

Efficiency of the iron supplementation programme for pregnant women in Jeneponto, Sulawesi, Indonesia

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An official iron supplementation programme for pregnant women in Jeneponto, South Sulawesi, Indonesia was assessed for efficiency. Data were collected in a cross-sectional study of 107 women in the second or third trimester of pregnancy from 18 villages. 47.7% of the women were anaemic, although 63.6% stated they had received prenatal care. Of the 68 women who had received prenatal care, 49 had obtained iron tablets. However, 32.7% of the 49 women who received iron admitted that they had not taken all of the tablets. Mean Hb levels of women in the second trimester who had received tablets was 9 g/l higher ($P=0.049$) than that of women who had not received tablets. To improve the efficiency of the iron supplementation programme there must be an improvement in the coverage of pre-natal care, in the completeness of iron tablet distribution, and in efforts to assure that the pregnant women actually take the tablets given to them.

Introduction

Iron deficiency anaemia is a serious public health problem, especially in developing countries. It is the most common nutritional disorder in the world today, affecting over one billion people¹. Iron deficiency occurs if the amount of iron absorbed is too little to meet the body's demands. This may be due to insufficient iron intake, reduced bioavailability of dietary iron, chronic blood loss, or increased iron requirements, as occur during pregnancy or a period of growth².

In general, iron deficiency in a population can be treated through different strategies: using medicinal iron tablets as supplements; changes in dietary habits; fortification of food; and if necessary, control of intestinal parasites. The last three approaches, however, are long-term strategies and many difficulties have to be overcome in developing countries before these strategies will lead to large-scale success. Therefore, iron supplementation seems to be the most appropriate way to improve the situation in a relatively short amount of time³.

The efficacy of iron supplementation through a primary health care system has been clearly demonstrated in several field trials^{4,5}, but effectiveness under programme conditions is often low^{6,7}. Recurring problems are low service utilization, an inadequate tablet supply, within-facility factors such as health staff motivation, and little patient compliance⁸.

About ten years ago the Indonesian government started implementing an iron supplementation programme for pregnant women supported by the United Nations Children's Emergency Fund (UNICEF). This programme is based on the assumption that all pregnant women regularly visit a Community Health Centre or an Integrated Health Service and Nutrition Post to receive prenatal care. According to gov-

ernmental policy, every pregnant women should receive a minimum of 30 tablets containing iron and folic acid three times free-of-charge through the prenatal care health service system⁸.

However the impact of this programme seems to be limited. The prevalence of anaemia among pregnant women in Indonesia has dropped from 70% in 1983 to 55% in 1988⁸. But data from a national survey conducted in 1992 indicated that prevalence had remained at 55% since 1988⁹. This suggests that no further reduction in prevalence has been achieved during the last four years. This situation is not unique to Indonesia, but is the case in many countries of the South East Asian region¹⁰. Therefore, studies are necessary to analyse the causes of the lack of effectiveness in supplemental iron programmes. The aim of this study was to investigate the Indonesian programme, especially in a rural area, in order to improve effectiveness.

Subjects and methods

The study was carried out in October 1992 and included 107 pregnant women in the second and third trimester of pregnancy. Subjects were between 17 and 47 years of age (Table 1). The study area was Jeneponto district, the most southern district in the province of South Sulawesi. The total population is about 296 179 with a density of 402 persons/km² (1992 data). Due to a long dry season from October to April, a limited ground-water supply and poor soils, Jeneponto has

Table 1. Selected characteristics of subjects ($n=107$). Values are means \pm sd.

Age (years)	26.9 \pm 6.0
Number of pregnancies	2.5 \pm 2.4
Gestation (m)	6.6 \pm 1.5
Haemoglobin (g/L)	111 \pm 13
Rate of illiteracy (%) ^a	22.4

^a Defined as less than three years formal education.

marginal potential for agriculture. Maize is the major food crop, followed by rice and cassava. Even though environmental conditions are quite unfavourable, compared to other parts of Indonesia, farming is still the major source of income for 70% of the families.

All five subdistricts of Jenepono – Bangkala, Tamalatea, Binamu, Batang and Kelara – were included in the study. Three to five villages were chosen from each subdistrict and the study was carried out in 18 villages altogether. The number of inhabitants in the 18 villages varied between 2000 to 11 000. Included was the district capital of Empoang with about 11 000 inhabitants, and two subdistrict capitals, located in the coastal lowland and in the mountains.

In each of the 18 villages, four to ten pregnant women were chosen with the help of health care workers or the village head. Since there were no available lists of all pregnant women in the villages, it can not be known what percentage of the entire pregnant population was investigated, or whether the selected women were representative. Data were collected by questionnaire on: socio-economic conditions, the utilization of health services for prenatal care, iron tablet distribution, and compliance of village women with the iron therapy. Hb levels were measured by a cyanomethemoglobin-method¹¹, using a Compur Minilab (Bayer Diagnostic, München, Germany). All subjects gave their informed consent.

Data analysis was carried out using the computer program Epi-Info (version 5.01b). Differences in mean values (normally-distributed, continuous values) between different categories of subjects were tested using ANOVA or the unpaired *T*-test. Differences in prevalence between categories of subjects were tested with the χ^2 -test.

Results

Of the 107 women, 47.7% were anaemic (Hb < 110 g/l). Anaemia was identified in 40.0% (18 out of 45) of the women in the second trimester and in 53.2% (33 out of 62) of the women in the third trimester. Prenatal care was received by 68 of the 107 women (63.6%). The service utilization rate was 37.8% among women in the second trimester, but this increased to 82.3% among women in the third trimester of pregnancy. Only 12 out of the 24 illiterate women (50%) received prenatal care vs 56 of the 83 (68%) literate women ($P=0.100$). Among those who received prenatal care, 72.1% obtained iron tablets (49 out of 68). The tablet distribution rate was higher in the third trimester than in the second trimester (74.5% vs 64.7%). Overall, only 45.8% of the whole group of 107 women obtained iron tablets.

Table 2 shows the amount of iron tablets received by the women. Of the 49 women who received iron tablets, 12

Table 2. Women's statement on amount of iron tablets received ($n=49$).

Amount of tablets	<i>n</i>	%
< 30	12	24.5
30–60	22	44.9
60	8	16.3
> 60	6	12.2
No answer	1	2.0

Table 3. Compliance of the women receiving iron tablets.

Trimester of pregnancy	Non-compliers ^a	
	<i>n</i>	%
2 & 3 ($n=49$)	16	32.7
2 ($n=11$)	2	18.2
3 ($n=38$)	14	36.8

^a Women who did not take all tablets.

received less than 30 tablets, although all of them were already 6 or more months pregnant. Data on the compliance of the women with the iron therapy are shown in Table 3. Some 37.2% of the women who received iron tablets admitted that they had not taken all the tablets. No information was obtained on how many tablets they actually had taken because the reliability of the answers was considered too low. Whereas only 18.2% of the women in the second trimester did not take all tablets, the non-compliance rate in the third trimester of pregnancy was twice as high, at 36.8%. Illiterate women tended to comply more fully (seven out of eight) than literate women (26 out of 41) ($P=0.18$). Age or number of pregnancies showed no relation to compliance. The reasons offered by the non-compliers for their the low compliance are given in Table 4. The most important reason was that the women simply forgot to take all the tablets (43.8%). Only two of the 16 non-compliers complained about side-effects such as bad taste or feelings of sickness. An overview of the results is presented in Fig. 1.

The differences in HB level between receivers and non-receivers of iron tablets are shown in Table 5. For women in the second trimester of pregnancy, the Hb level of those who received iron was 119 \pm 11 g/l, whereas it was only 110 \pm 13 g/l among women who did not receive iron tablets ($P=0.049$). For the women in the third trimester there was no significant difference in Hb level between receivers and non-receivers.

Table 4. Reasons for low compliance (16 non-compliers out of 49 who received tablets).

Reason	<i>n</i>	%
Forgot	7	43.8
Only received short time ago	4	25.0
Tastes bad	1	6.3
Feeling sick	1	6.3
Fear that the child will become too big	1	6.3
Fear that it is dangerous for the uterus	1	6.3
Stopped taking tablets after feeling healthy again	1	6.3

Table 5. Relation between Hb level and receiving iron tablets.

Received tablets	Trimester 2		Trimester 3	
	Hb (g/l)	n	Hb (g/l)	n
Yes	119 ± 11*	11	107 ± 15	38
No	110 ± 13†	34	109 ± 10	24

* Means ± SD

† Lower than value for women who received tablets ($P=0.049$).

subjects (%)

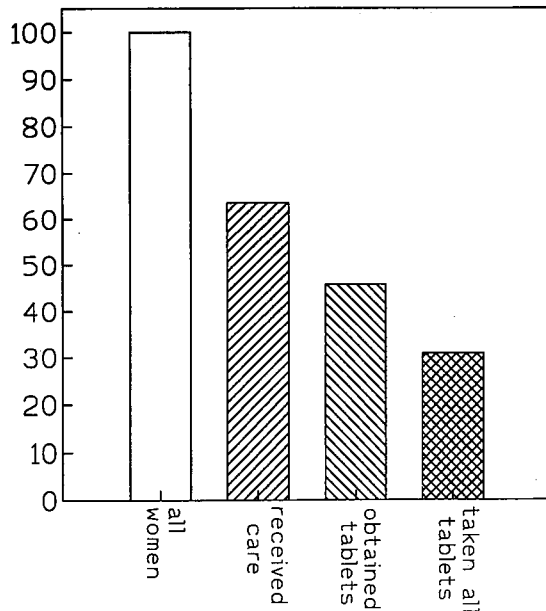


Figure 1. Overview of coverage rate of pre-natal care, iron tablet distribution, and of compliance with tablet intake

Discussion

The subjects in the study were not selected randomly and therefore did not necessarily represent all pregnant women in the district of Jeneponto. However, the 18 villages and small towns where the subjects lived do represent the district well, and the selection of subjects in each village was not based on specific socio-economic criteria. Therefore the results of the study are believed to give a good indication on the real situation.

The overall prevalence of anaemia among the pregnant women was 47.7%, while the prevalence in women in the third trimester of pregnancy has higher at about 53%. This is in accord with what has been reported to be Indonesian national prevalence rate of approximately 55%.⁹ Studies in urban and rural Java reported prevalence rates of 42%⁷ and 49%¹² respectively. These data clearly indicate the need for a more effective iron supplementation programme.

There are two most important constraints of a supplementation programme which directly limit its effectiveness; these are the distribution coverage rate and the compliance of women with the iron tablet intake. Only 64% of the women claimed to have received prenatal care during the latter two-thirds of gestation. The percentage of women who stated having obtained iron tablets was 45.8%. Health services

utilization and iron supply appeared to be higher among women in the third trimester of pregnancy than among women in the second trimester.

Possible reasons for the low health service utilization include a lack of access and a lack of benefit awareness^{8,13}. In Jeneponto, the latter reason is probably more important. This is indicated by the rate of service utilization which rises with progression of pregnancy when the necessity for prenatal care becomes more evident due to the impending birth of the child. Furthermore the number of illiterate women among those who did not receive prenatal care was relatively high. Therefore, to increase awareness of the benefits of prenatal care in general and iron supplements in particular during pregnancy seems very important. The benefits of iron supplements seem to be stressed by the fact that women in the second trimester of pregnancy who had received iron tablets had a higher Hb level than the women who had not received the tablets.

With respect to distribution of iron tablets, only 72% of the women who received prenatal care stated that they had obtained iron tablets. In addition 12 of those 49 women who had received iron tablets stated that they had received less than 30 tablets. The reasons for these shortcomings in iron tablet distribution are unknown.

Apart from the health service utilization and the iron tablet distribution, the effectiveness of the program was also influenced by compliance of the women with tablet intake. About one third of the women who received iron tablets did not take all of the tablets. Previous research experience indicates that the number of non-compliers may even be higher since not all women may have admitted that they did not take all of the tablets⁷.

Side-effects, such as epigastric discomfort, nausea, vomiting, constipation and diarrhoea, have been reported as major reasons for the low compliance of many women². Other information suggests, however, that the impact of these side-effects has been overemphasized⁸. The latter was confirmed by this study. Non-compliers stated the major reason that they did not take all their tablets was that they simply forgot, and side-effects were of minor importance. This may indicate that pregnant women were not aware of the benefits and the importance of iron for the health of their babies and themselves.

The results of this study indicate that the efficacy of the supplemental iron programme can still be much improved. Three main issues need to be addressed. First, the pre-natal care coverage rate needs to be increased. To achieve this, greater awareness among pregnant women regarding the necessity of prenatal health checks in general is essential. Special educational campaigns probably need to be initiated, and primary health care workers have to be educated in techniques of communication and motivation. Secondly, the iron tablet distribution system within the health care system needs to be improved in order to assure that women obtain all of the scheduled iron tablets during pre-natal care visits. Thirdly, compliance of women could be improved, through an increase in awareness about the benefits. While the results of this study may or may not be typical for Indonesia, they indicate that monitoring of supplementation programmes in general is necessary.

References

- 1 United Nations ACC/SCN. Second report on the world nutrition situation. Geneva: United Nations Administrative Committee on Coordination – Subcommittee on Nutrition, 1992.
- 2 DeMaeyer EM, Dallman P, Gurney JM, Hallberg L, Sood SK, Srikantia SG. Preventing and controlling iron deficiency anaemia through primary health care. Geneva: WHO, 1989.
- 3 World Health Organization. Control of nutritional anaemia with special reference to iron deficiency. Report of an IAEA/USAID/WHO joint meeting. Tech Rep Ser No. 580. Geneva: WHO, 1975.
- 4 Sood SK, Ramachandran K, Kamla Rani, Ramalingaswami V, Mathan VI, Ponniah J, Baker SJ. WHO sponsored collaborative studies on nutritional anaemia in India – The effect of parenteral iron administration in the control of anaemia of pregnancy. *Br J Nutr* 1979; 42: 399–406.
- 5 Charoenlarp P, Dhanamitta S, Kaewvichit R, et al. A WHO collaborative study on iron supplementation in Burma and in Thailand. *Am J Clin Nutr* 1988; 47: 280–97.
- 6 Bonnar J, Goldberg A, Smith JA. Do pregnant women take their iron? *Lancet* 1969; i: 457–8.
- 7 Schultink W, van der Ree M, Matulessi P, Gross R. Low compliance with an iron supplementation program: a study among pregnant women in Jakarta, Indonesia. *Am J Clin Nutr* 1993; 57: 135–9.
- 8 United Nations ACC/SCN. Controlling iron deficiency. ACC/SCN state-of-the-arts series. Nutrition policy discussion paper No. 9. Geneva: UN Administrative Committee on Coordination – Subcommittee on Nutrition, 1991.
- 9 Muhilal, Herman S, Karyadi D. The current national prevalence of anaemia among pregnant women and its preventive measures in Indonesia. XIII International Congress for Tropical Medicine and Malaria. Abstr Vol 1. Jomtien, Pattaya, Thailand. Nov. 29 – Dec. 4, 1992.
- 10 Gopalan C. Nutrition in developmental transition in South East Asia. New Delhi: WHO, 1992.
- 11 Cook JE, Dallman PR, Bothwell TH, Lynch SR, Covell AM, Worwood MA. Measurements of iron status: a report of the International Nutritional Anaemia Consultative Group (INACG). Washington: Nutrition Foundation, 1985.
- 12 Suharno D, West CE, Muhilal, et al. Cross sectional study on the iron and vitamin A status of pregnant women in West Java, Indonesia. *Am J Clin Nutr* 1992; 56: 988–93.
- 13 Nyazema NZ. Towards better patient drug compliance and comprehension: a challenge to medical and pharmaceutical services in Zimbabwe. *Soc Sci Med* 1984; 18: 551–4.

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Asia Pacific Journal of Clinical Nutrition 1994; 3:211-215**鐵補充計劃對印尼南 Sulawesi 省
Jeneponto 地區孕婦的效果****摘要**

一個官方的為孕婦補充鐵的計劃在印度南 Sulawesi 省 Jeneponto 地區進行，並評估其效果。數據是從 18 個村落的 107 位妊娠中三月或妊娠末三月的孕婦收集的。結果顯示，雖然有 63.6% 的孕婦陳述曾獲產前護理，但仍有 47.7% 患有貧血。在獲產前護理的 68 位孕婦中，有 49 位服用含鐵片劑。在 49 位中有 32.3% 承認沒有服完所有片劑。服食含鐵片劑的妊娠中三月的孕婦，其血液蛋白平均值為 9 克/升，較沒有服食者為高 ($p = 0.049$)。要改進鐵補充計劃的效果，必需增加產前護理的範圍，完成含鐵片劑的分配，和致力保證孕婦服用分配給她們的含鐵片劑。

Abstrak

Penelitian secara cross-sectional tentang efisiensi program suplementasi tablet Besi telah dilakukan di Jeneponto, Sulawesi Selatan, Indonesia. Penelitian ini dilakukan pada 107 ibu-ibu hamil dari 18 desa, dengan usia kehamilan pada trimester kedua atau ketiga. 47.7% dari ibu-ibu hamil tersebut menderita anemia, meskipun 63.6% menyatakan bahwa mereka menerima pelayanan prenatal. Dari 68 wanita yang menerima pelayanan prenatal, 49 menerima tablet Besi. Tetapi, 32.7% dari 49 ibu-ibu hamil yang menerima tablet besi tersebut menyatakan bahwa mereka tidak meminum semua tablet besi yang mereka terima. Kadar hemoglobin rata-rata pada trimester kedua kehamilan pada ibu-ibu yang menerima tablet Besi adalah 9 g/L lebih tinggi ($p=0.049$) dibanding ibu-ibu yang tidak menerima suplementasi tablet Besi. Oleh karena itu untuk meningkatkan efisiensi program suplementasi tablet Besi, harus ada perluasan cakupan pelayanan prenatal, perbaikan pendistribusian tablet besi, dan usaha untuk mengetahui secara pasti bahwa ibu hamil meminum tablet besi yang diberikan kepada mereka.

