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ORIGINAL ARTICLE

Assessment of semen quality in patients with androgenetic alopecia in an infertility clinic

Emre Sinan Güngör [1], Şule Güngör [2, *], Ali Galip Zebitay [1]

[1] Süleymaniye Training and Research Hospital, Obstetrics and Gynecology, Istanbul, Turkey
[2] Okmeydanı Training and Research Hospital, Dermatology, Istanbul, Turkey

A B S T R A C T

Background: Androgenetic alopecia (AGA) is a common cause of hair loss in men. It is associated with the risk of cardiovascular disease and metabolic syndrome. Additionally, it is suggested that premature AGA could be considered equivalent to that of polycystic ovary syndrome in women.
Objective: The aim of this study was to examine the relation between AGA and the quality of semen.
Methods: The semen specimens were collected from 203 young adult men included in the study. AGA was classified according to the Hamilton baldness scale, modified by Norwood. All participants were classified into two categories: normal to mild AGA (equivalent to Norwood types I−II) as Group I and moderate to severe AGA (equivalent to Norwood types III−VII) as Group II to assess the difference in the quality of sperms between the two groups.
Results: There were no statistically significant differences in the men's age and body mass index scores among the groups. For both Groups I and II, the history of smoking and varicocele was not statistically different ($p = 0.62$ and $p = 0.11$, respectively). All parameters of sperm including volume, density, motility, and morphology were significantly lower in participants with moderate to severe AGA than those with normal to mild AGA ($p < 0.01$, $p < 0.01$, $p < 0.01$, and $p < 0.01$, respectively).
Conclusion: This study showed that young adult men with moderate to severe AGA have poor quality of semen compared with those who have normal to mild AGA.

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Introduction

Infertility is reported in 10−15% of couples attempting to conceive during their reproductive life span. A male factor is identified in 40−60% of these couples and is the sole etiology in 20% of all couples seeking assistance for infertility.[1] In a considerable number of men with abnormal semen characteristics, the etiology is unexplained and may involve unknown environmental factors.[2] One of the main laboratory tests for evaluation of infertility is semen analysis (SA).

Androgenetic alopecia (AGA) is a common cause of hair loss in men. Numerous studies in recent decades have associated male AGA with the risk of cardiovascular disease and metabolic syndrome (MS).[3−7] In addition, some studies have inferred that premature baldness prior to the age of 30 in men could be considered equivalent to that of polycystic ovary syndrome (PCOS) in women.[8] Narad et al[9] and Arias-Santiago et al[10] reported decreased levels of sex hormone-binding globulin (SHBG) in men with premature AGA. We expect that if premature AGA is associated with these systemic diseases and changes in the hormone profile, it might also be related to the quality of semen. Hence, the aim of this study was to investigate the relation between AGA and the quality of sperm.

Materials and methods

Participants

The study population consisted of healthy young adult males among the couples visiting the infertility clinic between October 2012 and December 2013. Participants who did not provide a semen sample or those with a history of vasectomy, cryptorchism,

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* Corresponding author. Dermatology Department, Okmeydanı Hospital, Darüllacize Street, Şişli, Istanbul, Turkey.
E-mail address: drsulegungor@yahoo.com (Ş. Güngör).

history of radiation, chemotherapy, infections, sexual dysfunction, and endocrine hypogonadism were excluded from the study. The cigarette smoking status and body mass index (BMI) values of participants were recorded. Those with a history of medications especially of finasteride and dutasteride were excluded from the study. A total of 203 men were included in the study, and semen specimens were collected from these individuals.

Assessment of AGA

AGA was classified according to the Hamilton baldness scale, as modified by Norwood.[11] All participants were classified into two categories—normal to mild AGA (equivalent to Norwood types I−II) as Group I and moderate to severe AGA (equivalent to Norwood types III−VII) as Group II—to assess the difference in the quality of sperm among the two groups.

Approval by the institutional review board was not necessary for this study in our clinic because all the analyses described in this study were part of the routine infertility investigation; in addition, the men were only evaluated for their AGA status with physical examination during the interview with the couples. However, informed consent was obtained from each of the patients with respect to these clinical examinations in this study.

Semen samples were collected by ejaculation into special sterile plastic containers after 2 to 7 days of sexual abstinence. SA was performed within 2 hours of collection of the semen specimens.

SA

SA consisted of determination of sample volume, sperm density, progressive motility, and morphology. Standard clinical SA was performed according to World Health Organization criteria.[12] Ejaculate volumes were estimated by the weight of the specimen, assuming a semen density of 1.0 g/mL. Sperm concentration was evaluated using a hemocytometer (Improved Neubauer; Hauser Scientific, Inc., Horsham, PA, USA). Motility was analyzed using the World Health Organization 1999 criteria and classified as both progressive (A + B) and total (A + B + C). Sperm abnormal forms were examined according to Kruger's strict criteria.[13]

Statistical analysis

The primary outcomes of interest in this study were semen volume, sperm concentration, motility percentage, and normal morphology percentage. Covariates considered in the analysis were age, cigarette use, and BMI.

Average, standard deviation, median, lowest, highest, rate and frequency values were used for the descriptive statistics of the data. Distribution of the variables was analyzed using the Kolmogorov−Smirnov test. Quantitative data were analyzed using the Mann−Whitney U test. Qualitative data were analyzed using the chi-square test; when conditions for the chi-square test were not satisfied, Fischer's exact test was used. A value of $p < 0.05$ was considered statistically significant. All statistical analyses were performed using SPSS 22.0 for Windows (SPSS Inc., Chicago, IL, USA).

Results

Table 1 shows some of the demographic characteristics of the participants. No statistically significant difference was found for the men's age and BMI scores within the groups. In Groups I and II, cigarette smoking and varicocele history were not statistically significant ($p < 0.62$ and $p < 0.11$, respectively).

Table 1 Demographic characteristics of Group I (normal−mild AGA) and Group II (moderate−severe AGA).

		Group I ($n = 115$)	Group II ($n = 85$)	p
		Mean	Mean	
Age		31.8 ± 5.6	31.9 ± 5.9	>0.05
BMI		26.0 ± 3.3	25.8 ± 3.1	>0.05
Smoking	+	46 → 36.5%	30 → 40%	>0.05
	−	80 → 63.5%	45 → 60%	>0.05

AGA = androgenetic alopecia; BMI = body mass index.

Figure 1 shows that the participants with moderate to severe AGA had significantly lower sperm counts than those in the normal to mild AGA group ($p < 0.0001$). All sperm parameters were significantly worse in participants with moderate to severe AGA compared with those of the normal to mild AGA group. Sperm volume, density, motility, and morphology were significantly lower or poor in participants with moderate to severe AGA than those in normal to mild AGA group (Table 2) ($p = 0.002$, $p < 0.01$, $p < 0.01$, and $p < 0.01$, respectively).

Figures 2 and 3 illustrate the significantly worse sperm motility and morphology in moderate to severe AGA group ($p < 0.01$ and $p < 0.01$, respectively).

Discussion

Because all of the included participants were from infertile couples, this appears to be a limitation of the study at first glance. However, as the control group (men without AGA or mild AGA) of the study also comprises participants from infertile couples of the same population, we believe that this fact would not have influenced the results of the study. Moreover, as the severity of AGA increases with advancing age, this does not have an influence on the results, because both groups in this study share similar mean ages.

This study showed that young adult men with moderate to severe AGA, according to the Hamilton baldness scale, have poor semen quality compared with those with normal hair status. Previous studies on semen quality showed that decreased levels of
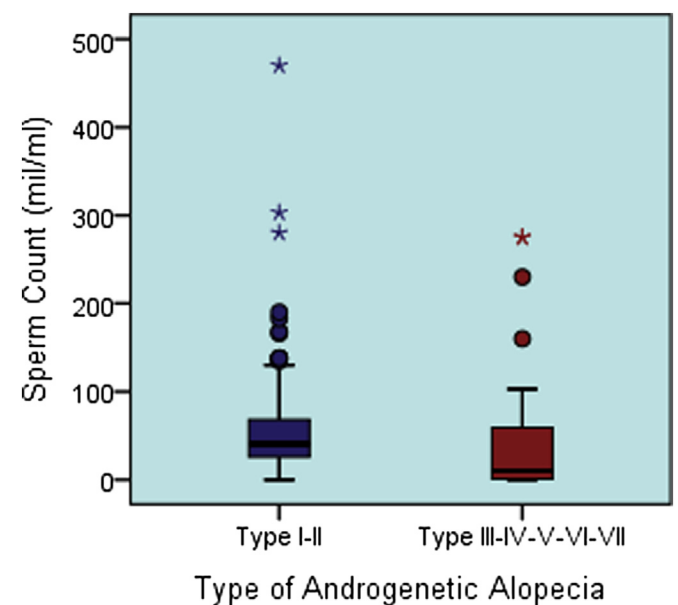

Figure 1 Participants with moderate−severe AGA (Hamilton III−VII) having significantly lower sperm count than normal−mild AGA (Hamilton I−II). AGA = androgenetic alopecia.