ORIGINAL RESEARCH

A study on prevalence of hair loss in apparently healthy adults

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ABSTRACT
Causes of alopecia are generally divided into the broad categories of cicatricial (scarring) and non-cicatricial (non-scarring) alopecia. In scarring alopecia hair follicles are permanently lost where as it is potentially reversible in nonscarring alopecia. Cicatricial alopecia can be primary or secondary. Apparently healthy adults (defined as the absence of history and symptoms suggestive of chronic diseases and acute medical symptoms such as fever, vomiting and diarrhoea) attending the Dermatology OPD and willing to participate in the study were included in the study if they fulfilled the defined criteria. Total number of participants was 100. The mean age of the subjects was 28.41 ± 6.69 years. Females (76%) outnumbered males (24%). More number of female participants (68.42%) had hair loss compared to male participants. Menstruation may predispose women to iron deficiency anemia which may be the factor for higher number of female participants having hair loss in our study. In the study 65% had hair loss and 35% had no hair loss.
Key words: Prevalence, hair loss, apparently healthy adults

INTRODUCTION

The scalp normally contains an estimated 100,000 hairs, and the average number of hairs shed daily is 100-150. The hair growth rate of terminal hairs is about 0.37 mm/day. Multiple factors are involved in controlling hair growth [1].

Hair growth is controlled by several cytokines and growth factors. It is stimulated by basic fibroblast growth factor (FGF), platelet derived growth factor, substance P, keratinocyte growth factor and vitamin D3 (low concentration); inhibited by transforming growth factor beta (TGF-β), interleukin 1 alpha (IL-α), parathyroid hormone and vitamin D3 (high concentration). Neurotrophin-3, glia-derived neurotrophic factors, neurturin and brain derived neurotrophic factors also affect hair cycle [2].

Androgens, thyroid hormones, insulin, cortisol, estrogen, prolactin and growth hormones can affect hair growth. Primary growth hormone resistance is characterized by thin hair, while acromegaly may cause hypertrichosis. Hyperprolactinemia may cause hair loss and hirsutism. Partial synchronization of the hair cycle in anagen during late pregnancy points to an estrogen effect, while aromatase inhibitors causehair loss. Hair loss in a causal relationship to thyroid disorders is well documented [3].

Androgens stimulate the tiny vellus follicles to transform into larger, deeper follicles forming longer, thicker, more pigmented hairs. Androgens are responsible for the increased hair growth over the areas like face, upper pubic area, chest and limbs. They also have the opposite effect on specific areas of the scalp; causing loss of terminal hair and balding. Paradoxically androgens appear to have no effect on other hairs such as the eyelashes, eyebrows. In many tissues, testosterone is metabolized intra-cellularly by one of the 5α-reductase enzymes to 5α-dihydrotestosterone, a more potent androgen, which binds preferentially and more strongly to the androgen receptor on targeted cells to activate gene expression. The skin and hair follicles contain a range of enzymes that can metabolize weak androgens, such as circulating dehydroepiandrosterone (DHEA) from the adrenals to more powerful testosterone and dihydrotestosterone[4].

Causes of alopecia are generally divided into the broad categories of cicatricial (scarring) and non-cicatricial (non-scarring) alopecia. In scarring

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alopecia hair follicles are permanently lost where as it is potentially reversible in nonscarring alopecia. Cicatricial alopecia can be primary or secondary. In primary cicatricial alopecia there is preferential inflammatory damage to hair follicles and/or its associated dermis with relative sparing of the interfollicular reticular dermis. In secondary cicatricial alopecia hair follicle is damaged due to surrounding inflammation [5, 6].

METHODOLOGY
Apparently healthy adults (defined as the absence of history and symptoms suggestive of chronic diseases and acute medical symptoms such as fever, vomiting and diarrhoea) attending the Dermatology OPD and willing to participate in the study were included in the study if they fulfilled the defined criteria. Total number of participants was 100.

INCLUSION CRITERIA
1. Apparently healthy adults aged 19-40yrs willing to participate in the study.

Exclusion criteria
1. History of any systemic illness, fever, communicable illness in the previous 6 months.
2. Received iron supplementation in the last 6 months.
3. Pregnancy & lactation.
4. Dermatosis affecting the scalp skin.

Method of collection of data
- Apparently healthy adults willing to participate in the study were enrolled after obtaining written informed consent.
- A predesigned proforma was given to all participants and demographic and other personal details were collected.
- Participants were enquired about the history of presence or absence of hair loss.
- In those who had hair loss, meticulous history was taken regarding the duration of hair loss, progression of hair loss and history of increased hair shedding/hair thinning/poor hair growth.
- Participants with history of abrupt, rapid and generalized hair shedding were considered as having telogen effluvium. History for eliciting precipitating factors was also noted in such patients. Hair shedding persisting for longer than

6 months was considered as having chronic telogen effluvium. Gradual diffuse hair loss with thinning of central scalp or widening of central parting line was considered as having FPHL. Participants with frontoparietal/frontotemporal recession and vertex thinning were considered as having male pattern hair loss.

- Complaints of hair loss in the family members were noted in all participants.
- General physical examination and systemic examination were done to rule out underlying systemic illness.
- Scalp examination was done in each participant and visual assessment of distribution of clinically evident hair loss was done to diagnose telogen effluvium, female pattern hair loss and male pattern hair loss.

CLINICAL TESTS: Hair pull test was done in study participants. A group of approximately 60 hairs was gathered between the thumb and forefinger of the non-dominant hand. With the dominant hand the strands of hair were loosely twisted to remove stray hairs and then the hairs were grasped between the dominant thumb and forefinger near the scalp. Gentle traction was applied in a smooth, gradual manner, away from the scalp. The hair pull test was performed at the vertex, 2 parietal areas and the occipital area of the scalp. If more than 5% hairs were pulled away from scalp, it constituted a positive hair pull test. Microscopic examination of the pulled hair was done whenever necessary.

LABORATORY TESTS: 5ml of venous blood was drawn from all participants and 1.5ml was collected in plain tube for estimation of serum ferritin by vidasbiomeiurex-EIA method. Serum ferritin level $\leq$ 40µg/L was considered as low serum ferritin level that required for normal hair cycle in both males and females.
1.5ml of blood was collected in EDTA tube for estimation of hemoglobin by sysmex XS-800 i cyanide free SLS method. As per WHO definition, hemoglobin level <12g/dL and <13g/dL was considered as low hemoglobin level for females and males respectively. 2ml of blood was collected in EDTA tube for estimating complete blood count, ESR and also for peripheral blood smear examination.

RESULTS
Table 1: Age distribution of subjects in the study

		Number of subjects (n=100)	Percentage
Age	<20 years	14	14.0%
	21 to 30 years	50	50.0%
	> 30 years	36	36.0%
	Total	100	100.0%

Mean age of subjects in the study was 28.41 ± 6.69 years. Majority of subjects were in the age group 21 to 30 years (50%).
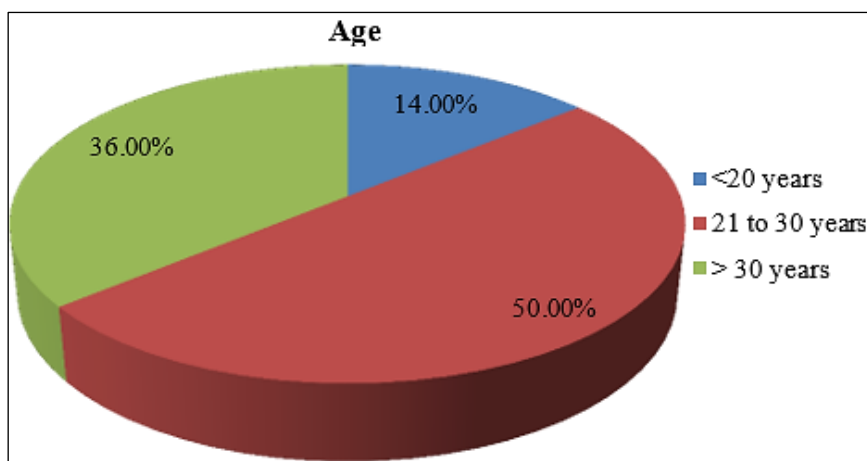

Fig 1: Pie diagram showing Age distribution of subjects in the study

Table 2: Hair loss distribution of subjects in the study

		Number of subjects (n=100)	Percentage
Hair loss	Yes	65	65.0%
	No	35	35.0%

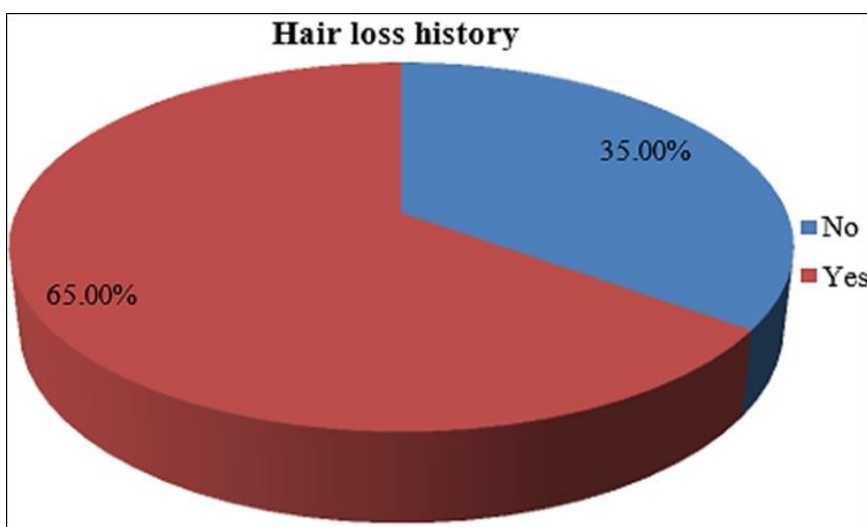In the study 65% had hair loss and 35% had no hair loss.

Fig 2: Pie diagram showing Hair loss distribution of subjects in the study

Table 3: Gender distribution of subjects in the study

		Total Number of subjects (n=100)	Hair loss present (n=65)	Hair loss absent (n=35)
Gender	Female	76	52 (68.42%)	24(31.57%)
	Male	24	13(54.16%)	11(45.83%)

In the study 76% were females and 24%were males. 68.42% of females and 54.16% of males had hair loss.
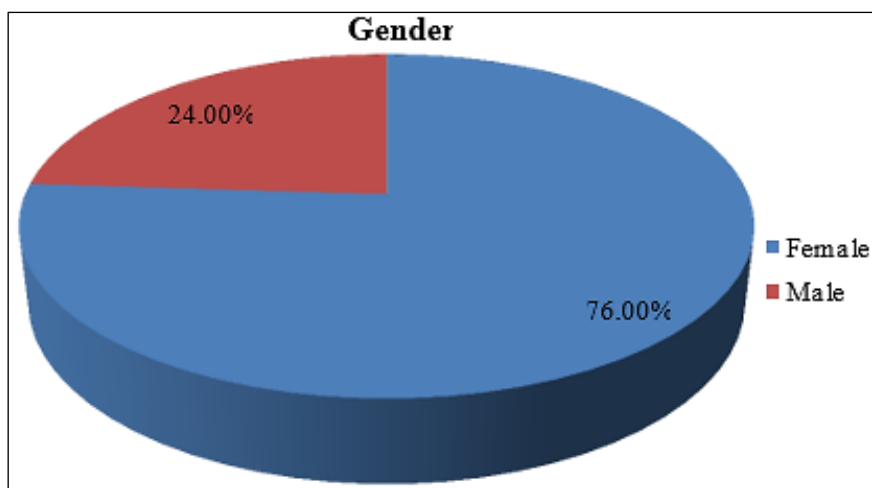
Fig 3: Pie diagram showing Gender distribution of subjects in the study

Table 4: Marital status distribution of subjects in the study

		Total Number of subjects(n=100)	Hair loss present(n=65)	Hair loss absent(n=35)
Marital status	Married	53	33(62.26%)	20(37.73%)
	Unmarried	47	32(68.08%)	15(31.91%)

In the study 53% were married and 47% were unmarried. 62.26% of married and 68.08% of unmarried subjects had hair loss.
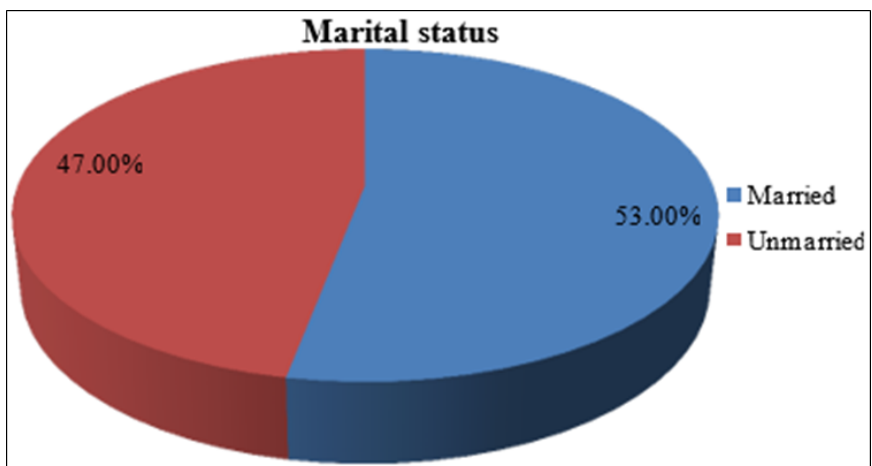

Fig 4: Pie diagram showing marital status distribution of subjects in the study

Table 5: Dietary habit distribution of subjects in the study

		Total Number of subjects (n=100)	Hair loss present (n=65)	Hair loss absent (n=35)
Dietary habit	Non vegetarian	71	44(61.97%)	27(38.02%0
	Vegetarian	29	21(72.41%)	8(27.58%)

In the study 71% were non vegetarian and 29% were vegetarian. 61.97% of non-vegetarians and 72.41% of vegetarian had hair loss.

DISCUSSION

The etiology of hair loss is multi-factorial and could be due to genetic predisposition, pathological states, drugs, nutritional deficiencies etc. However, the exact literatures reflecting the direct role of nutritional inadequacy leading to hair loss and importance of routine screening tests in hair loss and also reversal of hair loss with nutritional supplements are still inconclusive [7, 8].

Nutritional inadequacies especially iron deficiency is common problem in a developing country like India. A relative paucity of data on the exact causal association between hair loss and nutrition merits investigations in the patients presenting with hair loss. In our study majority of subjects were in the age group of 21 to 30 years (50%). The youngest subject was 18 years old and the eldest subject was 40 years

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old. The mean age of the subjects was 28.41 ± 6.69 years. Females (76%) outnumbered males (24%).

More number of female participants (68.42%) had hair loss compared to male participants. Menstruation may predispose women to iron deficiency anemia which may be the factor for higher number of female participants having hair loss in our study.

In the study 71% were non vegetarian and 29% were vegetarian. More number of vegetarians (72.41%) had hair loss compared to non-vegetarians. This may be because of lack of adequate nutrients in their diet which are essential for hair growth.

CONCLUSION

- Hair loss is a common dermatological condition among apparently healthy individuals with the prevalence of 65%.
- Females and younger population are more affected by hair loss compare to males and older population.
- More number of vegetarians are having hair loss compared to non-vegetarians.

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