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Research Paper

Prevalence of premature greying of hair and Its Association with Lifestyle and Dietary Factors Among Young Adults: A Cross-Sectional Study

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ABSTRACT:

Background: *Premature greying of hair is a common hair-pigmentation disorder that may occur at a relatively young age. Its development is considered multifactorial, with genetic, environmental, nutritional and lifestyle-related factors being implicated.*

Objectives:

1. *To determine the prevalence of premature greying of hair among young adults.*
2. *To assess the association between lifestyle factors and premature greying of hair among young adults.*
3. *To assess the association between dietary factors and premature greying of hair among young adults.*

Methodology: *A cross-sectional study was conducted using a structured questionnaire. The analysis was restricted to participants aged 18–30 years. The sample size was calculated using $n = Z^2pq/d^2$, taking $Z = 1.96$, $p = 27.3\%$, $q = 72.7\%$ and an absolute allowable error of 10%, giving a minimum sample size of approximately 77 participants. Of the available responses, 87 participants aged 18–30 years were includedin the final analysis. Premature greying was operationally defined as currently having grey/white hair with onset before 25 years of age. Associations were assessed using Pearson's chi-square test or Fisher's exact test, as appropriate. A p-value <0.05 was considered statistically significant.*

Results: *Amongthe 87 participants aged 18–30 years, 62 (71.3%) reported currently having grey/white hair. Using the predefined operational definition, 56 participants (64.4%) were classified as having premature greying.Sleepdurationwassignificantlyassociatedwithprematuregreying(p=0.044),aswasfrequencyof perceived stress (p = 0.026). Among dietary factors, frequency of fruit consumption was significantly associated with premature greying (p = 0.049). Other assessed lifestyle and dietary factors were not statistically significant.*

Conclusion: *Prematuregreyingwas frequently reported in the study sample. Sleep duration, perceived stress and fruit consumption showed statistically significant associations with premature greying, while the other assessed factors did not.*

KEYWORDS: *Prematuregreying; lifestyle; dietaryfactors; youngadults.*

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I. INTRODUCTION

Hair graying is a visible manifestation of the aging process and occurs because of a reduction or cessation of melanin production by melanocytes within the hair follicle. Although graying is generally

associated with increasing age, premature graying may occur much earlier in life.[1]

Premature graying of hair, also referred to as premature canities, has been described using age-based definitions that vary according to ethnicity. In Asian populations, graying before approximately 25 years of age is commonly considered premature.[2,3]

Thedevelopmentofprematuregrayingisconsideredmultifactorial.Geneticpredispositionandfamilyhistory are important factors, while oxidative stress, smoking, nutritional deficiencies and certain medical conditions have also been reported in the literature.[1,2] A systematic review and meta-analysis reported associations between premature graying and smoking, deficiencies of vitamin B12, folic acid and biotin, low serum calcium and ferritin, family history, lack of exercise, thyroid disorders and other metabolic conditions.[2]

Lifestyle factors may also influence hair health. Smoking, for example, has been investigated in relation to premature hair graying, with proposed mechanisms involving oxidative stress and vascular effects.[4]Psychological stress has also been proposed as a possible contributor to hair pigmentation changes, although the relationship is complex and requires further investigation.

Diet and nutritional status are also of interest because several micronutrients are involved in melanogenesis and normal hair follicle function. Deficiencies involving vitamin B12, folate, iron, calcium, copper and other micronutrients have been reported in association with premature graying.[1,2]

An Indian community-based cross-sectional study among 384 young adults aged 15–30 years reported a prevalence of premature graying of 27.3%. The study also reported significant associations with paternal and maternal history, smoking, sunlight exposure and body mass index.[5]

Despite the increasing observation of premature graying among younger individuals, there remains a need to examine potentially modifiable lifestyle and dietary factors in different populations. Therefore, the present study was undertaken to determine the prevalence of premature graying and assess its association with selected lifestyle and dietary factors among adults aged 18–30 years.

II. OBJECTIVES

1. Todeterminetheprevalenceofprematuregreyingofhairamongyoung adults.
2. Toassesstheassociationbetweenlifestylefactorsandprematuregreyingofhairamongyoung adults.
3. Toassesstheassociationbetweendietaryfactorsandprematuregreyingofhairamongyoungadults.

III. METHODOLOGY

Study design

Across-sectionalstudywasconductedtoassesstheprevalenceofprematuregreyingofhairand its association with selected lifestyle and dietary factors.

Study setting

Thestudywasconductedamongtheyoungadultsaged18to30yearsfromVidarbhaand Khandesh region, Maharashtra, India.

Study period

1August2026to1October2026. Study population

The study population comprised individuals who participated in the structured questionnaire-based data collection. The final analysis was restricted to participants aged 18-30 years.

Sample size

The required sample size was calculated using $n = Z^2pq/d^2$, where Z = 1.96 at a 95% confidence level, p = 27.3% = 0.273, q = 100ᵽ = 72.7% = 0.727, and d = 10% = 0.10. The calculated minimum sample size was 76.24,approximately77participants.Atotalof87participantsaged18-30yearswereavailableandincludedin

Theprevalencevalueusedforsample-sizeplanningwas27.3%,basedontheprevalencereportedina comparable community-based Indian study among young adults.[5]

Samplingtechnique

Acommunity-basednon-randomconveniencesamplingtechniquewasusedforparticipantrecruitment through the structured questionnaire.

Inclusion criteria

1. Participants aged 18–30 years.
2. Participants who provided responses to the study questionnaire.

3. Participants who provided information regarding their hair-graying status and relevant lifestyle and dietary factors.

Exclusion criteria

Participants with incomplete responses that prevented assessment of premature graying status were excluded from the analysis. Critically ill participants or those unable to provide reliable questionnaire responses were excluded.

Data collection

Information was collected using a structured questionnaire covering sociodemographic characteristics, hair graying, lifestyle practices and dietary habits.

Premature greying of hair was operationally defined as self-reported current grey/white hair with firstnoticing of grey/white hair before 25 years of age. This age threshold is consistent with commonly used definitions for Asian populations.[3]

Statistical analysis

Categorical variables were summarized as frequencies and percentages. Associations between premature greyingandcategoricallifestyleordietaryfactorswereassessedusingPearson'schi-squaretestorFisher's

Ethicalconsiderations

Participation was based on voluntary completion of the study questionnaire. Participant responses Owere treated confidentially and used for research purposes. Institutional Ethics Committee approvalHwas obtained prior to commencement of the study.

IV. RESULTS

Study participants: A total of 87 participants aged 18–30 years were included in the final analysis. The mean age was 24.0 ± 2.7 years, with a median age of 24 years and an age range of 18–30 years. There were 49 females(56.3%)and38males(43.7%).Mostparticipantswerefromurbanareas(51;58.6%),followedby semi-urban(22;25.3%)andrural(14;16.1%).Studentsconstituted64participants(73.6%),followedby

Table 1. Sociodemographic characteristics of study participants (N = 87)

1. Most participants were aged 18-24 years (62.1%) and female (56.3%).
2. The majority were urban residents (58.6%) and students (73.6%).

Characteristic	Category	n	%
Agegroup	18-24years	54	62.1
	25-30years	33	37.9
Sex	Female	49	56.3
	Male	38	43.7
Residence	Urban	51	58.6
	Semi-urban	22	25.3
	Rural	14	16.1
Occupation	Student	64	73.6
	Employed	18	20.7
	Other	5	5.7

Prevalence of premature greying

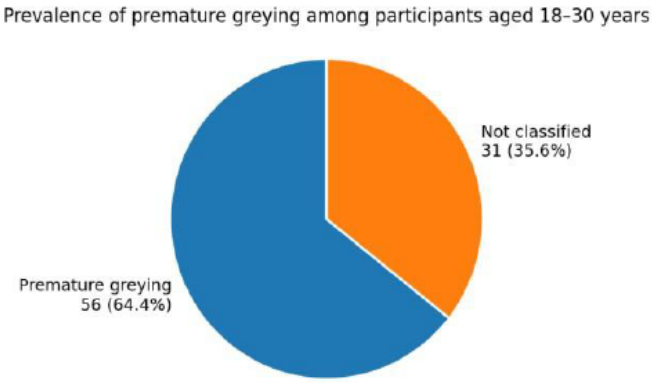
Of the 87 participants, 62 (71.3%) reported current grey/white hair, 16 (18.4%) reported no grey/white hair and 9 (10.3%) were unsure. Using the predefined operational definition, 56 participants (64.4%) were classified as having premature greying and 31 (35.6%) were not classified as having premature greying.

Table 2. Prevalence of current grey/white hair and premature greying (N = 87)

1. Current grey/white hair was reported by 62 participants (71.3%).
2. Premature greying was classified in 56 participants (64.4%).

Measure	Category	n	%
Currentgrey/whitehair	Yes	62	71.3
	No	16	18.4
	Notsure	9	10.3
Prematuregreying	Yes	56	64.4
	No/notclassified	31	35.6

Figure 1. Premature greying among participants aged 18-30 years



Association between lifestyle factors and premature greying

UsingPearson'schi-squaretestorFisher'sexacttest,asappropriate,sleepdurationwassignificantlyassociated with premature greying (p = 0.044), as was frequency of perceived stress (p = 0.026). Physical activity, tobacco use, alcohol use, heat-styling tools, chemical hair treatment and water hardness were not statistically significant (p > 0.05).

Table 3. Association between lifestyle factors and premature greying of hair

1. Sleepduration(p=0.044)andperceivedstress(p=0.026)showedstatisticallysignificantassociations.
2. Otherassessedlifestylefactorswerenotstatisticallysignificant(p>0.05).

Lifestylefactor	Category	Prematuregreyingn/N(%)	p-value
Sleepduration	<6 h	20/38(52.6%)	0.044
	≥6 h	36/49(73.5%)	
Perceivedstress	Never/rarely	7/17(41.2%)	0.026
	Moderate/high	49/70(70.0%)	
Physicalactivity	<3days/week	48/73(65.8%)	0.538
	≥3days/week	8/14(57.1%)	
Tobaccouse	Anyuse	4/6(66.7%)	1.000
	Nouse	52/81(64.2%)	
Alcoholuse	No	49/77(63.6%)	1.000
	Yes	7/10(70.0%)	
Heat-stylingtools	No	29/47(61.7%)	0.574
	Yes	27/40(67.5%)	
Chemicalhairtreatment	No	47/69(68.1%)	0.153
	Yes	9/18(50.0%)	
Waterhardness	Don't know	6/11(54.5%)	0.176
	Hard	40/56(71.4%)	
	Soft	10/20(50.0%)	

Association between dietary factors and premature greying

Frequencyoffruitconsumptionshowedastatisticallysignificantassociationwithprematuregreying(p= 0.049).
The other dietary factors assessed were not statistically significant (p > 0.05).

Table 4. Association between dietary factors and premature greying of hair

1. Fruitconsumptionwassignificantlyassociatedwithprematuregreying(p=0.049).
2. Theotherassesseddietaryfactorswerenotstatisticallysignificant(p>0.05).

Dietaryfactor	Category	Prematuregreyingn/N(%)	p-value
Meals/day	1-2	40/63(63.5%)	0.782
	≥3	16/24(66.7%)	
Greenleafyvegetables	<3/week	48/72(66.7%)	0.327
	≥3/week	8/15(53.3%)	
Fruits	<3/week	52/76(68.4%)	0.049
	≥3/week	4/11(36.4%)	
Pulses/beans/lentils	<3/week	48/71(67.6%)	0.184
	≥3/week	8/16(50.0%)	
Milk/dairyproducts	<3/week	43/64(67.2%)	0.360
	≥3/week	13/23(56.5%)	
Animal-proteinfoods	<3/week	49/75(65.3%)	0.638
	≥3/week	7/12(58.3%)	
Fastfood/junkfood	≤2/week	38/54(70.4%)	0.135
	≥3/week	18/33(54.5%)	
Skippingmeals	Never/rarely	23/34(67.6%)	0.609
	Sometimes/often	33/53(62.3%)	
Specialdiet	No	26/44(59.1%)	0.299
	Yes	30/43(69.8%)	
Vitamin/mineralsupplements	No	47/74(63.5%)	0.764
	Yes	9/13(69.2%)	

Table 4. Association between dietary factors and premature greying of hair (continued)

Dietaryfactor	Category	Prematuregreyingn/N(%)	p-value
Nutritionaldeficiency	Don'tknow	5/7(71.4%)	0.890
	No	41/65(63.1%)	
	Yes	10/15(66.7%)	

Table5.Statisticallysignificantassociationswithprematuregreying

Factor	Comparison	Prematuregreyingn/N(%)	p-value
Sleepduration	<6hvs≥6h	20/38(52.6%)vs36/49(73.5%)	0.044
Perceivedstress	Never/rarelyvsModerate/high	7/17(41.2%)vs49/70(70.0%)	0.026
Fruitconsumption	<3/weekvs≥3/week	52/76(68.4%)vs4/11(36.4%)	0.049

DISCUSSION

Premature graying of hair is considered a multifactorial phenomenon involving genetic, biological, nutritional and environmentalinfluences.[1,2]Theoperationaldefinitionusedinthisstudyisconsistentwithcommonlyuseddefinitionsfor Asian populations.3 Lifestyle factors,including smoking, havealso been investigatedin relation topremature hair graying

The observed prevalence in the present dataset is higher than the 27.3% reported in a community-based study conducted among 384 young adults aged 15–30 years in Srinagar, Uttarakhand.[5] Differences may relate to participant characteristics, sampling methods, outcome definitions and methods of assessment. The earlier study assessedgrayingthroughdirectscalpexamination,whereasthepresentstudyusedself-reportedquestionnairedata.[5]

Sleepdurationandperceivedstressweresignificantlyassociatedwithprematuregreyinginthepresentstudy.These findingsindicateassociationswithinthissampleanddonotestablishthatinadequatesleeporstresscausespremature greying.

Previous research has reported associations between premature graying and several lifestyle and medical factors, includingsmokingandlackofexercise.[4]Thepresentstudydidnotdemonstratestatisticallysignificantassociations with physical activity, tobacco use or alcohol consumption.

Frequency of fruit consumption was significantly associated with premature greying, whereas the other dietary factorsassessedwerenotstatisticallysignificant.Thisfindingshouldbeinterpretedcautiouslybecausethestudy relied on self-reported dietary frequency and did not include laboratory measurements of nutritional status.

Family history and genetic susceptibility are also important considerations. Previous Indian research has reported associationsbetweenfamilyhistoryandprematuregraying.[5]Thepresentanalysisdidnotusefamilyhistoryasone oftheprimarylifestyle/dietaryassociationtables,andthereforenoindependentconclusionregardingfamilyhistory is drawn here.

CONCLUSION

Premature greying was identified in 56 of 87 participants (64.4%) using the study's operational definition.

Current grey/white hair was reported by 62 participants (71.3%).

Sleep duration showed a statistically significant association with premature greying ($p = 0.044$).

Perceived stress was also significantly associated with premature greying ($p = 0.026$).

Frequencyoffruitconsumptionshowedastatisticallysignificantassociationwithprematuregreying($p=0.049$).

The other assessed lifestyle factors, including physical activity, tobacco use, alcohol use, heat-styling tools, chemical hairtreatment and water hardness, were not statistically significant.

Theotherassesseddietaryfactorswerealsonotstatisticallysignificant.

The findings highlight sleep duration, perceived stress and fruit-consumption frequency as factors associated with premature greying in this study sample.

Thesefindingssuggestthatsleepduration,perceivedstressandfruit-consumptionfrequencymayberelevantfactors associated with premature greying in this study population.

LIMITATIONS

1. Thestudyusedacross-sectionaldesign;therefore,causalrelationshipscannotbeestablished.

2. Thesamplesizewasrelativelysmall,althoughthefinalsampleof87exceededthecalculatedminimumof77.

3. Hairgrayingandlifestyle/dietaryfactorswereassessedusingself-reportedquestionnaireresponses.

4. The study did not include laboratory assessment of nutritional biomarkers, and the findings may not be generalizable beyond the study population.

FUNDING

Noexternalfundingwasreceivedforthisstudy.

CONFLICT OF INTEREST

Theauthorsdeclarenoconflictofinterest.

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