Tropical Journal of Applied Natural Sciences
Vol. 2 Issue 3 (2024)

Tropical Journal of Applied Natural Science
ISSN: 2449-2043

ASSOCIATION OF INTESTINAL PARASITIC INFECTIONS WITH HAEMORRHOID AMONG ADULTS IN ANAMBRA STATE

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Abstract

Hemorrhoids, also known as piles are a common anorectal disease, caused by increased pressure in the rectal veins, which displace the anal cushions. This study determined the association of intestinal parasitic infections with haemorroids among adults in Anambra State. Structured questionnaires were used to access information on haemorrhoids and their risk factors. Faecal specimens were examined using direct smear technique, formol ether concentration technique and Kato-katz technique. Of a total of 2,428 fecal specimens examined, 776(31.96%) were positive for intestinal parasites infections. Of this total, 142(5.85%) had hemorrhoid. Co-infection between hemorrhoid and intestinal parasites was 112 (4.61%). Seven species of parasite were recorded in the study. *Entamoeba histolytica* 27.06% was the most prevalent, while *Giardia lambia*, 9.28% was the least. Others were *Ascaris lumbricoides* 24.23%, Hookworm 9.79%, *Strongyloides stercoralis* 5.41%, *Taenia spp* 10.44% and *Trichuris trichiura* 13.79%. The difference in prevalence of intestinal parasite species was statistically significant (P>0.05; P=0.000). Overall, prevalence of co-infection was highest, 6.22% in the age group 23-27years, while the least, 3.69% was recorded in age group >38years. Co-infection of haemorrhoid with *A. lumbricoides* was highest, 2.07% in age group 23-27years, while the least, 0.41% was recorded in age group 33-37years. The highest intestinal parasites prevalence, 72.22% was recorded among those that had only informal education, while the least, 20.31% was among the tertiary education group. A reasonable percentage, 40.21% do not always wash their hands after daefecation. Also, 42.53 do not do wash their hands always before eating fruits, while 46.01% does not always wash fruits before eating. A total of 78.87% admitted always eating a low-fiber diet, while 21.13% does not. Also, 83.80% sit long periods on time of the toilet while 16.20% does not. On the other hand, 67.61% regularly lift heavy items while 32.39 do not. The study also showed that there is a co-infection of haemorrhoid and the parasites among some inhabitants of the study area. Awareness programmes and public health education on the risk factors of helminths and protozoan parasites infection should be conducted in the study area to help curtail the spread of the infections

Keywords: Hemorrhoids. Intestinal parasitic infections. *Entamoeba histolytica. Giardia lambia. Ascaris lumbricoides*, Hookworm, *Strongyloides stercoralis*, *Taenia spp*, *Trichuris trichiura.*

INTRODUCTION

Parasitic infections, caused by intestinal helminths and protozoan parasites, are among the most prevalent infections in humans in developing countries. In developed countries, protozoan parasites more commonly cause gastrointestinal infections compared to helminths. Intestinal parasites cause a significant morbidity and mortality in endemic countries. Hemorrhoids are a very common anorectal condition defined as the symptomatic enlargement and distal displacement of the normal anal cushions. The cushions are conglomerates of blood vessels, supporting tissues and overlying mucus membrane or skin of the anorectal region (Olatoke *et al.,* 2014). They affect millions of people around the world, and represent a major medical and socioeconomic problem. It is a leading cause of lower gastrointestinal bleeding with a high impact on quality of life (Ray, 2015).Multiple factors have been claimed to be the etiologies of hemorrhoidal development, including constipation and prolonged straining. The abnormal dilatation and distortion of the vascular channel, together with destructive changes in the supporting connective tissue within the anal cushion, is a paramount finding of hemorrhoidal disease (Ray, 2015). An inflammatory reaction and vascular hyperplasia may be evident in haemorrhoids (Chung *et al.,* 2004). Hemorrhoids occur frequently in the adult general population. Notably, a considerable number of people with hemorrhoids do not complain about symptoms.

This study provided current epidemiological data with respect to distribution pattern and prevalence of intestinal parasitic infections among adults with haemorrhoids in the study area that could be used in determining the need for mass chemotherapy and provide baseline data for monitoring and evaluation of control programmes aimed at improving the health, sanitary and hygiene status of inhabitants in the study area.

MATERIALS AND METHODS

Study area

Anambra is a state in South-eastern Nigeria with boundaries formed by Delta State to the west, Imo State to the south, Enugu State to the east and Kogi State to the north. Its name was inspired by the term Omambala, the Igbo name of the Anambra River which flows through the area and is a tributary of the River Niger. The state lies between latitude 5˚ 42′ N and 6˚ 47′N and longitude 6˚ 37′ E and 7˚ 23′ E.

Sample and sampling technique

A total of 2428 people were randomly selected from each senatorial zone. Age groups 18 - 60 were recruited.

Collection and examination of faecal samples

A day before the collection of faecal samples, a labelled, wide-mouth transparent sterile specimen container was given to each participant. An applicator stick and a clean plain paper were also given. The faecal samples were microscopically examined using direct smear technique (wet mount), formol ether concentration technique and Kato-Katz Technique.

Determination of intestinal parasites in faecal samples

Direct smear technique (Wet mount)

The direct smear technique (wet mount) as described by Chessbrough (2000) was employed. A wet saline smear was prepared by placing a drop of saline on the centre of the slide. An applicator stick was used to pick up a small portion of the faecal sample (size of a match head) from the specimen container, and mixed with the drop of saline. A thin smooth preparation was made. The emulsified sample on the slide was covered with cover slip, pressed gently to avoid the formation of air bubbles and examined with a binocular microscope for helminth eggs and larvae and protozoan cysts. Identification of parasites was done using keys described by Chessbrough (2000).

Formol ether concentration technique

The formol ether concentration technique as described by WHO (1991) was employed. With an applicator stick, 1g of faecal sample was emulsified in 10mL of 10% formalin in a tube until a slightly cloudy suspension is formed. A gauze filter was fitted into a funnel and the funnel was placed on top of the centrifuge tube. The faecal suspension was passed through the filter into the centrifuge tube until the 7ml mark is reached. The filter was removed and discarded with the lumpy residue. Four (4) ml of ether was added and mixed well for a minute. The suspension was centrifuged at 1000g for a minute. The faecal debris was loosened with an applicator stick and the supernatant poured away by quickly inverting the tube. The tube was replaced in its rack and the fluid on the sides of the tube was allowed to drain down to the sediment. It was well mixed and a drop placed on a slide and then covered with coverslip for examination under a binocular microscope. The eggs and larvae of soil-transmitted helminths were identified using keys described by Chessbrough (2000).

Kato-katz technique:

The faeces were pressed through a mesh screen to remove large particles. A portion of the sieved sample was then transferred to the hole of a template on a slide. After filling the hole, the template was removed and the remaining samples were covered with a piece of cellophane soaked in glycerol. The eggs were then counted and the number calculated per gram of faeces (Cheesbrough, 2009).

Identification of risk factors using questionnaire

A questionnaire based on known and possible factors was developed to explore the objectives of the study and pre-tested. Data on socio-demographic and associated factors were collected according to local culture and norm. Questionnaires were administered to all the participants in the study. The information contained in the questionnaire include; bio-data, methods of faecal disposal and hygiene practices in order to identify distribution pattern of intestinal helminth infections within the study population as well as those suffering from haemorroids.

Analysis of results

Data obtained were presented in tables and analyzed statistically using Statistical Package for Social Sciences (SPSS) version 25.0. The Chi-square(X^2) test were performed to verify the possible association between the prevalence of intestinal parasites and variables such as sex, age, educational status, and possible risk factors. A p-value less than 5% was declared statistically significant.

RESULTS

Seven parasite species were recorded in the study as shown in table 1 *Entamoeba histolytica* 27.06% was the most prevalent, while *Giardia lambia*, 9.28% was the least. Others were *Ascaris lumbricoides* 24.23%, Hookworm 9.79%, *Strongyloides stercoralis* 5.41%, *Taenia spp* 10.44% and *Trichuris trichiura* 13.79%. The difference in the rate of infection was statistically significant (P>0.05; P=0.000).

Table 1: Parasites species composition and intensity of infection in the study area

Parasites Species	**Number Infected (%)**	**Intensity (%)**		
		Light (1-1999 EPG)	**Moderate (2000-3999 EPG)**	**Heavy (>4000 EPG)**
Ascaris lumbricoides	188 (24.23)	185 (98.40)	3 (1.60)	0 (0.0)
Hookworm	76 (9.79)	71 (93.42)	5 (6.58)	0 (0.0)
Strongyloides stercoralis	42 (5.41)	42 (100.0)	0 (0.0)	0 (0.0)
Taenia spp.	81 (10.44)	81 (100.0)	0 (0.0)	0 (0.0)
Trichuris trichiura	107 (13.79)	107 (100.0)	0 (0.0)	0 (0.0)
Entamoeba histolytica	210 (27.06)	207 (98.57)	3 (1.43)	0 (0.0)
Giardia lamblia	72 (9.28)	72 (100.0)	0 (0.0)	0 (0.0)
Total	776 (32.0)	765 (98.58)	11 (1.42)	0 (0.0)

Table 2 showed the prevalence and distribution of intestinal parasitic species in relation to age groups. The highest prevalence, 23.45% was recorded in age group 18-22years, while the least 17.01% was recorded in age group >38years. *A. lumbricoides* was highest in age group 23-27years, 12.17 while the least in >38years, 4.87%. Hookworm was most prevalent 3.89% in 23-27years, while least was in age group >38years, 1.84%. *S. stercoralis* was highest in 23-27years, 3.11% while no infection was recorded in >38years. *Taenia spp*. was most prevalent in group 33-37years, 4.94% while least in 23-27years, 1.81%. The prevalence of *T. trichiura*,

E. histolytica and *G. lamblia* are shown in table 17. The difference in prevalence in relation to age groups was not statistically significant (P<0.05; P=0.002).

Table 2: Prevalence of intestinal parasites species among the study participants in relation to age

Age (years)	No. Examined	*Ascaris* lumbricoides (%)	Hookworm (%)	*Strongyloides stercoralis* (%)	*Taenia spp.* (%)	*Trichuris trichiura* (%)	*Entamoeba histolytica* (%)	*Giardia lamblia* (%)	Total (%)
18-22	492	42 (8.54)	19 (3.86)	13 (2.64)	13 (2.64)	26 (5.28)	50 (10.16)	19 (3.86)	182 (23.45)
23-27	386	47 (12.17)	15 (3.89)	12 (3.11)	7 (1.81)	21 (5.44)	50 (12.95)	12 (3.11)	164 (21.13)
28-32	468	45 (9.62)	18 (3.85)	10 (2.13)	11 (2.35)	23 (4.91)	38 (8.30)	11 (2.35)	156 (20.10)
33-37	486	25 (5.14)	13 (2.67)	7 (1.44)	24 (4.94)	23 (4.73)	34 (6.70)	16 (3.29)	142 (18.30)
>38	596	29 (4.87)	11 (1.84)	0 (0.00)	26 (4.36)	14 (2.35)	38 (6.37)	14 (2.35)	132 (17.01)
Total	**2428**	**188 (7.74)**	**76 (3.13)**	**42 (1.73)**	**81 (3.34)**	**107 (4.41)**	**210 (8.65)**	**72 (2.97)**	**776 (31.96)**

The prevalence of intestinal parasites species in relation to gender were recorded in table 3. Males recorded higher prevalence, 32.31% than the females, 31.55%. *Ascaris lumbricoides* was highest in males, 8.65% while the least was recorded in females, 4.90%. Hookworm was most prevalent in females 4.99%, while least was in males, 1.53%. *S. stercoralis* was highest in females, 1.15% while least in males, 2.41%. The prevalence rate of *Taenia spp., T. trichiura, E. histolytica* and *G. lamblia* were recorded in table 4.16. The difference in prevalence in relation to gender was statistically significant (P>0.05; P=0.000).

Table 3: Prevalence and distribution of intestinal parasites species among the study participants in relation to gender

Gender (years)	No. Examined	*Ascaris* lumbricoides (%)	Hookworm (%)	*Strongyloides stercoralis* (%)	*Taenia spp.* (%)	*Trichuris trichiura* (%)	*Entamoeba histolytica* (%)	*Giardia lamblia* (%)	Total (%)
Male	1306	133 (8.65)	20 (1.53)	15 (1.15)	38 (2.91)	49 (3.75)	135 (10.34)	32 (2.45)	422 (32.31)
Female	1122	55 (4.90)	56 (4.99)	27 (2.41)	43 (3.83)	58 (5.17)	75 (6.68)	40 (3.57)	354 (31.55)
Total	**2428**	**188 (7.74)**	**76 (3.13)**	**42 (1.73)**	**81 (3.34)**	**107 (4.41)**	**210 (8.65)**	**72 (2.97)**	**776 (31.96)**

Assessment of Some Risk Factors of Intestinal Parasitic Infections in the Study Area

The responses on the risk factors of intestinal parasitic infection were shown in table 4. A reasonable percentage, 40.21% do not always wash their hands after defecation; 42.53% do not do wash their hands always before eating fruits; 46.01% do not always wash fruits before

eating; 75.77% always wear footwears outdoors, whereas 24.23% do not always wear footwears when outdoors.

Table 4: Prevalence of intestinal parasitic infection among the infected study participants in relation the hygiene status

Questions	Number of responses	Percentage (%)
Do you always wash hands after defecation?		
Yes	464	59.79
No	312	40.21
Total	776	100
Do you always wash hand before eating fruits?		
Yes	446	57.47
No	330	42.53
Total	776	100
Do you always wash fruits before eating?		
Yes	419	53.99
No	357	46.01
Total	776	100
Do you always wear foot wears outdoors?		
Yes	588	75.77
No	188	24.23
Total	776	100

Table 5 showed the prevalence of haemorrhoids in relation to age the study participants. The highest prevalence was recorded in 23-27years, 30 (7.77%) whereas the least was recorded in >38years, 24 (4.94%). Prevalence in other age groups were 18-22years, 28 (5.69%); 28-32years, 34 (7.26%) and 33-37years, 24(4.94%). The difference in prevalence of haemorrhoid in relation to age was not statistically significant (P>0.05; P=0.160).

Table 5: Prevalence of haemorrhoids among the study participants in relation to age

Age (in Years)	Total Number Examined	Number Positive with Haemorrhoid (%)
18-22	492	28 (5.69)
23-27	386	30 (7.77)
28-32	468	34 (7.26)
33-37	486	24 (4.94)
>38	596	26 (4.36)
Total	**2428**	**142 (5.85)**

Prevalence of haemorroids in relation to gender was recorded as shown in table 6. The highest prevalence of haemorrhoids was recorded in males 84 (6.43%) while the least was recorded in females 58 (5.17%). The difference in prevalence of haemorrhoid in relation to gender was not statistically significant (P>0.05; P=0.108).

Table 6: Prevalence of haemorrhoids among the study participants in relation to gender

Gender	Total Number Examined	Number Positive with Haemorrhoid (%)
Male	1306	84 (6.43)
Female	1122	58 (5.17)
Total	**2428**	**142 (5.85)**

Table 7 showed the co-infection in relation to age of the study participants. The highest co-infection was recorded in 23-27years, 24 (6.22%) while the least was recorded in >38years, 22 (3.69%). Co-infection in other age groups were 18-22years, 22 (4.47%); 28-32years, 26 (5.55%) and 33-37years, 18 (3.84%). The difference in co-infection of intestinal parasites and haemorrhoid in relation to age was not statistically significant (P<0.05; P=0.181).

Table 7: Co-infections of intestinal parasitic infections and haemorrhoids among the study participants in relation to age

Age (in Years)	Total Number Examined	Number with Co-Infection of Intestinal Parasitic infections & Haemorrhoids (%)
18-22	492	22 (4.47)
23-27	386	24 (6.22)
28-32	468	26 (5.56)
33-37	486	18 (3.70)
>38	596	22 (3.69)
Total	**2428**	**112 (4.61)**

Relationship Between Intestinal Parasitic Infection and Haemorrhoids

The figure below is a graphical representation of the prevalence of parasitic infection, prevalence of haemorrhoids and co-infection of intestinal parasitic infection and haemorrhoids (Figure 1). The figure shows the overlap between both infections and their co-infections among the study participants.

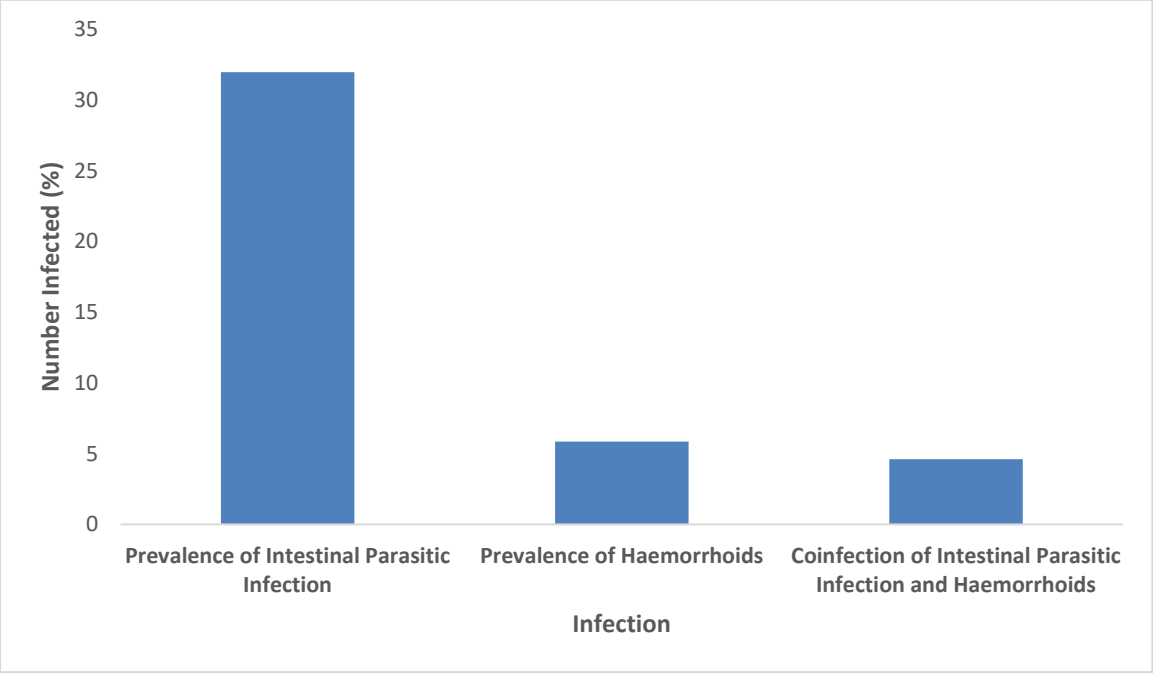

Fig 1: Parasitic Infection, Haemorrhoids and Coinfection Among the Study Participants

DISCUSSION

In this study, a total of 2,428 were examined for intestinal paraites. The study recorded an overall infection prevalence of 31.96%. In age groups, the highest prevalence of intestinal parasitic infection 164(42.49%) was recorded in age group 23-27years, whereas the least was recorded in age group >38years. Light infections were 100% in age groups 28-32years, 33-37years and >38years, while the lowest light infections were recorded in 18-22years. The difference in prevalence and intensity of infection in relation to age was not statistically significant (P>0.05). This study is in agreement with several others studies that reported higher prevalence of intestinal parasites in younger age group than older ones. (Usang *et al.,* 2020; Anumba *et al*., 2016; Ugbogu and Asogu, 2013). Studies have reported that the prevalence of parasitic infections decreases with increasing age. This is probably due to the fact that older people are more likely to maintain personal hygiene than those in younger age groups (Nzeukwu *et al*., 2022; Ukibe *et al*, 2018). This study agrees with these earlier reports.. In this study, the overall prevalence of haemorrhoid was 5.85%.. The hemorrhoids prevalence in our study in below an overall prevalence of 13.1% recorded in another study (Kibret *et al*., 2021) in Northwest Ethiopia. Hong *et al*., (2022) reported a prevalence of 16.6% of hemorrhoid among healthy young and middle-aged Korean adults. A high prevalence of 71% hemorrhoids among police officers in Oyo State, has been reported (Azeez and Isiugo-Abanihe, 2017). Another study reported 90.5% haemorrhoid prevalence among commercial motorcyclists in Kaduna State, Nigeria (Yashi *et al*., 2016). These reports show that haemorrhoid disease in prevalent in different localities including our study area.

Prevalence of haemorrhoid was highest in males, 6.43% while the lowest was in females 5.17%. Generally, Akpan and Okoh (2021) reported that both male and female subjects may suffer from haemorrhoid. But in contrast with this study, Hong *et al*., (2022) reported higher prevalence of hemorrhoids in females than in males. Also, Azeez and Isiugo-Abanihe (2017) recorded a higher prevalence of hemorrhoid in female police officers in Oyo State, than their male counterpart. The variation observed in highest prevalence in different gender at different location may suggest that parasites infection in not gender specific and thus can affect anyone irrespective of their gender.

Haemorrhoid was highest in age group 23-27years, 7.77%, but lowest in >38years, 4.94%. The difference in prevalence of haemorrhoid in relation to age was not statistically significant (P>0.05). Our findings fall within the range recorded in other studies. Kibret *et al*., (2021) recorded highest prevalence of haemrrhoid in age group 19–45years, while they recorded lowest in 46 – 84years. Also, Yashi *et al*., (2016) reported that all those who hard haemorrhoid in their study were within the ages of 21-40years. The observation of this current study agrees with these earlier reports which suggests that haemorrhoid is more prevalent in people in the mid-forties and below.

Co-infection of intestinal parasitic infection and haemorrhoid was highest in males than in females. Also, the highest co-infection was recorded in 23-27years (6.22%) while the least was recorded in >38years (3.69%). The difference in co-infection in relation to age was not statistically significant (P>0.05). This lack of statistical significance suggests that even though

co-infection vary in age, all ages are equally affected. Gyang *et al*., (2019), in their study also noted that the association of age with infection was not significant; and that all age groups were almost equally exposed. They suggested that it could be as a result of the general contamination of the environment which is also the same with this study.

On the risk factors of intestinal parasites infection, a substantial number of the study participants are involved in series of activities that expose them to parasitic infection. A total of 40.21% do not always wash their hands after defaecation, 42.53% do not always wash their hands before eating fruits, 46.01% do not always wash fruits before consuming, while 24.23% does not always wear footwears outdoors. crowded. A study has reported that poor hygiene is an important risk factor for the infection of intestinal parasites (Anumba *et al*., 2016). Another report also stated that the pre-disposing factors to intestinal worms are directly and indirectly related to matters of sustainable hygiene and consistent environmental sanitation (Funso-Aina *et al*. 2020). Therefore, the prevalence of intestinal parasitic infection in the study area is linked to the unhygienic practices of some of the study participants.

CONCLUSION

This study has revealed that there is a high prevalence of intestinal parasites infection in Anambra state. The study also showed that there is a co-infection of haemorrhoid and the parasites among some inhabitants of the study area. The findings also showed that prevalence vary in gender, age, and hygiene practices of the people in the study area. Also, finding showed that, although co-infection of haemorrhoid and parasites varied, it affected all classes categories; gender, age groups, amongst others. The study also revealed that a substantial number of people in the area are exposed to the risk factor for intestinal parasites, which are unhygienic practices. Clinical screening for haemorrhoid among the inhabitant of Anambra State should be encouraged at interval for early detection of the disease and creation of awareness on the risk factors associated with intestinal parasitic infections.

REFERENCES

Akpan, S.S and Okoh, J.T. (2021). Use of hot brine solution as a sitz bath in the treatment of haemorrhoids . A case study. *Sokoto Journal of Medical Laboratory Science,* **8**:2

Anumba, J. U., Onyido, A. E., Eneanya, C. I., Umeaneto, P. U., Iwueze, M. O., Okafor, E. N. and Chukwuekezie, O. C. (2016). Gastro-intestinal parasites among children in some orphanages of Anambra State. Nigeria. *Nigerian Journal of Parasitology*, **37** (2): 35-141

Azeez and Isiugo-Abanihe (2017) Sociocultural Context and Determinants of Treatments for Hemorrhoids Among the Nigeria Police Force, Oyo State Command. *Journal of Social, Behavioral, and Health Sciences* **11**: 31–46.

Chessbrough, M. (2000). *District Laboratory Practice in Tropical Countries.* Cambridge University Press, pp 209-211, 212, 215

Chessbrough, M. (2009). *District Laboratory Practice in Tropical Countries.* Part I, 2nd Edition. Cambridge University Press, pp 220

Chung, Y.C., Hou, Y.C. and Pan, A.C. (2004). Endoglin (CD105) expression in the development of haemorrhoids. *European Journal of Clinical Investigation*, **34**(2): 107-112

Funso-Aina, O. I., Chineke, H. N., & Adogu, P. O. (2020). A review of prevalence and pattern of intestinal parasites in Nigeria (2006-2015). *European Journal of Medical and Health Sciences*, **2**(1): https://doi.org/10.24018/ejmed.2020.2.1.139.

Hong, Y.S., Jung, K.U., Rampal, S. *et al.* Risk factors for hemorrhoidal disease among healthy young and middle-aged Korean adults. *Sci Rep* **12:** 129 (2022). https://doi.org/10.1038/s41598-021-03838-z

Kibret AA, Oumer M, Moges AM (2021) Prevalence and associated factors of hemorrhoids among adult patients visiting the surgical outpatient department in the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia. *PLoS ONE*, **16**(4): e0249736. https://doi.org/10.1371/journal.pone.0249736

Nzeukwu, C. I., Odumegwu, B. E., Irikannu, K.C and Amanze, C. I. (2022). Parasites Contamination of Currency Notes, Fruits and Vegetables from Selected Markets in Anambra State, Southeastern Nigeria. Parasitology and Public Health Society of Nigeria - Book of Abstracts of the 46th Annual Conference. Pp. 35

Olatoke, S., Adeoti, M., Agodirin, O., Ajape, A. and Agbola, J. (2014). Direct current electrotherapy for internal haemorrhoids: Experience in a tertiary health institution. *Pan African Medical Journal*, **18**: 145

Ray, O.E., and Elenwo, S.N. (2015). Endoscopic evaluation of upper and lower gastro-intestinal bleeding. *Nigeria Journal of Surgery*, **21**:106-110

Ugbogu OC, and Asogu GO (2013). Prevalence of intestinal parasites amongst school children in Unwana Community, Afikpo, Ebonyi State, Nigeria. *Nig J Parasitol.* **34**(2):69-71.

Ukibe SN, Ukibe NR, Obi-Okaro AC, Iwueze MO (2018). Prevalence and pattern of soil transmitted helminths (STHs) among Primary school children at Nnewi-North Local Government Area, Anambra State, Nigeria. *Ann Res Rev Bio*. **28**(1): 1-6. https://doi.org/10.9734/ARRB/2018/42195

Usang, A.U. Imalele E.E, Effanga, E. O and Osondu-Anyanwu C (2020) Prevalence of Human Intestinal Helminthic. Infections among School-Age Children in Calabar, Cross River State, Nigeria. *International Journal of Tropical Disease and Health* ,**41**(9): 55-63.

World Health Organization, (1991). Basic Laboratory Methods in Medical Parasitology. World Health Organization, Geneva, **1:** 16-17

Yashi Garda Nassa, Aliyu Danjuma, Samaila Balarabe Ayuba, Sani Ahmed Yahaya, Bulus Inusa, Ishaku Yakubu. (2016). Prevalence and Predictors of Hemorrhoids among Commercial Motorcyclists in Kaduna State, Nigeria. *World Journal of Preventive Medicine,*. **4**:.(1)2016, pp 1-4. http://pubs.sciepub.com/jpm/4/1/1