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Helminth and Protozoan Intestinal Infections: An Important Cause for Anaemia in Pregnant Women in Delhi

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Summary

A total of 110 anaemic pregnant women attending antenatal clinic or admitted in antenatal ward of Lok Nayak Hospital, Delhi, were studied for helminth and protozoan intestinal infections by stool examination. One or more type of infection was seen in 46 (41.81%) cases. Mixed infections were seen in 13 (11.81%) cases. In the 46 cases with positive intestinal infection, helminths seen were ankylostoma duodenale, ascaris lumbricoides, taenia solium, trichuris trichuria and enterobius vermicularis in 17 (36.95%), 11 (23.91%), 2 (4.34%) and 1 (2.17%) cases respectively, while protozoan infections were entamoeba histolytica in 16 (34.78%) cases and Giardia lamblia in 8 (17.39%). Intestinal infections were directly proportional to the severity of anaemia and were seen in 26.66% cases in Hb 10-11 gm% group, 13.51% in 8 to 9.9 gm% group, 72.72% in 6 to 7.9 gm% group and 90.90% in less than 6 gm% group. There is a very high prevalence of intestinal helminth and protozoan infections in pregnant women. Routine screening of all pregnant women and treatment of positive cases is recommended in endemic areas like India.

Introduction

Worm intestations and protozoal intestinal infections are very common in tropical countries like India. They are responsible for many cases of anaemia and gastrointestinal upset. Commonly isolated parasites during pregnancy are ascaris lumbricoides (19.0%), ancylostoma duodenale (16.7%) and trichuris trichuria (13.9%). Parasitic diseases are closely related to the lack of sanitation (unavailability of potable water, inadequate disposal of human waste, lack of latrines) or the absence of personal hygiene, a common scenario in India. They are also closely linked to warm and humid climates and are, therefore, considered tropical diseases. Of all helminths, hookworms cause the most severe anaemia because of iron deficiency due to chronic blood loss. Worldwide about 51% of pregnant women suffer from anaemia, almost twice as many as nonpregnant women (Santiso 1997). Hook worms are nematodes that infect roughly 1 billion people. Their preferred habitat is the jejunum, where they attach to the mucous tissue to feed and secrete an anticoagulant causing bleeding (Santiso 1997). The worm enters the body through the skin and reaches the highest number at the end of adolescence and young adulthood.

Anaemia caused by hookworms in severe cases can cause maternal and perinatal mortality and morbidity and can cause intrauterine growth retardation and reduction in the fetal ability to absorb iron provided by the mother. Almost all hookworm infections in India and Nepal are due to ankylostoma duodenale (Navitsky et al 1998). The prevalence of helminth infection in rural plains of Nepal was found to be 78.8%, 36.2% and 7.9% for hookworm, ascaris lumbricoides and trichuris trichuria respectively (Navitsky et al 1998). There have

been many case reports in the literature of complications of ascariasis in pregnancy where it can cause intestinal obstruction and acute pancreatitis due to biliary ascariasis (Asrat and Rogers, 1995). Echinococcosis of the liver has been reported during pregnancy (Van Vliet et al 1995). Giardiasis can be a debilitating disease during pregnancy threatening the well-being of mother and fetus (Kreutner et al 1981). Vertical transmission of intestinal parasites has not been established although there is evidence that ascaris infection can spread to the fetus as evidenced by presence of antiascaris lumbricoides IgM antibodies in the cord blood (Sanjeevi et al 1991).

Although most studies did recommend use of chemotherapy for intestinal parasites during pregnancy for the fear of embryotoxic, fetotoxic, mutagenic and teratogenic potential of these medicines (D'Alauro et al 1985) some authors have found no increase in congenital malformations in fetuses exposed to mebendazole and antihelminthic treatment during pregnancy has been shown to improve maternal, fetal and infant health (Santiso 1997, DeSilva et al 1997, Desilva et al 1999).

Material and Methods

A total of 110 pregnant women with anaemia (Hb less than 11 gm%) attending antenatal outpatient department or admitted in antenatal ward were recruited in the study. Age of the patients ranged from 17 to 35 years the mean being 24.5 years and parity ranged from 0 to 7 the mean being 3.1. Stool examination was done on 3 consecutive days in all of them for evidence of helminths or protozoan infection (any ova or cysts). If any of the stool samples was positive, the case was taken as positive. The patients were divided into 4 groups depending upon the haemoglobin status to see the difference in incidence of helminth or protozoan intestinal infection in different categories of anaemia. The four groups were with haemoglobin between 10-11 gm%, 8 to 9.9 gm%, 6 to 7.9 gm% and less than 6 gm%. The incidence of infections was also observed in different trimesters of pregnancy. The patients with positive infection were treated by mebendazole 100 mg twice a day for 3 days for helminths and metronidazole 400 mg thrice a day for 7 days for amoebiasis and giardiasis.

One or more type of infection was seen in 46 (41.81%) cases. Mixed infections (2 or more type of infections) were seen in 13 cases. Ankylostoma duodenale was the commonest worm infestation and was associated with ascaris lumbricoides, enterobius vermicularis, trichuris trichuria and giradia lamblia in 3, 1, 1 and 1 cases respectively. Ascaris lumbricoides was seen in association with trichuris trichuria entamoeba histolytica and giardia lamblia in 1 case each while entamoeba histolytica and giardia lamblia were seen together in 3 cases. Thus a total of 57 helminths or protozoans were isolated in 46 cases. The incidence of helminths and protozoan is shown in Table I. Ankylostoma, ascaris, taenia, trichuris, enterobius, entamoeba and giardia were seen in 17 (36.95%), 11 (23.91%), 2 (4.34%), 2 (4.34%), 1 (2.17%), 16 (34.78%) and 8 (17.39%) cases respectively with ankylostomosis and ascariasis being the commonest helminth infection and amoebiasis and giardiasis the commonest protozoan infection. Thus there were 15 patients (13.63%) in group I (Hb > 10 gm%), 62 (56.36%) in group II (Hb 8-9.9 gm%), 22 (20%) in group III (Hb 6-7.9 gm%) and 11 (10%) in group IV (Hb < 6 gm%). As is clear from Table II the incidence of intestinal helminth and protozoan infection was directly proportional to the severity of anaemia and was seen in 4 (26.66%), 27 (43.54%), 16 (72.72%) and 10 (90.90%) cases respectively in the four groups. Ankylostoma duodenale was the only hookworm isolated with no case of necator americanus or other varieties of hookworm and was seen in 0, 11 (17.74%), 3 (9.09%) and 4 (36.36%) cases respectively in the four

Table I: Showing Incidence of helminth and protozoan infections (n=110)

Helminth/Protozoan	No. of cases	Percentage of positive cases	Percentage of total cases
Ankylostoma duodenale	17	36.95	15.45
Ascaris lumbricoides	11	23.91	10.00
Taenia solium	2	4.34	1.81
Trichuria trichuria	2	4.34	1.81
Enterobius vermicularis	1	2.17	0.90
Entamoeba histolytica	16	34.78	14.54
Giardia lamblia	8	17.39	7.27

Table II: Showing Incidence of Helminth and Protozoan Infections in Different Grades of Anaemia (Percentages in brackets) (n=110)

Helminth/Protozoan	> 10gm%	8-9.9gm%	6-7.9gm%	<6gm%
Total no. of cases	15	62	22	11
Ankylostoma duodenale	0 (0)	11 (17.74)	2 (9.09)	4 (36.36)
Ascaris lumbricoides	1 (6.66)	4 (6.45)	3 (13.63)	3 (27.27)
Taenia solium	1 (6.66)	0	1 (4.54)	0
Trichuria trichuria	0 (0)	1 (1.61)	1 (4.54)	0
Enterobius vermicularis	0 (0)	1 (1.61)	0	0
Entamoeba histolytica	2 (13.33)	8 (12.90)	5 (22.72)	1 (9.09)
Giardia lamblia	0 (0)	2 (3.22)	4 (18.18)	2 (18.18)
Total No. of infected cases	4 (26.66)	27 (43.54)	16 (72.72)	10 (90.90)

Table III: Showing Trimesterwise Incidence of helminths and Protozoan Infections (Percentage in brackets) (n=110)

Helminth/Protozoan	Second Trimester	Third trimester
Total No. of cases	20 (18.18)	90 (81.81)
Ankylostoma duodenale	2 (10)	15 (16.66)
Ascaris lumbricoides	3 (15)	8 (8.38)
Taenia solium	2 (10)	0 (0)
Trichuria trichuria	0 (0)	2 (2.22)
Enterobius vermicularis	0	1 (1.11)
Entamoeba histolytica	3 (15)	13 (14.44)
Giardia lamblia	2 (10)	6 (6.66)
Total No. of helminth or protozoan positive cases	12 (60)	45 (50)

groups. Ascariasis was seen in 1 (6.66%), 4 (6.45%), 3 (13.63%) and 3 (27.27%) cases respectively in the four groups. Incidence of taeniasis, trichuriasis and enterobiasis was rare and as shown in table II. Amoebiasis was common and was seen in 2 (13.33%), 8 (12.90%), 5 (22.72%) and 1 (9.09%) cases respectively in the four groups while Giardiasis was seen in 0, 2 (3.22%), 4 (18.18%) and 2 (18.18%) cases respectively in the four groups. The trimester wise distribution of various helminth and protozoan infections is shown in Table III. There were 20 (18.18%) patients in second trimester and 90 (81.81%) in third trimester in the study. The incidence of isolation of helminth or protozoan was 12 (60%) cases in second trimester and 45 (50%) in third trimester. Thus incidence of ankylostomiasis, ascariasis, amoebiasis and giardiasis was 2 (10%), and 15 (16.66%), 3 (15%), and 8 (8.88%), 3 (15%) and 13 (14.44%), 2 (10%) and 6 (6.66%) respectively in second and third trimester. There was no significant difference in the distribution in different trimesters.

Thus there was a very high incidence of helminths and protozoan intestinal infection in anaemic women in pregnancy in the study. This contributes significantly to the aetiology of anaemia in India.

Discussion

Intestinal parasites may infect upto 90% women in pregnancy depending upon the geographical area associated to the environmental factors allowing the spread. They are considered tropical diseases due to their close link to warm and humid climates and are caused by lack of sanitation, inadequate disposal of human waste, lack of latrines or the absence of personal hygiene (Santiso 1997). Hook worms are the commonest intestinal parasites and cause the most severe anaemia because of iron deficiency due to chronic blood loss. These nematodes infect almost 1 billion people worldwide and enter the body through the skin and live in jejunum where they cause bleeding and suck blood. Common

parasites during pregnancy are hookworms (16.7% to 78.8%), ascaris lumbricoides (19.0% to 56.2%) and trichuris trichuria (7.9% to 15.9%), (Navitsky et al 1998). In the present study the commonest helminthic infection was hookworm caused in all cases by ankylostoma duodenale and was seen in 36.95% cases followed by ascaris lumbricoides (23.91%) cases. Trichuris trichuria, enterobius vermicularis and taenia solium were seen in 4.34%, 4.34% and 2.17% cases respectively. There was a very high incidence of amoebiasis (34.78%) and giardiasis (17.39%) in the present study. Mixed infections with 2 or more parasites were seen in many cases (12.7%). Not surprisingly incidence of helminthic and protozoan infections was directly related to the severity of anaemia and was highest (90.90%) in severely anaemic patients (Hb < 6 gm%) in contrast to 72.72% in 6-7.9 gm% group, 43.54% in 8-9.9gm% group and 26.66% in more than 10 gm% group. This has also been reported by Olsen et al (1998). There was no significant difference in the incidence of parasitic infections in second and third trimesters.

Ascaris lumbricoides during pregnancy has been reported to cause intestinal obstruction, acute pancreatitis (Asrat and Rogers 1995) and fetal infection (Sanjeevi et al, 1991). Ultrasound has successfully been used for the diagnosis of roundworms in gall bladder and common bile duct during pregnancy and is a method of choice (Gomez et al, 1993; Khuroo et al, 1992). Giardiasis was seen in 17.39% cases in the present study. It can cause debilitating disease during pregnancy affecting the well being of mother and fetus (Kreutner et al 1981) and can affect upto 12.5% maternal serum samples and 15% cord bloods showed IgG antibodies to the parasite (Kreutner et al 1981). In nonpregnant state metronidazole is the treatment of choice for giardiasis and amoebiasis, but for pregnant women a nonabsorbable aminoglycoside puromomycin may be tried first and metronidazole used if initial treatment fails (Hill 1993). There has been controversy whether intestinal parasites during pregnancy should be treated or not as the chemotherapy can be embryotoxic, fetotoxic, mutagenic and teratogenic (D' Alauro et al 1985) and treatment is recommended after delivery. However, recent studies have not found an increase in fetal abnormalities with the use of mebendazole during pregnancy and in fact chemotherapy has been shown to improve the maternal and perinatal outcome (Santiso 1997, DeSilva et al 1997, DeSilva et al 1999).

Seeing such high incidence of helminth and protozoan infections, therapeutic strategies should be linked to other measures, such as promoting the use of shoes, introduction of potable water, education and treatment of population at large, which can improve the patients knowledge, perception and behaviour toward intestinal parasites (Curtale et al, 1998). Routine screening of all pregnant women for intestinal helminth and protozoan infections is recommended in endemic areas followed by treatment in infected cases to improve the maternal and perinatal outcome in them.

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