International Journal of Anatomy and Research,
Int J Anat Res 2017, Vol 5(4.3):4635-39. ISSN 2321-4287
DOI: https://dx.doi.org/10.16965/ijar.2017.323

Original Research Article

PREMATURE HAIR GRAYING: PROFILING THE SCALP ANATOMICAL PATTERNS OF OCCURRENCE IN TANZANIA

Afadhali D. Russa [1], Tumain Haonga [2], Venant F. Mboneko [3, 4].

[1] Department of Anatomy, School of Medicine, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania.

[2] Muhimbili National Hospital, Dar es Salaam Tanzania.

[3] Department of Anatomy, Hubert Kairuki Memorial University, Dar es Salaam, Tanzania.

[4] Mbezi Medical Clinic, Dar es Salaam, Tanzania.

ABSTRACT

Introduction: Premature hair graying (PHG) is a relatively common condition affecting up to 50% of the young people before age 30. Hair graying has adverse effects on self esteem, socio-cultural acceptance and may lead to social stigma and discrimination. Studies have linked PHG with a variety of underlying ill-health conditions such as myocardial infarction, cancer, osteopenia, stroke and cirrhosis. In Tanzania and indeed in Africa at large, PHG is rarely studied. The present study aimed to describe the pattern of onset and anatomical distribution of premature hair graying among the young adult sufferers.

Materials and Methods: This cross sectional study involved 75 participants with the age below 30 years who were selected among students from colleges and universities in Dar es Salaam and the Coast region in Tanzania. Participants were interviewed followed with scalp physical examination and findings filled in a data sheet. The frequency distributions were used to summarize descriptive data whereas for association data a p-value d" 0.05 was considered statistically significant.

Results: The mean and median age of onset was 14.4 years and 14 years respectively with women onset at a younger age than men. Nearly 3 out of every 4 participants reported to have a family member who had hair graying before the age of 30 years with more males (n=39; 75.0%) than females (n=16; 72.7%) reporting that fact. Only 28.0% had smoked for a period beyond one year while 30.7% had possible nutritional deficiencies during childhood. Over 70% participants reported some form of loss of self–esteem and 45.3% were worried of a possible underlying disease process. Over 90 % of respondents' perceived that people with PHG were older of their age while 58.7% believed they are diseased.

Conclusions: Premature hair graying clandestinely affects many young people occurring more in men than in women but with the latter sex developing it at a much younger age. The temporal and parietal scalp areas are the earliest affected and huge proportion of sufferers develops emotional and psychological effects. Due to limited treatment options new methods are needed to address it rising effects.

KEY WORDS: Premature, Hair, Graying, Pattern, Occurrence.

Address for Correspondence: Dr. A.D. Russa, Department of Anatomy, School of Medicine, Muhimbili University of Health and Allied Sciences, P. O. Box 65001, Dares Salaam, Tanzania. Tel: +255 755 524 771, Fax: +255 22 2150465 **E-Mail:** adrussa@yahoo.com; drussa@muhas.ac.tz

Access this Article online

Quick Response code

DOI: 10.16965/ijar.2017.323

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 01 Jul 2017
Peer Review: 04 Jul 2017
Revised: None

Accepted: 16 Aug 2017
Published (O): 01 Dec 2017
Published (P): 01 Dec 2017

INTRODUCTION

Cases of men and women developing gray hair at a young age are widespread. While this premature hair graying (PHG) may present with no

overt health effects, sufferers often report an enormous social and emotional burden [1, 2]. PHG is defined as the first appearance of several gray hairs before the age of 20 among Caucasians, 25 years among Asian races, 30 years among people of the black race or when an individual acquires 50% of gray scalp hair before age 50 year irrespective of the race [3]. Following the onset of PHG the graying tends to be progressive and permanent but spontaneous re-pigmentation in the early stages of canities can occur due to melanogenesis in the deactivated bulbar melanocytes [2]. The process leading to normal hair graying may include irreversible defects in the self renewal and/ or development of follicular melanocyte stem cells gradual decrease of melanin production in the affected hair follicle over time and a drop in the catalase enzyme which stops hydrogen peroxide from breaking down melanin [4]. Some studies have linked cases of PHG with a variety of metabolic and degenerative conditions such as myocardial infarction, cancer, osteopenia, stroke, cirrhosis of the liver and gut problems. The exact etiology and pathophysiology is unknown. But the role of genetics via autosomal dominant pattern, autoimmune disorders, smoking and trace element deficiencies have all been implicated [2, 5].

In the quest to search for preventable risk factors leading to or associated with PHG, some studies have proposed smoking and other forms of tobacco use, a positive family history, UV radiations and medical and illicit drugs as independent risk factors [6-8] while other studies contradict this view [9].

Hair plays a vital role in the physical appearance and identity and has a further covert role in social communication. Studies have shown that PHG has adverse effects on self–esteem, socio-cultural acceptance, appearance of the affected individual and other subtle social consequences [1, 2]. Extreme cases of PHG have been linked with social stigma, discrimination, difficulties in marriage, perception of one being older of their age and loss of health and vigor. With tendencies of low self esteem and social stigma, sufferers have opted for the use of hair colorants. While the onset, pattern and progression are random and diverse there are notable differences between and within gender and age categories. Studies have shown a sex dimorphic pattern of premature hair graying—with males depicting temporal scalp region initially followed by the vertex of the scalp while in women graying starts with the perimeter of the hair line and affecting all scalp regions equally [2]. Other studies reports different patterns of onset with men's first onset involving the temporal and occipital regions while women's initial onset involving the frontal region. In the quest to describe the occurrence of PHG, Jo and co-workers [10] proposed a numerical grading of five grades I to V at a 20% interval scale referring to 20, 40, 60, 80 and 100% of grayness while other studies have proposed a much more nominal grading of 1-5 representing pure black, predominantly black, equal black and white, predominantly white and pure white respectively [11]. Globally, PHG is on the rise and it has been shown to affect up to over 50% of the young people [8, 10]. In Tanzania and indeed the Africa continent at large, PHG is rarely studied. The present study aimed to describe the age of onset, the anatomical patterns of occurrence and scalp distribution of the premature hair graying among the young adults. We also aimed at establishing the major risk factors with particular emphasis on those which are avoidable and their health and social impact to the sufferers.

MATERIALS AND METHODS

This was a cross sectional study involving 75 participants with the age below 30 years who were selected among students from colleges and universities in Dar es Salaam and the Coast regions of Tanzania. Due the rarity of the trait being examined, sampling was an admixture of convenience and snow ball methods. Ethical clearance was obtained from the Muhimbili University of Health Ethical Committee. Only participants with gray hairs who volunteered to take part in the study were interviewed and their response filled in data sheet. Interviewing was followed by a physical inspection of the scalp to document the pattern, distribution and grade of distribution of gray hairs. Scalp regions were roughly approximated based on the natural suture joints of the flat bones of the skull. Canities or gray hairs falling along the boundary lines were considered ambiguous and hence excluded

from the recording. For consenting participants only, photographic images of the scalp were acquired and were assured that the photographic data would be used for research purposes only. During photographic imaging the participant's face were blinded for protection of identity. Data were collected using structured English questionnaires. All analyses were accomplished using IBM-SPSS (version 20). A p-value $\leq$ 0.05 was considered statistically significant.

RESULTS

Among the 75 respondents 52 (69.3%) were males and 23 (30.7%) were females. The overall age of the respondents at the time of survey ranged from 18 to 30 years. The mean and median age of onset was 14.4 years and 14 years respectively. Women had developed canities at a younger mean and median age of 11.5 +- and 12 years as compared to men's mean age of 15.7 years and median age of 15 years. About 1 in every 5 participants had developed gray hair by the age of 10 years several of which reporting to have been born with gray hair. Over 4 out of every 10 females (43.5%) who were surveyed had developed gray hair before age 10 as compared to 1 in every 10 (13.5%) males who reported early onset of hair graying before the age of 10 years. The sex dimorphic difference of age of onset was statistically significant (p=0.003). Most respondents reported the initial gray hair development to involve the parietal scalp (65.3%), followed by the temporal (44.0%), the frontal (26.7%), the occipital (22.7%) and a non-region specific (5.3%). The pattern of scalp regional graying development did not essentially differ between sexes but more males (75.5%) had hair graying initially involving the parietal areas than in the females whose regional graying patterns were mostly equally distributed all over the scalp regions. Unlike the self-reported pattern of hair graying, a physical examination result showed that more graying involved the parietal (46.7%), temporal (21.3%), occipital (10.7%) and frontal (2.7%) while 18.7% had gray hair widely distributed equally over all the scalp regions. According to the grading by Jo and and co-workers[10] about half of respondents (49.3%) had grade I hair graying followed by grade II (22.7%), grade III (10.7%), grade (IV 5.3%) and grade V (12.0%). Regarding the association with known risk factors, nearly 3 out of every 4 (73.3%) participants reported to have at least one family member who had hair graying before the age of 30 years with more males (n=39; 75.0%) than females (n=16; 72.7%) reporting that fact. Unlike a positive family history which had a higher association, only 21 respondents (28.0%) reported to have smoked for a considerable time beyond one year (actively or passively) with more males (n=16, 30.8%) than females (n=5; 22.7%) reporting that fact. Overall, 21 (30.7%) respondents reported to have had a possible malnutrition or nutritional deficiencies of vitamins and/or other essential nutrients based on their poor family income levels during their childhood. Again more males (n=18; 34.6%) reported this fact than the females (n=20.8%). Other self - reported risk behaviors included a sedentary lifestyle (28%), irrational use of medical drugs (17.3%), scalp infections (2.7%) and autoimmune disorders (2.7%). More females (n=9; 39.1%) reported to have had history of a sedentary lifestyle as compared to their male counterparts (n=12; 23.1%). Nearly a third (29.3%) of participants were not satisfied with their body outlook with 40.0% feeling less attractive and 30.7% being perceived by peers as looking older of their age. Over 7 out of every 10 (70.7%) participants reported some form of loss of self–esteem, 45.3% are worried there might be an underlying disease process associated with their PHG, 14.7% lack confidence in social events and 5.3% tend to become socially anxious. Regarding the community perception, 93.3% of interviewee's perceived people with PHG as being older of their age while 58.7% perceived them as being diseased. Regarding the coping strategies, 41.3% uses hair colorants and 38.7% regularly shave their hairs very low whereas only 20.0% do no manipulations with their hair. Predominantly females (78.3%) use hair colorants while more males (53.8%) shave their hairs as means of coping with PHG.

DISCUSSION

We have shown that the premature hair graying in Tanzania occur at a mean age of 14.4 years among the affected people. Our findings are comparable with previous reports in which the

mean age of onset was 11.6 years to 15.5 years [12, 13]. In our study, females tended to develop gray hair at a relatively younger age (11.5 years) than the males—which contradicts with previous findings in which no age predilection was observed [13]. In the present study, the proportion of females who developed gray hair before the age of 10 was four fold higher than that of males. While the apparent sexual dimorphism in regard to the age of onset is still debatable [13], these differences may entail a possibility of a sex-linked or polygenic pattern of genetic inheritance of the trait. However, other studies have proposed an outosomal dominant genetic pattern of inheritance [2]. The spatial scalp distribution of graying onset involved the parietal regions than other regions. This spatial pattern was previously reported [10] while other researchers have noted the frontal region as the most predominantly affected initially [12].

The distribution of canities based on the physical inspection of the scalp did not differ with those obtained via questionnaire self-reported findings—which affirms the reliability of the two approaches to the hair graying assessment. The actual reasons for scalp region-specific predilection of canities have not been discerned but all possibilities point to the genetic factors more than those of environmental origin. In agreement with previous studies, individuals with grossly visible gray hair normally falling into grade III-V, constituted less than 30%. This is a group that normally resorted to camouflage methods such as the use of hair colorants, dyeing and low hair shaving. Females resorted to hair dyeing than males while the later tended to shave their hair to very low levels. Continual use of hair colorants have been reported to cause dermatitis, scalp infections and even some forms of cancer. New and effective methods such as hair transplanting are being used with logistical and technical limitations [14].

Consistent with previous reports, a positive family history was the strongest predictor of PHG [7, 13]. Childhood malnutrition was the second most reported risk factor common among the sufferers. This finding has not been previously reported and hence might provide more clues on the risk factors and pathogenesis of PGH. In agreement with previous reports, behaviors such as smoking and sedentary life style were reported by a huge proportion of participants [8, 15, 16] whereas some other studies established a weak association or no association at all [17]. The consequential psychological effects to the sufferers were enormous among the participants of the present study. Loss of self-esteem and worries over a possibility of worse underlying metabolic conditions such as diabetes cholesterolemia, coronary artery disease and osteopenia affected a huge number of the participants. Several studies have reported results that indicate a putative association between PHG and other hidden ill-health conditions [1, 11, 18, 19] whereas other findings have disputed this view [9, 17]. This equivocal hypothesis of PHG as ill-health indicator calls for the need of more studies in order to devise possible preventative approaches if a positive association is firmly established. In the present study there was a huge societal misconception that gray hair sufferers were older of their age. Similar findings were reported previously [17]. This fact has been reported to have a far-reaching effect to the sufferers in the society from social stigma to difficulties in getting spouses and marriage [2]. Consistent with previous reports, there is a huge misconception of PHG-affected individuals as having active and health underlying threatening diseases. Psychologically all these misperceptions add up to a reduced quality of life among the affected people. Due to limited conventional treatment options newer approaches such autologous hair transplantations should be strengthened through translational research and made widely accessible in clinical setups.

CONCLUSION

Premature hair graying clandestinely affects many young people occurring more in men than in women but with the latter sex developing it at a much younger age. The temporal and parietal scalp areas are the earliest affected and huge proportion of PHG sufferers develops silent emotional and psychological effects. Due to limited treatment options new methods are needed to address it rising effects.

ABBREVIATIONS

PHG - Premature hair graying

ACKNOWLEDGEMENTS

We are profoundly grateful to the students from the following Institutions in the Dar es Salaam and Cost Regions of Tanzania who participated in this study and from whom data and information were obtained: Ardhi University, Bagomoyo Nurses Training College, Dar es Salaam Institute of Technology, Dar es Salaam University College of Education, Institute of Finance Management, International Medical and University, Kibaha Clinical Officers Training College, Lugalo Clinical Officers Training College, Muhimbili University of Health and Allied Sciences, National Institute of Transport, Tanzania Institute of Accountancy and University of Dar e s Salaam.

Conflicts of Interests: None

REFERENCES

[1]. Akin Belli A, Etgu F, Ozbas Gok S, Kara B, Dogan G. Risk Factors for Premature Hair Graying in Young Turkish Adults. Pediatr Dermatol 2016;33(4):438-442.

[2]. Pandhi D, Khanna D. Premature graying of hair. Indian J Dermatol Venereol Leprol 2013;79(5):641-653.

[3]. Tobin DJ PR. Gerontobiology of the hair follicle pigmentary unit. Gerontology 2001;36:29-54

[4]. Endou M AH, Kobayashi T, Kunisada T. Prevention of hair graying by factors that promote the growth and differentiation of melanocytes. Journal of Dermatology 2014;41(8):716-723.

[5]. Bhat RM, Sharma R, Pinto AC, Dandekeri S, Martis J. Epidemiological and investigative study of premature graying of hair in higher secondary and pre-university school children. Int J Trichology 2013;5(1):17-21.

[6]. McDonough PH, Schwartz RA. Premature hair graying. Cutis 2012;89(4):161-165.

[7]. Shin H, Ryu HH, Yoon J, Jo S, Jang S, Choi M, Kwon O, Jo SJ. Association of premature hair graying with family history, smoking, and obesity: a cross-sectional study. J Am Acad Dermatol 2015;72(2):321-327.

[8]. Zayed AA, Shahait AD, Ayoub MN, Yousef AM. Smokers' hair: Does smoking cause premature hair graying? Indian Dermatol Online J 2013;4(2):90-92.

[9]. Glasser M. Is early onset of gray hair a risk factor? Med Hypotheses 1991;36(4):404-411.

[10]. Jo SJ PS, Choi JW, Lee JH, Cho S, Kim KH, Eun HC, Kwon OS. Hair graying pattern depends on gender, onset age and smoking habits. Acta Derm Venereol 2012;92(2):160-161.

[11]. Kocaman SA, Cetin M, Durakoglugil ME, Erdogan T, Canga A, Cicek Y, Dogan S, Sahin I, Satiroglu O, Bostan M. The degree of premature hair graying as an independent risk marker for coronary artery disease: a predictor of biological age rather than chronological age. Anadolu Kardiyol Derg 2012;12(6):457-463.

[12]. Daulatabad D, Singal A, Grover C, Chhillar N. Profile of Indian patients with premature canities. Indian J Dermatol Venereol Leprol 2016;82(2):169-172.

[13]. Fatemi Naieni F, Ebrahimi B, Vakilian HR, Shahmoradi Z. Serum iron, zinc, and copper concentration in premature graying of hair. Biol Trace Elem Res 2013;146(1):30-34.

[14]. Trueb RM. Aging of hair. J Cosmet Dermatol 2005; 4(2):60-72.

[15]. Chakrabarty S, Krishnappa PG, Gowda DG, Hiremath J. Factors Associated with Premature Hair Graying in a Young Indian Population. Int J Trichology 2016;8(1):11-14.

[16]. Choi JW, Lew BL, Sim WY. A Case of Premature Hair Graying Treated with Ferrous Sulfate. Ann Dermatol 2016;28(6):775-776.

[17]. Gould L, Reddy CV, Oh KC, Kim SG, Becker W. Premature hair graying: a probable coronary risk factor. Angiology 1978;29(11):800-803.

[18]. Aggarwal A, Srivastava S, Agarwal MP, Dwivedi S. Premature Graying of Hair: An Independent Risk Marker for Coronary Artery Disease in Smokers - A Retrospective Case Control Study. Ethiop J Health Sci 2015;25(2):123-128.

[19]. Rosen CJ, Holick MF, Millard PS. Premature graying of hair is a risk marker for osteopenia. J Clin Endocrinol Metab 1994;79(3):854-857.

How to cite this article:

Afadhali D. Russa, Tumain Haonga, Venant F. Mboneko. PREMATURE HAIR GRAYING: PROFILING THE SCALP ANATOMICAL PATTERNS OF OCCURRENCE IN TANZANIA. Int J Anat Res 2017;5(4.3):4635-4639. **DOI:** 10.16965/ijar.2017.323