ORIGINAL RESEARCH

The correlation between emotional distress and aging males' symptoms at a psychiatric outpatient clinic: sexual dysfunction as a distinguishing characteristic between andropause and anxiety/depression in aging men

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Background: Andropause and psychiatric disorders are associated with various symptoms in aging males and are part of the differential diagnosis of depression and anxiety. This study was designed to investigate the relationship between symptoms of aging, anxiety, and depression, and to determine if sexual dysfunction could be a differentiating characteristic in the psychiatric outpatient clinic.

Methods: One hundred seventy-six male psychiatric outpatients participated in the study and completed self-reported measures assessing symptoms of aging, depression, and anxiety. Symptoms of aging were assessed by the Aging Males' Symptoms scale. Anxiety and depression were measured by the Hospital Anxiety and Depression Scale. Erectile dysfunction was considered if a response to item 15 on the Aging Males' Symptoms scale (impaired sexual potency) was rated with 4 or 5 points. Affective disturbance was assessed by the total scores of the Hospital Anxiety and Depression Scale.

Results: Age was correlated with less anxiety and more sexual symptoms. Anxiety and depression were associated with more severe symptoms of aging, and depression was associated with more sexual symptoms than was anxiety. Impaired sexual potency was the only sexual symptom not significantly associated with depression and anxiety. Depression was associated with an interspousal age gap of ≥6 years. The point prevalence of erectile dysfunction was 28.4%, and age and affective disturbance were associated with the risk of erectile dysfunction.

Conclusion: Impaired sexual potency should raise the suspicion of androgen deficiency rather than depression and anxiety among middle-aged or older male psychiatric outpatients.

Keywords: androgen deficiency, depression, anxiety, erectile dysfunction

Introduction

The term "andropause" has been used to describe syndromes in aging males including various clinical symptoms encompassing somatic, psychological, and sexual dimensions, as well as endocrine dysfunction, partly related to an age-related decline in androgen and even androgen deficiency.[1–3] It is also associated with dysthymia[4] and an increase in depressive symptoms.[5,6] Exogenous testosterone replacement may be beneficial for treatment-resistant depression associated with androgen deficiency.[6,7] Androgen deficiency is associated with premature death, erectile dysfunction (ED), metabolic syndrome, and cardiovascular disease.[2]

Symptoms of andropause and androgen deficiency overlap with common psychiatric disorders such as major depressive disorder (MDD).[8] In one study conducted in a male climacteric clinic in Japan, patients with MDD had significantly more severe symptoms of aging as assessed by the Aging Males' Symptoms (AMS) scale than did patients without MDD; the estimated prevalence of MDD approached 50%.[9] Sato et al, in 2007, reported that the prevalence of MDD was 42% in an andrology clinic and recommended routine screening for MDD.[10]

Although the gold standard for the diagnosis of androgen deficiency is the measurement of serum free or bioavailable testosterone, such data are not available for every male suspected of suffering from decreased testicular function.[11] In order to assess aging males' symptoms, a valuable and easily applicable screening tool should be considered. In the present study, the AMS scale was selected as the screening questionnaire for several reasons. First, the validity and reliability of the AMS scale had been established in Taiwan.[12] Second, the internal structure of the AMS scale across other countries has been sufficiently similar to conclude that the scale measures the same phenomenon in varying contexts.[13] Third, the AMS scale was developed in response to the lack of a standardized scale[14] such as the androgen deficiency in aging males questionnaire. Fourth, it can measure the severity of symptoms of aging over time in different dimensions as well as their impact on health-related quality of life (QoL).[15]

Due to the complex nature of the phenomenon and the limited number of studies in the male psychiatric population, we investigated the relationship between aging males' symptoms and emotional distress by using the AMS scale and the Hospital Anxiety and Depression Scale (HADS), and examined whether sexual dysfunction could be a differentiating characteristic for symptoms of aging among middle-aged or older male psychiatric outpatients.

Methods
Population
The sample was previously recruited for validation of the Chinese version of the AMS scale, and a more detailed description has been published elsewhere.[12] One hundred seventy-six Taiwanese men, 40–80 years of age, attending the psychiatric outpatient service of Chang Gung Memorial Hospital at Linkou (a convenience sample) participated in the study. All participants reported neurotic symptoms such as anxiety, depression, insomnia, or somatic complaints. The participants had received general psychiatric evaluations

during their initial visits and had no psychotic, bipolar, or cognitive disorders and no history of psychoactive substance abuse. The demographic data were obtained through clinical interviews (Table 1). The age groups were defined as middle-aged (40–49 years), pre-elderly (50–64 years), and elderly (≥65 years). The interspousal age gap (IAG) was defined as the absolute age difference between the participants and their spouses. Three IAG groups were defined: age-matched (IAG = 0–2 years), moderate age gap (IAG = 3–5 years), and large age gap (IAG ≥ 6 years). Body mass index (BMI) groups were defined as normal (BMI < 24.0 kg/m^2), overweight (BMI = 24.0–26.9 kg/m^2), and obese (BMI > 27.0 kg/m^2). Education groups were defined by years of education: primary school and under (0–6 years), high school (7–12 years), and college or university and above (>12 years).

Table 1 Demographic data and characteristics of the initial participant sample (n = 176)

	Mean ± SD	Frequency (%)
Age (years)	54.3 ± 10.7	
Middle-aged (40–49)		74 (42.1)
Pre-elderly (50–64)		65 (36.9)
Elderly (≥65)		37 (21.0)
Married		157 (89.2)
Spousal age (years)	51.0 ± 10.1	
IAG (years)	3.9 ± 4.1	
Age-matched (0–2)		73 (46.5)
Moderate age gap (3–5)		44 (28.0)
Large age gap (≥6)		40 (25.5)
Education		
Primary school and under (≤6 years)		47 (26.7)
High school (7–12 years)		84 (47.7)
College or university and above (>12 years)		45 (25.6)
Employed		104 (59.1)
BMI (kg/m^2)	24.4 ± 2.8	
Normal (<24)		77 (43.7)
Overweight (24–26.9)		70 (39.8)
Obese (≥27)		29 (16.5)
HADS		
HADS-T	16.0 ± 8.1	
HADS-A	8.3 ± 4.6	
HADS-D	7.7 ± 4.7	
AMS scale		
AMS-T	39.9 ± 11.2	
AMS-PSY	11.8 ± 4.5	
AMS-SOM	16.4 ± 4.7	
AMS-SEX	11.7 ± 4.0	

Abbreviations: AMS, Aging Males' Symptoms; AMS-PSY, psychological score; AMS-SEX, sexual score; AMS-SOM, somatovegetative score; AMS-T, total score; BMI, body mass index (kg/m^2); HADS, Hospital Anxiety and Depression Scale; HADS-A, anxiety score; HADS-D, depression score; HADS-T, total score; IAG, interspousal age gap; SD, standard deviation.

Main outcome measures

Aging males' symptoms scale

This 17-item self-administered questionnaire is the best studied and validated questionnaire to help assess the severity of symptoms of aging males and the QoL in men >40 years of age.[13,16] The scale has been validated internationally with a standard translation of the Chinese version.[12] Each item is rated on a five-point Likert scale, with a response of "5" representing "extremely severe" and "1" representing "none." The total score (AMS-T) measures the overall severity of symptoms of aging and the QoL. The psychological score (AMS-PSY), the sum of items 6–8, 11, and 13, assesses the psychological dimension. The somatovegetative score (AMS-SOM), the sum of items 1–5, 9, and 10, assesses the somatic dimension. The sexual score (AMS-SEX), the sum of the remaining five items, assesses the sexual dimension. The AMS scale is moderately correlated with the Beck Depression Inventory[9,17] and the HADS.[12] With a cut-off value of 27,[18] the AMS-T has a sensitivity of 29% and a specificity of 97% in predicting androgen deficiency.[19] Erectile dysfunction (ED) is considered if a response to item 15 of the AMS scale (impaired sexual potency) is rated at 4 or 5.[20]

Hospital anxiety and depression scale

The HADS, a 14-item self-administered questionnaire comprised of a seven-item anxiety scale (HADS-A) and a seven-item depression scale (HADS-D) scored on a four-point Likert scale (0–3), is designed to provide a simple yet reliable screening tool for depression and anxiety in various clinical settings, with good internally consistent reliability for anxiety and depression (Cronbach's $\alpha = 0.80$ and 0.76, respectively),[21–23] and with good sensitivity and specificity (approximately 0.8) for identifying psychiatric cases.[24,25] The total score (HADS-T) measures affective disturbance; anxiety is defined as a HADS-A $\geq$ 11; depression is defined as a HADS-D $\geq$ 11.[23] Four severity grades of psychological distress are distinguished as follows: none (HADS-T $<$ 8), little (HADS-T = 8–10), moderate (HADS-T = 11–15), and severe (HADS-T $\geq$ 16).[22] To determine the effect of anxiety and depression, control was defined as a HADS-A $<$ 11 and a HADS-D $<$ 11, anxiety as a HADS-A $\geq$ 11 and a HADS-D $<$ 11, depression as a HADS-A $<$ 11 and a HADS-D $\geq$ 11, and mixed anxiety and depression as both HADS-A $\geq$ 11 and HADS-D $\geq$ 11.

Statistical analysis

Statistical analyses were performed using R version 2.14.1 for Windows (R Foundation for Statistical Computing, Vienna, Austria).[26] Student's t-test was used to test for continuous variables by two groups. A one-way analysis of variance was used to test for differences among groups. A post hoc Tukey HSD test was used to discern subgroup differences. Fisher's exact test was used to test for an association between two categorical variables. Kendall's correlation coefficients were derived with significance and multiplicity adjusted by Holm's method. A stepwise multiple logistic regression analysis was used for ED. The independent variables were the HADS-T, age, the IAG, BMI, marriage, employment, and education. The P value was set at 0.05 for all statistical tests.

Results

The mean age of subjects was 54.3 years (standard deviation [SD] = 10.7). Table 1 shows the demographic characteristics of all 176 participants.

Correlation between age, BMI, HADS, and AMS

Age was negatively correlated with the HADS-A ($\tau = -0.16$), and positively correlated with the AMS-SEX ($\tau = 0.22$). BMI was not correlated with HADS or AMS. There were mostly weak-to-moderately positive correlations ($\tau = 0.21$–0.55) among responses to the HADS and AMS scales (Table 2).

Groups of depression and anxiety

Table 3 shows the results of the one-way analysis of variance among groups in terms of depression and anxiety. There were 103 (58.5%) controls, 18 (10.2%) subjects with depression, 26 (14.8%) with anxiety, and 29 (16.5%) with mixed anxiety and depression. There were significant differences in the IAG, AMS-SEX, and all sexual symptoms except impaired sexual potency among groups with depression and anxiety. A post hoc Tukey HSD test showed that the depression group had a

Table 2 Kendall correlations between age, BMI, HADS, and AMS scale

	Age	BMI	HADS-T	HADS-A	HADS-D
BMI	0.05				
HADS-T	−0.06	−0.05			
HADS-A	−0.16*	−0.03	0.72***		
HADS-D	0.03	−0.04	0.73***	0.41***	
AMS-T	0.02	−0.10	0.50***	0.44***	0.42***
AMS-PSY	−0.11	−0.06	0.55***	0.54***	0.40***
AMS-SOM	−0.06	−0.10	0.43***	0.38***	0.37***
AMS-SEX	0.22**	−0.10	0.29***	0.21**	0.28***

Notes: *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.
Abbreviations: AMS, Aging Males' Symptoms scale; AMS-PSY, psychological score; AMS-SEX, sexual score; AMS-SOM, somatovegetative score; AMS-T, total score; BMI, body mass index (kg/m²); HADS, Hospital Anxiety and Depression Scale; HADS-A, anxiety score; HADS-D, depression score; HADS-T, total score.

Table 3 Analysis of variance among groups with depression and anxiety

	Control (1) (n = 103)		Depression (2) (n = 18)		Anxiety (3) (n = 26)		Mixed anxiety and depression (4) (n = 29)		P value	Tukey HSD
	HADS-A < 11 HADS-D < 11		HADS-A < 11 HADS-D ≥ 11		HADS-A ≥ 11 HADS-D < 11		HADS-A ≥ 11 HADS-D ≥ 11			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Age (years)	54.9	10.8	57.8	12.6	51.6	10.1	52.3	9.2	0.1765	
IAG (years)	3.7	3.8	7.0	5.7	3.5	4.4	3.7	4.1	0.0271	2 >1 and 3
AMS-SEX	10.4	3.4	14.3	4.4	12.2	3.9	14.0	4.0	<0.0001	2 and 4 >1
Item 12 Past peak	1.9	0.9	3.1	1.2	2.8	1.0	3.3	1.1	<0.0001	2 and 3 and 4 >1
Item 14 Decreased beard growth	1.2	0.4	1.7	1.0	1.3	0.6	1.2	0.5	0.0016	2 >1 and 3 and 4
Item 15 Impaired sexual potency	2.6	1.2	3.2	1.2	2.9	1.2	3.1	1.2	0.0676	
Item 16 Fewer morning erections	2.5	1.1	3.3	1.1	2.8	1.0	3.3	1.2	0.0016	2 and 4 >1
Item 17 Disturbed libido	2.3	1.1	3.1	1.2	2.5	1.1	3.1	1.3	0.0005	2 and 4 >1

Abbreviations: AMS-SEX, sexual score; HADS-A, anxiety score; HADS-D, depression score; IAG, interspousal age gap; SD, standard deviation.

significantly higher IAG than the control and anxiety groups. The group with anxiety only had a significantly higher score on item 12 (past peak) than did the control group, while the groups with depression and mixed anxiety and depression had significantly higher scores on items 12, 16 (fewer morning erections), and 17 (disturbed libido) than did the control group. The group with depression had a significantly higher score on item 14 (decrease in beard growth) than did the other 3 groups.

Erectile dysfunction

Fifty (28.4%) of the 176 participants had ED. There was significant positive association between age and ED (for every SD [10.7 years], the odds ratio for ED was 2.51 [95% confidence interval 1.58–4.00]). Subjects with ED were significantly older (61.0 ± 11.0 years versus 51.7 ± 9.4 years, $t[174] = 5.635$, $P < 0.0001$); had higher spousal ages (57.0 ± 9.9 years versus 48.4 ± 9.2 years, $t[155] = 5.226$, $P < 0.0001$); were less employed (40% versus 66.7%, $P = 0.0020$); and scored higher on the AMS-T (47.7 ± 11.1 versus 36.8 ± 9.7, $t[174] = 6.419$, $P < 0.0001$), AMS-PSY (13.4 ± 4.8 versus 11.2 ± 4.3, $t[174] = 2.958$, $P = 0.0036$), AMS-SOM (18.3 ± 5.0 versus 15.7 ± 4.5, $t[174] = 3.333$, $P = 0.0011$), and AMS-SEX (16.0 ± 2.8 versus 9.9 ± 3.0, $t[174] = 12.523$, $P < 0.0001$) compared with the 126 participants without ED. Subjects with ED had a trend towards a higher HADS-D than those without ED (8.8 ± 5.4 versus 7.3 ± 4.4, $t[174] = 1.922$, $P = 0.0563$). Subjects with ED were not significantly different from those without ED in terms

of IAG, HADS scores, marital status, BMI, and education (Table 4). After adjusting for demographic factors including age, BMI, HADS-D, and employment, the results of multiple logistic regression analyses for ED are shown in Table 5.

Discussion

In the present study, anxiety and depression were associated with more severe symptoms of aging and a poorer QoL, yet they exerted different effects on sexual symptoms. It is noteworthy that impaired sexual potency was the only sexual symptom not significantly associated with anxiety and depression. Anxiety was associated only with past peak, while depression was associated with all sexual symptoms except impaired sexual potency. The severity of both anxiety and depression was moderately correlated with past peak, while age was not, suggesting that this symptom was related more to psychological health than to aging. The other four sexual symptoms were weakly correlated with severity of depression but not with anxiety, suggesting that depression may play a more important role in sexual dysfunction than does anxiety. There was a weak negative correlation between age and severity of anxiety, and no correlation between age and severity of depression, which is in contrast to a previous report of a weak negative correlation between age and anxiety, and a curvilinear relationship between age and depression.[27] Age was positively correlated with the severity of sexual symptoms, impaired sexual potency, and fewer morning erections, but was not correlated with past peak and disturbed libido, paralleling the findings associated with age-related sexual dysfunction.

Table 4 Comparisons between subjects with and without erectile dysfunction

	No ED (n = 126)	ED (n = 50)	P value
Age	51.7 ± 9.4	61.0 ± 11.0	<0.0001
Spousal age	48.4 ± 9.2	57.0 ± 9.9	<0.0001
IAG	3.9 ± 4.2	4.2 ± 4.4	0.6944
BMI	24.6 ± 2.6	23.9 ± 4.2	0.1606
HADS-T	15.4 ± 7.9	17.5 ± 8.4	0.1353
HADS-A	8.1 ± 4.3	8.6 ± 5.1	0.5030
HADS-D	7.3 ± 4.4	8.8 ± 5.4	0.0563
AMS-T	36.8 ± 9.7	47.7 ± 11.1	<0.0001
AMS-PSY	11.2 ± 4.3	13.4 ± 4.8	0.0036
AMS-SOM	15.7 ± 4.5	18.3 ± 5.0	0.0011
AMS-SEX	9.9 ± 3.0	16.0 ± 2.8	<0.0001
Married	110 (87.3%)	47 (94%)	0.2828
Employed	84 (66.7%)	20 (40%)	0.0020
Education			0.3253
≤6 years	30 (23.8%)	17 (34%)	
7–12 years	61 (48.4%)	23 (46%)	
>12 years	35 (27.8%)	10 (20%)	
Anxiety	29 (23.0%)	18 (36%)	0.0908
Depression	36 (28.6%)	19 (38%)	0.2793
Mixed anxiety and depression	19 (15.1%)	10 (20%)	0.4997
Distress	56 (44.4%)	28 (56%)	0.1836

Abbreviations: AMS-PSY, psychological score; AMS-SEX, sexual score; AMS-SOM, somatovegetative score; AMS-T, total score; BMI, body mass index (kg/m²); HADS-A, anxiety score; HADS-D, depression score; HADS-T, total score; IAG, interspousal age gap; SD, standard deviation; ED, erectile dysfunction.

A large interspousal age gap was associated with depression and its severity, but not with anxiety. Such an age gap may place more of a psychological burden on men based on differences in sexual function, age identity,[28] health status, and social life. In one study of men with symptomatic benign prostatic hyperplasia, IAG was associated with increased symptoms and burden on the partner.[29]

Erectile dysfunction has a multifaceted relationship with psychological, neurologic, hormonal, and vascular problems,[2] and is linked to metabolic syndrome and cardiovascular diseases.[30] The prevalence of ED in Asian countries is estimated to be 7%–15% (40–49 years of age) and 39%–49% (60–70 years of age).[31] Several studies have shown a high

Table 5 Logistic regression of erectile dysfunction

	β*	SE	OR	95% CI	P (Wald's test)
Intercept	−1.05	0.33			0.0016
Age (years)	0.92	0.24	2.51	1.58–4.00	0.0001
BMI (kg/m²)	−0.29	0.19	0.75	0.51–1.09	0.1278
HADS-D	0.32	0.19	1.38	0.96–1.98	0.0858
Employed	−1.02	0.45	090	0.37–2.20	0.8223

Note: β*, standardized beta.
Abbreviations: BMI, body mass index; CI, confidence interval; HADS-D, depression score; OR, odds ratio; SE, standard error.

prevalence of ED among psychiatric patients.[32,33] Age is one of the important risk factors for ED. Other risk factors include less than good overall health, diabetes mellitus, cardiovascular disease, genitourinary disease, psychiatric disorders, other chronic conditions, smoking, and hormonal factors.[30] Schneider et al reported that significantly more individuals in clinical samples had ED than did a general population sample (28.9%–30.8% versus 15%), and subjects with ED were older, had lower testosterone levels, and more anxiety than those without ED.[20] The point prevalence of ED in our sample was 28.4%, and subjects with ED were significantly older, more likely to be unemployed, and had significantly higher AMS scores than did those without ED. The response to the HADS was not significantly different between subjects with and without ED. As shown in our logistic regression model, there was only a trend towards an association between ED and depression but not for anxiety.

The present cross-sectional study is one of the few papers to investigate relationships between symptoms of aging and emotional distress among male psychiatric outpatients with neurotic complaints, but it does have several methodological limitations. First, we did not have detailed medical and lifestyle assessments of the participants, and not all participants underwent blood tests for testosterone levels due to some economic and technical constraints. Second, we did not record potential confounding factors such as income, marriage duration, partner relationship, and psychosocial stressors, all of which may contribute to depression and anxiety. Third, self-administered questionnaires do not necessarily infer any specific diagnosis, and they are confounded by the current state of mind and personality traits. Nevertheless, they are efficient tools and provide some insight in phenomenological investigation. In addition, the AMS scale was not specific for the diagnosis of androgen deficiency, and we did not use a validated assessment of ED. Furthermore, the results may not be applied to the community at large due to the small sample size and hospital-based population.

Conclusion

Anxiety, depression, and ED were associated with more severe symptoms of aging and a poorer QoL in males. Impaired sexual potency was related more to aging than to emotional problems. A high prevalence of ED highlighted the importance of routine screening in male psychiatric outpatients who present with symptoms of aging. Mental health clinicians should be aware of the relationship between symptoms of aging and psychological health, and request further investigation when warranted.

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Disclosure

References

1. Morales A, Tenover JL. Androgen deficiency in the aging male: when, who, and how to investigate and treat. *Urol Clin North Am*. 2002;29(4): 975–982.
2. Shelton JB, Rajfer J. Androgen deficiency in aging and metabolically challenged men. *Urol Clin North Am*. 2012;39(1):63–75.
3. Surampudi PN, Wang C, Swerdloff R. Hypogonadism in the aging male diagnosis, potential benefits, and risks of testosterone replacement therapy. *Int J Endocrinol*. Epub March 14, 2012.
4. Seidman SN, Araujo AB, Roose SP, et al. Low testosterone levels in elderly men with dysthymic disorder. *Am J Psychiatry*. 2002;159(3): 456–459.
5. Seidman SN. Normative hypogonadism and depression: does 'andropause' exist? *Int J Impot Res*. 2006;18(5):415–422.
6. Seidman SN. Androgens and the aging male. *Psychopharmacol Bull*. 2007;40(4):205–218.
7. Bassil N. Late-onset hypogonadism. *Med Clin North Am*. 2011;95(3): 507–523.
8. Amore M. Partial androgen deficiency and neuropsychiatric symptoms in aging men. *J Endocrinol Invest*. 2005;28(11 Suppl Proceedings):49–54.
9. Yoshida NM, Kumano H, Kuboki T. Does the Aging Males' Symptoms scale assess major depressive disorder?: a pilot study. *Maturitas*. 2006;53(2):171–175.
10. Sato Y, Tanda H, Kato S, et al. Prevalence of major depressive disorder in self-referred patients in a late onset hypogonadism clinic. *Int J Impot Res*. 2007;19(4):407–410.
11. Tancredi A, Reginster JY, Schleich F, et al. Interest of the androgen deficiency in aging males (ADAM) questionnaire for the identification of hypogonadism in elderly community-dwelling male volunteers. *Eur J Endocrinol*. 2004;151(3):355–360.
12. Chen CY, Wang WS, Liu CY, Lee SH. Reliability and validation of a Chinese version of the Aging Males' Symptoms scale. *Psychol Rep*. 2007;101(1):27–38.
13. Daig I, Heinemann LA, Kim S, et al. The Aging Males' Symptoms (AMS) scale: review of its methodological characteristics. *Health Qual Life Outcomes*. 2003;1:77.
14. Heinemann LAJ, Saad F, Thiele K, Wood-Dauphinee S. The Aging Males' Symptoms rating scale: cultural and linguistic validation into English. *Aging Male*. 2001;4(1):14–22.
15. Heinemann LA, Saad F, Pöllänen P. Measurement of quality of life specific for aging males. In: Schneider HPG, editor. *Hormone Replacement Therapy and Quality of Life*. New York, NY: Parthenon Publishing Group; 2002:63–83.
16. Heinemann LA, Saad F, Zimmermann T, et al. The Aging Males' Symptoms (AMS) scale: update and compilation of international versions. *Health Qual Life Outcomes*. 2003;1:15.
17. Chiu YW, Chu CL, Chen Y, et al. Complaint of insomnia as a predictor of aging symptoms in males at a men's health clinic. *Aging Male*. 2012; 15(1):7–13.
18. Morley JE, Charlton E, Patrick P, et al. Validation of a screening questionnaire for androgen deficiency in aging males. *Metabolism*. 2000;49(9):1239–1242.
19. Heinemann LA, Saad F, Heinemann K, Thai DM. Can results of the Aging Males' Symptoms (AMS) scale predict those of screening scales for androgen deficiency? *Aging Male*. 2004;7(3):211–218.
20. Schneider G, Nienhaus K, Gromoll J, Heuft G, Nieschlag E, Zitzmann M. Sex hormone levels, genetic androgen receptor polymorphism, and anxiety in ≥50-year-old males. *J Sex Med*. 2011;8(12):3452–3464.
21. Mykletun A, Stordal E, Dahl AA. Hospital Anxiety and Depression (HAD) scale: factor structure, item analyses and internal consistency in a large population. *Br J Psychiatry*. 2001;179(6):540–544.
22. Snaith RP. The Hospital Anxiety and Depression Scale. *Health Qual Life Outcomes*. 2003;1:29.
23. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand*. 1983;67(6):361–370.
24. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale. an updated literature review. *J Psychosom Res*. 2002;52(2):69–77.
25. Herrmann C. International experiences with the Hospital Anxiety and Depression Scale – a review of validation data and clinical results. *J Psychosom Res*. 1997;42(1):17–41.
26. R Development Core Team (2012). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http:/www.R-project.org.
27. Delhez M, Hansenne M, Legros JJ. Andropause and psychopathology: minor symptoms rather than pathological ones. *Psychoneuroendocrinology*. 2003;28(7):863–874.
28. Barrett AE. Gendered experiences in midlife: Implications for age identity. *J Aging Stud*. 2005;19(2):163–183.
29. Mitropoulos D, Anastasiou I, Giannopoulou C, et al. Symptomatic benign prostate hyperplasia: impact on partners' quality of life. *Eur Urol*. 2002;41(3):240–244.
30. Lewis RW, Fugl-Meyer KS, Corona G, et al. Definitions/epidemiology/ risk factors for sexual dysfunction. *J Sex Med*. 2010;7(4 Pt 2): 1598–1607.
31. Lewis RW. Epidemiology of sexual dysfunction in Asia compared to the rest of the world. *Asian J Androl*. 2011;13(1):152–158.
32. Hariri AG, Karadag F, Gurol DT, Aksoy UM, Tezcan AE. Sexual problems in a sample of the Turkish psychiatric population. *Compr Psychiatry*. 2009;50(4):353–360.
33. Mosaku KS, Ukpong DI. Erectile dysfunction in a sample of patients attending a psychiatric outpatient department. *Int J Impot Res*. 2009;21(4):235–239.