Original Article

Comparative Study to Find Out the Role of Nutritional Factors in Hair Growth between Tribal and Semi-Urban Population

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Abstract

Introduction: Hair is an important appendageal structure in the skin and hair growth is influenced by various factors like nutritional, hormonal, psychosocial and genetic factors. All these factors affect hair growth by altering the microenvironment of hair follicle which inturn results in changes in the hair cycle.

Materials and Methods: Our study was aimed to determine the role of nutritional factors such as Zinc, Iron, Calcium and Protein in promoting hair growth and decreasing chronic hair loss in tribal and semiurban population. A set of questionnaire were used to analyse the role of life style, nature of work and stress factors in influencing hair fall. The serum values of zinc, iron, calcium and protein were measured for each individual in both tribal and semiurban population and the mean value of all the four nutritional parameters were calculated separately and the results were analysed.

Results: The mean serum values of zinc, calcium and protein were almost similar in both tribal and urban people except serum ferritin value which was more in tribal people. We compared the role of stress influencing hair cycle in semiurban and tribal groups by analyzing the questionnaire.

Conclusion: The lifestyle without stress, good iron reserve with high ferritin level, usage of natural hair care products and genetic factors could be the reason for healthy hair growth in tribal population. Reduction of stress factors in daily life, adequate sleep and improving nutritional status may help to reduce hair fall in semiurban and urban population.

Key words: Alopecia, Hair cycle, Nutritional factors, Stress

INTRODUCTION

Alopecia is a common problem encountered by many people and diffuse thinning of scalp hair is associated with loss of confidence in some individuals. Although hair is one of the appendages of the skin, it plays a major role in the external appearance of an individual. The factors essential for the normal hair growth are iron, zinc, calcium, niacin, folic acid, biotin, selenium, and many other micronutrients.

Psychological and physical stress may also lead on to diffuse hair loss in this modern machinery of life. By estimating the levels of certain biochemical analytes and also comparing the lifestyle of tribal and semi-urban people, we could able to find out the cause for hair loss in the study groups and the solution for promoting hair growth in people with hair loss.

Aim

This study aims to determine the role of nutritional factors such as zinc, iron, calcium, and protein in promoting hair growth and decreasing chronic hair loss in tribal and semi-urban population.

Objectives

The objectives of the study were as follows:

1. To estimate the serum levels of zinc, ferritin, calcium, and protein and compare the values in tribal and semi-urban population.

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2. To determine the influence of socioeconomic factors in nutritional status and hair growth cycle in the study population.

MATERIALS AND METHODS

This study was conducted in semi-urban population of a northern district of Tamil Nadu and in the tribal population of a hilly area in Nilgiris of Tamil Nadu state, India.

About 30 tribal people and 30 semi-urban people were taken randomly for this study. The study population were divided into four groups based on their age, namely, 21–25 years (Group A), 26–30 years (Group B), 31–35 years (Group C), and 36–40 years (Group D). People with thyroid disorders, diabetes, anemia, androgenic alopecia, females with polycystic ovarian disease, and people on medication for certain chronic illnesses were excluded from this study.

A standard questionnaire was used to obtain relevant information about the history of hair fall, its severity and duration, usage of hair care products, food habits, nature of work, lifestyle habits such as inadequate sleep, changes in the sleeping pattern, any other chronic disease, and the history of any major illness in the recent past. The results of the questionnaire were analyzed. The serum values of zinc, iron, calcium, and protein were measured for each individual in both tribal and semi-urban population after obtaining written and informed consent from them. The mean value of all the four nutritional parameters was calculated separately in the four groups and the results were analyzed. This study was approved by our Institutional Ethical Committee.

Statistical Analysis

Statistical analysis was done using Stata. Independent sample t-test was used to compare the mean value between two groups. $P < 0.05$ was taken as statistically significant.

RESULTS

Among the study population, Group A (21–25 years) comprised 24 individuals belonging to semi-urban (12 individuals) and tribal population (12 individuals), Group B (26–30 years) comprised 16 individuals with eight people from tribal and eight people from semi-urban population, Group C (31–35 years) had 16 individuals in total with eight people from each population. and Group D (36–40 years) had four individuals in total with two people from each population. The answers of the questionnaire obtained from both tribal and semi-urban population were analyzed.

The history of hair fall, its severity, and duration were more in semi-urban people 73% (22 individuals) when compared to tribal population 6.6% (three individuals). The usage of chemical-based hair care products in the form of shampoos, hair oil, and hair serum was more in semi-urban people 83% (25 individuals). The tribal population were mainly using certain seeds and plant products for hair washing and buffalo milk butter for regular application over the scalp hair. The volume of hair is more in tribal population and the hair is also shiny and thick when compared to semi-urban people. The tribal population in our study were vegetarians. Rice, buffalo milk, milk products, roots, and green leafy vegetables were the main food items in their daily life. The quantity of intake of milk, roots, and green leafy vegetables was less in semi-urban population and their staple diet is rice. The main occupation was cattle herding in tribes whereas the semi-urban people were working as daily wages in farms, factories, and small industries. The stress in the working environment was more in semi-urban groups. Some of the people in semi-urban group were doing their work at night (eight individuals). There were no significant illnesses during the study period or in the past in the study groups.

On analyzing the values of micronutrients in Group A [Table 1], Group B [Table 2], and Group C [Table 3], the mean serum values of zinc, calcium, and protein were almost similar in both tribal and urban people except serum ferritin value which was more in tribal people in all three groups. Statistical analysis was not done in Group D because of the small sample size. Even though, there was not much difference in the mean serum values of calcium between the tribal and semi-urban population in Group B, P value was statistically significant ($P < 0.02$) for serum calcium estimation.

DISCUSSION

Hair growth in human being is controlled by both intrinsic and extrinsic factors. The stem cells in outer root sheath of hair follicles and the mesenchymal cells in dermal papilla play a major role in the intrinsic control of hair growth cycle. Hormonal factors and micronutrients are the important extrinsic factors responsible for normal hair follicle cycling.

Chronic telogen effluvium is defined as telogen hair shedding lasting for more than 6 months. Chronic telogen effluvium and androgenic alopecia are the common causes of diffuse non-scarring alopecia. Zinc deficiency, iron deficiency anemia, malnutrition, and thyroid disorders are the common accepted causes of chronic hair loss. The exact mechanism by which zinc and iron deficiency inducing hair loss is not known. Some researchers have demonstrated that ferritin is important for the dividing cells in the hair matrix. Hard and Kantor *et al.* suggested the role of iron in diffuse hair loss.[1,2]

Table 1: Group A (21–25 years)

Variables		Mean	Mean difference	t-Statistics	Degrees of freedom	P value
Semiurban	Zinc	158.33 µg/dL	4.5	0.44	22	0.6
Tribal	Zinc	153.83 µg/dL				
Semiurban	Ferritin	78.78 ng/ml	−25.75	-0.68	22	0.5
Tribal	Ferritin	104.54 ng/ml				
Semiurban	Calcium	10.14 mg/dL	0.25	1.60	22	0.1
Tribal	Calcium	9.88 mg/dL				
Semiurban	Protein	8.81 g/dL	0.04	0.21	22	0.8
Tribal	Protein	8.77 g/dL				

Table 2: Group B (26–30 years)

Variables		Mean	Mean difference	t-Statistic	Degrees of freedom	P value
Semiurban	Zinc	145.75 µg/dL	−3.5	−0.8	14	0.4
Tribal	Zinc	149.25 µg/dL				
Semiurban	Ferritin	68.27 ng/ml	−17.78	−0.31	14	0.7
Tribal	Ferritin	86.06 ng/ml				
Semiurban	Calcium	10.05 mg/dL	0.43	2.44	14	0.02
Tribal	Calcium	9.61 mg/dL				
Semiurban	Protein	8.38 g/dL	−0.07	−0.34	14	0.7
Tribal	Protein	8.46 g/dL				

Table 3: Group C (31–35 Years)

Variables		Mean	Mean difference	t-Statistic	Degrees of freedom	P value
Semiurban	Zinc	150 µg/dL	−6.62	−0.88	14	0.3
Tribal	Zinc	156.62 µg/dL				
Semiurban	Ferritin	46.7 ng/ml	−77.93	−1.76	14	0.09
Tribal	Ferritin	124.63 ng/ml				
Semiurban	Calcium	9.75 mg/dL	0.06	0.66	14	0.5
Tribal	Calcium	9.68 mg/dL				
Semiurban	Protein	8.38 g/dL	0.1	0.42	14	0.6
Tribal	Protein	8.28 g/dL				

Zinc is important for immune function, cell division, and barrier function in the skin. Cellular enzyme DNA polymerase is a zinc-dependent enzyme. Zinc deficiency is proved to be associated with alopecia areata and telogen effluvium.[3,4]

The role of protein and amino acids in hair growth is shown in many studies.[5] Amino acids such as L-lysine are important for iron uptake and are also present in the inner hair root and L-cysteine is a major component in hair keratin.[6] Protein malnutrition associated with hair loss and changes in hair texture have clearly been demonstrated in marasmus and kwashiorkor. Calcium concentration in hair is more than the concentration in the serum. Calcium deficiency in postmenopausal period may be one of the reasons for hair loss in menopausal age group females.[7] Supplementing diet with protein, vitamins, and minerals improves hair growth in patients with deficiency of the above-mentioned factors.

Even though stresses of everyday life are attributed to telogen effluvium, evidence for this factor influencing hair loss is less. Stress-induced local and systemic mediators such as catecholamines, prolactin, substance P, corticotrophin-releasing hormone, central hypothalamic stress hormone, and stress associated nerve growth factor may be responsible for hair loss by altering hair cycle.[8,9] In our study, we compared the role of stress influencing hair cycle in semi-urban and tribal groups by analyzing the questionnaire. The time bound work pattern, working at night, and physical and psychological stress associated with various occupation had a role in hair loss in semi-urban population. The traditional hair care methods influenced the hair cycle in tribal groups by lessening the damage to the hair and scalp and lessening the hair loss.

Ferritin plays an important role in hair growth by inducing proliferation of hair matrix cells during anagen stage of hair cycle. Non-vegetarian foods are good sources of iron when compared with vegetarian foods. Moderate iron deficiency has been reported with vegetarian food items. Serum ferritin level indicates the iron reserve and intracellular iron level. Some studies suggested the role of iron in maintaining hair growth while others did not show

any such association.[10,11] In our study, we could able to find out high serum ferritin level in tribal population in all three groups in spite of their vegetarian dietary habits. The values of other dietary factors such as zinc, protein, and calcium did not show much difference between the two comparison groups.

Limitations

The study was done on small population sample size. To generalize the results, it has to be conducted on more number of samples from the research population.

CONCLUSION

The lifestyle without stress, good iron reserve with high ferritin level, usage of natural hair care products, and genetic factors could be the reason for healthy hair growth in tribal population. Reduction of stress factors in life, adequate sleep, and improving nutritional status may help to reduce hair fall in patients and detailed analysis of underlying factors causing hair fall is important for proper counseling and treatment.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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