controlling IPIs aimed at reducing transmission and re-infections by promoting healthy behaviours such encouraging the use of latrines, wearing shoes, and hygienic

behaviours**.** Without a change in sanitary behaviours, regular deworming cannot achieve a significant reduction in IPIs transmission**.** In addition, health education can be offered simply and economically by decreasing cost, increasing levels of knowledge and decreasing re-infections rate. Likewise, it does not involve any contraindications or risk. Its benefit goes beyond the control of IPIs infections as it can build trust and engage communities, which are essential aspects to the successfulness of public health initiatives**.** Children should be strictly warning on walking barefoot in areas where hookworm is common and where there may be human faecal contamination of the soil

ETHICAL APPROVAL

A letter dated 10th October 2019 was written to the Yobe State Ministry of Health with detailed explanation of the research aims & objectives seeking for ethical clearance to conduct this research study through Director research and the Yobe State Ethical Committee (YOHREC) executed a meeting on my research proposal and then clearance letter was issued to me dated, 15th October 2019 with **Ref. No: MOH/GEN/747/VOL.I.** However, the research was not conducted on time due to insecurity of Boko Haram which necessitated the Geidam's Community to flied the town, until this January 2022 when the insecurity situation subsided. That the clearance letter was presented to Headmaster Geidam Central primary school and he granted permission to collect the stool sample.

FUTURE PROSPECTS

Due to financial constraints, I would like to express a final though on future prospects, which seem to me to be just as interesting to cover all part of Geidam primary schools and Yobe state at large to ascertained an exact prevalence of Intestinal parasitic infections (IPIs) in the case study area, as 1 primary school is too limited to achieves our desired aims and objectives and therefore suggested for other researchers to utilize this opportunity to cover the whole state.

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