Hair Graying Pattern Depends on Gender, Onset Age and Smoking Habits

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Gray hair is a conspicuous sign of ageing (1, 2). It is known to usually occur in the fourth decade regardless of gender (1, 3–6), but the age at onset varies from one person to the next. Based on the strong association between ageing and hair graying, it has been asked whether gray hair is a manifestation of the general ageing process of individual, and whether people that appear to be old for age have a shorter life span. However, some previous studies suggest that it does not (7–9). In addition, although several reports have indicated that premature hair graying may be associated with some medical problems (10–14), we know that premature graying predominantly occurs in people without any severe disease.

Then if early-onset graying does not mean biological ageing, a shorter life span or unhealthy condition, what are the differences between individuals with an early or a late onset? Moreover, we suspected that men and women are likely to show clinical differences in hair graying, based on our clinical experiences. However, little is known about the clinical characteristics of hair graying, especially its dependences on age at onset and gender.

In this study, we investigated the prevalence of gray hair in a Korean population using a questionnaire and by physical examination.

METHODS

This study was approved by the institutional review board of SNUH (IRB No. H-0912-059-304). A total of 1,002 subjects were initially recruited at two dermatologic outpatient clinics and completed the questionnaire, in which subjects were asked whether they had gray hair or not. Subjects that believed they had gray hair estimated the extent of grayness by themselves as follows; grade 1 (less than 20% of total hair), grade 2 (20~40%), grade 3 (40~60%), grade 4 (60~80%), and grade 5 (more than 80%). Demographic data, the presence of a medical problem, family history, parameters on lifestyle, such as smoking and drinking behaviors, and information on hair graying, such as age at onset, the initially involved site, currently involved sites, and hair dyeing were also surveyed. Subjects with a smoking history of more than 3 pack-years and those who drank alcohol more than three times a week were regarded as smokers and drinkers, respectively.

After excluding subjects who declined hair examination or had dyed their scalp hair, involved scalp areas and extent of grayness were evaluated in the remaining 576 subjects by trained investigators. Extent of grayness was assessed with a photographic scale showing increasing reference degrees of graying (grade 1 to 5 as described above).

The statistical analyses were performed using SPSS version 17.0 (SPSS Inc, Chicago, IL), and p-values of < 0.05 were considered significant. Unanswered items in questionnaires were regarded as missing values. The Chi-square test for nominal variables and the student's *t*-test for continuous variables were used to identify significant differences with respect to gender, age, and age at onset. The risk factors of graying were sought by multivariate logistic regression analysis.

RESULTS

A total of 522 men and 480 women were recruited and ages ranged between 12 and 91 years. According to questionnaire responses, the prevalence of gray hair by age was 51.5% in their thirties, 81.1% in their forties, and 95.3% in their fifties. Among the subjects over 50 years old with gray hair, 72.5% thought that their grayness was of $\geq$ grade 2, whereas 85.9% of the subjects below 40 years thought it to be grade 1. Similar findings were also observed in the investigator's examination.

An analysis of questionnaire responses revealed that the temporal area was significantly more involved in men than in women whereas the frontal and parietal areas were affected more in women. Interestingly, according to the investigator's examination results, the temporal and occipital involvements were significantly more common in men than in women (Fig. 1).

In our study population, average overall age at onset of hair graying was 41.6 ± 13.1 years. Age at onset for men (40.8 ± 14.1) was similar to that of women (42.4 ± 11.9). However, concerning scalp regions initially involved, a significant difference was observed. That is, gray hair first appeared in the temporal area (60.6%) in men, but in the frontal (38.6%), temporal (31.0%) or parietal area (22.0%) in women ($p < 0.001$).

We classified 607 subjects with gray hair into an early-onset (228, 37.6%) or a late-onset group (379, 62.4%) based on age at onset of < or $\geq$ 40 years. When analyzing initially involved areas by onset age, the subjects with a parietal or occipital area involvement at onset composed a larger proportion of the early-onset group (38.5%) than the late-onset group (17.8%) ($p < 0.001$). As regards the relationship between the duration and the extent of grayness, it took longer duration for subjects in the early-onset group to reach grade 5 than those in the late-onset group (Fig. 2). The mean time for the whole population was 26.7 years.

Multivariate logistic linear regression analysis showed that age and smoking behavior were significantly correlated with hair graying. The risk of hair graying increased by 14.9% each year ($p < 0.001$) and the risk in smokers was 1.99 times higher than that in non-smokers ($p = 0.008$). In contrast, gender, drinking history, hair loss, a history of a skin disease of the scalp, and a concurrent medical disease were not significantly correlated with graying.
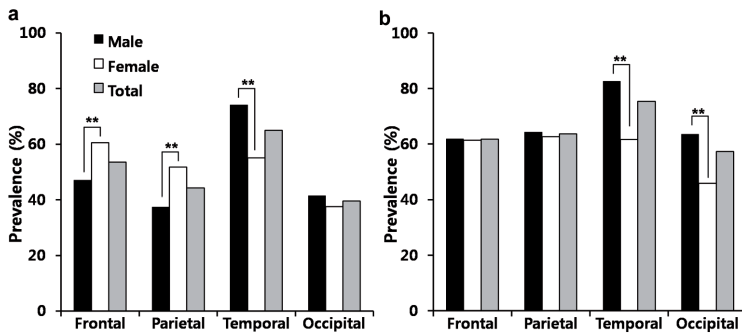
Fig . 1. Prevalence of gray hair in the scalp regions according to (a) questionnaire responses and (b) investigator's examination results (**$p < 0.01$).

DISCUSSION

The present study confirmed that the incidence of graying was similar for men and women and the usual age at onset was around 40 years as has been previously reported (3, 5). Interestingly, we found that some clinical features of hair graying were different between men and women or early- and late-onset groups. Firstly, temporal and occipital areas were more commonly involved in men than in women. Secondly, graying usually started in the temporal area in men but in the frontal area in women. Lastly, initially involved scalp regions were also different depending on onset-age; that is, parietal or occipital area was more involved at onset in early-onset group whereas frontal area was more involved initially in late-onset group.

Early onset did not mean faster progress. Rather, the extent of grayness sharply increased after the fifth decade regardless of age at onset. In addition, smoking was found to be significantly correlated with hair graying as reported previously (15).

All subjects in our study were Koreans whose original hair color is near black. This homogeneity of original hair color in the study population was advantageous, as gray hair stood out against a dark background, which simplified the grading process.

In this study, data were obtained using two methods, a questionnaire and a series of reference photographic

scale. A questionnaire provided a straightforward means of collecting data and allowed the recruitment of more subjects, but the recall and detection biases would be unavoidable. Actually, regional prevalence assessed using questionnaires were lower than those determined by the investigators, which suggests detection bias of questionnaire. On the other hand, investigator-based assessments might cause selective enrollment because the use of hair colorants was more common among women, elders, and subjects with severe graying. Further study using objective methods such as dermoscopy and phototrichogram is needed for precise assessment for hair graying.

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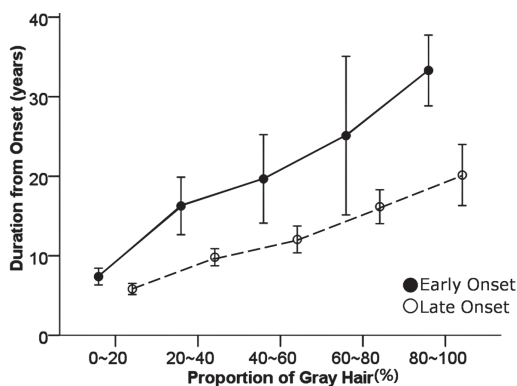

Fig. 2. The relationship between duration of development and extent of grayness by onset-age. Error Bars: 95% CI.