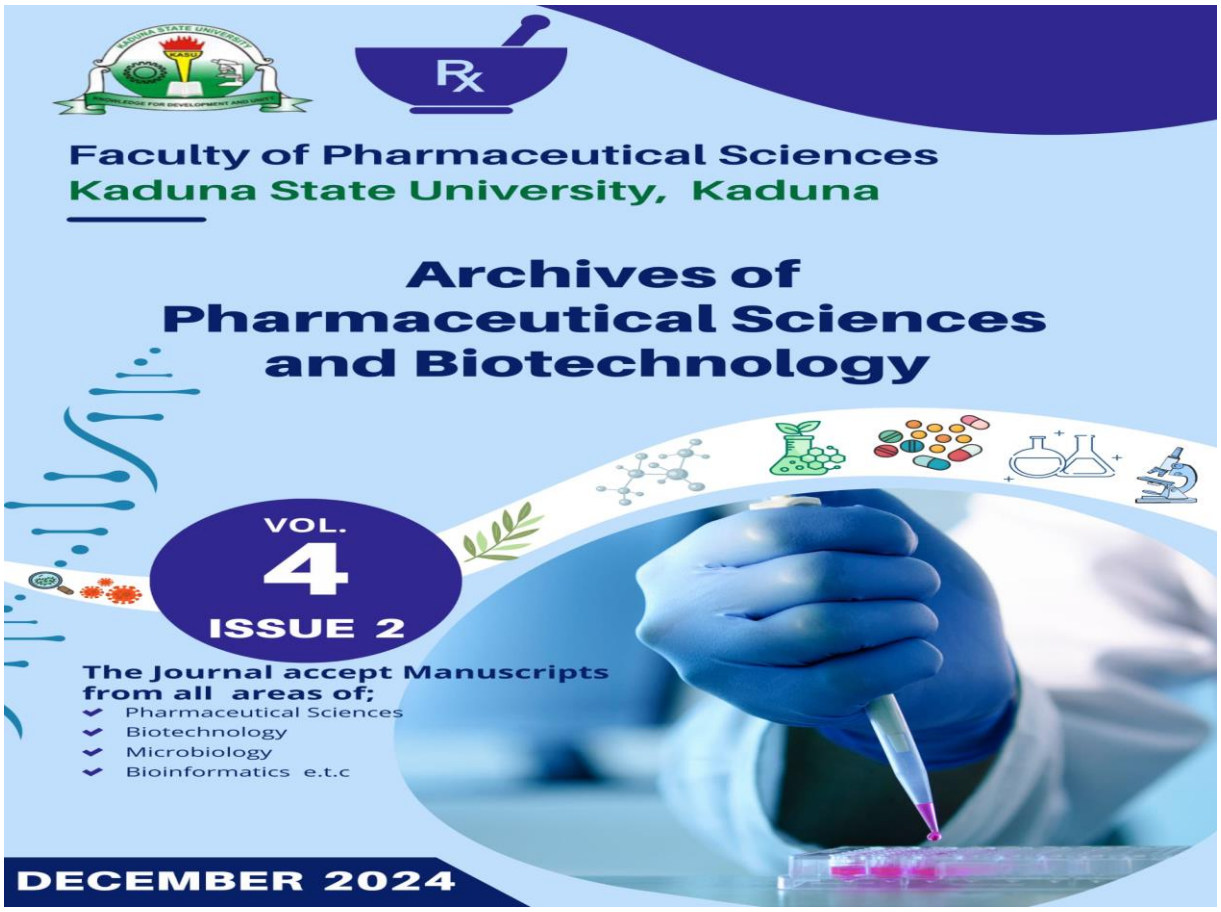
Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025



ARCHIVES OF PHARMACEUTICAL SCIENCES AND BIOTECHNOLOGY JOURNAL

VOLUME 4 ISSUE 2, December 2024

ISSN 2971 – 611X

Published by the Faculty of Pharmaceutical Sciences, Kaduna State University, Kaduna

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

INTENSITY OF INTESTINAL HELMINTHIASIS IN RELATION TO BLOOD GROUP AMONG PUPILS OF MARABAN RIDO, KADUNA STATE, NIGERIA

Okodua M.A.[1], Danladi, J[2]. Hosea T.Z.[3], Suleiman, J.I[3]. Egbebi A.H.[4], Akinseye J.F.[4], Agu C.C.[4], Buru, A.S.[3,5]

[1]Department of Medical Microbiology, Faculty of Medical Laboratory Science, Ambrose Alli University, Ekpoma, Edo State
[2]Department of Community Medicine, Faculty of Clinical Sciences, College of Medicine, Kaduna State University, Kaduna, Nigeria
[3]Department of Medical Laboratory Science, Faculty of Allied Health Sciences, College of Allied Health and Pharmaceutical Sciences, Kaduna State University, Kaduna, Nigeria
[4]Department of Medical Laboratory Science, Faculty of Allied Health Sciences, College of Medicine and Health Sciences, Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria
[5]Department of Medical Laboratory Science, Faculty of Medical and Health Sciences, Newgate University, Minna, Niger State, Nigeria
Corresponding author: Email: sunday.buru@kasu.edu.ng Tel.:+2349097082712

ABSTRACT

Introduction: Intestinal helminth causes annual preventable deaths. The helminthic burden and related morbidity varies from place to place due to environmental and host factors. Blood group is one of the host factors implicated in the variation of the intensity of helminthic infections.

Aims: This study aimed at determining the relationship between intensity of intestinal helminthiasis and Blood group among Primary School Pupils of Maraban Rido, Chikun Local Government Area, Kaduna State.

Methods: A total of three hundred and fifty (350) stool and blood samples were collected from the study population. Formol ethyl acetate concentration Technique, Stoll's dilution Technique for egg count and direct cell grouping methods were used to analyze the samples.

Results: Blood group distribution among the pupils showed that, 50.0 % of the pupils belong to blood group O, 21.1% belongs to blood group A, 22.6% belongs to blood group B and 6.3 % wereblood group AB. The Rhesus distribution showed that, 95.1 % were Rhesus positive while 4.9% were Rhesus negative. The overall prevalence was 22.6%. Hookworm infection was 14.0%, *Ascaris lumbricoides* and *Taenia* spp. were 3.1% each and *Schistosoma mansoni* infection was 2.3%. Infectivity by blood group showed that, blood group O had total infectivity of 17.7% with mean egg count of 306.4561 EPG, Blood group A had 27.0% infectivity with mean egg count of 330.0000 EPG, Blood group B had 30.4% infectivity with mean egg count of 583.3333 EPG and Blood group AB had infectivity of18.2%with mean egg count of 225.000EPG. There was statistically significant relationship between intestinal helminthic infection and Blood group ($P<0.05$). One way ANOVA indicates that, the intensity varies with Blood group ($P<0.05$). Turkey's post hoc test revealed that, pupils of blood group B has more likelihood of having high intensity of intestinal helminthiasis than other blood groups ($P<0.05$).

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

Conclusion: The studies showed no relationship of intensity of intestinal helminthiasis with risk factors (P>0.05). We recommend intensive health education, provision of pipe borne water, improve environmental sanitation and continuous deworming campaign in this community.

Keywords: Intestinal helminths, Blood group, Pupils, Intensity, Relationship

INTRODUCTION

Intestinal helminths have played a vital role in undermining the health status of populace thereby hindering the development of Tropical countries economically (1). Several factors were suggested to be implicated in the severity of intestinal helminthiasis. The severity and related morbidity varies from place to place due to host and environmental factors. Blood group is one of the host factors implicated in the variation of helminthic infection. The blood groups are A, B, AB and O and each of these is either Rh-positive or Rh-negative (2). The nature of the relationship is uncertain, although researches have documented a high prevalence of *Schistosoma mansoni* infection and high morbidity in individuals with blood type A and blood type B (3). This could be due to N-acetyl-D-galactose polysaccharides in *Schistosoma mansoni*, which have structural similarities to substances in the A and B blood groups (4). The *Schistosoma mansoni* polysaccharides may serve as receptors to adsorb A and B antigens, leading to concealment of target antigens on the helminth's surface. By this mechanism it was stated that *S. Mansoni* may escape the host immune system and cause greater morbidity in patients with blood types A and B. Susceptibility to helminthic infection has been associated with blood type, and individual with a certain blood type cannot mount an adaptive immune response to helminths (5). Studies have also documented association of blood group with severity of diseases such as Malaria, Cholera, Ulcer etc (6). Studies have demonstrated that, intestinal helminthiasis reduced growth rate, cognitive ability and anaemia in children due to heavy infection (7). About two billion people are infected with intestinal helminths yearly (8). Children may also be particularly susceptible to the adverse effects of helminthic infections due to their incomplete physical development and their greater immunological vulnerability (9). It has been estimated that approximately 300 million people have severe morbidity due to intestinal helminths of which 10,000-135,000 deaths occur annually (10). The public health implication of Intestinal helminthiasis, variations in its intensity, mortality associated with its intensity and paucity of data on relationship of intensity of intestinal helminths and blood group in the study area prompted this research work and therefore the study aimed at investigating the relationship between intensity of intestinal helminths and blood group.

MATERIALAND METHODS

Study Area

The study area was Maraban rido, located in Chikun Local Government Area of Kaduna State. Chikun Local Government is located between latitude 10^0 19^0-10^0 29^0 North and longitude $7^0 14^0$-$7^0 25^0$ East (11). The Local Government Area has boundary with Kaduna South, Igabi, Kachia and Kajuru Local Government Areas. The total population of the Local Government Area is 372,272. It

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

has an Area of 4,646 km^2 with density of 108.2 /km^2 (12). Rainy season is from May to October and dry season from November to April. The inhabitants are predominately farmers and petty traders with Gbagyi as the major tribe.

Ethical Consideration: Prior to this study, Permission was sought from Education Secretary, Chikun Local Government Area Education Authority.

Administration of questionnaire: Structured Questionnaire was administered to the study population in order to collect demographic data and risk factors of the disease.

Study Population: The study population are pupils from Primary School Maraban Rido who are within the ages of 3-15 and from primary 1-6.

Sample Collection

Pupils were taught on how to provide the early morning stool samples into a wide-mouthed screw cap container labelled with each pupil's name, gender, age, research number, and class**.** The stool samples collected were preserved in 10% formalin for later use in the laboratory for analysis (13).The blood sample was collected based on the method described by Nanda, (14).

Laboratory Analysis

Three hundred and fifty (350) stool and blood samples were collected for Analysis. The stool samples were analyzed in the Public Health Laboratory, Department of Community Medicine, Kaduna State University using formalin- ethyl acetate concentration Technique as described by CDC, (15), the egg count was done using modified stool dilution Technique as described by Ochei and Aundhati, (16) while direct cell grouping was done based on the method described by Shirish, (17) to determine the blood group.

Macroscopy: Each stool collected was examined for colour, constituency and consistency (formed, semi formed or loose).

Statistical Analysis: Results obtained were analyzed using statistical package for social sciences (SPSS) version 23 software. Percentage was used to determine the prevalence rate of the infection among the study subjects. Chi-square was used to determine the relationship of the intensity of intestinal helminthiasis with ABO blood group and relationship of the intensity of intestinal helminthiasis with risk factors, one way ANOVA was used to determine the difference in intensity in relation to blood group, Turkey's post hoc was used to determine blood group whose its intensity differs from others and results considered significant when p-values are less than 0.05.

RESULTS

The study on the intensity of intestinal helminthiasis in relation to blood group showed that, 50.0% of the pupils belongs to blood group O, 21.1% belongs to blood group A, 22.6% belongs to blood group B and 6.3% were blood group AB, the rhesus distribution showed that, 95.1% were rhesus positive while 4.9% were rhesus negative (Table 1). The overall prevalence of intestinal helminthiasis was 22.6%. Hookworm infection had highest prevalence of 14.0% followed by *Ascaris lumbricoides* and Taenia spp. with 3.1% each and *Schistosoma mansoni* had the least prevalence of 2.3% (Table 2). The occurrence of intestinal helminths in relation to blood group revealed that, Blood group B had the highest infectivity (30.4%), followed

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

by Blood group A (27.0%), the group with least prevalence of infection was blood group O (17.7%) as shown in (Table 3). There was statistically significant relationship between intestinal helminths infection and blood group P<0.05, Blood group B has the highest mean egg of 583.333 EPG while Blood group AB had the least mean egg count of 225.000 EPG (Table 4). One way ANOVA indicates that, there is significant difference in the intensity of intestinal helminths in relation to blood groups of the pupils at 5% level of significance (F=18.790, DF=(3,75), P-Value=0.000), P-value <0.05 (Table 5 and 6). Turkey's post hoc test indicates that, the intensity of Blood group B is significantly difference from other blood groups (O,A and AB) P<0.05 (Table 7) this places group B at the risk of having high intensity of intestinal helminths than any other blood group. One hundred and seventy (170) questionnaires were administered to pupils in primary four (4) to six (6) to assess the risk factors among the pupils while exempting primary one (1) to three (3) due to difficulty in understanding and filling the questionnaire. From the responses, pupils whose parents are Civil servants are 11 with infectivity rate of 27.3%, odd ratio of 1.2 and mean egg count of 333.33EPG, pupils whose parents are farmers are 127 with infectivity rate of 24.4%, odd ratio of 0.9 and mean egg count of 320.00EPG, those whom parents are traders are 24 with infectivity rate of 25.0%, odd ratio of 1.0 and mean egg count of 416.00 EPG, and those whose parents are force are 8 with infectivity rate of 25.0%, odd ratio of 1.0 and mean egg count of 200.00 EPG. Responses from type of toilet facility showed that, pupils who used pit toilet are 17 with infectivity rate of 41.2%, odd ratio of 2.36 and mean egg count of 328.57 EPG, those who defecate in the bush are 153 with infectivity rate of 22.9%, odd ratio of 0.4 and mean egg count of 314.29 EPG, and none of the pupils uses water system. Responses from source of water showed that, pupils that uses well are 104 with infectivity rate of 19.2%, odd ratio of 0.48 and mean egg count of 300.00EPG, those that uses stream are 66 with infectivity rate of 33.3%, odd ratio of 2.1 and mean egg count of 377.36 EPG and none of the pupils uses borehole or pipe borne water in the community. From the response of walking barefooted, 139 pupils don't walked barefooted and have infectivity rate of 10.8%, odd ratio of 0.02 and 320.00 EPG as mean egg count, while those that walked barefooted are 31 with infectivity rate of 87.1%, odd ratio of 55.8 and mean egg count of 351.85 EPG. Responses from washing of vegetables/fruits before eating indicated that, pupils who don't wash vegetables or fruits before eating are 27 with infectivity rate of 33.3%, odd ratio of 1.7 and mean egg count of 288.88EPG, those who washed are 37 with infectivity rate of 24.3%, odd ratio of 0.9 and mean egg count of 311.11 EPG and those who sometimes washed are 106 with infectivity rate of 22.6%,odd ratio of 0.8 and mean egg count of 325.33 EPG. The study showed no relationship of intensity of intestinal helminths with risk factors P>0.05 (Table 8).

Table 1: Blood group/ Rhesus Distribution Among the Pupils

Blood group	N	No. (%)
O	350	175 (50.0)
A	350	74 (21.1)
B	350	79 (22.6)

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

AB	350	22 (6.3)
Rhesus		
Positive	350	333(95.1)
Negative	350	17(4.9)

Table 2: Prevalence of intestinal Helminths among the Pupils

Intestinal helminths	No. examined	No. infected (%)	Mean Egg count (EPG)
Hookworm	350	49 (14.0)	418.3673
A. lumbriciodes	350	11 (3.1)	336.3636
Taenia spp.	350	11 (3.1)	363.6364
S. mansoni	350	8 (2.3)	350.000
Total		**79 (22.6)**	**392.4051**

Table 3: Intensity of intestinal helminths in relations with Blood Group of the pupils

Blood Group	N	AL	HK	Taenia	SM	Total	Mean egg count (EPG)
O	175	5(2.9)	24(13.7)	2(1.1)	0(0.0)	31 (17.7)	306.4561
A	74	3(4.1)	9(12.2)	3(4.1)	5(6.8)	20(27.0)	330.0000
B	79	3(3.8)	15(19.0)	4(5.1)	2(2.5)	24(30.4)	583.3333
AB	22	0(0.0)	1(4.5)	2(9.1)	1(4.5)	4(18.2)	225.000
Total	**350**	**11(3.1)**	**49(14.0)**	**11(3.1)**	**8(2.3)**	**79(22.6)**	**392.4051**

χ^2=17.307, P-value=0.044*, P-value <0.05 is statistically significant

N= number examined, AL=*Ascaris lumbricoides*, HK= Hookworm, SM= *Schistosoma mansoni*

Table 4: Mean egg count with Blood group

Blood Group	Parasites	Mean egg count (EPG)	Std. Deviation	N
O	AL	260.0000	89.44272	5
	HK	316.6667	227.78072	24
	TAENIA	300.0000	.00000	2
	Total	**306.4516**	**203.20020**	**31**
A	AL	300.0000	.00000	3
	HK	366.6667	70.71068	9
	TAENIA	300.0000	.00000	3
	SM	300.0000	.00000	5
	Total	**330.0000**	**57.12406**	**20**
	AL	500.0000	.00000	3

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

B	HK	620.0000	156.75276	15
	TAENIA	525.0000	50.00000	4
	SM	550.0000	70.71068	2
	Total	**583.3333**	**134.05601**	**24**
AB	HK	300.0000	.	1
	TAENIA	200.0000	.00000	2
	SM	200.0000	.	1
	Total	**225.0000**	**50.00000**	**4**
Total	AL	336.3636	120.60454	11
	HK	418.3673	227.00355	49
	TAENIA	363.6364	136.18170	11
	SM	350.0000	130.93073	8
	Total	**392.4051**	**196.62026**	**79**

Table 5: One Way Analysis of Variance Test for intestinal Helminthiasis Intensity with Blood Group

Blood group	No. infected	Mean egg count (EPG)	Std. Deviation	Std. Error	Minimum egg count	Maximum egg count
O	31(17.7)	306.4516	203.20020	36.49583	100.00	1000.00
A	20(27.0)	330.0000	57.12406	12.77333	300.00	500.00
B	24(30.4)	583.3333	134.05601	27.36407	500.00	1100.00
AB	4 (18.2)	225.0000	50.00000	25.00000	200.00	300.00
Total	**79(22.6)**	**392.4051**	**196.62026**	**22.12151**	**100.00**	**1100.00**

Table 6: One way ANOVA Table Showing F distribution table

	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	1293900.027	3	431300.009	18.790	.000*
Within Groups	1721543.011	75	22953.907		
Total	**3015443.038**	**78**			

P<0.05 (*) is statistically significant

One-way ANOVA test conducted to determine if there is significant difference in the intensity of intestinal helminthiasis amongst the pupils in this study according to ABO blood group using the F distribution. The Table indicates a statistical significance difference at 5% level of significance ($F_{(3,\ 75)} = 18.79$, $P < 0.05$). This implies that there is statistical

Archives of Pharmaceutical Sciences and Biotechnology Journal
Volume 4 Issue 2 December, 2024 ISSN: 2971_611X
https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004
APSBJournal
Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

significant difference in the intensity of intestinal helminthiasis amongst the pupils in this study according to ABO blood group.

Table 7: Turkey's Multiple Comparison Test

(I) Blood Group	(J) Blood Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
O	A	-23.5484	45.30391	.954	-143.0039	95.9071
	B	-276.8817*	42.94784	.000*	-390.1249	-163.6386
	AB	81.4516	83.92080	.767	-139.8274	302.7306
A	O	23.5484	45.30391	.954	-95.9071	143.0039
	B	-253.3333*	47.82469	.000*	-379.4356	-127.2311
	AB	105.0000	86.51812	.621	-123.1275	333.1275
B	O	276.8817*	42.94784	.000*	163.6386	390.1249
	A	253.3333*	47.82469	.000*	127.2311	379.4356
	AB	358.3333*	85.30801	.000*	133.3966	583.2701
AB	O	-81.4516	83.92080	.767	-302.7306	139.8274
	A	-105.0000	86.51812	.621	-333.1275	123.1275
	B	-358.3333*	85.30801	.000*	-583.2701	-133.3966

Turkey's post-hoc test output to determine the blood group whose intensity is significantly statistically different from the other blood groups. The result of the analysis indicates that the

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

intensity of blood group B is significantly different from others (P<0.05). This implies that blood group B is the most associated blood group with the intensity of intestinal helminthiasis.

Table 8: Relationship of intensity of intestinal helminthiasis and Risk factors

Factors	N	No Infected	OR(%)	Mean egg count (EPG)	χ^2 –value	P-value
Parents Occupation						
Civil Servant	11	3(27.3)	1.2	333.33		
Farmers	127	31(24.4)	0.9	320.00		
Traders	24	6(25.0)	1.0	416.00		
Forces	8	2(25.0)	1.0	200.00	2.232	0.897
Type of Toilet Facility						
Pit	17	7(41.2)	2.36	328.57		
Bush	153	35(22.9)	0.4	314.29	5.128	0.077
Source of Water						
Well	104	20(19.2)	0.48	300.00		
Stream	66	22(33.3)	2.1	377.36		
Borehole/Tap	0	0(0.00)		0.00	0.019	0.991
Walking bare footed?						
No	139	15(10.8)	0,02	320.00		
Yes	31	27(87.1)	55.8	351.85	4.751	0.093
Do you wash vegetables/fruits before eating?						
No	27	9(33.3)	0.02	288.88		
Yes	37	9(24.3)	0.9	311.11		
Sometimes	106	24(22.6)	0.8	325.33	1.585	0.811
Do you eat sand?						
No	170	42(24.7)		340.47		
Yes	0	0(0.00				

From the result it indicates that, there is no relationship between intensity of intestinal helminthiasis with Risk factors (P>0.05). P-value>0.05 not statistically significant

Archives of Pharmaceutical Sciences and Biotechnology Journal
Volume 4 Issue 2 December, 2024 ISSN: 2971_611X
https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004
APSBJournal
Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

DISCUSSION

From the results obtained in this research, half of the pupils examined belong to Blood group O while the least belongs to blood group AB. The blood group distribution is similar with the work of Bakare *et al.,* (18) in Oyo state that recorded, blood group O 50.0%, blood group A 22.9%, blood group B 21.3 % and blood group AB 5.9%. The research was slightly different from the work of Etim *et al.,* (19) in Adamawa State and reported blood group O is 50.0%, blood group A is 17.7%, blood group B is 21.3% and blood group AB is 4.7%. The Rhesus distribution revealed, rhesus positive was 95.1%, rhesus negative was 4.9%, this is slightly different from the work of Erhabor *et al.,* (20) in Sokoto and reported rhesus positive 89.2% and rhesus negative 10.8%, and this may be due to differences in genetic make-up. Occurrence of 22.6% of intestinal helminthic infections was reported in this research as overall prevalence, this is lower compare with the work of Nock *et al.,* (21) whom reported 52.0% in their work in Kaduna state, this may be due intervention by some Non-Governmental Organization and Federal Ministry of Health. The ova of hookworm, *Ascaris lumbricoides*, Taenia spp. and *Schistosoma mansoni* were recovered. The study also showed hookworm has the highest infectivity, followed by *Ascaris lumbricoides* and *Taenia* spp.and *Schistosoma mansoni* had the least. The study agrees with the work of Anosike *et al.,* (22) whom in their work in Central Nigeria rural Community recorded highest prevalence of hookworm (12.7%), this may be due to the habit of walking barefooted observed among the study population. The infectivity based on blood group revealed that, Blood group B had the highest infectivity followed by Blood group A while the least is Blood group O. The report agrees the work of Degarege *et al.,* (23), whom reported high infectivity rate among blood group B (63%). Blood group A has the highest infectivity of *Ascaris lumbricoides*, Blood group B has highest infectivity of Hookworm, Blood group AB has the highest infectivity of *Taenia* and Blood group A has the highest infectivity of *Schistosoma mansoni*. The chi-square test showed that, there is statistical significant relationship between blood group and intestinal helminths $P<0.05$. This finding agreed with that of

Archives of Pharmaceutical Sciences and Biotechnology Journal
Volume 4 Issue 2 December, 2024 ISSN: 2971_611X
https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004
APSBJournal
Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

Ayenew *et al.*, (2), whom recorded statistical significant relationship between intestinal helminths and blood group. The finding also agreed with finding of Degarege *et al.*, (24), who reported statistical significant relationship between blood group and intestinal helminths infection (AOR) 2.08, 95% confidence interval (CI), 1.22-3.56). However, the finding contradicts that of Gabr and Mandour, (25); and Cooper *et al.*, (26) they indicated non association of intestinal helminths and blood group. One way Analysis of variance (ANOVA) showed, the variation among the blood groups in relation to intensity of intestinal helminthic infections was statistically significant $P<0.05$. When subjected to Turkey's multiple comparison test (post hoc), the intensities of blood group O, A and AB are significantly different from that of blood group B ($P<0.05$). This implies that, blood group B is the most associated with intensity of intestinal helminths. Studies have shown that, polysaccharides that resemble substances in blood group B have been identified in *Ascaris lumbricoides*, hookworm and *Schistosoma mansoni*, which can absorb blood group substances to mask target antigen on the parasite surface (27). *Ascaris lumbricoides* extracts from blood group B individual prohibit agglutination of anti-B antibodies, this suggests that, *Ascaris lumbricoides* mimics antigens of infected blood B individual, thus the immune system of such individual may not be effective, leading to high morbidity in such an individual (28, 27). The report agreed with the works of Trangle *et al*., (29) and Haseeb, *et al.*, (27) whom in their work reported high morbidity of intestinal helminths among blood B persons. However, the findings contradicts that of Ayenew *et al.*, (2), whom in their research among primary school children in Sanja, Northwest Ethiopia, reported high intensity of intestinal helminths among individuals with blood group AB (4.2 odds ratio, 95% CI, 1,3.13.7) , the difference may be due racial distribution difference. The study also contradicts the work of Degarege *et al.*, (30); Wokem *et al.*, (31) whom reported susceptibility of children with blood A and O to heavy intestinal helminthic infections. The difference may be due to genetic make-up. One hundred and seventy (170) questionnaires were administered to pupils in primary four (4) to six (6) to assess the risk factors among

Archives of Pharmaceutical Sciences and Biotechnology Journal
Volume 4 Issue 2 December, 2024 ISSN: 2971_611X
https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004
APSBJournal
Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

the pupils. From the responses, pupils whose parents are farmers are the most populated followed by pupils whose parents are Traders and the least are pupils whose parents are forces. Pupils whose parents are civil servants had the highest infectivity followed by pupils of Traders and forces and the least infection occurred pupils whose parents are farmers. The highest mean egg count was seen among pupils whose parents are Traders and the least seen among pupils whose parents are forces. The finding disagreed with that of Ezeagwuna *et al*., (32).Who reported highest infectivity among pupils whose parents are farmers (59.84%), but agreed with that of Anosike *et al.*, (22) whom reported highest infectivity among pupils whose parents are civil servants. The chi-square test showed that, there is no relationship between intensity of intestinal helminths and parents occupation P>0.05.The highest infectivity reported among pupils whose parents are civil servants may be due the fact that, they may engaged in walking barefooted or eating vegetables or fruits without washing thereby exposing them to intestinal helminths. Responses from type of toilet facility showed that, pupils who used Bush for defecation had high number than those that used pit toilet. The infectivity is high among pit toilet users than those that use Bush. The mean egg count was also high among pit toilet users than Bush users. The finding contradicts that of Chigozie *et al.,* (33). Who reported highest infectivity among bush users (33.8%). The chi-square test indicated that, no relationship between intensity of intestinal helminths and type of toilet facility P>0.05.The highest infectivity reported among pupils that used pit toilet may be due to either walking barefooted in a contaminated soil or eating vegetables or fruits without washing thereby exposing them to intestinal helminths more than Bush users. Responses from source of water showed that, pupils that uses well are more than those that used stream. The infectivity was high among stream users than well users. The mean egg count was also high among stream users than well users. The chi-square test indicted that, no relationship between intensity of intestinal helminths and water source P>0.05. The highest infectivity recorded among stream users may be due the fact that, faeces from the contaminated environment are washed into the stream where some of the got their

Archives of Pharmaceutical Sciences and Biotechnology Journal
Volume 4 Issue 2 December, 2024 ISSN: 2971_611X
https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004
APSBJournal
Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

water from thereby exposing them to these parasites. From the response of walking barefooted, 139 pupils don't walked barefooted while 31 pupils do walked barefooted. The infectivity and mean egg count were high among pupils that walked barefooted than those who don't. The chi-square testy showed that, no relationship between intensity of intestinal helminths and walking barefooted P>0.05. The high infectivity reported among those who walked barefooted may be due to constant exposure to contaminated soil thereby placing at higher risk than those who are always on shoes. Responses from washing of vegetables/fruits before eating indicated that, pupils who sometimes washed fruits/ vegetables before eating had the highest frequency followed by those who always washed fruits/vegetables before eating and the least frequency was among those don't washed fruits/ vegetables before eating. The highest infectivity was recorded among those who don't washed fruits/vegetables before eating followed by those who always washed fruits/vegetables before eating and the least infection occurred among those who sometimes washed fruits/vegetables before eating. The highest mean egg count occurred among pupils who sometimes washed fruits/vegetables before eating and the least mean egg count occurred among those who don't washed fruits/vegetables before eating. The chi-square test showed no relationship between intensity of intestinal helminths and washing of vegetables or fruits P>0.05.Eating of sand as a risk factor, none of the pupil indicates that he/she eats sand, this may be due to shyness which some of them may not want to be looked upon as babies, since eating of sand/soil is mostly associated with babies.

CONCLUSION

Although all blood groups are susceptible to intestinal helminthic infection, Blood group B have more intensity than others and its intensity is significantly different from other groups, making it the Blood group associated with intensity of intestinal helminths.

Conflict of Interest: None to declare

Acknowledgement

We wish to acknowledge the staff of Public Health Laboratory, Department of Community, Kaduna State University for assistance rendered during this research

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

work. Our profound gratitude also goes to Pupils whose blood and stool were used for this work.

REFERENCES

1. Kuboye, S., Nock, I. H., Aken'oven, T. O. L. &Ndams, I. S. (2017). Occurrence of Intestinal Helminths among Nursery School Pupils in Sabon Tasha, Chikun Local Government Area, Kaduna State, Nigeria. Journal of Tropical Bioscience, 12: 88-89.
2. Ayenew, A., Zinaye, T., Amare, T., Ababe, A., Habte, T., Belete, B. &Andargachew, G. (2016). The Association between ABO Blood groups and Intestinal Schistosomiasis among Masero Primary School Children in Sanja, North-West Ethiopia. Journal of Tropical Diseases, 4(2):2-5.
3. Degarege, A., Animut, A., Medhin, G., Legesse, M. &Erko, B. (2014). The association between multiple Intestinal Helminth Infections and Blood group, anaemia and nutritional status in Human Populations from Dore Bafeno, Southern Ethiopia. Journal of Helminthology, doi: 10.1017/S0022149X12000855.
4. Zaky, W.I., El-Gindy, I.M. & El-Badry, A.A. (2019). Association between ABO Blood groups and susceptibility to Schistosomiasis. Parasitology Research, 18 (6): 1915-1922
5. Gombe, N.T., Manga, S.B. &Yari, A. (2021). The Relationship between Blood groups and susceptibility to intestinal parasitic infections in Gombe, Nigeria. Journal of Immunology and immunotherapy, 2(1): 28-32.
6. Silamlak, B.A. (2021). Human ABO Blood Groups and Their Associations with Different Diseases. Biomedical Research International, (2021): 6629060.doi: 10.1155/2021/6629060. PMID: 33564677; PMCID: PMC7850852.
7. Obeta, M.U., Ejinaka, O.R., Jwanse, R.L., Lote-Nwanu, I.E. & Ibrahim. A. (2019).Prevalence and Distribution of Soil-Transmitted Helminths Among Children Attending Township Primary School, Jos, Plateau State, Nigeria. London Journal of Medical and Health Research, 19 (1): 55-62.
8. World Health Organizatio, (2020). Soil Transmitted Helminth Infection. http:// www.who.int/newsroom/fact-sheets/detail/soil-transmitted-helminth-infections.
9. Monstresor, A. (2002). Helminth Control in School-Age Children. A Guide for managers of Control Programs. World Health Organization.
10. Hussein, A., Alemu, M. and Ayehu, A. (2022). Soil

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

contamination and infection of School Children by Soil – Transmitted Helminths and Associated Factors at Kola Diba Primary School, Northwest Ethiopia: An institution –Based Cross-sectional Study. Journal of Tropical Medicine, August 3: doi: 10.1155/2022/4561561.

11. Olayiwola, A. (1997). The role of Kaduna Refining and Petrochemical Company (KRPC) on the Development of Chikun Local Government Area, Kaduna
12. National Population Commission (2006). Federal Republic of Nigeria 2006 Population Census. www.population.gov.ng/files/nationafinal.pdf.
13. Belyhun, Y., Girmay, M. &Alemayehu, A. (2010). Prevalence and risk factors for Soil Transmitted Helminth Infection in mothers and their children in Butajira, Ethiopia: a population based study. BMC Public Health, 10: 1-2.
14. Nanda, M. (2015). Clinical Pathology, Haematology and Blood Banking (for DMLT Students). Second edition. Jaypee Brothers Medical Publishers (p) LTD, New Delhi. 12-13
15. Centre for Disease Control (CDC, 2016). DPDX: Laboratory identification of parasites of Public Health Concern, Atlanta: Centre for Disease Control and Prevention, USA.
16. Ochei, J. &Arundhati, A. K. (2008). Medical Laboratory Science (Theory and practice), 7th edition. Tata McGraw-Hill publishing company limited, New Delhi. 952.
17. Shirish, M. K. (2013). Essentials of Haematology, 2nd edition. Jaypee Brothers Medical Publishers (p) LTD, London. 463-465.
18. Bakare, A. A., Azeez, M. A. &Agbolade, J.O. (2006). Gene frequencies of ABO and Rhesus Blood groups and Haemoglobin variants in Ogbomoso South-west, Nigeria. African Journal of Biotechnology, 5(3): 224-229.
19. Etim, E. A., Akpotuzor, J. O., Ohwonigbo, A. C. & Francis, A. A. (2017). Distribution of ABO and Rhesus Blood group in Adamawa State, Nigeria. Haematology Transfusion International Journal, 4(6):00102. Doi:10.15406/httj.2017.04.00102.
20. Erhabor, O., Babangida, S., Onuigwe, F. U., Abdulrahman, Y., Isaac, Z., Adias, T.C., Ezima, A.C.U., Ibrahim, K., Buhari, H., Okweshi, A., Ahmed, M. &Yeldu, M. H. (2014). ABO and Rhesus D blood groups distribution among students in Usman Danfodiyo University, Sokoto, North-Western Nigeria. Jacobs Journal of Emergency Medicine, 1(2):008

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

21. Nock, H., I., Duniya, D., &Galadima, M., (2013). Geohelminth Eggs in the soil and stool in pupilsof some primary school in samaru Zaria, Nigeria. The Nigerian Journal of Parasitology, 24: 115 – 122.
22. Anosike, J.C., Zaccheaus, V.O., Adeiyongo, C. M., Abanobi, O.C., Dada, E. O., Keke, I.R., Uwaezuoka, J. C., Amajuoyi, O. U., Obiukwu, C. E., Nwosu, D. C. &Ogbuju, F. J. (2016). Studies on the Intestinal worm (Helminthiasis) Infestation in Central Nigeria Rural Community. Journal of Applied Environmental Management, 10(2):61-66.
23. Degarege, A., Animut, A., Medhin, G., Legesse, M. &Erko, B. (2012). The association between multiple Intestinal Helminth Infections and Blood group, anaemia and nutritional status in human populations from Dore Bafeno, Southern Ethiopia. Journal of Helminthology, doi: 10. 1017/S0022149X12000855.
24. Degarege, A., Yiman, Y., Madhivanan, P. &Erko, B. (2017). The relationship between helminth infections and low haemoglobin levels in Ehiopia Children with blood type A. Journal of Helminthology, 91(3): 278-283.
25. Gabr, N. S. &Mandour, A. M. (1991). Relation of Parasitic Infection to Blood group in Elminia Governorate, Egypt. Journal of Egyptian Society of Parasitology, 21: 679-683.
26. Cooper, P. J., Guevara, A. & Guderian, R. H. (1993). Intestinal Helminthiasis in Ecuador: the relationship between Prevalence, genetic, and socioeconomic factors. Revista da Sociedade Brasileira de Medicina Tropical, 26: 175-180.
27. Haseed, M. A., Thors, C., Linder, E. & Eveland, L. K. (2008). Schistosoma mansoni: Chemoreception through N-Acetyl-D-galactosamine –containing receptors in females offers insight into increase severity of Schistosomiasis in individuals with ABO blood group A. Experimental Parasitology, 119: 67-73.
28. Deleon, P. P. & Valverdeh, J. (2003). System antigenic determiners expression in *Ascaris lumbricoides. Revista do Instituto Medicina Tropical de sao Paulo,* 45:53-54
29. Trangle, K. L., Goluska, M. J., O'Leary A. & Douglas, S. D. (1979). Distribution of Blood groups and secretor's status in Schistosomiasis. Parasite Immunology, 1:133-140.
30. Deleon, P. P., Foresto, P., Zdero, M. &Valverdeh, J. (2000). Preliminary studies on antigenic mimicry of *Ascaris lumbricoides. Revista do Instituto de Medicina Tropical de sao Paulo,* 42: 295-296

Archives of Pharmaceutical Sciences and Biotechnology Journal

Volume 4 Issue 2 December, 2024 ISSN: 2971_611X

https://doi.org/10.47514/10.47514/APSBJ.2024.4.2.004

APSBJournal

Page 32 - 47 Submitted 10/11/2024 Accepted 19/3/2025

31. Wokem, G.N., Abah, E. &Iwuaba, P. A. (2016). Hookworm Infection and ABO Blood Group among children in Aba metropolis, Abia state, Nigeria. World Applied Sciences Journal, 34 (9):1216-1221.
32. Ezeagwuna, D., Okwelogu, I., Ekejindu, I. &Ogbuagu, C. (2010). The prevalence and socioeconomic factors of Intestinal Helminth Infections among Primary School pupils in Ozubulu, Anambra State, Nigeria. The International Journal of Epidemiology, 9 (1):8
33. Chigozie, J. U., Kelvin, O. E., Patrick, G.O., Nelson. C. A. & Emmanuel, A. (2007). Soil Transmitted Helminth Infection in school children in South-Eastern Nigeria: the public health implication. The Internet Journal of the third World Medicine, 4 (1): 23