Parasitic Infections and Malnutrition in Children Aged 1-16 Years in Omu Community via Ijebu- Ode

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Article history:
Received: 17 June, 2014
Accepted: 22 June, 2014
Available online: 21 May, 2015

Keywords:
Smoking, alcohol, diet, lipid profile, myocardial infarction

Abbreviations:
MI: Myocardial Infarction, TC: Total Cholesterol, LDL: Low density lipoprotein, HDL: High density lipoprotein, TG: Triglyceride, IHD: Ischemic heart disease

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Abstract
The prevalence of parasitic infections and malnutrition are still on a high side in Nigeria. A cross-sectional survey to obtain anthropometric, parasitological and socio-economic data of the children in Omu community of Ogun State, Nigeria was carried-out. Anthropometric data were expressed as weight for age (WAZ), height for age (HAZ), weight for height (WAH) using Z-scores and Gomez method. Parasitological examinations of stool and blood samples were done through wet preparation, formaldehyde-ether concentration and Giemsa staining method. Results of nutritional status and parasitosis of 284 children investigated revealed A. lumbricoides 17.9%, Hookworm 2.1%, Trichuris trichiura 0.7%, mixed infection 1.1% and malaria parasite 50.7% while percentage underweight was 39.4%, stunting 25.5%, wasting 31.2% using Z-Scores and percentage underweight was 29.6% and stunting 23.2% using Gomez method. Only stunting was associated with gender ($x^2=7.1$, $p<0.05$) but underweight and wasting were Not ($x^2=2.27, p>0.05$ and $x^2=0.26, p>0.05$). The present study was embarked upon to investigate prevalence of parasitic infections and malnutrition in Omu-ijebu, Nigeria. The study revealed high prevalence of both parasitic infections and malnutrition despite government efforts in combating the menaces. Government needs to do more in the area of provision of social amenities and other infrastructure.

Citation:

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1. Introduction and Review of Literature

Parasitic Infections and malnutrition still remains major public health problem in Africa and other resource constraints nations worldwide and are intricately linked. The young or school age children are mostly affected than any other age group by this menace (Amuta et al., 2009). Worldwide, intestinal helminths caused hundreds of thousands of avoidable deaths each year and are among prevalent infectious diseases. United Nations Food and Agriculture Organization in 2010 reported that 925 million people were undernourished with 239 million of them lived in the Sub-Saharan Africa, Asia and the Pacific 578 million, Latin America and Caribbean 53million, Near East and North Africa 37 million and Developed countries 19 million. Also, in March, 2012; a United Kingdom based charity Organization ranked Nigeria as the fifty countries in the World where half of the children are malnourished. Besides, intestinal parasitism has clear social and environmental determinants, with high prevalence in Sub-Saharan Africa which include Nigeria and other regions with poor sanitation, lack of safe water supply; education, poverty, deficiency in adequate dwelling conditions and unsafe human waste disposal (Samwobo et al., 2005 and Filipe et al., 2007). It is estimated that for children 5- 14 years of age in resource constraints countries intestinal worms
accounts for 12% of the total diseases burden (Filipe et al., 2007). Parasitic infections affect pre-school and school aged pupils negatively and have detrimental effects on their survival, growths, physical fitness and cognitive performance (Hesham et al., 2005).

2. Objective of Research

The study was designed to assess the relationship between Parasitic infections and malnutrition among children in Omu-ijebu in Ijebu-ode, Nigeria.

2.1 Rationale for the research

There is scanty information on the relationship between parasitic infections and nutritional situation of school age children in Omu community of Ogun state. Besides, before State government gave the community health facility in the year 2007 many of the children from the area visited State hospital, Ijebu-ode kilometers away were diagnosed for either parasitic infection or malnutrition and this necessitate the study design. Data generated will be used to design appropriate programmed that can improve both their nutritional and health status for better living.

3. Materials & Methods

3.1 Justification of research

Large percentage of Africans still resides in the rural areas where social amenities and other infrastructures are either lacking or inadequate. As a result of these many people especially the younger ones and women of child bearing age sometimes suffer from malnutrition and parasitic infections. The study which was conducted between May 2007 and November 2008 intends to examine the prevalence of parasitic infections and malnutrition critically in the study community and suggest how the problems can be solved.

3.2 Study area

Omu is a community situated in the Southwestern Nigeria; on latitude 30.56°E and longitude 60.45°N of Ogun state. The town lies within the tropical rain forest vegetation zone. Majority of the inhabitants engage in farming and trading activities. Over the years, the town had witnessed some tremendous development in education and provisions of social and infrastructural facilities. The total population of Odogbolu Local government area in which Omu is situated is 127,123 as at 2006 population figures released by National Population Census.

3.3 Study population

The study population includes pre-school and school aged children. A total of 284 of them were enrolled between the months of March to October 2008. Anthropometric measurement of their height and weight were taken. Heights were taken in centimeters (cm) using measuring tape, infants scale ACS-20A-YC manufactured in Germany for those of them less than 2 years. Their weight was taken in kg using weighing machine without school sandals and with light cloths; measure precision 0.1kg.

3.4 Sample collection and analysis

Stool samples were collected in screw capped labeled plastic bottles, which were distributed a day prior to the day of collection. The children collected morning stool samples as instructed. The sample containers were collected from the children after each of them inscribed their identities (name, sex and age) on the sample container. It was later transported to laboratory and examined for the presence of ova and cysts of intestinal parasites within two hours using direct saline and iodine wet preparation method. Negative samples were re-examined by formaldehyde-ether concentration (WHO, 2005). Sample which could not be analyzed within two hours, were fixed the same day with 10% formol saline for subsequent analysis. (WHO, 2005). Malaria Parasite estimation was done by making thick blood films from finger pricks of the subjects, stained with Geimsa stain and examined microscopically under the 100x objective.

3.5 Statistical analysis

Data were entered and analyzed using SPSS version 15.0 and EPI-INFO 2002 computer packages. Descriptive statistics such as frequency mean and standard deviation (Mean SD) were used as appropriate with the variables. Chi-square (X²) test was used to test the association of the categorical data; t-test, F-test (ANOVA) and least significance difference (LSD) were also used appropriately. P-Value less than 0.05 were considered to be significant.

4. Results

A total of 284 Children were enrolled in this study comprises of 144 females and 140 males.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male n=140 Mean (S.D)</th>
<th>Female n=144 Mean (S.D)</th>
<th>T-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>7.99(4.63)</td>
<td>8.24 (4.94)</td>
<td>0.45</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>21.69 (10.45)</td>
<td>20.14 (9.60)</td>
<td>1.31</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Height ( cm)</td>
<td>116.72 (27.29)</td>
<td>119.46 (27.10)</td>
<td>0.86</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>
Table 1 shows baseline characteristics by sex among the subjects by considering their mean and standard deviation. The mean age (year) for male was 7.99 with standard deviation of 4.63 while mean age for female was 8.24 with standard deviation of 4.94. Statistically there was no difference (p>0.05). Weight (kg) shows mean of 21.69 and standard deviation of 10.54 for male and 20.14 and 9.60 for female. This also shows no significant difference statistically (p>0.05). Mean height (cm) for male was 116.92 with standard deviation of 27.29 while that of female was 119.46 and 27.10 for mean height and standard deviation respectively. Statistically there was no significant difference (p>0.05).

Table 2: Prevalence of Parasites by Sex Among Children Under Study

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Intestinal Parasites</th>
<th>Malaria Parasite</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A. lumbricoides</td>
<td>Hookworm</td>
</tr>
<tr>
<td>Male 140</td>
<td>34 (24.3%)</td>
<td>24 (17.1%)</td>
</tr>
<tr>
<td>Female 144</td>
<td>43 (29.9%)</td>
<td>29 (20.1%)</td>
</tr>
<tr>
<td>Total 284</td>
<td>77 (27.1%)</td>
<td>53 (18.7%)</td>
</tr>
</tbody>
</table>

Table 2 shows Prevalence of parasites by sex among the children females 43 (29.9%) were more infected than males 34 (24.3%) for the intestinal parasites but the difference was not statistically significant (P>0.05). For malaria parasite (P. falciparum) males 74 (52.9%) were more infected than females 70 (48.6%). P-value >0.05.

Table 3: Prevalence of Parasites by Age Group

<table>
<thead>
<tr>
<th>Age</th>
<th>Ascaris lumbricoides (%)</th>
<th>Hookworm</th>
<th>Trichuris trichiura (%)</th>
<th>Entamoeba histolytica (%)</th>
<th>Mixed infection</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤5yrs n=110</td>
<td>16 (14.5)</td>
<td>1 (0.9)</td>
<td>10 (9.0)</td>
<td>6 (5.5)</td>
<td>1 (0.9)</td>
<td>25 (22.7)</td>
</tr>
<tr>
<td>6-10yrs n=77</td>
<td>17 (22.1)</td>
<td>2 (2.5)</td>
<td>1 (1.3)</td>
<td>3 (3.9)</td>
<td>2 (2.5)</td>
<td>25 (22.5)</td>
</tr>
<tr>
<td>≥11yrs n=97</td>
<td>22 (22.7)</td>
<td>2 (2.1)</td>
<td>0 (0.0)</td>
<td>3 (3.1)</td>
<td>0 (0.0)</td>
<td>27 (27.8)</td>
</tr>
<tr>
<td>Total: n=284</td>
<td>55 (19.4)</td>
<td>5 (1.8)</td>
<td>2 (0.7)</td>
<td>12 (4.2)</td>
<td>3 (1.1)</td>
<td>77 (27.1)</td>
</tr>
</tbody>
</table>

Table 4: Prevalence of Helminth Infection in Relation to Toilet Type / Facility by Questionaire

<table>
<thead>
<tr>
<th>Type of toilet</th>
<th>Number examined</th>
<th>Number (%) infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water closet</td>
<td>41</td>
<td>5 (12.2%)</td>
</tr>
<tr>
<td>Pit toilet</td>
<td>145</td>
<td>44 (30.3%)</td>
</tr>
<tr>
<td>Bush toilet</td>
<td>98</td>
<td>28 (28.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>284</td>
<td>77 (27.1%)</td>
</tr>
</tbody>
</table>

Table 4 shows that the prevalence of helminthes infection was highest among those using method for defeation 44 (30.3%) following by those using bush toilet method 28 (28.6%) and finally by those using water closet toilet method 5 (12.2%). Statistical analysis showed that there was no significant difference in the trend (X² =2.61, p>0.05).

5. Chapter Five Discussions, Conclusion and Recommendation

5.1 Discussions

It has been established worldwide that parasitic infections and malnutrition co-exist and together constitute serious health problem especially in the tropical countries. While malnutrition results when diet consumed by an individual does not provide adequate calories and protein for growth and maintenance; parasitic infections are associated with appalling unhygienic and environmental conditions, poverty and over-dispersion of parasites (Garba and colleague, 2010; Temitope, 2012). Parasitic infections usually have negative lifelong health effects, and also lead to malnutrition which in turn can result in delayed growth as well as cognitive growth of any child. Ascaris lumbricoides causes growth retardation; vitamin A and carotenes deficiencies and possibly malnutrition, Hookworm causes systemic effects related to iron deficiency, anaemia and therefore induced malnutrition while Trichuriasis also causes iron deficiencies anaemia which may lead to malnutrition (Amuta et al., 2009). The result of present study revealed intestinal parasitic prevalence of 27.1% and malaria parasite infection to be 50.7% with high prevalence of three common intestinal worms vis-a-vis Ascaris lumbricoides (18.7%), Hookworm (2.1%) and Trichuris trichiura (0.7%), which were the major parasites isolated in the study earlier conducted by Adeyeba and Tijani (2002) and Ukpai et al. (2003) in Ikwuano Local Government Area of Abia State, Easter Nigeria. High presence of these parasites in
the area is the reflection of poor local level of environmental sanitation and personal hygiene found in most communities in the tropical and subtropical regions of the world where up to 15% of host population harbour approximately 70% of the worm population and serve as major source of environmental contamination. Ascaris lumbricoides infection occurred with the highest frequency. The possible reason for this is that it is well established that the infective stages of A. lumbricoaides, the embryonated eggs, have enormous capacity for withstanding the unfavourable atmospheric condition abound in the tropics (Chigozie et al., 2007).

The prevalence of parasitic infection in the understudied children increased with age. This observation is in consonance with that of other workers. (Amuta et al., 2009; Adefioye and colleagues, 2011). Children below the age of 15 years are usually more predisposed to parasitic infections than older ones because children of the age brackets spend more of their leisure time outdoors, playing and or foraging in garbage dumps and eating food remains on the street without watching hands.

Mixed – infection rate was 1.1%. This is higher than 0.4% reported by Chigozie et al. (2007) in South Eastern Nigeria. The result of this study showed that 37.7% and 33.8% of these children suffered from mild to moderate and severe malnutrition respectively. This result is similar to what Garba and Mbofung (2010) reported in Adamawa Region of Cameroon. The prevalence of malnutrition in males and females were 32.4% and 39.1 % respectively but without significant difference (P>0.05). This suggested that malnutrition in Omu is independent of sex.

The percentage underweight was 39.4%, stunting 25.5% and wasting 31.2% using Z - scores while that of Gomez was 29.4% for underweight and 23.2% for stunting. This agrees with Beth et al (2003). The food and Agriculture Organization of the United Nations (FAO) also reported that 850 million people worldwide were undernourished in 1999 to 2005 (Michael, 2006).

Also observed from this study was that underweight; stunting and wasting were associated with gender. The females grow better than males but males weighed well than females.

The prevalence of malaria infection (50.7%) was high in this study than 23.7% reported by Olowu et al. (2000). This could be attributed to the time of the year this study was carried out.

Majority of the children in this study (30.3%) depends on pit toilets as means of defecation with fewer (1.3%), having access to water closet. Non-availability of toilet facilities has been one of the risk factors responsible for high prevalence of intestinal helminthic infections in most African rural communities (Ali et al., 1999).

The measurements of height and weight were conducted as baseline between male and female sexes. It was discovered that males weighed more with mean weight of 21.69kg than females’ 20.46ckg but the difference was not significant (P> 0.05). For the height females with mean height of 119.46 cm and standard deviation (27.10) grow better than males with mean height I 16.72cm and standard deviation of 27.29.

Conclusion

In conclusion, this study shows high prevalence of parasitic infections (A. lumbricoaides 17.9%, Hookworm 2.1% and Malaria 50.7%) and malnutrition exist synergistically among school children in Omu community to the level of public health significant and called for control measures.

Research Highlights

1. The study confirmed that parasitosis and malnutrition still constitute major health problem in the study community.

2. Many children in the study area are malnourished.

3. Prevalence of Soil transmitted helminthes are on the high side.

4. Local method of defecating is still being practiced.
Limitation

Gaining the consent of parents / guardians of some of the children who participated in the study was difficult despite letter of authority from Local Government Education Authority.

Recommendation

It is therefore necessary for health planners to take adequate measures in combating these menaces, which should include improving sanitary food and water storage, provision of first aid boxes and give necessary education to the children and their parents or guardians on basic personal hygiene. The common practice of defecating on the open ground and near drinking water sources should be discouraged out rightly. All schools should be provided with toilet facility, clean drinking water, well design kitchen and minimum health facilities. Government at all level should know that’ investment in education that is not accompanied by investment in the health and nutrition of school children is a net loss for a country.

Funding and Policy Aspects

Like other researches in Nigeria, the research was a self sponsored one. Government should adequately fund researches by making grants available and provide enabling environment for private organizations to fund researches.

Author’s Contribution and Competing Interests

Adebusuyi S. A. Drafted the manuscript and performed parasitological testing. Dr. Amoo A.O.J Supervised the study design, correct the manuscript writes up and results interpretation. All authors read and agreed to the content of the manuscript. No conflict of interest is declared.

Acknowledgement

We are grateful to all the staff of department of Medical Microbiology and Parasitology, college of Medicine, Olabisi Onabanjo University, Ago Iwoye and the Department of Medical Laboratory Services, State Hospital Ijebu Ode for their valuable contribution and support.

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