International Journal of Research in Medical Sciences
Tripathi N et al. Int J Res Med Sci. 2024 Jun;12(6):xxx-xxx
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20241293

Original Research Article

Gender-based comparison of nutritional status in tribal and non-tribal populations: a study in the Udaipur region

Nisha Tripathi*, P. Satyanarayana

Department of Biochemistry, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, India

Received: 17 April 2024
Accepted: 06 May 2024

***Correspondence:**
Nisha Tripathi,
E-mail: nishaneeraj7671@gmail.com

ABSTRACT

Background: It is imperative to examine the nutritional quality of adult populations, both tribal and non-tribal, in the Udaipur region of Rajasthan in order to comprehend the health dynamics of these societies. Tribal communities frequently encounter particular difficulties with regard to healthcare access, socioeconomic standing, and cultural customs that may have an impact on their nutritional well-being that is distinct from that of non-tribal communities.
Methods: Our study group consisted of 300 tribals and 300 non tribals. The blood was tested to determine various nutritional parameters like minerals iron, calcium, phosphorus, magnesium, and vitamins like vitamin, vitamin A, vitamin D, and vitamin B12.
Results: Comparable levels of parameters like calcium, magnesium, phosphorus, vitamin A, and vitamin D3 were found in both non-tribal and tribal people, suggesting that both groups' nutritional statuses were generally similar. Non-tribal males and females exhibited significantly higher iron levels compared to their tribal counterparts. Both non-tribal males and females had considerably higher levels of vitamin C and B12 compared to tribal peers.
Conclusions: The study highlights the differences in iron, vitamin C, and vitamin B12 levels that occur in the Udaipur region between non-tribal and tribal individuals.

Keywords: Nutritional status, Vitamins, Minerals, Vitamin B12, Iron, Vitamin C

INTRODUCTION

A wealth of research indicates that diet has a major influence on growth in utero, youth, and adulthood, as well as general health as we grow. It is well recognized that diet has an impact on both physical and mental health. Many health problems are now linked to malnutrition, which might worsen when dealing with work-related stressors if the right nutritional changes aren't implemented. The world has advanced significantly this century, with considerable advances in health outcomes among them.

There has been a remarkable and satisfying global trend toward major breakthroughs in health in the twenty-first century. This is a good development that affects many aspects of health.

Nutrition and dietary plans have taken a front seat in the health care routine of individual all across the world. India is world's largest producer of milk and pulses and ranks as the second largest producer of rice, wheat, sugarcane, groundnut, vegetables, fruit and cotton as per the Food and Agriculture Organisation. Despite of the status 14% of India's population is undernourished, according to the state of food security and nutrition in the world, 2020.[1]

There is definitive evidence that diet plays a vital role in maintenance of ideal health and most importantly it extends its influence on future generations through nutriture in intrauterine life. In most developing countries nutritional deficiencies of both macro and micronutrients are common in women of reproductive age.[2]

METHODS

The current observational and comparative study was carried out in the Department of Biochemistry, Pacific Institute of Medical Sciences, Udaipur. The subjects consented after being fully informed. The ethics committee of Sai Tirupati University approved the study's protocol (STU/IEC/2022/106). The study included all regular patients, both tribal and non-tribal, who visited the gynecology and medicine departments and had no illnesses.

Blood was collected and tested for various nutritional parameters like minerals iron, calcium (TG), phosphorus, magnesium and vitamins like vitamin D, vitamin B12, vitamin C and vitamin A.[3-10]

The standard deviation and mean have been utilized to define each group. Using an unpaired "t" test, the significance of the differences between tribal male and non-tribal male and also female participants between tribal and non-tribal was determined. P-values less than 0.05 were deemed significant, and values less than 0.001 were deemed extremely significant. For analysis, GraphPad Prism version 6 software was used.

RESULTS

Table 1 provides an overview of the gender-wise comparison of both tribal and non-tribals, highlighting significant differences and indicating similar levels of some minerals and vitamins.

Table 1: Gender wise comparison of levels of minerals and vitamins in tribal and non-tribal population.

Parameters	Non-tribal males (n=185)	Tribal males (n=169)	P value	Non-tribal females (n=115)	Tribal females (n=131)	P value
	Mean±SD			Mean±SD		
Calcium (mg/dl)	8.65±1.15	8.64±1.08	0.933	8.92±1.06	8.79±1.07	0.3406
Magnesium (mg/dl)	2.06±0.48	2.03±0.45	0.5455	2.01±0.47	2.01± 0.44	1.00
Phosphorus (mg/dl)	4.05±0.32	4.01±0.28	0.2134	4.06±0.31	4.03±0.25	0.402
Iron (µg/dl)	225.5±38.45	212.1±44.88	0.0027	231.1±39.78	212.75±48.42	0.0015
Vitamin C (mg/dl)	0.60±0.14	328.9±20.80	0.0001	0.62±0.13	0.59±0.12	0.0611
Vitamin A (µg/dl)	47.22±12.11	46.33±12.25	0.4926	49.26±12.90	47.34±12.87	0.2447
Vitamin D3 (pg/ml)	47.21±18.61	47.40±18.57	0.9235	45.39±17.68	46.29±17.48	0.6889
Vitamin B12 (pg/ml)	361.5±29.90	328.9±20.80	0.0001	359.4±28.70	331.2±20.55	0.0001

*p<0.0001highly significant, p<0.05 significant

Calcium

The calcium analysis showed no significant differences between tribal and non-tribal males (p=0.933) and also in tribal and non-tribal females (p=0.340).

Magnesium

Similarly, Mg level was observed among tribal and non-tribal males which was non-significant with values p=0.545 and in comparison tribal and non-tribal females it was p=1.00.

Phosphorus

There was no statistically significant distinction in phosphorus between tribal and non-tribal males with p=0.213 and the comparison of tribal and non-tribal females was p=0.402 which was higher than 0.05 hence non-significant.

Iron

The result analysis showed significant difference when observed between non-tribal and tribal males and the significance level was p=0.0027 and comparison between tribal and non-tribal females was also significant with values p=0.0015.

Vitamin-C

Non-tribal had significantly lower values of vitamin C compared to tribal and non-tribal males and values were p=0.0001whereas no significant differences were observed when compared females of tribal and non-tribal population.

Vitamin A

The results showed no significant difference when compared males of tribal and non-tribals and also when females of tribal and non-tribals.

Vitamin D3

No significant difference was noted in vitamin D3 levels when compared males of tribals and non-tribals also between tribal and nontribal females.

Vitamin B12

Non-tribal individuals exhibited significantly higher levels of vitamin B12 compared to tribal and non-tribal males

with values p=0.0001. The comparison of females between tribal and non-tribals also showed highly significant differences with values p=0.0001.

These findings overall suggest overview of the gender-wise comparison results for tribal and non-tribal males and also tribal and non-tribal females populations highlighting non-significant differences in levels of calcium, phosphorus and magnesium in females of tribal and non-tribals and also males of tribal and non-tribals. Vitamin C, vitamin B12 and iron were highly significant. The vitamin A and D3 were with no significant differences in males of tribal and non-tribals and also females of tribal and non-tribals. The nutrient potential differences were found in levels of vitamin B12 and iron mineral when compared males of tribal and non-tribals and also females of tribal and non-tribals.

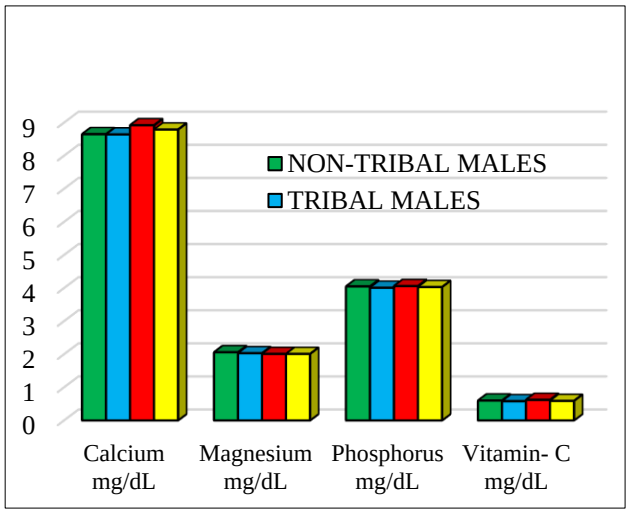

Figure 1: Gender-wise comparison of calcium, magnesium, phosphorus and vitamin C in tribal and non-tribals.

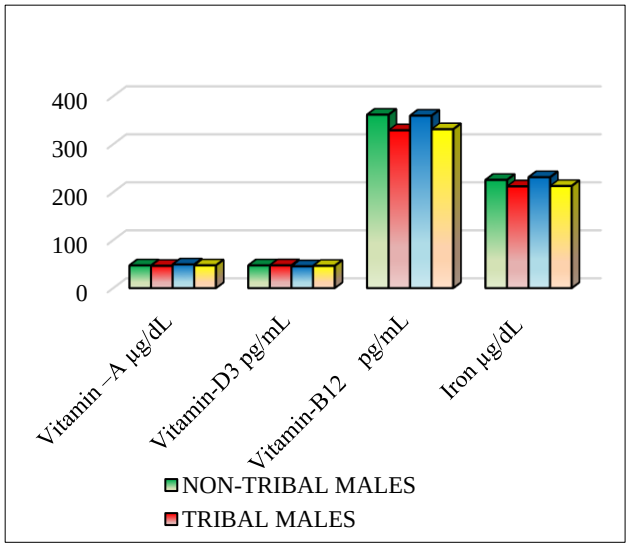

Figure 2: Gender-wise comparison of vitamin A, D, B12 and iron in tribal and non-tribals.

DISCUSSION

We provide the mean values of vitamin D3 and B12, as well as minerals including calcium, magnesium, iron, and phosphorus in this study (Table 1 and Figures 1 and 2). It was shown that the levels of calcium, phosphorus, iron, and magnesium in females were lower than those in males. On the other hand, males had higher levels of vitamin C, vitamin A, vitamin D3, and vitamin B12 than females did. Our results are consistent with those of Gruccio et al, and Colak et al investigation observed comparable patterns.[11,12]

Rural pregnant women usually include local, high-oxalates and high-fiber veggies like spinach, cucumber, and leafy greens in their diets on a regular basis. When dietary minerals and oxalates combine, insoluble mineral oxalates are formed, which are then excreted in stool. As a result, the amount of calcium excreted in stools and dietary intake are directly correlated in a linear fashion.

Low vitamin and mineral consumption is also a result of aspects like limited fruit and vegetable prices and inadequate nutritional understanding in rural locations. There were no discernible disparities between the male and female outcomes.

It is clear from comparing the data between tribal and non-tribal in Table 1 and Figures 1 and 2 that the non-tribal have higher amounts of minerals including calcium, magnesium, phosphorus, iron, and vitamins D3 and B12. Their food habits can be the reason for this disparity. Iron and vitamin B12 were significantly higher in non-tribals with p values less than 0.05 (iron p=0.0001; vitamin B12 p=0.0001). These results are consistent with those of Basu, who emphasized the various nutrition and health issues that the tribal people of India faces. including overall wellbeing, accessibility to healthcare, and better nutrition practices.[13]

They showed that remote geographic locations, erratic food availability, a lack of access to healthcare, and the effect of specific traditional beliefs and cultural practices make tribal populations particularly vulnerable to malnutrition.[13]

Tribal cultures still frequently undervalue the benefits of eating fruits and vegetables, which results in a decreased intake of vital nutrients including fibre, vitamins, and minerals. A lack of attention on healthy eating habits is a result of social problems such as low quality of life, inadequate housing, overcrowding, population increase, malnutrition, lack of education, big family sizes, early marriages, and limited knowledge. Research by Rao showed that although intake of other nutrients such total fat, energy, vitamin A, riboflavin, vitamin C, and free folic acid was below required levels, tribal diets satisfied necessary allowances for protein, calcium, iron, thiamine, and niacin.[14]

Basu highlighted how diverse tribal groups' socioeconomic, sociocultural, and ecological differences lead to a range of health problems.[13] A major worry is nutritional anemia, which is more common in rural and tribal women because of their hard workloads and multiple pregnancies. Tribal women often suffer from maternal malnutrition, which is made worse by closely spaced pregnancies. More than 80 million tribal people live in India, with 37% of them living in the Udaipur district alone. These are typically poor indigenous tribes whose dietary intake is not well documented. However, Udaipur's industrialization creates a unique environment where tribal people can develop socioeconomically through employment opportunities. They nevertheless still struggle with malnutrition. Due to their low purchasing power and lack of nutritional understanding, they have diets that are noticeably deficient in important nutrients.[15]

Despite socioeconomic developments, tribal tribes typically reject the effects of technology and want to hold onto their traditional way of life. They are usually marginalized and have little means of subsistence. Mineral build up can be influenced by a range of factors, including as the lifestyle of the mother, the surroundings, genetic predispositions, dietary practices, body composition, and levels of physical activity.

Nevertheless, there were no appreciable differences in the two groups' vitamin and mineral levels according to our research. As far as we are aware, no prior research has looked into this topic among tribal people. The synthesis of hormones specific to a given sex may be the cause of this lack of distinction. Male and females calcium and magnesium levels were studied by Colak et al, who found that female neonates had higher calcium levels and male neonates had higher magnesium levels.[12]

Our investigation produced conclusions that were consistent with theirs. On the other hand, no appreciable variations in minerals were found between male and female.[16] In a similar vein, Speich discovered no appreciable variations in mineral levels at birth related to sex.[17]

Our results were also supported by the findings of Tremollieres et al.[18] The differences between the levels of circulating hormones in male and female newborns, especially estrogens and androgens, could be the cause of these discrepancies.

CONCLUSION

The results highlight the nutritional differences that exist between non-tribal and tribal inhabitants in the Udaipur region, especially with regard to iron, vitamin C, and vitamin B12. In particular, for indigenous communities, addressing these inequities through knowledge, better access to nutrient-rich foods, and focused dietary interventions is critical to promoting general health and well-being.

ACKNOWLEDGEMENTS

Authors would like to thank PMCH and PIMS Udaipur for providing all the resources needed to carry out the work. The authors acknowledge the substantial assistance provided by the academics whose publications are cited and listed in the manuscript's references.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Tripathi N, Satyanarayana P. Gender-based comparison of nutritional status in tribal and non-tribal populations: a study in the Udaipur region. Int J Res Med Sci 2024;12:xxx-xx.