



## Original Article

# Should albendazole be included in antenatal package in hookworm endemic zone like India?

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### Abstract

**Objectives:** WHO recommends antenatal deworming for pregnant women where prevalence of hookworm infestation exceeds 20-30%. The ongoing prospective study seeks to assess change in hemoglobin concentration and neonatal birth weight of severely anemic mothers, given a dose of albendazole in the antenatal period. **Methods:** Out of the 139 women who reported to the antenatal clinic, 72 with hemoglobin concentration <7gm% who formed the study group (A) received a dose of 400mg albendazole at 28-30 weeks of gestation. Sixty seven women, who formed the control group (C) did not receive the dose. Both the groups received 200 mg ferrous sulphate tablets twice daily till confinement. Hemoglobin concentration at term and neonatal birth weight were recorded. **Results:** The mean hemoglobin concentration at term for group (A) and group (C) were 10.2883 gm/dl and 9.0522 gm/dl respectively, with a mean difference of 1.2361 gm/dl between the two groups (t=4.965 d.f=137, p<0.0001). There was an observed difference of 196.7g in birth weight in group (A) with respect to group (C). (t=2.54 d.f=137p<0.01). **Conclusions:** Ease of single dose administration, absence of serious maternal or fetal side effects, high efficacy and low cost make albendazole the ideal deworming agent for our pregnant population.

Key words: anemia, albendazole, hookworm infestation.

### Introduction

With scientific and technological advancement in all spheres, with a fast growing economy, India is forging ahead with bold strides into the twenty-first century. Yet nearly half of the global population of anemic women live in the Indian subcontinent. It is truly pathetic that the problem of iron deficiency anemia, a preventable

condition, looms large and continues to take a heavy toll on maternal lives.

Hookworms are the commonest intestinal parasites which cause the most severe anemia because of iron deficiency due to chronic blood loss. It is widely prevalent in India, infecting as high as 90% of the pregnant population. *Ancylostoma duodenale* has been implicated as the chief infecting agent in India and Nepal<sup>1,2</sup>. WHO recommends antenatal deworming for pregnant women in areas where prevalence of hookworm infection exceeds 20-30%<sup>3</sup>. WHO, in its "The millennium development goals" (WHO/CDS/CPE/PVC/2005,12) states that recent evidence indicates that pregnant women benefit greatly from regular deworming. To achieve its goal to reduce child mortality

*Paper received on 16/03/2007 ; accepted on 28/02/2009*

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and improve maternal health, it has cited the evidence in Nepal, where the deworming drug, albendazole, given to pregnant women in their second trimester, lowered the rate of severe anemia during the third trimester. The present study was undertaken to realize the feasibility of government uptake of the WHO policy on deworming.

## Methods

The present study is an ongoing prospective one started on January 2006. Severely anemic women attending antenatal clinic were recruited; the criteria for selection being 1) Primigravida 2) Second or third gravida with minimum two years birth spacing 3) Hemoglobin concentration less than or equal to 7gm%. Criteria used for exclusion were 1) Associated medical disorder if any 2) Multiple pregnancy 3) Hypertension 4) Antepartum hemorrhage or placenta previa in ultrasound 5) Age more than 35 years 6) History of any bleeding disorders. For the study, 161 moderately severe anemic women were recruited, till July 2006. All the women underwent thorough physical examination and routine antenatal investigations to rule out medical causes of anemia. Ultrasound was advised in those cases where last menstrual period was not known.

One half of the women who constituted the study group, were randomly chosen to receive one dose of albendazole (400mg) at 28-30 weeks of gestation. The rest formed the control group. Both the groups received 200mg ferrous sulphate tablets twice daily. Twenty two women were lost to follow up. Thus the study group

(A) comprised of 72 women while the control group (C) of 67 women (C). There was no group B. Both the drugs, albendazole, and iron tablets were provided to the women to ensure their regular intake. Hemoglobin concentration was estimated at 28-30 weeks of gestation at the time of receiving Albendazole with the help of photoelectric colorimeter. The same was repeated on admission to the labor room, when delivery was imminent. The babies born were weighed on an electronic weighing machine, adjusted to record one thousandth of a gram. Congenital malformation, if any noted, was recorded. Statistical analysis of the result was done with SPSS version 13.0.

## Results

As the women were randomly selected to receive albendazole, no difference was observed among group (A) and group (C) as regards age and body mass index. This has been revealed in Table 1 and Table 2. Similarly Table 3 shows no difference in the mean hemoglobin concentration at the time of recruitment between the two groups at 28-32 weeks of gestation. This makes the two groups worthy of comparison.

Table 4 reveals a statistically significant difference in hemoglobin concentration among the groups at the time of delivery. There is a difference of 1.236 gm/dl between the mean hemoglobin concentrations of the two groups. Table 5 records an improvement in the mean birth weight in group (A) by 196.7 gm, when compared to that in group (C), the difference being statistically significant.

**Table 1. Comparison of age of group (A) and group (C).**

Pregnant women	Number	Mean age (years)	Standard deviation of age (years)	Standard error mean	t-test
Group A	72	21.31	3.19	0.38	t=1.229
Group C	67	20.69	2.71	0.33	p>0.05

**Table 2. Comparison of body mass index of group (A) and group (C).**

Pregnant women	Number	Mean BMI (Kg/m <sup>2</sup> )	Standard deviation of BMI (Kg/m <sup>2</sup> )	Standard error mean	t-test
Group A	72	20.0761	2.8649	0.3376	t=1.04
Group C	67	19.6024	2.2771	0.2782	p>0.05

**Table 3. Comparison of hemoglobin concentration at 28-30 weeks of gestation.**

Pregnant women	Number	Mean Hb% at 28 weeks (gm/dl)	Standard deviation of Hb% (gm/dl)	Standard error mean	t-test
Group A	72	6.168	0.741	8.737E-02	t=1.344
Group C	67	6.313	0.497	6.067E-02	d.f=137 p>0.05

**Table 4. Comparison of hemoglobin concentration at term before delivery.**

Pregnant women	Number	Mean Hb% at delivery (gm/dl)	Standard deviation of Hb% (gm/dl)	Standard error mean	t-test
Group A	72	10.2883	1.5971	0.1882	t=4.965
Group C	67	9.0522	1.3121	0.1603	d.f=137 P<0.0001

**Table 5. Comparison of mean birth weight of group (A) and group (C).**

Pregnant women	Number	Mean birth weight (Kg)	Standard deviation (Kg)	Standard error mean	t-test
Group A	72	2.8106	0.5381	6.342E-02	t=2.54
Group C	67	2.6139	0.3634	4.439E-02	d.f=137 p<0.01

## Discussion

WHO estimates that around 2 billion people are infected with soil transmitted helminthes, causing anemia and poor physical growth. Anthelmintics may be administered to pregnant women living in hookworm endemic zones, which contribute directly to maternal and neonatal survival by reducing anemia<sup>3</sup>. In spite of this recommendation, deworming has not been included in antenatal care packages in most developing countries<sup>4</sup>.

The first studies were done in Sri Lanka, where mebendazole, given to women in the second trimester of pregnancy, caused significant positive change in hemoglobin and serum ferritin<sup>5</sup> and reduction in low birth weight (<1500g)<sup>6</sup>. A longitudinal study conducted in Sierra Leone with a single dose of 400mg albendazole in second trimester resulted in a 6.6g.L mean change in

hemoglobin concentration between baseline and the third trimester<sup>7</sup>.

In our study, we recorded a difference in the mean hemoglobin concentration of 1.236g/dl between the two groups.

We observed a marked improvement in mean birth weight by 196.7 g in the study group. This is higher than what has been reported in a previous study. A study in rural Nepal had recorded an improvement in birth weight of babies born to women receiving albendazole by 59g<sup>2</sup>. Since the incidence of intestinal helminthiasis is directly proportional to the severity of anemia, being 90% in severely anemic women (Hb%<6gm%)<sup>1</sup>, only women with hemoglobin concentration <7gm% were taken up for the study. Further exclusion of women with medical disorders resulted in a relatively smaller sample size. Albendazole was taken up as it has been shown to be very effective

(98.8% cure rate) for hookworm infestation. The single dose recommended is 400 mg <sup>8</sup>.

The main deterrent to anthelmintics use in pregnancy is the fear of teratogenesis. Although the intake of mebendazole in the first trimester of pregnancy, contrary to medical advice, has resulted in 2.5% incidence of major congenital defects, none of the studies done so far have reported an increased incidence of congenital defects when anthelmintics are taken in the second trimester<sup>6,7</sup>. We had a bony malformation of a foot in a neonate in group (A), and none in group (C). The sample size is not sufficiently large to ascribe the defect to albendazole alone.

### **Conclusion**

According to WHO, 43% of all the nonpregnant women who live in developing countries have anemia during pregnancy. Anemia has been recognized as the risk factor for still birth and low birth weight <sup>9</sup>.

Lack of proper sanitation and personal hygiene along with hot and humid climate makes ideal breeding ground for hookworm infection <sup>10</sup>. The incidence of hookworm infestation has been reported to be ranging from 36% to 74% in pregnant women<sup>1,2</sup>.

Ease of single dose administration, absence of serious maternal or fetal side effects, high efficacy and low cost make albendazole the ideal deworming agent in pregnancy. This calls for a thought to integrate albendazole in our maternal anemia control program.

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