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Effect of Minerals on pregnant women suffering from pre-eclampsia and eclampsia.

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Abstract

A study was undertaken in four Government and Private Hospitals to assess the effect of minerals on pregnant women suffering from pre-eclampsia and eclampsia. Twenty four hours dietary recall was taken and the total no. of respondents i.e. 60 were divided into three income groups i.e. low income group (LIG), middle income group (MIG), high income group (HIG) and then minerals intake especially sodium, iron and calcium per day was calculated for three days and compared with recommended dietary allowances given by Indian Council of Medical Research (ICMR 1990). Average nutrient intake shows that the intake of sodium were above the recommended dietary allowances (RDA) whereas the intake of calcium and iron were below the RDA recommended by ICMR. The average daily dietary sodium intake of LIG respondents was 1348.76 mg/day and that of MIG respondents was 1294.20 mg/day and HIG it was 1106.8 mg/day. The more consumption of sodium may lead to consequences of pre-eclampsia, while low sodium intake may decrease blood pressure. Hence sodium intake should be restricted between 200-400 mg/day depending on the severity of the disease. The average daily iron intake of group I respondents was 35.30 mg/day and that of group II and group III respondents were 31.59 and 29.48 mg/day respectively. All these values were below RDA values. The average daily calcium intake of group I respondents was 670.12 mg/day and that of group II and group III respondents were 542.98 and 822.26 mg/day respectively, both were below the RDA values. Statistical analysis shows a significant difference in the consumption of calcium, iron and sodium among the three income groups.

Key words: Pre- eclampsia, Eclampsia, Calcium, Sodium, Iron.

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Introduction

In pregnancy nutrition is very important as it directly deals with the life and health of not only the mother who delivers the child but also that of unborn child .Therefore, the diet of the pregnant women must provide the additional requirements. If the diet of pregnant women is deficient in one or more nutrients, she is likely to suffer certain pregnancy complications such as Pre- eclampsia and Eclampsia. Pre-eclampsia is defined as the combination of high blood pressure (hypertension), swelling (edema), and protein in the urine (albuminuria, proteinuria) developing after the 20th week of pregnancy [1].

Eclampsia is simply convulsions of pregnancy due to raised blood pressure. Before eclampsia state of pre-eclampsia may be seen in which blood pressure of pregnant lady is raised, swelling can be seen on feet & face and proteins are excreted in urine usually without fits. The cause of pre-eclampsia is unknown, although several factors have been shown to contribute [2,3]. Pre-eclampsia is more common in women during their first pregnancy [4]. Calcium deficiency has been associated with pre-eclampsia [5]**.** State of convulsions occur when blood calcium level is low because calcium is required for maintaining the tone of muscles. During hypocalcemia tremor occurs and if they are generalized a state of convulsion may occur.

The National Institute of Health recommends an intake of 1,200 to 1,500 mg of elemental calcium daily during normal pregnancy [6]. In women at risk of pre-eclampsia, most trials showed reduced incidence in women who have taken 2,000 mg of supplement calcium per day [7]. Unlike other conditions that cause high blood pressure, salt restriction and use of diuretics can worsen pre-eclampsia by reducing blood flow to the kidneys and placenta [8]**.** In pre-eclampsia, unrestricted use of salt and an

increased consumption of water are needed to maintain normal blood volume and circulation to the placenta [9]. Sodium increases osmolarity of tissues, hence more water is absorbed and edema results due to excessive fluid retention which may aggravate hypertension whereas low sodium causes reduction in fluid volume and hence decreases both edema and hypertension.

Iron and markers of iron status have been reported to be abnormal in pre-eclampsia. Entman et al. [10] reported increased free iron in pre-eclampsia. Several studies suggested an association with anemia [11] and ferritin is increased [12] and transferrin is decreased [13] in women with pre-eclampsia.

If these complications are not corrected in time, the patient will go into coma and convulsion will occur. These convulsions are hazardous to both mother and child. Only two or more convulsions may lead to fetal and maternal death.

Material and Methods

Sixty respondents attending O.P.D. of four Hospitals: Nazrath Hospital, Swaroop Rani Hospital of Motilal Nehru Medical College, Kamla Nehru Hospital all from Allahabad City and Era's Medical College and Hospital from Lucknow were purposively selected to fill up enquiry schedule. The corresponding respondents were grouped into three different income groups i.e. LIG (Low income group), MIG (Middle Income Group) and HIG (High Income Group).

The survey method was used to collect data. The selected respondents were personally interviewed and necessary informations were collected by using a pre- tested schedule. Minerals effect was observed through dietary survey and laboratory findings.

The twenty four hours dietary method was used and the average nutrient intake was calculated of each respondent, using the food composition Table of C. Gopalan et al. 1990 [14].

Methods of Analysis

1. The tabulation method was used for analyzing the data.
2. Statistical analysis of data.
3. The test undertaken for interpreting the data was chi-square and ANOVA Table.

Results and Discussion

The results of the study are presented in the tables given below and their results are discussed as follows.

Table 1. Average Nutrient intake of respondents per day

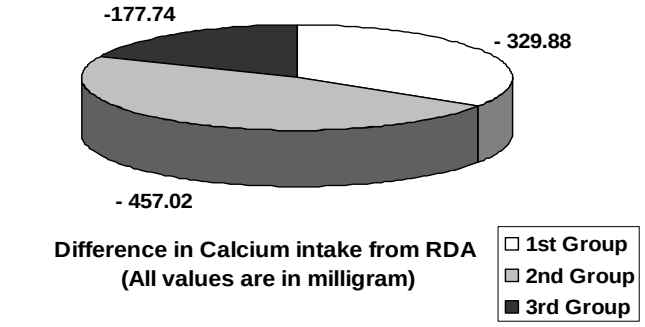
Income group		Calcium (mg)	Iron (mg)	Sodium (mg)
Group I	RDA*	1000	38	1000
(n=35)	Observed average value	670.12	35.30	1348.76
	Difference	-329.88	-2.70	+348.76
Group II	RDA	1000	38	1000
(n=15)	Observed average value	542.98	31.59	1294.20
	Difference	-457.02	-6.40	+294.20
Group III	RDA	1000	38	1000
(n=10)	Observed average value	822.26	29.48	1106.8
	Difference	-177.74	-8.52	+106.8

*******[Recommended dietary allowances for Indians (ICMR 1990)]*

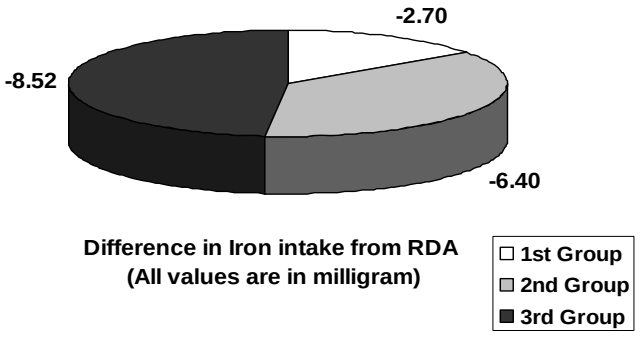
Table 2. Anova Table Showing Nutrient Intake

Source of Variation	d. f.	S. S.	Mean S.S.	F. Cal	F(at 5%)
Due to income group	2	491864.23	245927.11	15.06	$F_{2.4}$=6.94
Due to nutrients (Ca, iron, Na,)	2	6073.861	3036.93	0.18	$F_{2.4}$=6.94
Error	4	65310.31	16327.57		
Total	8	563248.4	70406.6		

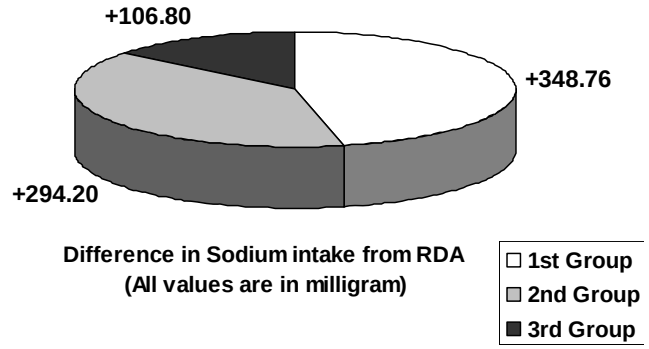
d. f. = degree of freedom, S. S. = sum of squares,
mean S. S. = Mean sum of squares, F. Cal = Calculated



Difference in Calcium intake from RDA (All values are in milligram)



Difference in Iron intake from RDA (All values are in milligram)



Difference in Sodium intake from RDA (All values are in milligram)

of calcium and iron of all respondents was below the daily allowances recommended by I.C.M.R where as dietary intake of sodium were above the RDA values.

The food and nutrition board recommended that excessive amount of sodium tends to increase the blood pressure, which is a sign of pre-eclampsia, while low sodium, causes a decrease in blood pressure. Hence, sodium intake should be restricted between 200-400 mg/day depending on the severity of the disease.

The average daily sodium intake of group I respondents were 1348.76 mg/day and that of group II and III espondents were 1294.20 and 1106.8 mg/day respectively, both of which were above the RDA values

The committee on maternal nutrition discouraged the routine use of salt restriction and adequate amount of protein (about 100 gm per day) during pregnancy. Sodium increases osmolarity of tissues. Hence water is absorbed from adjacent cells, edema is due to excessive fluid retention and aggravation of hypertension where as low sodium causes reduction in fluid volume and hence decreases edema and hypertension both. Steegers et. al (1996) found that although strict dietary sodium restriction has been shown to be effective in the long term management of chronic hypertension, there is no convincing evidence that salt restriction has any role to play in either the prevention or treatment of hypertensive disorder of pregnancy [15].

The average calcium intake of group I respondents was 670.12 mg/day and that of group II and group III respondents were 542.98 and 822.26 mg/day respectively, both of which were below the RDA values.

A committee on Nutrition Expert Group (1990) reported that calcium is required for maintaining tone of muscles. During hypocalcemia, tremor occurs and if they are generalized then a state of convulsions occur.

Walker (2000) stated that calcium supplements lower the risk of pre-eclampsia and eclampsia because calcium is required for maintaining tone of muscles [16].

Jama (1997) observed that pre-eclampsia still remains a dangerous entity with an elusive pathogenesis and causes significant morbidity in both, the mother and fetus [17]. It has been found that women on a high calcium diet have a low incidence of pre-eclampsia.

It is also known that pre-eclamptic women have reduced urinary excretion of calcium, so there is an inverse relationship between the dietary consumption of calcium and events of eclampsia.

Knight and Keith (1992) studied calcium supplementation on normotensive and hypertensive pregnant women. A significant inverse relationship was observed between dietary calcium intake and blood pressure [18].

Mitchell et. al (1990) revealed that ecampsia was due to maternal deficiency in calcium through fetal absorption and held that good results were obtained by calcium administration . He stated that the hypocalcemia of eclamptic patients led to an accumulation of fat in the liver and therefore impairment of its function resulting into convulsive attacks [19].
Balda et. at (1994) from their study concluded that prevalence of high blood pressure was significantly greater in

excessive smokers, high salt consumers, high activity and in high income groups [20].

The average daily iron intake of group I respondents was 35.30 mg/day and that of group II & III were 31.59 mg/day & 29.48 mg/day respectively, which were below the RDA values.

The analysis of variance revealed that there is a significant difference in the dietary intake of calcium, iron and sodium due to socioeconomic groups.

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