Serum Zinc Levels Amongst Tribal Population in a District of Jharkhand State, India: A Pilot Study

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Objective: **Nutritional deficiency of zinc is widespread in developing countries. India has the second largest concentration of tribal population after that of African continent. Limited data is available on the serum zinc levels amongst tribal population in India.**
The objective of this study is to assess the status of serum zinc amongst tribal population in a district of Jharkhand State, India.
Method: **The study was conducted amongst tribals in the age group of 18-75 years residing in district Sahibganj, Jharkhand. Two blocks in the district were selected for the detailed study keeping in view the operational feasibility. A semi-structured pre-tested questionnaire was utilized to collect information about their age, sex and other socio demographic details. A total of 944 subjects were enrolled for the present study. Serum zinc was determined by the standard atomic absorption spectrophotometry method.**
Results: **The mean age of the subjects was 34 years. The mean serum zinc concentration of the study subjects was 70.68 ± 26.71 µg/dl. Fifty three percent of the study subjects had zinc deficiency (serum zinc <70 µg/dl). The deficiency was higher in females (61.3%) as compared to the males (38.7%).**
Conclusion**: The results of the present study documented a high prevalence of zinc deficiency amongst tribal population.**

Key words*: Zinc nutriture, tribals, zinc deficiency, dietary intake*

Zinc is an essential trace element, influencing growth and affecting the development and integrity of the immune system (1,2). Nutritional deficiency of zinc is widespread in developing countries (3). India has the second largest concentration of tribal population after that of African continent. As per the 1991 census, India's tribal population is 67.76 million that forms about 7.95 per cent of the total population (4). Maize is the main staple diet of the tribals and the dietary intake of calories and other nutrients is inadequate. Food articles are available in the market but they are too expensive in relation to their income. Most of the time they consume maize or rice as a major meal at least once daily. The diet is poor in quantity and nutritional quality. Limited data is available on the serum zinc levels amongst tribal population in India, hence the present study was conducted to assess the status of serum zinc amongst tribal population in a district of Jharkhand state, India.

Material and Method

The study was conducted amongst tribals in the age group of 18-75 years residing in district Sahibganj, Jharkhand. Two blocks in the district were selected for the detailed study keeping in view the operational feasibility. The informed consent of the subjects to participate in the study was taken. A semi-structured pre tested questionnaire was utilized to collect information about their age, sex and other socio-demographic details.

A total of 944 subjects were enrolled for the present study. Blood from antecubital vein was drawn from the subjects and collected in previously labeled polypropylene tubes. Blood was transported in ice packs to the central laboratory for separation of serum. The samples were centrifuged at 3500 rpm at 4^{o} C for 30 minutes for the collection of serum. Serum zinc was determined by the standard atomic absorption spectrophotometry method (5). The quality control of the biochemical investigation was ensured utilising the following steps. Each serum samples was estimated for serum zinc levels in triplicate and the mean of the three values was reported as the zinc concentration of that particular sample. Sero-norms procured from Randox Ltd. (with known zinc concentration) were run with each batch of assay for the internal quality control assurance programme. When the serum zinc level for the seronorm sample was over or underestimated, the whole batch of assay was repeated. The reference range for the serum zinc considered was 70-100 µg/dl and hence serum samples with zinc levels less than 70.0 µg/dl were considered as deficient in zinc (6).

Results

The mean age of the subjects was 34 years. Sixty percent of the subjects were females. Blood was collected from 826 subjects out of 944 enlisted subjects to assess

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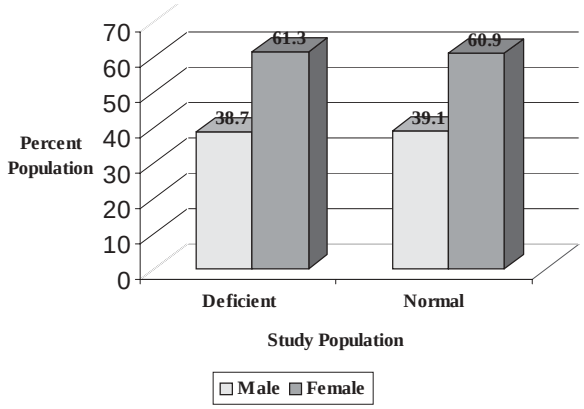

Figure 1. Sex wise distribution of study subjects according to their serum zinc levels.

their zinc status. The socio-demographic characteristics of subjects who refused to participate in the study were similar to those who participated in the study.

The mean serum zinc concentration of the study subjects was 70.68 ± 26.71 µg/dl. The serum zinc concentration was 70.95 ± 28.02 µg/dl and 70.51 ± 25.87 µg/dl in males and females, respectively. There was a statistically significant difference in the mean serum zinc concentrations of deficient and normal subjects ($p<0.0001$). Figure 1 depicts the sex wise distribution of study subjects according to their serum zinc levels. Fifty three percent of the study subjects had zinc deficiency (serum zinc <70 µg/dl). The deficiency was higher in females (61.3%) as compared to the males (38.7%).

Discussion

In the present study, 52.9% of the tribal population had deficiency of zinc as revealed by their mean serum levels. This was possibly because of low dietary intake of food and thereby zinc. The main staple diet of the tribals in Sahibganj was rice/maize. It is known that zinc deficiency is high in populations who consume rice based diets because the high phytate content of cereal proteins decreases the bioavailability of zinc (7). The phytate and fiber present in cereal diets also form insoluble complexes with zinc leading to its reduced bioavailablity. The results of the present study documented a high prevalence of zinc deficiency amongst tribal population. There is a need to assess serum zinc levels amongst tribals in other parts of the country to establish the magnitude of the deficiency.

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