

Research Article

Evaluation of some minerals in cord blood from tribal and nontribal population of Udaipur region

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ABSTRACT

Background: Vitamins and minerals collectively referred to as micronutrients have important influence on the health of pregnant women and the growing foetus. (1) Pregnancy is related to increase demand of all nutrients and deficiency any of these can affect pregnancy, delivery and outcome of pregnancy. (2) Disorders in mineral element nutrition and metabolism can lead to wide variety of malformations. Data on mineral values in newborn are very less in contrast to adult hence the present study was planned to analyse some of minerals in the umbilical cord blood of tribal and nontribal population and compare them gender wise.

Methods: Our study group consisted of 200 healthy full term newborn. The cord blood was collected immediately after a normal delivery to estimate calcium, Magnesium, Phosphorus and Iron.

Results: The results showed that the levels of calcium, magnesium, phosphorus and iron were higher in non-tribal population than Tribal ones. The levels of calcium and iron were higher in female nontribal neonates as compared to male non-tribal neonates. Calcium was statistically significant ($p=0.04$) when compared with male and female non-tribal neonates. The trend showed increase levels of calcium, magnesium and phosphorus in females of tribal population than cord blood of male tribal neonates.

Conclusions: The result shows that tribal and non-tribal population, also female and male neonates have genetic variation and difference in mineral metabolism.

Keywords: Cord blood, Calcium (Ca), Magnesium (Mg), Iron (Fe), Phosphorus (P), Tribal

INTRODUCTION

Vitamins and minerals collectively referred to as micronutrients have important influence on the health of pregnant women and the growing foetus.¹ Pregnancy is related to increase demand of all nutrients like iron, copper, zinc, magnesium, vitamin B12, folic acid and ascorbic acid and deficiency any of these can affect pregnancy, delivery and outcome of pregnancy.² Disorders in mineral element nutrition and metabolism in embryo are potentially mutagenic and teratogenic and may lead to abortion or a wide variety of malformations. These disorders may give rise to growth retardation and

many abnormalities.³ Some effects may express in later life in the form of psychological, neurological, Carcinogenesis, and even teratogenesis in effects.³

Iron deficiency results in anaemia, which may increase risk of death from haemorrhage during delivery. In developing countries iron deficiency anaemia in pregnant women ranges from 35% to 75% and is recognized as the most common nutritional problem in the world.⁴ Calcium is the 5th most common element and the most prevalent cation found in the body. It is involved in the action of other intracellular messenger, such as cyclic adenosine mono phosphate and inositol 1, 4, 5- triphosphate and

thus mediates the cellular response to numerous hormones.⁵ It takes part in nerve transmission. Magnesium, calcium and sodium dearrangements are a frequent finding in asphyxiated infants and these abnormalities are significantly associated with poor outcome.⁵ Calcium and phosphorus are the major component of bones and cartilages.⁵ Magnesium is essential for the synthesis of fatty acids and proteins and it is critical in metabolic processes that require energy derived from ATP (adenosine tri phosphate).^{6,7} Data on mineral values are very less hence the study was planned to estimate some minerals in cord blood of neonates.

METHODS

The present prospective study was conducted in the department of Biochemistry, Geetanjali Medical College and hospital, Udaipur.

A total of 200 healthy neonates (following healthy normotensive pregnancy) were included in the study which were divided on the basis of environmental genetic variant as Tribal (N=25) and non tribal (N=175) and further subdivided according to gender (male and females).

Inclusion criteria for mothers

Healthy mother only on iron folic acid and calcium supplementation were included.

Exclusion criteria for mothers

History with alcoholism, smoking hypertension, thyroid disorders, diabetes mellitus, renal diseases, hypercholesterolemia, twins, liver diseases, tuberculosis and asthma, pregnancy induced hypertension were excluded.

Inclusion criteria for neonates

Gestational age between 35-42 weeks and Absence of congenital anomalies were included.

Exclusion criteria for neonates

Congenital malformations, Neonates born to mother with maternal illness, Neonates with perinatal problems like hypoglycemia, pathological jaundice, Intrumental delivery including extraction and also Neonates with hypoxic ischemic encephalopathy and sepsis were excluded.

Sample collection

After delivery and cord clamping umbilical venous blood was taken from maternal umbilical end. Serum was separated and analysed for minerals calcium, Magnesium, Phosphorus and Iron.

Estimations

The levels of Calcium (NA-BAPTA end point method), Magnesium (Colorimetric end point method), Phosphorus (Molybdate UV method) and Iron (Ferrozine method), were assayed by method.⁸⁻¹¹ The assay were performed with cobas c311 fully auto analyzer instrument.

Statistical analysis

The mean and standard deviation has been used to define data in each group. These data were compared and significance was calculated between tribal and non-tribal neonates and also between male and female neonates using unpaired 't' test. The p-value less than 0.05 were considered as significant and values less than 0.001 were considered as highly significant. Graph Pad prism version 6 software was used for analysis.

RESULTS

Table 1 shows comparison between non-tribal and tribal population. The results showed that the levels of calcium, magnesium, phosphorus and iron were higher in non-tribal population than Tribal ones. The ratio Calcium to magnesium was lower in non-tribal population than in tribal populations. The significance of variance showed no significance when compared non-tribal and tribal populations.

Table 1: Serum levels of some minerals in cord blood from non-tribal and tribal population.

S. No.	Para-meters	Non-tribal (n=175)		Tribal (n=25)		P-value
		Mean ± sd	Range	Mean ± sd	Range	
1	Calcium Mg/dl	9.02 ± 1.32	5.9-12.00	8.89 ± 0.97	7.20-10.7	0.63
2	Magnesium Mg/dl	2.11 ± 0.70	0.94-3.90	1.98 ± 0.66	0.96-2.91	0.38
3	Phosphorus Mg/dl	5.71 ± 0.99	2.60-8.60	5.01 ± 1.97	3.70-7.1	0.47
4	Iron µg/dl	163.74 ± 40.18	100-309	160.97 ± 40.04	110-245	0.74

The Table 2 shows the levels of calcium, magnesium, phosphorus and iron in non-tribal population. The levels of calcium, magnesium, phosphorus and iron were higher in female nontribal neonates as compared to male non-tribal neonates.

Calcium was statistically significant (p=0.04) when compared with male and female non-tribal neonates. No statistical significant differences between mean levels magnesium, phosphorus and iron in male and female non-tribal population were seen. P-values less than 0.001

were highly significant and less than 0.05 were significant but were non-significant if the values were more than 0.05.

Table 2: Serum levels of some minerals in cord blood of male and female neonates from non-tribal environment.

S. No.	Parameters	Non-tribal (n=175) Mean ± SD		P-value
		Male (N=103)	Female (N=72)	
1	Calcium mg/dL	8.89 ± 1.30	9.30 ± 1.30	0.04
2	Magnesium mg/dL	2.16 ± 0.67	2.18 ± 0.73	0.45
3	Phosphorus mg/dL	5.62 ± 0.99	5.65 ± 0.87	0.79
4	Iron µg/dL	162.96 ± 42.98	164.86 ± 36.08	0.75

The trends were same with increased levels of calcium, magnesium, phosphorus and iron in females of tribal population than cord blood of male tribal neonates. The significant variance between male and female tribal neonates were non-significant (p>0.05) (Table 3).

Table 3: Serum levels of some minerals in cord blood of male and female neonates from Tribal population.

S. No.	Parameters	Tribal (n=25) Mean ± SD		P-value
		Male (N=18)	Female (N=07)	
1	Calcium mg/dL	8.82 ± 0.94	8.87 ± 1.12	0.91
2	Magnesium mg/dL	1.95 ± 0.69	2.05 ± 0.61	0.74
3	Phosphorus mg/dL	5.53 ± 1.01	5.63 ± 0.67	0.78
4	Iron µg/dL	161.71 ± 44.50	159.07 ± 33.51	0.75

DISCUSSION

During embryonic life until birth a normal fetus acquires all the nutrients in larger amount about 250-300 mg iron.¹² There is evidence of the importance of maternal nutrition as a determinant of the outcome of pregnancy¹³ it is difficult to find a direct correlation between maternal and health of the newborn, especially in a population without marked economic deprivation.¹⁴

According to genetic variation we divided the population as tribal and nontribal because they have distinct differences in their living style and socioeconomic profile.

In general the level of calcium, magnesium, phosphorus and iron were relatively low in tribals although prenatal calcium, iron supplementation is a standard protocol followed by obstetricians, the reason thought was that her minerals were drained by the foetus. The other reason seemed to be mainly due to their ignorance towards the selection of food. By habit they are non vegetarians and hunting provides them main source of food with fast erosion of forests, strong restriction on hunting of wild animals and prohibitive cost of non vegetarians food have resulted in their change of food habits and intake. They still pay very little attention to vegetables and fruits and this is mainly responsible for lower intake of vitamin, mineral. The social factor includes many non medical factors such as poor quality of life, poor housing and overcrowding, population explosion, under nutrition, lack of education, large families, early marriages, lack of awareness are cause of ignorance to healthy food habits.

To check the sex variation in genetic variants if any, the cord blood of subjects were divided into males and females neonates. Our evaluation revealed no significant difference in the levels of calcium, magnesium, phosphorus and iron, though tend to be higher in non-tribal females. However we find sex wise difference in nontribal female neonates with higher values than male neonates and same in tribal female newborns with higher value than male newborns. Iron was higher in female tribal neonates. Obviously there are important mechanism of mineral metabolism and also iron rich nutrient status in mothers of tribals.

There is no such literature available about genetic status comparison. The incidence was higher in tribal and non-tribal female neonates compared to male neonates. The reason could be genetic variation. The obsession of modernization and Industrialization has led to an unusual increase in smoke, dust and pollution. People in general are developing a bad habit of spending more on items other than food with this result, poor and unbalanced nutrition is adding dimensions to health. Contaminated food and drinks are frequently consumed.

The result shows that female and male have genetic variation and different mineral metabolism.

CONCLUSIONS

The studies to evaluate some minerals levels in cord blood of neonates from non-tribal and tribal population have not proved any significant difference between the studied groups. The result shows that tribal and non-tribal population, also female and male neonates have genetic variation and difference in mineral metabolism.

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