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RESEARCH PAPER

INTESTINAL HELMINTHES INFESTATION IN RELATION TO SOME HAEMATOLOGICAL PARAMETERS AMONG PREGNANT WOMEN ATTENDING ANTENANTAL CLINICS IN EKPOMA, Edo, Nigeria.

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ABSTRACT

This study assessedintestinal helminthes infection in relation to some haematological parameters among pregnant women attending antenatal clinics in Ekpoma, Southern Nigeria, over a period of 3 months. Two hundred and thirty (230) subjects comprising of 180 pregnant women and 50 controls (non-pregnant women) were examined.Their stool samples were examined using direct saline and iodine preparation, while the blood samples were analyzed for full blood count (Packed Cell Volume, Heamoglobin concentration, White Blood Cell count and Differential White Blood Cell count). Twenty-three (23; 10%) of the total examined subjects were infected with intestinal parasites, 15 (8.3%) out of the 180 pregnant women were infected, while 8 (16%) of the non-pregnant women were infected with intestinal helminthes. Ascaris lumbricoides was the only intestinal helminth seen in this study and pregnant women in the first trimester were mostly infected with intestinal helminthes. The mean and standard deviation of Packed Cell Volume (PCV) and total white blood cells count in the infected and non-infected pregnant women was 33.00 $\pm$ 26 and 34.17 $\pm$ 2.86 and 5.3 $\pm$ 0.97 (10^9/L) and 9.7 $\pm$ 0.97 (10^9L) respectively. It was observed that there was a significant difference in the total white blood cell values and eosinophil count between intestinal helminthes infected pregnant women and those that were not infected. These findings show that total white blood cell values and eosinophil count was more elevated in those that were infected than those that were not infected.

Key words: Pregnant, women, intestinal, infection, helminth

INTRODUCTION

Intestinal parasitic infections caused by protozoa and helminthes are globally endemic and have been described as constituting the greatest single worldwide cause of illness and disease (Chan *et al*., 1997). Intestinal helminthes are among the most common and widespread formof human infections, contributing to poor nutritional status, anaemia and impaired growth (Baidoo *et al*., 2010). Intestinal helminthiases are also known to aggravate pre-existing anaemia by decreasing appetite and thus food and iron intake (Bondevik *et al*., 2000; Stephenson *et al*., 2000). Worldwide anemia is an important reproductive health problem because of its association with adverse pregnancy outcome such as increase of rate of maternal and perinatal mortality, premature delivery, low birth weight etc (Dim and Onah, 2007). Intestinal parasitic infections have a worldwide distribution with high prevalence found in people with low socio-economic status and poor living conditions as well as people in over-crowded arrears with poor environmental sanitation, improper garbage disposal, unsafe water supply and unhygienic personal habits (Adamu *et al*, 2006; Noor *et al*., 2007; Uzairue *et al*. 2013).

Helminthes produce diseases by a variety of mechanism including mechanical effects such as intestinal obstruction (e.g ascariasis), invasion of host cells or tissue with damage or loss of function (e.gtrichnellosis) or competition for nutrients (e.g. vitamin B12 deficiency from fish tape worm infections). (Mondell *et al*., 2005). Intestinal helminthes contribute to anaemia as they feed on blood and cause further haemorrhage by releasing anticoagulant compounds, thereby leading to iron deficiency anaemia. Hookworm infection is the leading cause of pathological blood loss in tropical and subtropical regions (Pawlowski, 1991). Globally, an estimated 44 million pregnancies a year are complicated by maternal hookworm infection alone, posing a serious threat to the health of mother and fetuses (Bundy, 1995). Anaemia during pregnancy is associated with premature delivery, low birth weight, maternal ill health and maternal death (Scholl *et al.*, 1992). This study therefore, assesses the prevalence of intestinal helminth infection and its hematological alterations during pregnancy.

MATERIALS AND METHODS

Study Area: This cross sectional study was carried out in Ekpoma, the administrative headquarters of Esan West Local Government Area of Edo State, Nigeria. It has an estimated population of 127,718 and lies within latitude $6^{o}43^{1}$N and $6^{o}45^{1}$N, longitude 6o61 and $6^{o}N^{1}$E of the Greenwich meridian (Aziegbe, 2006).

Study population and sampling: A simple random sampling method was used (Kothari, 2004).A total of two hundred and thirty subjects (230) formed the study population comprising one hundred and eighty (180) pregnant women and fifty (50) non-pregnant women (control group).

Exclusion and Inclusion Criteria: Samples were collected only form pregnant women attending ante-natal clinics in Government owned primary health care facilities, while samples were not collected from those that were not registered in these health facilities.

Ethnical consideration: The principle of the declaration on the right of the subject was employed for this study. The participants that were enrolled for this study were informed on the significance of the study and their consents sort and obtained.

Sample Collection: After an informed consent was obtained from the subjects, two milliliters of blood samples were collected by venipuncture from subject (both test and control) into EDTA anticoagulated containers. Fresh stool sampleswere also collected from subject into dry, leak proof and wide mouth sample containers.

Sample analysis: The stool samples were examined for consistency and presence of proglottids and adult worms. Saturated sodium salt floatation and formol – ether concentration techniques were used for faecal analysis based on the thresholds recommended by the World health Organization (Cheesbrough, 1993). PCV, haemoglobin, WBC, differential WBC was examined as described by Cheesbrough (1993).

Statistical analysis: Data obtained was analysed using SPSS software package version 20.0. Values were considered statistically significant when P-values are less than 0.05 ($P > 0.55$). Pearson Chi- square, Z test and correlation were used to determine the association between hematological parameters and heliminthic infection.

RESULTS

Of the total two hundred and thirty (230) subjects comprising 180 pregnant women and 50 non-pregnant women (control), twenty three (23) pregnant women representing 10.0% of the total examined subjects were infected with intestinal parasites. Fifteen (8.3%) of the 180 pregnant women and 8 (16.0%) of the 50controls (non-pregnant women) were all infected with intestinal helminthes with an insignificant statistical difference ($P = 0.144$, $P > 0.05$). According to trimester of the pregnant women, intestinal parasitic infection rate was 15.4%, 6.4% and 8.4% in 1st, 2nd and 3rd trimesters respectively.

Patients within age group range of 31 – 35 years were most infected with infection rate of 11.5%, while those of age groups 15 – 20, 21 – 25, 26 – 30 and 36 – 40 years had 6.3%, 7.1%, 9.2% and 6.7% infection rate respectively but the difference was not statistically significant ($P = 0.32$, $P > 0.05$) as shown in table 1. Table 2 shows the comparison of the mean and standard deviation of pack cell volume total while blood cell count (TWBC) and the

differential while blood cell count (DWBC) between pregnant women. The mean ± SD of PCV of pregnant subjects was 31.67 ± 4.18%, while the mean ± SD of PCV of control subjects was 35.83 ± 3.66%. The difference in the means between test and control subjects was statistically insignificant (P > 0.05), the mean ± SD of TWBC of pregnant subjects is 5750.00 ± 1544.99 cells /L while the mean ± SD of control subjects was 7750.00 ± 1408.1 cells / L, the difference in the means between test and control subjects was statistically significant (P < 0.05). Table 3 shows the comparison of the mean and standard deviation of pack cell volume, total while blood cell count (TWBC) and differential white blood cells count (DWBC) between pregnant women and non infected pregnant women. The difference is the means of PCV between test and control subjects was statistically insignificant (P> 0.05) while the difference in the means of the TWBC of pregnant subjects and controls was statistically significant (P < 0.05). Table 4 shows the comparison of the mean and standard deviation of PCV, TWBC and DWBC between the different trimesters and the controls.

Table 1: Prevalence of intestinal helminthic infection according to the type of subject, Trimester and Age group of the study group.

Parameters	NE	NI	Prevalence %	X2	P – Value	Remarks
Pregnant women	180	15	8.3	2.13	0.144	NS
Non – pregnant	50	8	16.0			
Total	230	23	10.0			
Trimester[b]						
1st	13	2	15.4	3.60	0.165	NS
2nd	78	5	6.4			
3rd	89	8	8.9			
Age						
15-20	32	2	6.3	4.667	0.32	NS
21 – 25	42	3	7.1			
26 – 30	65	6	9.2			
31 – 35	26	3	11.5			
36 – 40	15	1	6.7			

Key: NE = Number Examined, NI = Number infected, % = percentage, NS = Not significant

Table 2 shows the comparison of the Mean and Standard deviation of Pack cell volume, Total White Blood Cells Count (TWBC) and the differential while blood cells count (DWBC) between pregnant women and non-pregnant subjects was 31.67 ± 4.18%, while the mean ± SD of PCV of control subjects was 35.83 ± 3.66%. The differences in the means between test and control subjects was statistically insignificant (P > 0.05), the mean ± SD of TWBC of pregnant subjects is 570. ± 1544.99 cells/L while the mean ± SD of control subjects was 7750.00 ± 1408.19 cells/L, the differences in the means between test and control subjects was statistically significant (P < 0.05), the mean ± SD of the various differentiated white blood cell is shown in the table below with their statistical inference.

Table 2. The Mean and Standard Deviation of Packed Cells volume (PVC), Total white Blood Cells (TWBC) and Differential Cell Count of pregnant women and Non-pregnant Women (Controls)

Parameters	**Pregnant women X ± SD**	**Non-pregnant (Control)X ± SD**	**Z-Cal**	**P-value**	**Remarks**
PCV (%)	31.67 ± 4.18	35.83 ± 3.66	-2.44	0.06	NS
TWBC (10^6)	5750.00 ± 1544.99	7750.00 1408.19	-3.220	0.02	S
Differential Count (%)					
Neutrophils	53.83 ± 7.19	60.33 ± 4.97	-2.210	0.08	NS
Lymphocytes	40.83 ± 6.59	34.67 ± 4.89	2.290	0.07	NS
Monocytes	2.33 ± 1.86	2.33 ± 2.58	0.004	0.99	NS
Eosinophils	2.50 ± 1.38	2.67 ± 1.75	-0.302	0.78	NS
Basophils	NA	NA	NA	NA	NA

KEYS: X = mean, SD = Standard deviation, PCV = packed cell volume, TWBC = Total White Blood Cells Count , % = Percentage, NA = not applicable, S = Significant, NS = Not significant.

Table 3: The mean and standard Deviation of packed cells volume (PCV), Total white Blood Cells (TWBC) and Differential Cell Count of Intestinal Helminthic Infected Pregnant Women and Not Infected Pregnant Women

Parameter	Non-infected pregnant women X ± SD	Infected pregnant women X ± SD	Z – Cal	P-Value	Remarks
PCV	33.00 ± 2.61	34.17 ± 2.86	-1.099	0.322	NS
WBC (10^6)	5333.3 ± 937.37	9703.3 ± 936.4	-11.42	0.0000	S
Differential Count (%)					
Neurophils	58.00 ± 5.76	59.83 ± 5.19	-0.778	0.47	NS
Lymphocytes	39.17 ± 5.12	35.00 ± 3.89	1.995	0.10	NS
Monocytes	2.33 ± 1.63	2.83 ± 2.56	-0.75	0.49	NS
Eosinophils	2.33 ± 1.63	2.83 ± 2.56	-0.75	0.49	NS
Basophils	NA	NA	NA	NA	NA

Keys: X = mean, SD = Standard deviation, PCV = packed cell volume, TWBC = Total White Blood Cells Count, % = Percentage, NA = not applicable, S = Significant, NS = Not significant.

Table 4: The Comparison of Mean and Standard Deviation of Packed Cells Volume (PCV), Total White Blood Cells (TWBC) and Differential Cell Count of the Various Stages of Trimester and The Non-Pregnant Women (Controls)

Parameters	Trimester 1st X ± SD	2nd X ± SD	3rd X ± SD	Control X ± SD	F- Cal	P-Value	Remarks
PCV (%)	32.51^a ± 2.95	31.85^a ± 4.62	32.55^a ± 3.15	35.83^a ± 3.66	1.467	0.254	NS
Differential Count(%)							
Neutrophils	56.50^a ± 3.15	54.17^a ± 9.70	50.17^a ± 3.92	60.33^a ± 4.89	2.708	0.07	NS
Lymphocyte	40.00^a ± 2.24	43.17^b ± 9.75	46.33^b ± 3.39	34.67^c ± 4.89	4.38	0.02	S
Monocytes	2.00^a ± 1.67	2.00^a ± 2.28	1.67^a ±1.63	2.33^a ±2.58	0.10	0.96	NS
Eosinophils	1.50^a ±1.64	1.00^b ± 1.09	1.83^a ±1.33	2.67^c ±1.75	1.35	0.29	NS
Basophils	NA	NA	NA	NA	NA	NA	NA

KEYS: X = mean, SD = Standard deviation, PCV = packed cell volume, TWBC = Total White Blood Cells Count, % = Percentage, NA = not applicable, S = Significant, NS = Not significant.

DISCUSSION:

The differences in the prevalence of intestinal helminthic infections in a population is a function of many different factors, most importantly is the environmental factors, parasite factors and the host factors (Taiwo and Agbolade, 2000, Gundiri*et al*., 2001).

From the present study, it is obvious that the prevalence of intestinal parasitic infections were found to be a little lower than the findings of Alison et al., (2004) in Uganda who found 17.0% but in disagreement with findings of prevalence reported by other authors in previous studies in Nigeria. Anosike *et al.* (2002) reported an overall prevalence value of 42.2% in south-eastern Nigeria. Our finding also differs with what was reported by some authors like Gundiri et al. (2001) who reported prevalence value of 33.3% in Adamawa State in Northern Nigeria. they also recorded a value of 33.3%, 37.5% and 33.3% for Imo, Abia and Enugu States encampments of nomadic Fulanis respectively, Jimenez-Gonzalez et al. (2009) reported a value of 34.0% among inhabitants of a rural community in Mexico.

As regards to parasites species recovered, (100.0% *Ascarislubricoides*), our finding agrees with the findings by Alli*et al*., (2011) who reported *Ascarislubricoides* as the highest occurring intestinal helminthes of 35.5% in ante natal clinic at University College Ibadan, Nigeria.

The distribution of intestinal helminthes in regards to trimesters, first trimester with 15.4% had the highest occurrences and this finding is in contrast with findings of Alli and colleagues (2011) who reported hyper-endemicity of intestinal helminthic infection among second trimester and this discreparties evaluated and treated with antihelminthic drugs (Bundy *et al*., 1995; Stotzfus *et al*., 1997). Asregards the prevalence of intestinal helminthes among the pregnant women based age, it is quite clear that those within the age group of 31 – 35, had the highest occurrence with 11.5% and this totally disagreed with assertion by Alli*et al*. (2011) who reported that age group 18 – 32 had the highest occurrence of intestinal helminthes.

In this current study, the mean and standard deviation of PCV of infected and non-infected pregnant women was 33.0 $\pm$ 2.61 and 34.17 $\pm$ 2.86 respectively, while the total white blood cell for the helminthic infected and non-helminthic infected was 5.3 $\pm$ 0.9 (10^9/L) and 9.7$\pm$ 0.9 (10^9/L) respectively. These findings were a bit higher than the findings by Serojim *et al*. (2013) who reported 7.5 (109/L) for non-infected filariasis and 14.0 (109/L) for the infected filariasis, as well as 43.0% and 41.0% for non-filariasis infected and filariasis infected individuals respectively. The variation noticed in this research could be attributed to differences in the physiological and biochemical state of the study group; especially between those in this current study and those of Serojim and colleagues.

For the differential white blood cell count, the mean and standard deviation for Neutophils, Lymphocytes, Monocytes, and eosinophil and Basophils for infected pregnant women and non-infected pregnant women were 58.0 $\pm$ 5.76, 39.7 $\pm$ 5.12, 2.33 $\pm$ 1.63, 1.00 $\pm$ 0.89 and 0.00 $\pm$ 0.00 and 59.5 $\pm$ 5.19, 35.0 $\pm$ 3.89, 2.83 $\pm$ 2.56, 2.30 $\pm$ 2.33 and 0.00 $\pm$ 0.00 respectively, while Sarojimi*et al*. (2013) reported 53%, 40% 4% 1% and 2% for Neutrophils, Lymphocytes, Monocytes, and eosinopil and Basophils in filariasis infected individuals and 82%, 14%, 4%, 0% and 0% Neutrophils, Lymphocytes, Monocytes, and Eosinophil and Basophils in the control group. In this study, eosinophil was found to be elevated in the intestinal helminthic infected pregnant women.

Furthermore, comparing the mean and standard deviation of packed cell volume (PCV), total while blood cells and differential white blood cells count of the various stages of trimester and the control, there was no significant difference in PCV and this could be attributed to the type of intestinal heminthic infection (*Ascarislumbricoides*) which has not been implicated to cause anemia like hookworm known for its established capacity to cause acquired anemia in pregnant women infected with it. The fact that total white blood cells at first trimester was significantly different from those of the second and third trimesters but not significantly different from those of the control, could be attributed to the physiological and biochemical adaptations of the pregnant women during pregnancy which are more pronounced in the second and third trimesters (Dziedzom*et al*., 2012).

CONCLUSION

A*scaris lumbricoides* was the only intestinal parasite encountered in this study, and women within the first trimester were mostly infected. There was a significant difference in the total white blood cell count and eosinophil count among women infected with intestinal parasite compared with those not infected.

Pregnant women should be evaluated routinely for intestinal helminthic infection especially in the first trimester to reduce the burden contributed to pregnancy by them. Furthermore anti-helminthic drugs that do not have adverse effect on the women and the developing fetus should be used as prophylactic in pregnancy.

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REFERENCES

Adamu, H., Endeshaw, T., Teka, T., Kife., A. and petros, B. (2006): Prevalence of intestinal parasite. *Ethiop J \ Health Div*; 20 (1): 39 – 47.

Alison, M. E., James A.G.W., Moses, L.M, Moses K., peter, H., and joseph, W.B. (2004): *Trop. Doc*; 34: 27 – 28.

Alli., J. A., Okonko, I.O., Kolade., A.F., Nwanze, J.C., Dada., V.K., and Oundele, M (2001): Prevalence of intestinal nematode infection among pregnant women attending antenatal clinic at the University College Hospital, Ibadan, Nigeria. *Adv in Applied Sci Research*; 2(4): 1 – 13.

Anosike, J. C., Chighana, J.I., Nwoke, B.E.D., Ezike, M.N., Dike, M.U., Ukaga, C.N., Okere, M.S.C and Ajero, M.U 92002): A survey of intestinal parasite among students of post primary institutions in Imo State, Nigeria. 28th annual conference Abstract (63) *Niger Soc. Parasitol;* 20:74.

Aziegbe, F.I. (2006): Sediment Sources, Redistribution and Management in Ekpoma, Nigeria. *J. Hum. Ecol*; 20(4): 259-268.

Baidoo, S. E., Tay, S.C.K. and Abruquah, H.H. (2010): Intestinal helminth infection and anaemia during pregnancy: A Community based study in Ghana. *Afr J Microbiol Res*; 4 (16): 1713 – 1718.

Bondevik, G.T., Eskeland, B., Ulvik, R.J., Lie, R. T., Schneede, J. and Kvale, G. (2000): Anemia in preg-nancy: Possible causes and risk factors in Ne-pali women. *Euro J Clin Nutr*; 54: 3 – 8.

Bundy, D, Chan, M. S. and Savidi, I. (1995): *Trans Soc. Trop. Med. Hgy 89:* 521 – 522

Chan, M. S. (1997): The global burden of intestinal nematode infections – Fifty years on. *Parasitol Today*; 13: 438 – 443.

Cheeshrough M. (1993): Protozoa Medical Laboratory Manual For Tropical Countries. Voll II low price edn. *Trop Hlth Technol.,* 1: 45 – 48.

Cheesbrough, M. (2006): Parasitological Test, In: District Laboratory practice in Tropical Countries. 2nd edition, part I (Low Price Ed), Cambridge University Press. pp.183 – 215.

Dim, C. and Onah, H.E. (2007): The prevalence of anemia among pregnant. *Immunol*; 7: 22 – 29

Dziedzom, K., de Souza, A.A., Koudou, B., Kelly – Hope, L.A., Wilson, M.d., Bockarie, M.J. and Boakye, D.A. (2012): *Parasites & Vectors*; 5: 259.

Gundiri, M.A., Kwalagbe, B. T., Gundiri, E.A and Godly, C. (2001): Prevalence of parasitic infections among school age Fulani children in Guduso, Girei Local Government Area of Adamawa State, Nigeria. The Nigerian Society for Parasitology, 25th Annual conference, 2 – 5 September 2001, Abstract No 9.

Jimenez-Gonzalez, D.E., Marquez – Rodriguez, K., Rodriguez, J.M., Gonzales, X., Oxford, J., Sanchez, R., kawa-Karasik, S., Flisser, A. and Maravilla, P. (2009): *J of Parasitology and Vector Biology; 1 (2): 009 – 012.*

Kothari, C.R. (2004): Research Methodology: Method and Techniques. New Age International Publishers, New Delhi, India. Pp 123-124

Mandell, A. Douglas, D. and Bemetts, S. (2005): Principles and practice of Infectous disease, 6thed. Elsevier publishing, india. Pp. 258 – 272,

Nor, M.Y., San, Y.m., Gan, C.C., Yusri, M.Y., Nurulsyamzawaty, Y., Zuhaizam, A. H., Maslawaty, M. N., Norparina, I and Vythilingam, I. (2007): Prevalence of intestinal protozoa in an aborigine community in Pahang, Malaysia. *Trop Biomed*;, 24: 55 – 62.

Surojini., S., Mohad, P. and Senthilkumaar, P. (2013): Haematological studies of lymphatic filariae, *Wuchereriabancrofii*affected patients in Arakkonam area, Tamil Nadu, India, *Euro J of Experimental Biology*;, 3(2): 194 – 200.

Scholl, T. O., Hediger, M.L., Fischer, R.L and shearer, J. W., (1992): Anemia vs Iron deficiency: increased risk of preterm delivery in a prospective study. *Am J ClinNut*; 55: 985 – 988.

Stephenson, L.S., Latham, M.C. and ottesen, E. A (2000): Global malnutrition. *Parasitol*; 121: 5 – 22.

Stotzfus, A. K. and Agbolade, O.M. (2000): *Nigerian Journal of Science*; 34: 283 – 286.

Uzairue., L. I., Ugbor, C.I., Ezeah, G.A.C., Eze, N.O. and Nwadike, I.G. (2013): *Gastrodiscoides hominis* Infestation On Vegetables (Cabbages). Sold in Ekpoma markets, Edo State, Southern Nigeria – A case Report. *IJBAIR*; 2(2): 37 – 39.

AUTHORS CONTRIBUTIONS

All authors (Okodua M.A, Eyaufe A.A, Ehinon V.O, Festus O.O, Osagie R.N, Adeleke G) actively took part in this study and article presentation. Below are the specific contributions of the authors:

Okodua, M.A: Chief Investigator and Team leader
Eyaufe, A.A: Litterature search and write up
Ogbosei, V.E.: Laboratory analysis (Parasitilogy)
Festus, O.O: Statistical analysis and proof readings
Osagie, R.N: Review of Litterature and proof reading
Adeleke, G: Laboratory analysis (Haematology)