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ORIGINAL RESEARCH

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A comparative study of stigma and mental health status between patients with erectile dysfunction and patients with erectile dysfunction and diabetes

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Abstract

Recently, although stigma and mental health among patients with diabetes have garnered significant research attention, there are still limited investigations into the stigma and mental health of patients with erectile dysfunction (ED) and diabetes. In this study, we aimed to examine the stigma and mental health of patients with ED and diabetes to provide insights for improving the treatment and nursing of patients with ED and diabetes. We selected 82 patients with ED and diabetes and 82 patients with ED. Patients were evaluated using the Basic Information Scale, Symptom Checklist 90 (SCL-90) and Social Impact Scale (SIS). Patients with ED and diabetes had higher scores than the national norm in all dimensions of shame ($p < 0.05$), while patients with ED scored higher than the national norm in the dimensions of social exclusion, economic discrimination and internal shame ($p < 0.05$). Further, patients with ED and diabetes had higher scores of disease shame regarding social exclusion, internal shame and social isolation dimensions than patients with ED ($p < 0.05$). The score of interpersonal relationship factors of patients with ED was lower than that of the national norm ($p < 0.05$), while for patients with ED, the score of interpersonal relationship factors in patients' SCL-90 was lower ($p < 0.05$) and the score of psychotic factors was higher than that of the national norm ($p < 0.05$). A positive correlation was observed between the paranoid factor score in the SCL-90 of patients with ED and diabetes, the social exclusion dimension score, and the total score in the sense of shame ($p < 0.05$). Both patients with ED and diabetes and patients with ED exhibited abnormally higher rates of SCL-90 scores, indicating the presence of psychological distress and urging the need to strengthen psychological care.

Keywords

Diabetes; ED; Stigma; Mental health

1. Introduction

Male erectile dysfunction is one of the most common sexual dysfunction diseases affecting men worldwide [1]. Some studies have reported that 85%–90% of ED are caused by psychological factors, which can seriously impact men's self-esteem and self-confidence, leading to the occurrence and aggravation of mental and psychological distress [2]. The long-term impact of ED can lead to a deep sense of shame, which has been recognized by numerous studies as a complex issue encompassing psychology, medicine, sociology and other disciplines [3]. The sense of shame has a close relationship with the patient's response and also impacts the rehabilitation of the patient's disease to a certain extent. Stigma refers to the shame patients feel when society labels them with certain undesirable characteristics, causing them to feel different and discriminated [4].

Stigma is closely associated with the patient's mental health status [5]. In recent years, research on stigma and mental health of diabetic patients has become a research hotspot. Patients with diabetes are often labeled as having "no self-discipline, obesity and unhealthy lifestyle", leading to feelings of discrimination and stigma [6]. Similarly, patients with ED are afraid of being treated differently from healthy individuals due to their ED may also often lead to feelings of inferiority and shame, which can accumulate over time, resulting in negative psychological outcomes such as self-blame, depression or even suicide [7].

Studies indicate that the prevalence of ED among diabetic male patients is as high as 72.5% [8]. Patients with ED and diabetes not only have to bear diabetes-related labels but also a sense of shame due to ED-related symptoms caused by the underlying diabetes. Thus, one of the unclarified issues in this field is: can diabetes aggravate patients' sense of stigma and

psychological condition?

Until now, few studies have investigated the stigma and mental health of patients with ED and diabetes, both domestically and abroad. Therefore, this study aimed to investigate and analyze the characteristics of stigma and mental health in patients with ED and diabetes and patients with ED to provide a basis for reducing the level of stigma and improving their mental health.

2. Methods

We used a self-made basic questionnaire and two types of psychological questionnaires to evaluate respondents. The basic questionnaire was designed by the researchers and included parameters such as age, place of residence, education level, Body Mass Index (BMI), income, International Index of Erectile Function 5 (IIEF-5) questionnaire, and comorbidity status. The two types of psychological questionnaires include the Social Impact Scale (SIS) and Symptom Checklist 90 (SCL-90). SIS used in this study was developed by Fife and Wright [9] in 2000. SIS was then compiled and translated into Chinese by Pan [10]. The scale is divided into four dimensions, namely social exclusion, social isolation, economic discrimination and internal stigma, and has a highest total score of 96 points and a lowest score of 24 points. The purpose of filling in SIS is to measure the patient's level of stigma. The higher the SIS score, the higher the patient's level of stigma. SCL-90 was compiled by Derogatis [11] in 1973 and comprised a total of 90 items, ranging from somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, *etc*. The 9 factors of terror, paranoia and psychosis reflecting the presence and severity of psychological symptoms. Each item adopts a five-grade scoring system, whereby 1, 2, 3, 4 and 5 points refer to none, very light, moderate, heavy and serious, respectively. According to the national norm [12], abnormal psychological test results were considered if the total score exceeded 160 points, the number of positive items exceeded 43, or any factor score exceeded 2 points. The aim of filling SCL-90 questionnaire is to evaluate the patients' psychological condition. A higher SCL-90 score indicated a more serious psychological condition.

We used random sampling to identify 82 patients with ED and diabetes from the Department of Endocrinology and 82 patients with ED from the Department of Andrology at a tertiary hospital in Nanjing from March 2021 to July 2021.

The participants were recruited according to the diagnostic criteria of erectile dysfunction in the sexual and reproductive health guidelines of the European Association of Urology [13]. The study inclusion criteria of patients with ED and diabetes were: 1. ED history >3 months and an International Index of Erectile Function 5 (IIEF-5) score ≤21 points; 2. had clear consciousness and could complete the questionnaire independently; and 3. the diabetes condition was diagnosed by endocrinologists and the patient had stable blood sugar level in the past month. Exclusion criteria of patients with ED and diabetes were: 1. patients with a primary diagnosis of other sexual dysfunction; 2. patients were diagnosised with severe psychological abnormalities affecting communication; and 3. the presence of other serious diseases of the body system (such as cancer, tumor, endocrine disease, *etc.*). The inclusion criteria of patients with ED were: 1. ED history >3 months and an International Index of Erectile Function 5 (IIEF-5) score ≤21 points; and 2. had clear consciousness and could complete the questionnaire independently. The exclusion criteria of patients with ED were: 1. presence of other sexual function abnormalities as the first diagnosis; 2. patients were diagnosised with serious psychological abnormalities affecting communication; 3. and presence of other serious diseases of the body such as cancer, endocrine disease, *etc*. Additionally, a total of 82 questionnaires were collected from patients with ED and diabetes and patients with ED, and questionnaires that were missing or filled with mistakes were excluded.

The purpose and significance of the study were detailedly explained to the participants, and their cooperation was obtained. The participants in the survey were nurses from the Department of Andrology and postgraduate nursing students rotating in the Department of Endocrinology. We interview every subject for 40–60 minutes. Participants in the survey conducted relevant training, completed quality control, and informed each patient selected to participate in this study by abiding by the study criteria to ensure the accuracy and completeness of the questionnaires.

We conducted a preliminary investigation on both patients. We evaluated 20 patients with ED and 20 patients with ED and diabetes in advance. We calculated the mean and standard deviation of SIS and SCL-90 scores for patients with ED and 20 patients with ED and diabetes. Based on the national norm scores of SIS and SCL-90 [10, 11], we use the formula $[n = (u_{\alpha/2}\sigma/\delta)^2]$ to calculate the minimum required sample size of 67. By increasing the sample loss by 10%, we determined the sample size to be 74. Finally, we evaluated the data of 82 patients with ED and 82 patients with ED and diabetes.

All data were recorded in the Microsoft Excel 2006 (Version 7.0, Microsoft Corp., Redmond, Washington, USA) software. After checking and correcting for errors, they were analyzed in the SPSS (Version 22.0, IBM Corp., Chicago, USA) software. Constituent ratio (%) was used for enumeration data, mean ± standard deviation ($\bar{x} \pm s$) for the statistical description of measurement data, LSD (least significant difference)—*t*-test was used for pairwise comparison between groups, and Pearson correlation analysis was used to assess the relationship between stigma and SCL-90. The inspection level was $\alpha = 0.05$, and $p < 0.05$ was used to indicate statistical significance.

3. Results

We used the SPSS v22.0 software to inspect the results of SIS and SCL-90. Data normality/equal variances was checked before performing the inferential statistics. All data matches data normality/equal variances.

3.1 Basic characteristics of patients with ED and diabetes and patients with ED

We found that the mean age of patients with ED and diabetes was 55.37 ± 14.59 years, which was higher than that of patients with ED (36.46 ± 7.73 years, $p < 0.01$). The percentage of patients with ED and diabetes whose income was ≥10,000

Chinese yuan was the highest (46.34%), and the percentage of patients with ED and diabetes with income <5000 Chinese yuan was the lowest (10.98%). Additionally, the percentage of patients with ED whose income was between 5000 and 10,000 was the highest (46.34%), and the percentage of patients with ED whose income was ≥10,000 Chinese yuan was the lowest (12.20%, $p < 0.01$). The percentage of patients with ED and diabetes with comorbidity, such as hypertension, was the highest (52.44%), while the percentage of patients with ED without comorbidity was the highest (69.51%, $p < 0.01$). There was no significant difference in IIEF-5, BMI, place of residence and education level between the diabetic and patients with ED ($p > 0.05$, Table 1).

3.2 Comparison of stigma levels between patients with ED and diabetes and patients with ED

In this study, the age, comorbid and income level are different between patients with ED and diabetes and patients with ED. We adjusted the Related factors for confounding effect. The scores of each dimension of stigma in patients with ED and diabetes and patients with ED were compared with the national norm [10] (Table 2). All dimensions of stigma in patients with ED and diabetes were different from the national norm ($p < 0.05$), while no significant difference was observed in the dimension of social isolation between patients with ED and national norms. Meanwhile, the stigma levels of patients with ED and diabetes and patients with ED were compared (Table 2). Additionally, we found no significant difference between the two in the dimension of economic discrimination ($p > 0.05$).

3.3 Positive psychological detection rate in patients with ED and diabetes and patients with ED

In this study, the positive symptom detection rate of patients with ED and diabetes was 50% (40 cases), which was higher than 42.68% (35 cases) of patients with ED, but the difference was not statistically significant ($\chi^2 = 0.614$, $p = 0.433$). The positive detection rate of psychotic factors in patients with ED and diabetes was found to be lower than in patients with ED ($\chi^2 = 4.571$, $p = 0.033$). However, there was no significant difference in the positive detection rate of other factors ($p > 0.05$, Table 3).

3.4 Mental health status differences between patients with ED and diabetes and patients with ED

The psychological levels of patients with ED and diabetes and patients with ED were compared with the normal model [11] (Table 4). Our results showed that the interpersonal relationship, hostility and paranoia factors of patients with ED and diabetes were significantly different from the normal model ($p < 0.05$). However, although no significant difference was observed regarding other factors in patients with ED, significant differences were observed in their psychotic factors compared to the national norm ($p < 0.05$). Additionally, no significant difference was observed in psychological level between patients with ED and diabetes and patients with ED ($p > 0.05$).

3.5 Correlation analysis between stigma and mental health in patients with ED and diabetes and patients with ED

Here, we investigated the correlation between stigma and mental health in patients with ED and diabetes and patients with ED. The results showed that only paranoid Factors of patients with ED and diabetes were correlated with the total score of stigma and the dimension of social exclusion ($p < 0.05$), and the other factors and total scores were not significantly correlated with stigma. The total score of stigma and the scores of each dimension in patients with ED were significantly positively correlated with the psychological status of patients ($p < 0.05$).

4. Discussion

4.1 General data of patients with ED and diabetes and patients with ED

Our study found that the average age of patients with ED and diabetes was higher than that of patients with ED. An American study reported that the elderly are more likely to develop diabetes due to age-related decline in the proliferative potential of pancreatic β-cells [14]. Similarly, we observed that older individuals were also more prone to diabetes and ED, and the average age of patients with ED and diabetes was higher than that of patients with ED. The proportion of people with hypertension in patients with ED and diabetes was high, while patients with ED were likelier to have no comorbidity. A meta-analysis by Wang *et al.* [15] showed that the risk of ED in hypertensive patients was 1.84 times higher than that in people with normal blood pressure. After adjusting for other cardiovascular risk factors, hypertension was still significantly related to the incidence of ED (OR = 1.58). Petrie *et al.* [16] showed that oxidative stress, inflammation and fibrosis, which may cause microvascular and macrovascular complications in patients with diabetes, were also associated with vascular remodeling and dysfunction of hypertension from the perspective of the vascular mechanism of susceptibility to these two diseases, indicating that people with diabetes are prone to hypertension. Therefore, the proportion of hypertension in patients with ED and diabetes was also high. Additionally, the most common comorbidity in patients with ED was hypertension. Our study found that the income level of patients with ED and diabetes was generally higher than that of patients with ED. It has been reported that the income level of developing countries or economically backward countries is also positively related to the incidence rate of type 2 diabetes, supporting previous evidence showing that the prevalence of type 2 diabetes was higher in people from high per capita income of families [17, 18].

TABLE 1. Results of general data of patients with ED and diabetes and patients with ED.

Characteristics		patients with ED and diabetes (n = 82)	patients with ED (n = 82)	*t*	*p*
Age (years)	Mean (SD)	55.37 (14.59)	36.46 (7.73)	10.365	<0.001
IIEF-5		13.00 (4.94)	11.95 (5.31)	1.310	0.192
		n (%)	n (%)	χ^2	*p*
BMI					
	BMI <24	35 (42.68%)	40 (48.78%)	0.614	0.433
	BMI ≥24	47 (57.32%)	42 (51.22%)		
Place of residence					
	Urban	41 (50%)	37 (45.12%)	0.391	0.532
	Rural	41 (50%)	45 (54.88%)		
Education					
	Less than middle school	13 (15.85%)	11 (13.41%)		
	Middle school	29 (35.37%)	27 (32.93%)	0.429	0.807
	High school or more	40 (48.78%)	44 (53.66%)		
Comorbid status					
	None	16 (19.51%)	57 (69.51%)		
	Hypertension only	43 (52.44%)	12 (14.63%)	43.550	<0.001
	Hyperlipidemia only	12 (14.63%)	8 (9.76%)		
	Hypertension & Hyperlipidemia	11 (13.42%)	5 (6.10%)		
Income					
	<5 k	9 (10.98%)	34 (41.46%)		
	≥5 k and <10 k	35 (42.68%)	38 (46.34%)	30.992	<0.001
	≥10 k	38 (46.34%)	10 (12.20%)		

ED: erectile dysfunction; SD: standard deviation; BMI: body mass index.

TABLE 2. Comparison of the scores of various dimensions of stigma in patients with ED and diabetes and patients with ED with the national norm ($\bar{x} \pm s$).

Dimensions	Patients with ED and diabetes	Patients with ED	National norm	A		B		C	
				t	*p*	*t*	*p*	*t*	*p*
Social exclusion	20.24 ± 4.13	18.01 ± 5.08	14.87 ± 4.07	11.776	<0.001	5.606	<0.001	3.088	0.002
Economic Discrimination	7.23 ± 1.91	7.45 ± 2.23	5.73 ± 2.31	7.131	<0.001	6.994	<0.001	−0.678	0.499
Inner shame	17.82 ± 2.17	14.29 ± 3.41	8.45 ± 2.67	39.149	<0.001	15.523	<0.001	7.902	<0.001
Social isolation	20.74 ± 3.02	16.44 ± 4.65	14.64 ± 3.80	18.316	<0.001	3.501	0.001	7.028	<0.001

A: Comparison between Patients with ED and diabetes and National norm;
B: Comparison between Patients with ED and National norm;
C: Comparison between Patients with ED and diabetes and patients with ED;
ED: erectile dysfunction.

TABLE 3. Patients with ED and diabetes and patients with ED with positive psychological detection (n (%)).

Group	Interpersonal Sensitivity	Anxiety	Phobic	Psychoticism	Other	Depression	Hostility	Paranoid	Somatization	Obsessive-Compulsive
Diabetic ED patients	14 (17.07)	16 (19.51)	6 (7.31)	8 (9.76)	14 (17.07)	21 (25.61)	9 (10.98)	10 (12.20)	9 (10.98)	17 (20.73)
patients with ED	21 (25.61)	16 (19.51)	8 (9.76)	18 (19.51)	15 (18.29)	23 (28.05)	13 (15.85)	9 (10.98)	12 (14.63)	25 (30.49)
χ^2	1.780	0.000	0.312	4.571	0.042	0.124	0.840	0.060	0.492	2.048
p	0.182	1.000	0.576	0.033	0.838	0.724	0.359	0.807	0.483	0.152

ED: erectile dysfunction.

TABLE 4. Comparison of the mental health status of patients with ED and diabetes and patients with ED with the national norm ($\bar{x} \pm s$).

Items	Patients with ED and diabetes	Patients with ED	National norm	D		E		F	
				t	p	t	p	t	p
Interpersonal relationship	1.44 ± 0.48	1.55 ± 0.55	1. 65 ± 0.51	−3.924	<0.001	−1.720	0.089	−1.270	0.206
Anxiety	1.38 ± 0.45	1.50 ± 0.54	1.39 ± 0.43	−0.167	0.868	1.831	0.071	−1.517	0.131
Terror	1.23 ± 0.37	1.34 ± 0.51	1.23 ± 0.41	−0.109	0.914	1.870	0.065	−1.584	0.115
Psychosis	1.32 ± 0.39	1.52 ± 0.55	1.29 ± 0.42	0.709	0.480	3.741	<0.001	−2.626	0.009
Depression	1.54 ± 0.51	1.61 ± 0.59	1.50 ± 0.59	0.713	0.478	1.691	0.095	−0.808	0.420
Hostility	1.37 ± 0.40	1.43 ± 0.44	1.48 ± 0.56	−2.432	0.017	−1.002	0.319	−0.912	0.363
Paranoia	1.32 ± 0.39	1.39 ± 0.41	1.43 ± 0.57	−2.583	0.012	−0.851	0.397	−1.168	0.244
Somatization	1.33 ± 0.34	1.38 ± 0.45	1.37 ± 0.48	−1.123	0.265	0.260	0.795	−0.883	0.379
Coercion	1.58 ± 0.55	1.70 ± 0.63	1.62 ± 0.58	−0.608	0.545	1.144	0.256	−1.262	0.209

D: Comparison between Patients with ED and diabetes and National norm;
E: Comparison between Patients with ED and National norm;
F: Comparison between Patients with ED and diabetes and patients with ED;
ED: erectile dysfunction.

4.2 Comparison of stigma levels between patients with ED and diabetes and patients with ED

In this study, the stigma score of patients with ED and diabetes was 66.04 ± 8.94 points, and the stigma score of patients with ED was 56.32 ± 12.90 points, both higher than the middle of the scale value of 48. Comparing the two dimensions of stigma with the national norm showed that all dimensions of patients with ED and diabetes were higher than the norm with significant differences, while the social isolation dimension of patients with ED was similar to the national norm. By comparing the total stigma score and each dimension of the two, except for the dimension of economic discrimination, revealed a significant difference in the other dimensions. In recent years, with the improvement in living standards, more and more men are pursuing high-quality sex life. Therefore, ED, as a complication of patients with diabetes, has attracted more and more social attention. Long-term ED may thus produce anxiety, self-blame, low self-esteem and other bad emotions, and over time, leading to shame and malignant psychology [19] due to ED patients worrying, fearing or even hating sexual intercourse.

The stigma level of patients with ED and diabetes in this study was higher than that of patients with ED. This disparity may be attributed to several factors. Firstly, patients with diabetes themselves may feel stigmatized due to their diabetic condition. According to the report of the International Diabetes Federation (IDF), patients with diabetes who are treated unfairly by society may experience discrimination and shame [20]. This pre-existing stigma may then be compounded by the presence of ED, resulting in higher levels of stigma. Secondly, compared to patients with ED, patients with ED and diabetes are more likely to be obese, which can lead to self-image disorders as obese people often feel pervasive, a resilient form of social stigma. Research indicates that weight stigma can cause physical and psychological harm [21]. Thirdly, patients with ED and diabetes not only experience difficulties in their sexual relationship, especially between husband and wife, due to the inability to have normal erections but also avoid social interaction due to long-term insulin injections, blood sugar

monitoring and management *etc.*, due to fear of exposing their diseased condition, leading to intentionally or unintentionally insulin injection in public places, to avoid public attention and discrimination [22]. Patients avoid normal social interaction because of their own stigma and gradually become self-isolated, leading to more serious stigma and forming a vicious circle. In this study, the level of stigma in patients with ED and diabetes was lower than that of patients with ED in the dimension of economic discrimination, but the difference was not significant. Patients with ED and diabetes believe that ED is caused by diabetes and spend their money on treating the diabetes condition. In contrast, patients with ED tend to think that diseases are caused by their own actions. So, the former may lead to a lower level of stigma. However, both of them are more self-financed [23]. Thus, the difference in the level of stigma in patients with ED and diabetes and patients with ED was not statistically significant, as both have a high sense of stigma and require early intervention. Patients with ED and diabetes need more management in terms of lifestyle and self-management.

4.3 Comparison of the mental health status of patients with ED and diabetes and patients with ED

In this study, the positive detection rate of the SCL-90 scale in patients with ED and diabetes was 50%, higher than that of patients with ED (42.68%). Table 3 showed that the positive detection rates of depression (25.61%, 28.05%), obsessive-compulsive disorder (20.73%, 30.49%), anxiety (19.51%, 19.51%) and interpersonal relationship (17.07%, 25.61%) factors in patients with ED and diabetes and patients with ED were high. Compared with the national norm, the total psychological scores of the two were higher, with significant differences observed in interpersonal relationship factors, patients with ED had differences in psychotic factors, and there were no significant differences in the rest. No significant difference in the psychological status of patients with ED and diabetes and patients with ED was observed ($p > 0.05$). Patients with Diabetes often have negative emotions such as anxiety and depression. Psychological stress can cause insulin antagonism, leading to decreased insulin sensitivity, increased blood sugar, and promoting the development of ED symptoms [24], which can, in turn, aggravate their psychological state and form a viscous cycle. In this study, the positive rates of negative psychology in patients with ED and diabetes and patients with ED were high, but the difference between the two was not significant. This could be attributed to several reasons. First, both patients with ED and diabetes and patients with ED may have negative psychology due to a lack of disease knowledge, fear, anxiety and shame. So the psychological scale score will be higher than ordinary people. Second, the positive detection rates of interpersonal relationship (17.07%, 25.61%) factors in patients with ED and diabetes and patients with ED were high, which might have been related to the disharmony between husband and wife and distance from normal social groups due to inner fear and shame in patients with ED symptoms. Therefore, it is necessary to intervene early by implementing adequate psychological measures in these patients.

4.4 Correlation between stigma and mental health status

In this study, the correlation analysis between stigma and psychological status in patients with ED and diabetes showed that only paranoid psychological factors were correlated with the overall level of stigma and social exclusion, while the rest was not significantly correlated. The difference was that each psychological factor of patients with ED significantly correlated with each dimension of stigma. These observations might have been related to: 1. Patients with ED and diabetes may have increased stigma due to the occurrence of both diabetes and ED. However, if patients with ED and diabetes are aware that diabetes is the cause of their ED, this might help reduce their psychological burden. On the contrary, patients with ED will feel that the disease is caused by their own reasons. Such patients with ED will feel ashamed. Therefore, the sense of stigma produces and affects mental health. 2. Depending on the patient's department in which they are treated, there may be differences in the emphasis of admission education, resulting in differences in completing the questionnaire and scaling. 3. The patients in this study were limited to one hospital, and the results may vary. Further, in regard to paranoid psychological factors, we speculated that the long-term duration of the diabetes condition might have caused the patients with ED and diabetes to have a sense of shame, which was further aggravated by the occurrence of ED. However, it could also be that the real stigma exists only in the patient's mind.

4.5 Countermeasures to reduce stigma and improve the psychological status of patients with ED and diabetes

In clinical practice, it is essential for clinicians to pay more attention to patients with ED and diabetes, monitor changes in their stigma levels and promptly address any psychological changes through effective countermeasures to reduce the stigma levels and improve their psychological conditions. Several potential measures could be implemented. Firstly, establishing a specialized nursing escort could provide patients the necessary support and care to manage their condition effectively. Medical institutions should set up a well-equipped diabetes clinic that focuses on managing the various complications caused by diabetes, providing awareness of the disease and disease knowledge education to reduce the stigma caused by disease perception. Secondly, setting up a psychological counseling group to provide patients with the necessary support and confidence to manage their condition. Educating medical staff on anti-stigma and adopting holistic care for diabetes management for patients could eliminate any stereotypes or prejudices and reduce patients' sense of stigma [25]. Although specialized diabetes clinics exist in China, most are focused on dietary and physical activities and overlook stigma intervention [26]. Therefore, it is necessary to set up a psychological consultation group to better help patients reduce stigma. Thirdly, wards could provide multi-modal disease knowledge education to enhance disease awareness. Medi-

cal staff may explain disease knowledge and the importance of self-management. Through appropriate public education, patients would understand that this is a controllable disease, which would improve their anxiety and fear. Distributing brochures, developing official accounts, and other forms can also enable patients to further understand and relieve their negative emotions and feelings. Fourthly, family support is crucial in providing security and care. According to Spanish research reports, family tradition is one of the cores of culture, and patients' medical decision-makers are generally family members [27]. Therefore, obtaining support at the family level, especially from the patient's partner, is very important for the patient's subsequent treatment and care. Emotional support, diet management, and treatment supervision at home can help alleviate patients' stigma and improve negative psychology. Fifth, establishing a peer assistance platform can provide patients with social support, reduce stigma and improve their psychological level. Carrying out "continuous chain activities" and forming a peer group comprising newly diagnosed and other patients may allow sharing of experience, pour out negative emotions, encourage each other, and provide rule-of-thumb guides. Medical staff can launch a "patients with ED and diabetes mutual aid group" for patients can obtain more social support to reduce their stigma and improve their psychological level.

5. Limitations

This study analyzed the level of stigma and negative psychology of patients with ED and diabetes and patients with ED. However, there were limitations in our study's selection of research subjects, mainly as follows. Patients with diabetes may experience a sense of shame due to their condition, and the presence of ED may further intensify this sentiment. Thus, diabetes in conjunction with ED could lead to an increased sense of exclusion and poorer mental health status. In this study, we only recruited patients with ED and diabetes and patients with ED. For further studies, we recommend including a group of patients solely diagnosed with diabetes to better discuss the stigma and psychological problems of patients with ED and diabetes. Our findings also suggested that patients with ED and diabetes with comorbidities, especially hypertension, exhibit a higher level of stigma and poorer mental health outcomes. In this case, diabetes with ED and hypertension may lead to an increased sense of exclusion and poorer mental health status. However, it remains unclear whether the stigma or psychiatric symptoms in patients with ED and diabetes with hypertension are a consequence of diabetes or hypertension.

6. Conclusions

To sum up, the stigma levels of patients with ED and diabetes and patients with ED were found to be higher than the national norm, and the stigma level of patients with ED and diabetes was found to be more prominent than that of patients with ED. Patients with ED and diabetes and patients with ED had a higher positive psychological detection rate, although the difference between them was not significant. Therefore, in the clinical treatment and nursing of patients with ED and diabetes, targeted negative psychological counseling and psychological intervention could be considered to reduce the level of stigma, improve the psychological status, and improve the quality of life.

ABBREVIATIONS

ED, erectile dysfunction; SCL-90, Symptom Checklist 90; BMI, Body Mass Index; IIEF-5, International Index of Erectile Function Exponentially-5; SIS, social impact scale; LSD, least significant difference.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

ESZ, TMW XYC and JW—were responsible for designing the research study. ESZ and TMW—performed the research; wrote the manuscript. YZ and WW—provided help and advice on designing. TMW—analyzed the data. ESZ, WC, WW, XQ, JW and XYC—Manuscript revision for important intellectual content. ESZ—obtained the funding. All authors contributed to editorial change

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Ethics Committee of the Nanjing Drum-Tower Hospital, Nanjing, China (ID: 2021-417-01). Informed consent was obtained from participants in this study.

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CONFLICT OF INTEREST

The authors declares no conflict of interest.

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