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Haemoglobin levels among pregnant women in the Polonnaruwa District

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Abstract

This study was carried out to assesshaemoglob-in levels of pregnant women resident in 3 health areas in the Polonnaruwa district. 978 pregnant women were randomly selected from among ante-natal clinic attendees, of whom 401 were from the Lankapura health area, 247 from the Dimbulagala health area and 330 from the Thamankaduwa health area. Capillary blood was obtained by finger prick and haemoglobin levels were estimated by the HemoCue method. Thirty seven percent of pregnant women were anaemic using a cutoff value of 11.0 g/dL. There were no significant differences in the prevalence of anaemia among the first 4 parities (p=0.5180). There were signi- ficant differences in the prevalence of anaemia between the 3 trimesters with the prevalence being highest during the 3rd trimester (44%). The prevalence of anaemia was highest among pregnant women in the Lankapura health area area (44%) and lowest among pregnant women in the Thammankaduwa health area (19%).

Key words: *haemoglobin concentration, pregn ant women, Polonnaruwa district, iron supple mentation.*

Introduction

Iron deficiency anaemia is the most widespread form of micro-nutrient deficiency in both develo ping and developed countries of the world, and its prevalence is found to be highest among in- fants, young children and women of child bea ring age, particularly pregnant women (1). Studi es on pregnant women in Sri Lanka have shown that the prevalence of anaemia ranges from 56 percent to 78 percent (2). The effects of anaemia are devastating and include debilitating fatigue, compromised immune function, maternal deaths, damage to the foetal brain, premature delivery, in- trauterine growth retardation, perinatal mortality and failure of the child to grow well and develop physically and mentally (1).

Iron deficiency is highly prevalent in the developing world due to many causes. Underlying most of these is poverty. Lack of purchasing power to afford foods containing heme iron transport costs to access antenatal services, poor access to health services, inadequate water supply, poor sanitation, etc. all coexist in poor households living in marginalised environments where the prevalence of anaemia invariably is highest. The low social status of women is another important factor for the high prevalence of anaemia among women. Low iron intake, poor bio-availability of dietary iron, and parasitic and other infestations combine to compromise an individual's iron status (1).

Over the last few decades, the recommendations for iron supplementation in pregnancy has not re- sulted in a reduction of the prevalence of anaemia among low income pregnant women and the com- pliance to supplementation has not been measured (3). Although universal iron supplementation dur- ing pregnancy is recommended as a large propor- tion of pregnant women have difficulty maintain- ing iron stores, conclusive evidence of the ben- efits of such a programme is lacking (4). Iron supplementation during pregnancy is not associ- ated with important health risks (4, 5, 6).

In the District of Polonnaruwa, the prevalence of aneamia in pregnancy was not measured before or after the introduction of universal iron-folate supplementation of pregnant women. The programme managers were not aware whether there is any improvement of iron status follow

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ing universal iron supplementation during pregnancy. As no baseline data were available, it was decided to evaluate the situation with regard to haemoglobin status among pregnant women.

Methodology

Study setting

Thamankaduwa, Lankapura and Dimbulagala health areas of the Polonnaruwa district were selected for the study. Thamankaduwa is a comparatively urban area which is an old colony established in the 1930's and has better facilities including health facilities. The largest curative care institution of the district is situated in the area. Public health staff were available and supervisory mechanisms were in operation during the period of study. Lankapura is also an old settlement, but in contrast to Thamankaduwa, it is underdeveloped health wise. Other facilities like transport etc. are not as developed as those in Thamankaduwa. Dimbulagala, on the other hand is a new Mahaweli settlement. Mahaweli settlements started in the 1980's and are still being developed.

Subjects and methods

978 pregnant women were randomly selected from antenatal clinic attendees, of whom 401 were from the Lankapura health area, 247 from the Dimbulagala health area and 330 from the Thamankaduwa health area during the period January to August 1995. Selected females were informed of the study objectives and informed verbal consent obtained. Capillary blood was obtained by finger prick using disposable lancets under sterile conditions. Haemoglobin levels were estimated by the HemoCue method. All standard procedures recommended by the manufacturer were adhered to in the haemoglobin estimation. The results of the HemoCue estimation were not validated by any other standard method.

Results

The ages of the 978 pregnant women included in the study ranged from 16 to 42 years (Table 1). Of the subjects chosen, 401 were from Lankapura health area while 247 and 330 were from Dimbulagala and Thamankaduwa health areas, respectively. 36 pregnant females were para 5 or above.

Thirty seven percent of pregnant women were anaemic using a cutoff value of 11.0 g/dl. When women of the first four parities were considered, there were no significant differences in the prevalence of anaemia between the 4 parities ($p=0.5180$). Other parities were not considered due to small sample sizes.

The majority of pregnant women were tested during the second trimester. There were significant differences in the prevalence of anaemia between the 3 trimesters with the prevalence being highest during the 3rd trimester (44%).

There were significant differences in the prevalence of anaemia among the pregnant women of the 3 areas ($p<0.0001$). The prevalence of anaemia was highest among pregnant women in the Lankapura health area (44%) and lowest among pregnant women in the Thammankaduwa health area (19%).

Discussion

The study was designed to assess the haemoglobin level of pregnant women in the Polonnaruwa district and to evaluate the outcome of the iron supplementation during pregnancy, a programme initiated about two decades ago by the Department of Health Services. The major obstacle to achieve both the objectives was the lack of baseline data of pregnant women of the District. The overall prevalence of anaemia of 37% among pregnant women in the District can be considered relatively good as compared with national estimates of 56 to 78 percent (2), and over 90 percent in 1992 (7), as Polonnaruwa District is considered a socio-economically backward area. Malaria is largely under control in the district and all pregnant women are given weekly malaria chemoprophylaxis. The problem of geohelminthiasis is not a major threat in Polonnaruwa as shown in studies among school children including this study, in which, the prevalence of hookworm infection was 13% in the Dimbulagla health area and 0% in the Thamankaduwa health area (unpublished data).

The estimate of the prevalence of anaemia for the District obtained in this study can be considered representative of the whole District considering the large and varied population studied from the 3 health areas.

The results of this study indicate that haemoglobin levels do not vary with parity at least until the 4th pregnancy, a finding contrary to what is usually believed. Nutritional education and iron supplementation in early pregnancy together with adequate birth spacing possibly contributes to this.

The haemoglobin levels during the first trimester were lower than during the second trimester probably due to the present policy of providing iron supplementation only after the first three months of gestation. The prevalence of anaemia was higher among pregnant women in the third trimester of the pregnancy. This is probably due to the haemodilution that takes place during the third trimester. It is also possible that the compliance of iron supplementation and dietary modification following nutrition education wanes off during the third trimester. The interest of the health staff may also be less during the third trimester as they tend to focus more attention on newcomers due to their busy schedules.

The differences in the prevalence of anaemia among pregnant women in the 3 health areas indicate differences in socio-economic characteristics, nutritional status and access to health care. The three health areas are socio-economically distinct. The Thammankaduwa health area is the administrative and commercial centre of the district and facilities such as transport, education and health are more developed than the other two areas. The socio-economic status of the residents is better than residents of the other 2 areas. The Lankapura health area is a more remote area having poorer facilities, including health, as compared to Thamanka-duwa, and has a large resident refugee population. The Dimbulagala heath area is a new Mahaweli settlement with services like health still being developed. A large number of field health staff vacancies existed during and before the survey period. The Lankapura and Dimbulagala health areas were subject to frequent terrorist attacks during the study period affecting the day to day life and agricultural activities of the inhabitants. The differences in the prevalence of anaemia within a district, highlights the need for targeting interventions and control measures against anaemia in pregnancy based on sound epidemiological data including micro-epidemiological data and other factors such as the socio-economic status of the community, and the access to, and availability of, health services.

The prevalence of anaemia in pregnancy in the Polonnaruwa district, at present, appears to be less as compared to the past. Even though a major limitation of this study is the absence of iron-folate intake data of the women, the prevalence of anaemia appears to be reliable and realistic. In addition to the present efforts of controlling and preventing iron deficiency, other factors such as improvement in the socio-economic status may be responsible for the improvement. Further studies need to be conducted to evaluate the effectiveness of the iron supplementation programme in pregnancy carried out by the Department of Health.

The majority of pregnant women in Sri Lanka seek antenatal care in the latter part of the first trimester or the beginning of the second trimester. Hence, iron supplementation during pregnancy will not significantly improve the iron status especially if these women are anaemic before pregnancy. Therefore, the possibility of iron supplementation prior to pregnancy in rural populations such as the one studied in Polonnaruwa need to be seriously considered. It is possible to have a community wide preventive iron supplementation programme at least at weekly intervals prior to pregnancy with the assistance of the field Public Health Midwives. The present policy of providing iron supplementation after the first trimester of pregnancy primarily due to the side effects of the preparations currently used should be reconsidered by providing supplementation with preparations that have fewer side effects. Ideally, iron supplementation should be started during adolescence, and the feasibility of implementing such a programme should be studied.

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Table 1. Haemoglobin levels by parity

Parity	Number of mothers	Range of Hb (g/dL)	Mean Hb (g/dL)	Standard Deviation of Hb (g/dL)	Number (%) anaemic
1	470	7.1-15.5	11.40	1.61	176 (37.4)
2	273	6.5-14.8	11.29	1.56	108 (39.6)
3	151	7.5-14.7	11.36	1.38	53 (35.1)
4	48	7.7-14.7	11.48	1.63	14 (29.2)
5	18	8.3-14.3	11.69	1.69	5 (27.8)
6	13	7.4-12.0	10.45	1.41	7 (53.8)
7	3	7.6-12.7	11.39	-	-
8	1	-	-	-	-
9	1	-	-	-	-
Total	978	6.5-15.5	11.36	1.56	363 (37.1)

$\chi^2_3 = 2.27$; p=0.5180 (comparing percent anaemia in parities 1 to 4)

Table 2. Haemoglobin levels by trimester

Trimester	Number of mothers	Range of Hb (g/dL)	Mean Hb (g/dL)	Standard Deviation of Hb (g/dL)	Number (%) anaemic
Frist	188	7.1-15.5	11.58	1.70	65 (34.6)
Second	539	7.1-14.8	11.38	1.49	136 (25.2)
Third	251	6.5-15.0	11.71	1.58	111 (44.2)
Total	978	6.5-15.5	11.36	1.56	363 (37.1)

$\chi^2_2 = 29.20$; $p<0.0001$

Table 3. Haemoglobin levels by health area

Health area	Number of mothers	Range of Hb (g/dL)	Mean Hb (g/dL)	Standard Deviation of Hb (g/dL)	Number (%) anaemic
Lamkapura	401	7.0-15.0	10.97	1.48	189 (47.1)
Dimbulagala	247	6.5-14.8	11.39	1.55	90 (36.4)
Thamankaduwa	330	8.3-15.5	12.04	1.31	64 (19.4)
Total	978	6.5-15.5	11.36	1.56	363 (37.1)

$\chi^2_2 = 63.28$; $p<0.0001$