Prevalence of low androgen levels among middle and old age men attending Outpatient Clinics

Original Article

Taha Abdelnaser[1], Dina El Gayar[2], Islam F. Soliman Abddelrahmana[1], Ramy Taher[3]

[1]Departments of Andrology, [2]Clinical and Chemical Pathology, Faculty of Medicine, Cairo University, Cairo

[3]Ministry of Health Hospitals, Egypt, Cairo

ABSTRACT

Introduction: Tiredness is a common symptom of hypogonadism, which can be profound, but there are many medical practitioners who do not include the assessment of testosterone levels in the clinical workup of this symptom. Although male hypogonadism is an established clinical condition, which can be treated, many men experiencing it are undiagnosed.

Aim: The aim was to assess the prevalence of low androgen level among middle and old age men in a cohort of patients attending Kasr Elaini hospital outpatient clinics.

Patients and Methods: A total of 265 male patients older than 40 years attending the outpatient clinics in different specialty were included. All included men were subjected to full history taking and complete general and local examinations. All participants were interviewed personally face to face using Arabic generic version of full aging male scale (AMS) questionnaire. Venous blood samples were withdrawn between 8 and 10 a.m. after a 12-h overnight fast for measurements of total and free testosterone levels.

Results: The mean total testosterone level was 4.0 ± 2.6 ng/ml, ranging from 0.4 to 16.4 ng/ml. The mean free testosterone level was 6.9 ± 2.4 pg/ml, with range between 1.4 and 18.5 pg/ml. Low androgen level was founded in 19.2% of the participants based on total testosterone and in 36.2% when adding the participants with low free testosterone levels. AMS score showed statistically significant difference between age groups (*P<0.001*). Age is negatively correlated with total and free testosterone levels (r=-0.226 and -0.242, respectively), but the correlation is weak. Total testosterone level shows strong positive correlation with free testosterone level and weak negative correlation with AMS score (r=0.732 and -0.240, respectively).

Conclusion: The prevalence of hypogonadism among middle and old age males seeking medical consultation in different specialties may be high.

Key Words: Hypogonadism, low androgen, middle and old age, testosterone

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Corresponding Author: Islam F. S. Abdelrahman, MD, MRCS, FECSM, FEAA, Department of Andrology, Faculty of Medicine, Cairo University, Cairo, Egypt, **Zip Code:**11553, **Tel.:**+201004244360, **Fax:**+202236879, **E-mail:** islamandrology@yahoo.com

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INTRODUCTION

Although male hypogonadism is an established clinical condition, which can be treated, many men experiencing it are undiagnosed. There are several reasons for this, which include a lack of general clinical awareness, the nonspecificity of its symptoms, biochemical tests that are not always easy to interpret, concerns over the safety of testosterone replacement therapy especially in older men, and the false perception that testosterone is a sex hormone that has no other specific health benefits. Tiredness is a common symptom of hypogonadism, which can be profound, but there are many medical practitioners who do not include the assessment of testosterone levels in the clinical workup of this symptom. Hypogonadism impairs well-being and quality of life and puts relationships and employment at risk[1,2].

AIM

The aim was to assess the prevalence of low androgen level among middle and old age men in a cohort of patients attending Kasr Elaini hospital outpatient clinics.

MATERIALS AND METHODS

This study was carried out on 265 male patients older than 40 years attending the outpatient clinics in different specialties of Kasr El Aini Hospital, Cairo University, after obtaining the approval from the Andrology Department

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ethical committee. Males younger than 40 years or with history of puberty disorder, patients with hypogonadism on androgen replacement therapy, as well as patients with known history of prostatic cancer who received antiandrogen all were excluded from the study. All included men were subjected to full history taking and complete general and local examinations. All participants were interviewed personally face to face using Arabic generic language to full aging male scale (AMS) questionnaire, which was originally developed in Germany in 1999. The summation of the response points of the participants started from below 26 and higher. The higher the score, the more impairment is present. It is classified into no impairment with score less than 26, little impairment with score ranging from 27 to 36, moderate impairment with score ranging from 37 to 49, and severe impairment with scores more than 50[3].

Venous blood samples were withdrawn from all participants between 8 and 10 a.m. after a 12-h overnight fast for measurements of total and free testosterone levels. Total and free testosterone hormone assays were performed in the Chemical Pathology Department at the Cairo University Medical School (Kasr El Aini). Total and free testosterone levels were measured by radio immunoassay kit supplied by DIA source Immunoassays S.A. (Belgium), Ottignies-Louvain-la-Neuve, Belgium DIAsource is the company name and read using Cobra II Auto-Gamma counter. Regarding hypogonadism, reference values for total testosterone level was less than or equal to 230 ng/dl or less than or equal to 2.3 ng/ml[4]. For the free testosterone level, the reference range was obtained from radio immunoassay kit, with reference range of less than or equal to 6.1 pg/ml in males less than 60 years old and less than or equal to 5 pg/ml in males more than 60 years old.

RESULTS

The characteristic data of the included participants in the study, including age, residency, BMI, smoking, erectile dysfunction, and comorbidity, are shown in Table 1.

Hormonal levels among participants, AMS scores, and their classification are represented in Table 2. As shown in Table 2, the mean total testosterone level was 4.0 ± 2.6 ng/ml, ranging from 0.4 to 16.4 ng/ml. The mean free testosterone level was 6.9 ± 2.4 pg/ml, with range between 1.4 and 18.5 pg/ml. Low androgen level was found in 19.2% of the participants based on the total testosterone level and in 36.2% when individuals with low free testosterone level were added. AMS score was 35.9 ± 6.1 and ranged from 17.0-52.0. Normal participants represented 6.8%, whereas those with low and moderate impairments were comparable at 45.3 and 47.9%, respectively. These results indicated high prevalence of androgen deficiency among middle age and old age patients attending the outpatient clinics.

Linear correlations between different numeric variables of the study are shown in Table 3.

Age is negatively correlated with total and free testosterone levels (r=-0.226 and -0.242, respectively), but the correlation is weak. However, it is positively correlated with AMS score (r=0.405). Total testosterone level shows strong positive correlation with free testosterone and weak negative correlation with AMS score (r=0.732 and -0.240, respectively).

The participants are grouped according to their age into three groups: group 1 (40-49 years), group 2 (50-59 years), and group 3 (≥60 years).

All groups were comparable regarding BMI (*P>0.05*). AMS score was statistically significant (*P<0.001*). The younger age has higher percentage of no impairment (15.3%), as shown in Table 4.

In Table 4, AMS score showed statistically significant difference between age groups (*P<0.001*). Moderate impairment was lower (16.9%) in young age (40-49 years) compared with 51.8 and 62.1% in age groups 50-59 and ≥60, respectively; all groups were significantly different from each other.

Comparison between different age groups regarding both total and free testosterone levels showed that there is a statistically significant difference between groups, as both total and free testosterone levels decrease with age (Table 5).

The prevalence of low androgen levels (either low total testosterone or free testosterone or both) in different age groups is presented in Table 6. It showed no statistical significant difference.

Table 1: Characteristics of participants in the study (n=265)

	Number (%)
Residence	153 (57.7)
Urban	112 (42.3)

▒Rural		
Age (years)		65.3 ± 8.5[a] (40–83[b])
▒Mean± SD		
Anthropometric measures		
▒Weight (kg)		85.2±14.9[a] (50–130[b])
▒Height (cm)		168.4±7.6[a] (150–197[b])
▒WC (cm)		98.0±15.6[a] (63–192[b])
▒BMI (kg/m2)		29.9±5.3[a] (19.3–58[b])
BMI classifications		
▒Overweight	83 (31.3)	
▒Obese	131 (49.4)	
▒Normal	51 (19.2)	
Smokers		
▒Yes	158 (59.6)	
Smoking type		
▒Cigarettes	112 (70.9)	
▒Shisha	46 (29.1)	
ED		
▒Yes	191 (72.1)	
Comorbidity		
▒CVS	29 (10.9)	
▒Medical CNS	1 (0.4)	
▒HTN	36 (13.6)	

[a]Data presented as mean±SD.
[b]Range of data.
CVS, cardiovascular diseases; DM, diabetes mellitus; ED, erectile dysfunction; HTN, hypertension; WC, waist circumference.

Table 2: Hormonal score levels and their classification in the studied participants (n=265)

	Mean±SD	Minimum–maximum
Total testosterone	4.0±2.6 ng/ml	0.4–16.4
Free testosterone	6.9±2.4 pg/ml	1.4–18.5
AMS score	35.9±6.1	17–52
AMS score [n (%)]		
▒No impairment	18 (6.8)	
▒Little	120 (45.3)	
▒Moderate	127 (47.9)	
Low free testosterone [n (%)]	96 (36.2)	
Low total testosterone [n (%)]	51 (19.2)	

AMS, aging male scale.

Table 3: Correlation between different study variables (n=265)

	R		*P value*
Age			
▒BMI	-0.012	0.844	NS
▒Total testosterone	-0.226	<0.001	Weak negative
▒Free testosterone	-0.242	<0.001	Weak negative
▒Score	0.405	<0.001	Weak positive
BMI			
▒Total testosterone	-0.014	0.827	NS
▒Free testosterone	-0.084	0.174	NS
▒Score	-0.045	0.469	NS
Total testosterone			
▒Free testosterone	0.732	<0.001	Strong positive
▒Score	-0.240	<0.001	Weak negative
Free testosterone			
▒Score	-0.210	0.001	Weak negative

P≤0.05 is significant.
r, correlation coefficient.

Table 4: BMI categories, aging male scale score, and low free androgen in relation to different age groups (n=265)

	Age groups [n (%)]			
	40-49 (n=59)	50-59 (n=110)	≥60 (n=96)	*P value*
BMI				
▒Overweight	20 (33.9)	31 (28.2)	32 (33.3)	0.907
▒Obese	29 (49.2)	56 (50.9)	46 (47.9)	
▒Normal	10 (16.9)	23 (20.9)	18 (18.8)	
AMS Score[a]				
▒No impairment	9 (15.3)	4 (3.6)	5 (5.3)	<0.001
▒Little	40 (67.8)	49 (44.5)	31 (32.6)	
▒Moderate	10 (16.9)	57 (51.8)	59 (62.1)	

P≤0.05 is significant.
[a]All groups are significantly different from each other.

Table 5: Total testosterone and free testosterone levels (mean± SD) in relation to different age groups (n=265)

	Age groups						
	40-49 (n=59)		50–59 (n=110)		≥60 (n=96)		
	Mean	SD	Mean	SD	Mean	SD	*P value*
Total testosterone	4.8	2.1[a]	5.2	2.9[b]	3.6	2.2[a-b]	<0.001
Free testosterone	7.6	2.1[a]	7.4	2.6[b]	6.1	2.2[a-b]	<0.001

P≤0.05 is significant, similar letters indicate statistical significant difference.
*All groups are significantly different from each other.

Table 6: Comparison between different age groups according to prevalence of low androgen levels

Age groups				
	40-49 (n=59)	50-59 (n=110)	≥60 (n=96)	*P value*
Low androgen	19/59 (32.2%)	47/110 (42.7%)	37/96 (38.5%)	0.407

DISCUSSION

Many studies have aimed to investigate the prevalence of androgen deficiency in different populations based on total testosterone level (2.1-38.7%) and free testosterone (36.2-40%)[5-10]. In the current study, the prevalence of low androgen level was 19.2% based on total testosterone level and in 36.2% when adding the participants with low free testosterone levels. These percentages were comparable to studies done by Araujo *et al.*[6], which showed a prevalence of 25.3% in the same age group of greater than or equal to 40-year-old participants with TT cut-off value of 400 ng/dl and FT of less than 8.9 ng/dl. In addition, our results were comparable to another study done by Araujo *et al.*[7], as they showed that 24% of the participants have TT less than or equal to 300 ng/dl in males aged 30-70 years old. Moreover, ~11% have FT of less than or equal to 0.17 nmol/l, and 9.3% have low levels of TT and FT. Another study was carried on 734 participants in Taiwan. It showed that 24.1% of participants showed TT level of less than 300 ng/dl, and 16.6% showed lower both TT and FT (TT <300 ng/dl and FT <5 ng/dl)[10]. However, Mulligan *et al.*[5], in 2006, studied the prevalence of hypogonadism among 2650 participants. The study showed that 38.7% of participants had low TT level (<300 ng/dl), which increased to 40% when FT level was used (<52 ng/dl). These results are much higher than in the current study. However, this can be explained by that in Mulligan *et al.*[5] study, they had higher age group (starting from 45 years old) and we acquired participants aged 40 years and older. Moreover, they had a higher cutoff value for TT (<300 ng/dl), but in our study, we used lower cutoff value of <230 ng/dl.

Another study was done by Wu *et al.*[8], 2010, that showed the prevalence of hypogonadism among 3369 male participants aged greater than 40 years was 17.0%, with total testosterone level cutoff value of less than 11 nmol/l (317 ng/dl) and was 4.1% with total testosterone level cutoff value less than 8 nmol/l (231 ng/dl), which is lower than our results. However, this can be explained by the type of participants, as in Wu *et al.*[8], the study participants were recruited from the general population, but in our study, the participants are patients attending the outpatient clinics in our tertiary hospital.

This explanation raises the issue that the symptoms of androgen deficiency are vague, the patients may relate it to aging process not to their disease, or the symptoms may be reflected by another disease. It is difficult to be measured and differentiate it from hormone-independent aging. This condition may result in significant detriment to quality of life and adversely affect the function of multiple organ systems[11,12].

In the present study, there is a weak negative correlation between total and free testosterone levels with age. This result is in agreement with other studies[13-15]. However, other studies showed that there is no decline in testosterone level in the blood with advancement of age [16-19]. Interestingly, only two studies showed that there is an increase in serum testosterone levels with aging in men rather than a decline[20,21].

Our study showed that up to 19.2% of our study group had low androgen level based on total testosterone, and this percentage increased to 36.2% when we added the low free testosterone participants. This also accompanied by the high percentage of patients showing abnormal AMS score, denoting the presence of 93.2% of the patients having mild or moderate impairment. This should increase the awareness of late-onset hypogonadism among physicians dealing with middle and old age males, and the importance of total testosterone and free testosterone screening in such group of patients, especially in the presence of vague symptoms suggestive of hypogonadism.

CONCLUSION

The prevalence of hypogonadism among middle and old age males seeking medical consultation in different specialty may be high. Therefore, awareness of late-onset hypogonadism among physicians dealing with such patients should be raised.

CONFLICT OF INTEREST

There are no conflict of interests.

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