

ASSOCIATED FACTORS OF DEPRESSIVE SYMPTOMS IN PATIENTS WITH ERECTILE DYSFUNCTION

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The presence of depression in patients with erectile dysfunction not only worsened the condition but also makes its management more complicated. We conducted a cross-sectional study to investigate several factors associated with depression of 131 patients with erectile dysfunction at Hanoi Medical University Hospital. The depression rate of the subjects was 45.8%. Compared with the non-depressive group, the patients with depression had a lower mean age (39 ± 13.3 and 50 ± 14.1 years old, $p < 0.001$) and a greater frequency of masturbation (0.6 ± 1 and 0.1 ± 0.5 times/week, $p = 0.001$). The factors that correlate with the severity of depression on the PHQ-9 scale were age and masturbation frequency ($r = -0.352$ and 0.346 , $p < 0.001$). The factors associated with depression include age under 40 (OR = 5.15, $p < 0.001$), single (OR = 6.53, $p < 0.001$), masturbation (OR = 5.02, $p = 0.001$) and the sudden onset of erectile dysfunction (OR = 2.36, $p = 0.03$). The results show that depression occurs in patients with erectile dysfunction at a relatively high rate, therefore, depression needs to be screened for this group of patients, especially those with risk factors

Keywords: Depression, erectile dysfunction, masturbation.

I. INTRODUCTION

Depression is a major public health issue that requires considerable attention. This is an affective disorder manifested by the inhibition of all mental activities and negatively affects a person's emotions, thinking and action. According to the World Health Organization (WHO), it is the leading cause of disability which increases disease burden and healthcare costs worldwide.¹ Depression is a mental disorder that may occur in patients with many different diseases such as cardiovascular diseases, diabetes, metabolic syndrome, chronic kidney disease, and, undoubtedly, in men with erectile dysfunction (ED). Recent studies have shown that ED can trigger depressive symptoms. The

prevalence of depression in patients with ED is relatively high, ranging from 33.3 to 79.56%.^{2,3}

The relationship between sexual dysfunction and depression seems to be bidirectional, in that the presence of either one of these conditions may trigger or exacerbate the other, and the treatment of one condition may improve the other. For example, in men with depression, erectile dysfunction may follow the onset of depression, or alternatively, men with erectile dysfunction may develop secondary depression associated with loss of sexual functioning.⁴ The presence of depression makes the treatment of ED more complicated and less effective due to reduced compliance of the patients. On the contrary, when ED is treated incompletely, it can make depression more severe and even trigger a lifelong depressive disorder. In previous studies, age, marital status and duration of ED have been shown to be associated

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with depression.^{3,5} Therefore, investigating risk factors associated with the presence of depression in patients with ED is critical for the management and treatment of the condition as well as depression as part of a community healthcare strategy, which contributed to the improvement in patient's health and family's happiness. Given the aforementioned facts, we conducted the study: "**Associated factors of depressive symptoms in patients with erectile dysfunction**" with the purpose to investigate several risk factors of depression in patients with erectile dysfunction at the Department of Andrology and Sexual Medicine, Hanoi Medical University Hospital from September 2020 to May 2021.

II. MATERIALS AND METHODS

1. Subjects

All patients presented at the Department of Andrology and Sexual Medicine - Hanoi Medical University Hospital from September 2020 to May 2021.

Inclusion criteria:

- Men over 18 years old, who had at least one stable sex partner and had regular sexual intercourse (at least once a week).
- Men diagnosed with erectile dysfunction.
- Men who agreed to participate in the study.

Exclusion criteria:

- Men having other sexual disorders.
- Men who had been diagnosed with and treated for any mental disorder previously.
- Men having inadequate information needed for the study.

2. Location and time of the study

- Location: Department of Andrology and Sexual Medicine - Hanoi Medical University Hospital.
- Time: September 2020 to May 2021.

3. Study design

Cross-sectional study.

4. Sample size

Apply the formula for estimating the sample size of a prevalence study:

$$n = Z_{1-\alpha/2}^2 \frac{p(1-p)}{\Delta^2}$$

In which:

n: sample size.

p: prevalence of patients with erectile dysfunction who had depression. $p = 0.39$ according to Jeong et al. (2011)⁶

$\Delta = 0.1$: precision for prevalence.

$\alpha = 0.05$, with 95% CI.

$Z = 1.96$ with $\alpha = 0.05$

The minimum sample size is 92. In the study, we enrolled 131 patients.

5. Study process

Patients presented at the department given medical history, thorough clinical examination, hormonal tests, blood chemistry panel, and testicular ultrasound according to a routine procedure at the Department of Andrology and Sexual Medicine, Hanoi Medical University Hospital.

Diagnostic criteria of Erectile dysfunction in DSM – 5 (5th edition of *Diagnostic and Statistical Manual of Mental Disorders*)⁷

A. At least one of the three following symptoms must be experienced on almost all or all (approximately 75% - 100%) occasions of sexual activity (in identified situational contexts or, if generalized, in all contexts):

(1) Marked difficulty in obtaining an erection during sexual activity.

(2) Marked difficulty in maintaining an erection until the completion of sexual activity.

(3) Marked decrease in erectile rigidity.

B. The symptoms in Criterion A have persisted for a minimum duration of approximately six months.

C. The symptoms in Criterion A caused clinically significant distress in the individual.

D. The sexual dysfunction is not better explained by a nonsexual mental disorder or as a consequence of severe relationship distress or other significant stressors and is not attributable to the effects of a substance/ medication or another medical condition.

Subsequently, patients completed a research medical record intake including general characteristics as age, age of first sexual encounter, number of sexual partners, sexual frequency, masturbation frequency included PHQ-9 and IIEF-5 scales.

Depression is diagnosed based on the PHQ-9 scale when it scores five or more. The classification of depressive disorder is as follows:

- 0 - 4: No depression
- 5 - 9: Mild depression
- 10 - 14: Moderate depression
- 15 - 19: Moderately severe depression
- 20 - 27: Severe depression

Based on the IIEF - 5 scale, erectile dysfunction is classified as follows:

- 22 - 25: No erectile dysfunction
- 17 - 21: Mild erectile dysfunction
- 12 - 16: Mild to moderate erectile dysfunction
- 8 - 11: Moderate erectile dysfunction
- 5 - 7: Severe erectile dysfunction

Concepts used in this study:

- Regular sexual intercourse: the frequency of sexual intercourse is at least once per week.
- Stable sexual partners: partners who have relationships for more than 3 months. These partners are usually wives, lovers.

- Masturbation: The participants were asked if they had masturbated in the previous three months. Those who answered "Yes" were asked how many times they had masturbated in a week.

- Frequency of sexual intercourse: times/ week in the last three months.

- Testosterone deficiency: when the total testosterone concentration is below 12 nmol/L.

6. Data analysis

Data was processed and analyzed using SPSS 20.0. When comparing two groups, T-student test was used for normally distributed variables, Mann Whitney's test was used for non-normally distributed variables. The correlation between the PHQ-9 scale and other characteristics was determined using Spearman's rank correlation analysis. The logistic regression model was used to calculate the odds ratio (OR) of depression rates between groups. All hypothesis testing was considered statistically significant if $p < 0.05$.

7. Ethical considerations

Patients voluntarily participated in the study. The information provided by the research subjects was kept confidential. This was a cross-sectional, non-interventional study. The research results and suggestions are used for the purpose of raising awareness about ED, the quality of diagnosis, and the treatment of the disorder.

III. RESULTS

From September 2020 to May 2021, 131 patients with erectile dysfunction who met the inclusion and exclusion criteria were included in the study. Of which, 60 patients had TC, accounting for 45.8%. The rate of mild depression was 68.3% (41/60), moderate depression made up 25% (15/60), and moderately severe depression accounted for 6.7% (4/60).

1. General characteristics of the subjects

Table 1. General characteristics of the subjects (N = 131)

Features	Mean ± SD	n (%)	Min - Max
Age (years old)	45 ± 14.8		18 - 83
< 40		52(39.7)	
≥ 40		79(60.3)	
Age at the first sexual intercourse (years old)	21.8 ± 3.2		13 - 36
< 18		11(8.4)	
≥ 18		120(91.6)	
Number of sexual partners in the last 12 months (person/people)			
1		107(81.7)	
2		16(12.2)	
≥ 3		8(6.1)	
Masturbation			
Yes		32(24.4)	
No		99(75.6)	
Frequency of sexual intercourse (times/week)	1.3 ± 0.8		1 - 5
1		103(78.6)	
>1		28(21.4)	
BMI (kg/m ²)	23.3 ± 2.5		17.9 - 29.4
< 18		1(0.8)	
18-23		56(42.7)	
> 23		74(56.5)	

The average age of the subjects was 45 ± 14.8; most of them were from the age group of 40 and over, accounting for 60.3%. The average age of first sexual intercourse was 21.8 ± 3.2; mainly in the age group of 18 years or older

(91.6%) and with a partner in the last 12 months (81.7%). The majority of study patients did not masturbate (75.6%), had sexual intercourse once a week (78.6%) and were overweight (56.5%).

2. Comparison of some characteristics between the patients with depression and without depression

Table 2. Comparison of some characteristics between patients with depression and without depression (N = 131)

Characteristics	Depression (n = 60)	Without depression (n = 71)	p
Age (years old)	39 ± 13.3	50 ± 14.1	< 0.001
Age at the first sexual intercourse (years old)	21.5 ± 3.4	22.1 ± 4	0.383
Frequency of sexual intercourse (times/week)	1.3 ± 0.7	1.4 ± 0.8	0.768
Frequency of masturbation (times/week)	0.6 ± 1	0.1 ± 0.5	0.001
Stable sexual partners (person/people)	2 ± 1.4	2 ± 1.6	0.917
Testosterone (nmol/L)	17.7 ± 7	16.4 ± 6.9	0.337
LH (mU/mL)	7 ± 8.3	6.1 ± 3.4	0.449
Estradiol (pmol/mL)	130 ± 41.9	117.2 ± 44.5	0.127
BMI (kg/m ²)	23.1 ± 2.4	23.4 ± 2.6	0.517

Compared with patients without depression, patients with depression had a lower mean age and a greater frequency of masturbation with $p < 0.05$.

3. Factors related to the degree of depression on the PHQ-9 scale

Table 3. Factors related to the degree of depression on the PHQ-9 scale

Factors	r	p
Age (years old)	- 0.352	< 0.001
Age at the first sexual intercourse (years old)	- 0.11	0.211
Frequency of sexual intercourse (times/week)	0.042	0.637
Frequency of masturbation (times/week)	0.346	< 0.001
Hardness of erection (points)	-0.071	0.418
IIEF-5 (points)	-0.22	0.807
Testosterone (nmol/L)	0.06	0.536

The PHQ-9 scale had a negative correlation with age and a positive correlation with the frequency of masturbation in the subjects with $p < 0.001$.

4. Investigation of factors associated with depression in patients with erectile dysfunction

Table 4. Factors associated with depression in patients with erectile dysfunction

Factors	Groups	Depression n (%)	Non-depression n (%)	OR(95%CI)	p
Age (Years old)	< 40	36(69.2)	16(30.8)	5.16(2.08-7.62) 1	< 0.001
	≥ 40	24(30.4)	55(69.6)		
Area	Rural	32(47.8)	35(52.2)	1 0.85(0.37-2.13)	0.645
	Urban	28(43.8)	36(56.2)		
Frequency of sexual intercourse (times/week)	1	46(44.7)	57(55.3)	1 1.24(0.65-2.34)	0.615
	> 1	14(50)	14(50)		
Masturbation	No	35(35.4)	64(64.6)	1 6.53(3.13-10.38)	< 0.001
	Yes	25(78.1)	7(21.9)		
Marital status	Single	19(76)	6(24)	5.03(2.81-9.11) 1	0.001
	Married	41(38.7)	65(61.3)		
Duration of ED (years)	≤ 1	33(54.1)	28(45.9)	1 0.53(0.23-1.42)	0.075
	> 1	27(38.6)	43(61.4)		
Onset of ED	Gradual	38(40)	57(60)	1 2.36(1.37-4.08)	0.03
	Sudden	22(61.1)	14(38.9)		
Testosterone deficiency	Yes	41(50.6)	40(49.4)	1 0.59(0.33-1.12)	0.24
	No	11(37.9)	18(62.1)		

Note: Of the 131 patients in the study, only 110 had a blood test to measure testosterone levels.

Patients under 40 years of age, masturbating, being single and having sudden onset ED had a statistically significant higher risk of depression with p < 0.05.

IV. DISCUSSION

General characteristics of the subjects

In the present study, nearly half of the patients with ED reported having depression on the PHQ-9 scale, accounting for 45.8%. Depression is a common mental disorder in this group of patients which was reported in previous studies with a rate of about 33.3 to 79.56%.^{2,3,8} The relatively high rate of depression in patients with ED requires more attention to emotional issues in particular and mental health in general.

The mean age of the study subjects was 45 ± 14.8 years old. This is the period when

men developed co-morbidities related to the organic causes of erectile dysfunction especially metabolic disorders. This was also reflected in BMI where more than half of the subjects were overweight, accounting for 56.5% (Table 1). In our study patients over 40 years old comprise the majority with 60.3%. Previous studies on ED also focused on this age group with two prominent studies, MMAS and EMAS, conducted on aging men in the US and Europe.^{9,10} In our study, however, patients under 40 years old comprises a relatively large

proportion (39.7%), showing that ED is no longer prevalent in older men but also common in young men.

The age of having the first sexual intercourse of the study subjects was 21.8 ± 3.2 years old with 91.6% of the patients having the first coitus after the age of 18. In addition, 81.7% of the subjects had only one sexual partner in the last 12 months (Table 1). In Vietnam, sex is still considered a sensitive affair, thus men tend to have sex for the first time when they are both physically and mentally mature. Moreover, maintaining monogamy with a steady partner is also considered as one of the fundamental principles for establishing a stable family life. Furthermore, patients in the study had a low masturbation rate (24.4%) and had sex mostly once a week (78.6%) (Table 1) indicated decreased sexual activity in men with ED.

Comparison of the groups of patients with depression and without depression

When comparing the two groups (Table 2), we found that the subjects with depression had a lower mean age than the non-depression group, but the frequency of masturbation was greater. The difference of these two features was statistically significant with $p < 0.05$. Further analysis indicated that age and masturbation were also associated with the risk of the presence and severity of depression. In terms of other factors, we did not find any difference between the two groups.

Factors associated with depression

In this study, using Spearman's rank correlation, we found that age and frequency of masturbation are strongly related to depression ($p < 0.001$). Age was negatively related to PHQ-9 score: the older the participant, the lower the PHQ-9 score ($r = -0.352$, $p < 0.001$). This implied that among men with ED, older age was associated with decreased risk of

depression. The tendency was more apparent when comparing two groups under 40 years old and 40 years old and above. Subjects who were under 40 had a 5.16 times greater chance of developing depression compared with those aged 40 years and above ($p < 0.001$) (Table 4). For patients with depression, the first stage of onset usually occurs between 20 and 40 years of age, with an average age of onset of 25 years old.¹¹ Men in this group have a greater sexual desire but are under a lot of pressure from economic and social problems, thus the failure in sexual life due to ED may trigger the onset of depression. However, depression in male subjects is more difficult to recognize because symptoms are masked and undetected by clinicians. On the contrary, older men have more socio-economic stability. Moreover, ED is also more likely to be accepted in these subjects as a manifestation of the aging process.

Meanwhile, masturbation frequency was positively related to depression. Higher frequency of masturbation was associated with higher PHQ-9 score ($r = 0.346$; $p < 0.001$). This result implied that men with ED who masturbate more frequently had an increased risk of developing depression. Masturbation is a safe sexual behavior that helps to satisfy desire without the risk of getting sexually transmitted infections.¹² Men with ED who avoid sex may seek to masturbate as a way to achieve pleasure and maintain erectile function. However, masturbation is a sexual activity without a partner which can lead to feelings of loneliness and low self-esteem, especially in the situation where a man fails to get an erection during masturbation. The results of our study show that masturbation is a factor that increases the risk of depression by 6.53 times ($p < 0.001$) (Table 4). This is in agreement with the results of Castellini et al (2016).¹³ Therefore,

when having symptoms of ED, men should go to the doctor for timely advice and treatment by a specialist.

Also in this study, marital status is an associated factor of depression. Single men (including single or divorce/widower) had a 5.03 times higher chance of developing depression than married men ($p = 0.001$) (Table 4). This is consistent with the association between depression and marital status which has long been known to be a two-way relationship: single people are reported to have higher rates of depression, and conversely, depression is a cause of unhappy marriages and breakdowns in romantic relationships.⁵ If men with ED receive their partner's sympathy, they feel easier to express their problems and seek medical consultation.

ED with sudden onset is due to stress and psychological tension which increase sympathetic system tone leading to inhibition of the erection process. Stress is also the cause of depressive symptoms and, if prolonged, may lead to depressive disorder with all the features of a depressive episode. On the background of pre-existing psychological risk factors, the presence of ED in these patients exacerbates stress and psychological tension leading to an increased risk of depression. Our study shows that patients with sudden onset of ED have a greater chance of developing depression with $OR = 2.36$ at $p = 0.03$ (Table 4).

Testosterone is a male sex hormone that has been shown to be associated with depression: low testosterone is one of the factors that increase depression levels.¹⁴ However, in our study, on the subjects with erectile dysfunction, we did not find this relationship. Similarly, severity of ED assessed by IIEF-5 scale was not associated with depression on the PHQ-9 scale in these subjects (Table 3). It could

be speculated that ED can trigger depression regardless of its severity. In addition, previous studies focused on the group of older men who have had a decrease in testosterone levels,^{15,16} but in our study, there were many young men with the group under 40 years old accounting for nearly 40% and their testosterone levels within normal limits. Currently, the mechanism underlying depression, especially in male subjects, is not well-known, and testosterone deficiency is hypothesized to be one of the causes. However, further studies are needed to establish this association.

V. CONCLUSION

Depression presents at a relatively high rate (45.8%) in patients with ED, so symptoms of depression should be screened for this population. Age and the masturbation frequency were different characteristics between depression and non-depression groups. In addition, these are also two characteristics that are related to the degree of depression on the PHQ-9 scale. Factors including age under 40 years, masturbation, being single, and the sudden onset of erectile dysfunction increase the risk of depression.

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