Association of Anaemia with Parasitic Infection in Pregnant Women Attending Antenatal Clinic at Koshi Zonal Hospital

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Abstract

Intestinal parasitic infections associated with anaemia during pregnancy have direct negative impact on the health of expected mother and developing baby. In order to assess the association between anaemia and parasitic infection during pregnancy, a total of 200 stool samples from pregnant women on their first consultation to antenatal service in Koshi Zonal Hospital were collected from April to August 2012. The stool samples were examined for intestinal parasites by direct smear technique, while haemoglobin level of pregnant women were collected from laboratory record of the hospital. Out of 110 anaemic pregnant women 40(36.3%) had parasitic infection, while from 90 non-anaemic pregnant women; only 18(20%) of them were infected with intestinal parasites. The association of anaemia with intestinal parasite was statistically significant (p<0.008). The prevalence of Hookworm (76.9%) was most prevalent infection followed by Ascaris lumbricoides (73.3%) in anaemic pregnant women. The mean Haemoglobin (Hb) level of pregnant women with single parasite and with multiple infection was 10.4 ± 1.80 gm/dl (mild anaemia) and 9.81 ± 0.84 gm/dl (moderate anaemia) respectively. However, the overall prevalence of the parasitic infection among pregnant women was 58(29%). A. lumbricoides (32.3%) was the most predominant followed by Hookworm (26.1%), Giardia lamblia (21.5%), Entamoeba histolytica (10.7%), Trichuris trichiura (6.15%), Strongyloides stercoralis (1.5%) and Hymenolepis nana (1.5%). An integrated programme for the control of this parasitic infection should be regarded as an issue of public health priority in order to reduce the degree of anaemia during pregnancy.

Key words: Ascaris, Haemoglobin, Hookworm, Prevalence, Trimester

Introduction

Intestinal parasitic infection (IPI’s) caused by pathogenic helminthes and protozoan species are endemic throughout the World. Intestinal parasitic infections (IPI) constitute a global health burden causing clinical morbidity in 450 million people, many of these are women of reproductive age and children in developing countries (Quihui et al. 2006). The major IPI’s of global public health concern are the protozoan species Entamoeba histolytica and Giardia intestinalis and the soil transmitted helminthes A. lumbricoides, T. trichiura, and Hookworm (WHO 1999, WHO 2000). Amoebiasis, Ascariasis, Hookworm infection and Trichuriasis are among the ten most common infections in the world (WHO 1987). The incidence and prevalence of these parasitic pathogens varies both between and within countries (Mata 1982, Montresor et al. 1998). Gastrointestinal helminth infections rank fourth in the top ten infectious diseases in Nepal (Magar et al. 2011). An epidemiological study by Brooker et al. (2008) estimated one-third of all pregnant women in developing countries were infected with Hookworm. Hookworm infection is a recognized major contributor to gastrointestinal blood loss; causing malnutrition and anaemia (Crompton 2000, Dreyfuss et al. 2000 and Stephenson et al. 2000). Hookworm infestation was significantly related with anaemia (Shah and Baig 2005), and were

Prevalence of anaemia among pregnant women in developing countries averages 56% with a range of 35%-100% among various regions of the world (WHO 1992). Studies from South-Asian countries (Bondevik et al. 2000 and Dreyfuss et al. 2000) have estimated 75% prevalence of anaemia among pregnant women, the highest in the world (WHO 1998). Dreyfuss et al. (2000) showed the prevalence of anaemia to be 73% in the plains of Nepal and Shah and Baig (2005) reported prevalence of anaemia to be 66% in eastern Nepal, while according to the Demographic Health Survey in 2006 of Nepal, prevalence of anemia in pregnant women is 42%.

Materials and Methods

The study was done in Koshi Zonal Hospital (KZH), Biratnagar, it was designed to include the all the pregnant women coming for their antenatal care except those pregnant women, who were already on iron supplement, or who had been dewormed by anti – helminthic drug. Altogether 200 stool samples from pregnant women from April to August 2012 were collected. The entire stool sample was examined in the laboratory of KZH by direct smear method; both stained and unstained preparations were used for detection of intestinal parasites. Both the Macroscopic and microscopic examinations were conducted for laboratory diagnosis of helminth parasites. The Haemoglobin report of respective pregnant women was recorded from record file of haematology department of KZH.

Results

Out of the 200 stool samples examined, 58(29%) were positive with one or more intestinal parasites. The prevalence of specific intestinal parasitic infection found showed that *A. lumbricoides* was the most predominant 21(32.3%), followed by Hookworm 17(26.1%), *Giardia lamblia* 14(21.5%), *Entamoeba histolytica* 7(10.7%), *T. trichiura* 4(6.15%), *Strongyloides stercoralis* 1(1.5%) and *Hymenolepis nana* 1(1.5%).

Among 58 positive cases, 51(88%) included infection with single parasite, and 7(12%) were infected by two species of parasites. The occurrence co-infection of *Ascaris* and Hookworm infection was more prevalent i.e. 4(57.1%) than infection of *A. lumbricoides* and *T. trichiura*, *A. lumbricoides* and *H. nana*, and *E. histolytica* and *G. lamblia* in which one case was observed in each (14.3%). Among infected samples, almost two-third of the parasites belonged to helminthes parasites 44(67.7%) whereas protozoan in one-third of parasite 21(32.3%) (Table 1).

Table 1. Prevalence of specific intestinal parasitic infection in pregnant women (N=58).

<table>
<thead>
<tr>
<th>Parasites</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protozoan parasites</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>14</td>
<td>21.5%</td>
</tr>
<tr>
<td>Entamoeba histolytica</td>
<td>7</td>
<td>10.7%</td>
</tr>
<tr>
<td><strong>Nematodes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>A. lumbricoides</em></td>
<td>21</td>
<td>32.3%</td>
</tr>
<tr>
<td>Hookworm</td>
<td>17</td>
<td>26.1%</td>
</tr>
<tr>
<td><em>T. trichiura</em></td>
<td>4</td>
<td>6.15%</td>
</tr>
<tr>
<td><em>Strongyloides stercoralis</em></td>
<td>1</td>
<td>1.5%</td>
</tr>
<tr>
<td><strong>Cestodes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hymenolepis nana</td>
<td>1</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

There was a significant association of anaemia with intestinal parasitic infection (p<0.008). The haemoglobin level of 110(55%) of the study population were anaemic. Among these anaemic pregnant women, 40(36.3%) of them had parasitic infection. Similarly the haemoglobin level of remaining 90(45%) cases were within normal range, and only 18(20%) of them were infected with intestinal parasites (Figure 1).
However, the mean Hb level of pregnant women without any parasites was 11.1 ± 1.5 gm/dl whereas with multiple infections recorded the lowest mean Hb levels of 9.81 ± 0.84 gm/dl (moderate anaemia). The mean Hb levels of pregnant women who were with single parasitic infection were 10.4 ± 1.80 gm/dl (mild anaemia). Using the one-way ANOVA test, there was a significant difference within the groups (p<0.008).

Table 2. Prevalence of anaemia within different specific species of intestinal parasites

<table>
<thead>
<tr>
<th>Species</th>
<th>Haemoglobin level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anaemia</td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>9 (69.2%)</td>
</tr>
<tr>
<td>Entamoeba histolytica</td>
<td>1 (16.7%)</td>
</tr>
<tr>
<td>A. lumbricoides</td>
<td>11 (73.3%)</td>
</tr>
<tr>
<td>Hookworm</td>
<td>10 (76.9%)</td>
</tr>
<tr>
<td>T. trichiura</td>
<td>2 (66.7%)</td>
</tr>
<tr>
<td>Strongyloides stercoralis</td>
<td>1 (100%)</td>
</tr>
<tr>
<td>Multiple-infection</td>
<td>6 (85.7%)</td>
</tr>
</tbody>
</table>

Table 2 shows the prevalence of anaemia within the different specific species of Intestinal Parasites. Among those infected with Hookworm 10(76.9%) of them were anaemic. Similarly, in case of pregnant women who were infected with A. lumbricoides 11(73.3%), Giardia lamblia 9(69.2%), T. trichiura 2(66.7%) and Strongyloides stercoralis 1(100%) of them were anaemic. Additionally, 6(85.7%) of dual infection was affected with anaemia. In contrast to those, infected with Entamoeba histolytica, only 1(16.7%) were anaemic case.

Discussion and Conclusion

Intestinal parasites are worldwide in distribution. Poverty, illiteracy and different aspects of culture may play leading role in increasing rate of prevalence of parasites. Among 200 stool samples collected from the pregnant women, 58(29%) were infected by at least one type of intestinal parasites. This high rate of prevalence among pregnant women may be associated with unsanitary living style, poor socio-economic condition, usual contact with soil and consumption of vegetables, fruit and water contaminated with infected faeces, walking bare foot in faecal contaminated open area which was not considered in this study.

Overall prevalence rate of IPI among pregnant women showed comparatively less than several studies which showed higher rate (Nauvilsksy et al. 1998, Dreyfuss et al. 2000, Rodriguez-Morales et al. 2005).
and Shah and Baig 2005). Comparable prevalence of IPI was, however reported in some other studies (Vaidya and Acharya 1998, Ozumba et al. 2005, Fuseini et al. 2010 and Sehgal et al. 2010). This might be due to the difference in geographical location and economic status. Rai et al. (1994) concluded that the annual rate of positivity for STH ranged from 18.0-36.6%. The factors influencing soil transmitted helminth infection includes natural factors such as temperature and humidity and socio-ecological factors, structure of dwelling, life style, and habits of food consumption.

In this study seven different types of specific intestinal parasites were found which were *A. lumbricoides* (32.3%), Hookworm (26.1%), *Giardia lamblia* (21.5%), *Entamoeba histolytica* (10.7%), *T. trichiura* (6.15%), *Strongyloides stercoralis* (1.5%) and *H. nana* (1.51). *Ascaris lumbricoides* was the leading parasite followed by Hookworm. All these parasites had also been reported from Terai area Sarlahi District (Nauvilsky et al. 1998), in hilly area i.e. Dhankuta District (Shah and Baig 2005), in Venezuela (Rodriguez-Morales et al. 2005). The occurrence of helminthic infection at high rates among pregnant women is an indicative of faecal pollution of soil, domestic water supply around homes due to poor sanitation, ignorance of the mode of transmission of these worms and improper utilization of latrine and poor personal hygiene among the study population.

The present study had shown *A. lumbricoides* (32.3%) as the most prevalent intestinal helminth parasite followed by Hookworm (26.1%). This result is in agreement with that reported previously (Abebe et al. 2008, Van Eijik et al. 2009 and Rai et al. 1994) which also showed *A. lumbricoides* as the most prevalent helminth followed by Hookworm.

The result of this study was in favour with Navilsky et al. (1998) and Dreyfuss et al. (2000) that Hookworms were the stronger predictors of anaemia in pregnant women and Hookworm as the most prevalent helminth parasite in anaemic pregnant women (Nauvilsky et al. 1998, Shah and Baig 2005). General specific prevalence of Hookworm (26.1%) was relatively the second most common parasite species identified in this study. This prevalence rate is low when compared with the value from other studies in various parts of the country both now and in the past. Navilsky et al. (1998) reported infection rate of 78.8% in rural plain of Nepal, Dreyfuss et al. (2000) reported 74.2% in the plain of Nepal, and Kunwar et al. (2006) reported 53% in Himalayan region of Nepal. Comparable prevalence of Hookworm was reported in Vidya and Acharya (1998) study only 15.7% in Maternity Hospital, Kathmandu. Poor sanitary disposal of human faeces and indiscriminate defecation are the principal factors in the etiology of Hookworm infection (Mordi and Ngwodo 2007). However, the high prevalence of intestinal nematode recorded in this study indicates high level of unhygienic practices which enhanced transmission in the community.

This study had shown 110(55%) pregnant women attending antenatal care at KZH were anaemic patient, among those anaemic pregnant women 40(36.3%) had parasitic infection, while 90(45%) pregnant women were non-anaemic with 18(20%) among them with parasitic infection. The prevalence rate shows the association of anaemia with intestinal parasite was statistically significant (p=0.008). Pregnant women having multiple infections showed the lowest mean Hb levels of 9.81 ± 0.84 gm/dl (moderate anaemia) while the mean Hb levels of pregnant women infected with single parasite was 10.4 ± 1.80 gm/dl (mild anaemia).

There are many studies on anaemia, both hospitals based and community based in pregnancy in Nepal, which are comparable to the result of this study. In hospital based study done by Bonevik et al. (2000) showed prevalence of anemia 62.2% in Kathmandu, while Adak and Nazri in 2006 showed 54.6% in another study conducted in young girls and pregnant women of Birgunj, and study conducted by Marahatta in 2009 showed 42.6% in NMCTH. Similarly high prevalence (50% - 60%) (Ulstein et al. 1988) of anaemia were noted in various community based studies particularly important studied carried out by Shah and Gupta (2002) showed that prevalence of anaemia in adolescent girls in Dharan, a town in eastern region of the country was 68.8%. The probable reason for low proportion of women with anaemia in our study may be due to the fact that this study is hospital based study.
which is located in the city. The women who come for antenatal care to the hospital are slightly better informed with good health awareness. Although we cannot generalize the results of this study to the overall prevalence of anemia in this region but can envisage that the real prevalence of anemia in this area could be much higher.

In conclusion, the prevalence of IPI and anaemia in pregnant women varies greatly for asymptomatic infection to severe infection. The effect depends on parasitic load and immune status of the pregnant women. Based on results obtained from this study, we would like to recommend for early diagnosis and treatment of IPI and anaemia in order to maintain proper health among pregnant women.

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