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Factors affecting the adoption of health-promoting behaviours in patients with polycystic ovary syndrome: a cross-sectional study

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ABSTRACT

Objective This study aimed to investigate health-promoting lifestyle status and associated risk factors in patients with polycystic ovary syndrome (PCOS).

Design Cross-sectional study.

Setting This study was conducted at a tertiary hospital in Guizhou, China from December 2020 to June 2021.

Participants A total of 366 participants (18–45 years) diagnosed with PCOS were recruited from the outpatient departments.

Measures Sociodemographic characteristics were collected, and health-promoting behaviours were measured using the Health-Promoting Lifestyle Profile scale. Anxiety status was measured using the Zung's Self-Rating Anxiety Scale, depression status using the Zung's Self-Rating Depression Scale and self-efficacy using the Managing Chronic Disease 6-Item Scale. Multiple stepwise linear regression was conducted to assess the risk factors associated with the health-promoting behaviours of the study participants.

Results The participants had a poor health-promoting behaviours (88.54±17.44). The highest score in all dimensions was spiritual growth (16.68±4.98), while physical activity (12.71±2.68) was the lowest. Multiple regression analysis revealed that the main factors influencing the development and maintenance of health-promoting behaviours among participants were education (B=10.788, p<0.001), depression (B=−0.377, p<0.001), anxiety (B=−0.333, p<0.001) and self-efficacy (B=0.938, p=0.002). The model showed 74.40% variance shared between the dependent and independent variables (R^2=74.40, F=264.633, p<0.001).

Conclusion Health-promoting behaviours are minimal among patients with PCOS, and improving negative emotions and enhancing behavioural awareness and self-efficacy are necessary to increase the adoption of health-promoting behaviours among patients with PCOS.

Trial registration number ChiCTR2000034572.

Strengths and limitations of this study

- The Health-Promoting Lifestyle Profile scale was used to measure health-promoting behaviours in patients with polycystic ovary syndrome (PCOS).
- This study allows the examination of relationships between health-promoting behaviours and social demographic data, negative emotion, as well as self-efficacy in patients with PCOS.
- All participants were recruited from a single regional hospital, making it difficult to generalise the findings.
- This study used a cross-sectional design; therefore, a causal relationship could not be established.

INTRODUCTION

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder, affecting 4%–18% of women of reproductive age.[1] The main features of PCOS include hyperandrogenism, menstrual dysfunction and anovulatory polycystic ovaries. More than 80% of patients with PCOS are overweight or obese.[2 3] Furthermore, PCOS increases the risk of additional complications, such as type 2 diabetes, metabolic syndrome and cardiovascular diseases.[4 5] Treatment for PCOS includes lifestyle interventions (dietary, exercise, behavioural or combined intervention) and surgical and pharmacological options. However, lifestyle management is preferable and presents a cost-effective initial treatment strategy.[6] Moreover, international PCOS guidelines recommend lifestyle management as the first-line treatment.[7]

Many studies have reported the beneficial effects of lifestyle management in PCOS, such as optimising healthy weight, decreasing underlying hormonal disturbances, preventing future metabolic and reproductive complications, and improving the quality of life.[8–10] Unfortunately, despite the recommendation of healthy lifestyle changes, many patients fail to adopt and maintain healthy behaviours. A recent study indicated that 44% of patients with PCOS engage in high-level physical activity.[11]

Although several studies have reported the importance of lifestyle management among

patients with PCOS,[12 13] these studies did not clearly describe multidimensional life management with PCOS. Most studies focused on only one dimension of behaviour assessment, mainly nutritional intake and physical activity. Compared with these one-sided assessments, the Health-Promoting Lifestyle Profile II (HPLP-II) provides a multidimensional estimation of health-promoting behaviour. Previous research has revealed that participants following health-promoting lifestyle recommendations were healthier and suffered less pain.[14] However, only one study described health-promoting lifestyles in relation to PCOS, and their results suggest that health-promoting lifestyles were at a moderate level, with physical activity being the lowest in subscales.[15] However, this study did not investigate which factors accounted for the phenomenon. Furthermore, the negative emotional impact of PCOS on patients is always underestimated; yet, no research has reported the relationship between health-promoting behaviours and negative emotions in patients with PCOS. Therefore, identifying factors that influence health-promoting behaviours is important to improve these behaviours and lower the risk of long-term complications in patients with PCOS. There is a paucity of data on the multidimensional assessment of health-promoting lifestyles among women of reproductive age with PCOS in China, and factors that impact health-promoting behaviours have not been explored.

This study aimed to identify health-promoting behaviours among patients with PCOS and validate the risk factors associated with health-promoting behaviours.

METHODS

Study design and setting

This is a cross-sectional observational study in which patients with PCOS were recruited by convenience sampling from the outpatient department of the Affiliated Hospital of Zunyi Medical University located in Zunyi City, Guizhou Province, China. It is a general hospital with 2800 beds and provides healthcare to approximately 12 million residents in this district. On average, the daily number of clinical patients is 8000. The study was conducted from December 2020 to June 2021.

Sample size calculation

The sample size was calculated by events per variable (EPV), assuming that p is the proportion of the population with PCOS, and K is the number of predictors. Based on the above assumptions and the equation N=EPV×K/p (k=6, p=0.18), the result is robust only when the EPV was at least 10. The sample size was calculated as 333. To allow for the attrition rate, the final sample size was 366.

Participant selection criteria and data collection

Patients who visited the outpatient department of the Affiliated Hospital of Zunyi Medical University from December 2020 to June 2021 were consecutively included in this study. Women of reproductive age (18–45 years) who met the Rotterdam criteria were included. Two of the following three criteria were required: oligo/anovulation, hyperandrogenism and polycystic ovaries on ultrasound.[16] Otherwise, eligible patients who refused to participate were excluded. Patients who could not read and/or understand the provided questionnaires were excluded from the study.

Data collection was conducted face-to-face by two well-trained researchers. After selecting patients with PCOS according to the Rotterdam criteria, a researcher explained the study's nature and purpose and the survey procedures to the patients. Written informed consent was obtained from all participants before the study. We collected data on physical and psychological characteristics, as well as sociodemographics from the enrolled participants. The second researcher assessed the patients for health-promoting lifestyle, self-efficacy, depression and anxiety.

Measures

The self-administered questionnaire included questions on demographic characteristics (self-designed) and instruments to evaluate depression, anxiety, self-efficacy and health-promoting lifestyles.

Sociodemographic characteristics

The sociodemographic characteristics questionnaire was used to obtain information on age, education level, living residence, marital status, occupation, weight, height, body mass index (BMI) and waist circumference (WC). Weight was measured with light clothing and without shoes. Height was measured without shoes using a stadiometer. BMI was calculated based on height and weight. WC was measured in centimetre using plastic tape at the midpoint between the costal margin and the iliac crest in the mid-axillary line in the standing position at the end of a gentle expiration.[17]

Health-promoting lifestyle

We evaluated health-promoting lifestyles using a health-promoting lifestyle profile. This scale consists of 6 dimensions and 52 items, including health responsibility (nine items), nutrition (nine items), physical activity (eight items), interpersonal relationships (nine items), stress management (eight items) and spiritual growth (nine items). Each item in the questionnaire was answered using a 4-point Likert scale with 1, 2, 3, and 4 corresponding to never, sometimes, often, and routinely, respectively. Total scores ranged from 52 to 208, with higher scores representing better health-promoting behaviours.[18] The total HPLP-II score was further classified into three levels: poor for the range 52–90, moderate for the range 91–139, good for the range 140–168, and excellent for the range 169–208.[19]

Depression status

We evaluated depressive symptoms using the Zung's Self-Rating Depression Scale (SDS),[20] which has been used in previous studies and is widely used in clinical settings to

assess the subjective severity of depressive symptoms.[21 22] This scale comprises 20 questions scored on a Likert scale of 1–4 (1, none or a little of the time; 2, some of the time; 3, a good portion of the time; 4, most of the time). The total raw score ranged from 20 to 80, with higher scores representing more severe depressive symptoms. Based on previous studies, we defined the morbidity cut-off point on the SDS as 50.[23] Patients with SDS scores >50 were categorised into the 'depressed group', and displayed moderate or severe depressive symptoms. Patients with SDS scores ≤49 were categorised into the 'non-depressive group'.

Anxiety status

Anxiety symptoms were measured using the Zung's Self-Rating Anxiety Scale (SAS).[24] The SAS consists of 20 self-reported items on anxiety symptoms. Some of the items were symptomatically positive and rated on a 4–1 scale (a little of the time, some of the time, a good part of the time and most of the time). Others were symptomatically negative and rated on a 1–4 scale. A standardised scoring algorithm was used to define anxiety symptoms, with a total score range of 20–80, higher scores represented more severe anxiety symptoms. Owing to the scale's good reliability and validity, it has been widely used in China and other countries.[25] Anxiety was defined as having SAS scores ≥50 points.[26]

Self-efficacy

We evaluated self-efficacy using the Self-Efficacy for Chronic Disease 6-item Scale (SECD6), which consists of six items with a 10-step Likert scale ranging from 1 (not at all confident) to 10 (totally confident). The scale is interpreted by calculating a mean score over at least four of the six items, thus allowing a maximum of two missing item responses. Means range from 1 to 10, with higher values indicating higher self-efficacy.[27] The SECD6 has good internal consistency, with a Cronbach's α of 0.91.[28]

Statistical analysis

EpiData (The Epidata Association, Odense, Denmark) was used to assess and verify the validity of the data, and SPSS V.18.0 was used to analyse the data. Descriptive statistics were presented as frequencies and mean±SD. Univariate analysis of sociodemographic characteristics, health-promoting behaviours, and subscale scores was conducted using independent sample t-test, rank-sum test, and one-way analysis of variance. Pearson correlation was used to assess age, BMI, depression, anxiety, self-efficacy and health-promoting behaviour (health responsibility, physical activity, nutrition, interpersonal relationships, stress management and spiritual growth). Multiple stepwise linear regression was performed to examine the risk factors for health-promoting behaviours. All tests were two sided, with α=0.05.

Patient and public involvement

Through literature review and clinical observation, we proposed the research questions, and explored health-promoting behaviours among patients with PCOS and validate the risk factors associated with health-promoting behaviours. During the study, the research team recruited patients with PCOS to participate in the study through the principles of disclosure and informed consent. None of the participants helped recruit and conduct the research. After the study, the research results will be shared with policymakers to help promote the health-promoting behaviours of patients with PCOS. The findings will also be shared with the participants as a guide to improve their health-promoting behaviour.

RESULTS

In total, 38 patients refused to participate in this study. Their reasons for refusal mainly included time pressure (N=13), fatigue (N=5), infertility (N=7), tension caused by the presence of diseases and unfamiliar environments (N=4), unplanned hospital admissions (N=6) and too many questionnaire items (N=3). The final sample comprised 366 patients with PCOS. Demographic information for the study sample is presented in table 1. The mean age of participants was 25.56 years (SD=4.01), the average BMI was 25.68 (SD=5.24) and the mean WC was 84.17 cm (SD=9.43). Almost all participants (n=366, 85.79%) had received at least a middle school education (over 9 years of education). More than half of the participants were single (n=366, 53.55%). The average SDS of the participants was 51.32 (SD=7.24), the average SAS was 50.54 (SD=7.82) and the average self-efficacy scale was 6.18 (SD=3.59) (table 1).

Table 2 shows the average item score for each subscale (table 2). The mean total HPLP-II was 88.54±17.44. The average score for spiritual growth (16.68±4.98) was highest on the subscales, but that for physical activity was lowest (12.71±2.68).

In terms of nutrition, there were statistical differences among the marital status, education and years of PCOS groups. When one-way Tukey variance analysis was performed, the mean scores of married patients were higher than those of patients who were either single or widowed/divorced (p=0.012). The mean scores of the patients with 1–3 years' duration of PCOS were higher than those of patients with <1, 4–6 and >7 years' duration. Nutrition scores were higher in university graduates (17.52±4.08) than in high school graduates (12.79±3.42), middle school graduates (11.48±3.86) and elementary school graduates (10.32±4.27) (p=0.043) (table 3).

In terms of physical activity, married patients had significantly higher physical activity scores (15.61±2.76) than single (12.51±2.57) and widowed/divorced patients (11.14±2.16). The higher the educational degree, the higher the physical activity score (p=0.011). The mean scores of the patients with 1–3 years' duration of PCOS (15.40±2.47) were higher than those of patients <1 (12.68±2.74), 4–6 (10.83±2.56) and >7 years' (9.14±2.58) (p=0.042) duration of PCOS. Participants who did not desire pregnancy had significantly lower physical activity

Table 1 Demographic characteristics of participants

Variable	Categories	Mean (SD)	Frequency (N)	Percentage
Age		25.56 (4.01)		
BMI		25.68 (5.24)		
WC		84.17 (9.43)		
Residence	City		198	54.09
	Countryside		168	45.90
Marital status	Single		196	53.55
	Married		140	38.25
	Widowed/divorced		30	28.19
Education	Elementary		52	14.21
	Middle school		78	21.31
	High school		68	18.58
	College		168	45.91
Occupation	Employed		111	30.33
	Unemployed		98	26.78
	Student		87	23.77
	Other		70	119.13
Duration of PCOS	<1 year		163	44.54
	1–3 years		125	34.15
	4–6 years		68	18.58
	>7 years		10	2.73
Desire for pregnancy	Yes		177	48.36
	No		189	51.64
SDS		51.32 (7.24)		
SAS		50.54 (7.82)		
Self-efficacy scale		6.18 (3.59)		

BMI, body mass index; PCOS, polycystic ovary syndrome; SAS, Self-Rating Anxiety Scale; SDS, Self-Rating Depression Scale; WC, waist circumference.

scores (15.29±2.48) than those who did (10.93±2.78) (p=0.024) (table 3).

As shown in table 4, age, WC, BMI, self-efficacy, depression and anxiety were significantly correlated with HPLP-II (p<0.05). Moreover, there was a statistically significant positive correlation between HPLP-II and age, and self-efficacy (p<0.01). This suggests that HPLP-II is significantly negatively correlated with WC,BMI, depression and anxiety (table 4).

Table 5 shows the results of stepwise multiple linear regression analysis which revealed that education (B=10.788, p<0.001), depression (B=−0.377, p<0.001),

Table 2 HPLP-II total and subscale mean scores (N=366) of patients with PCOS

	M (SD)	Min	Max	Highest and lowest obtainable score
Health responsibility	13.81 (3.39)	9	24	9–36
Nutrition	14.68 (4.28)	9	27	9–36
Interpersonal relations	16.33 (5.29)	9	32	9–36
Spiritual growth	16.68 (4.98)	9	31	9–36
Stress management	14.32 (4.15)	8	30	8–32
Physical activity	12.71 (2.68)	8	22	8–32
Total HPLP score	88.54 (17.44)	52	168	52–208

HPLP-II, Health-Promoting Lifestyle Profile II; M, mean; max, maximum; min, minimum; PCOS, polycystic ovary syndrome.

Table 3 Associations and differences of HPLP-II mean scores with demographic variables (N=366)

Variable	Categories	Health responsibility	Nutrition	Interpersonal relations	Spiritual growth	Stress management	Physical activity	Total HPLP score
Residence	City	13.58 (3.39)	14.93 (4.60)	16.31 (5.35)	16.94 (5.07)	14.72 (4.34)	12.45 (2.51)	88.89 (18.08)
	Countryside	14.33 (3.29)	14.48 (3.56)	17.32 (5.23)	16.85 (4.91)	14.65 (4.02)	12.82 (2.87)	90.43 (16.38)
	P value	0.165*	0.444*	0.846*	0.914*	0.918*	0.371*	0.429§
Marital status	Single	13.63 (3.58)	13.34 (4.14)	16.49 (5.25)	16.89 (4.94)	14.69 (4.33)	12.51 (2.57)	87.65 (17.09)
	Married	14.26 (3.02)	16.25 (4.42)	17.09 (5.55)	16.82 (5.09)	14.79 (4.13)	15.61 (2.76)	94.82 (18.21)
	Widowed/ divorced	13 (2.94)	12.25 (6.70)	14.50 (2.38)	18.75 (6.29)	13.25 (2.22)	11.14 (2.16)	82.89 (20.30)
	P value	0.449†	0.012†	0.558†	0.757†	0.781†	0.038‡	0.013†
Education	Elementary	13.58 (3.15)	10.32 (4.27)	16.44 (5.10)	17.23 (5.29)	14.73 (3.93)	10.27 (2.58)	82.57 (15.30)
	Middle school	14.04 (3.16)	11.48 (3.86)	17.36 (5.51)	17.44 (5.26)	13.48 (5.05)	11.60 (2.84)	85.10 (15.16)
	High school	14 (3.14)	12.79 (3.42)	16.57 (4.86)	17.50 (6.01)	14.64 (4.36)	12.85 (2.57)	88.35 (20.29)
	College	15.90 (3.64)	17.52 (4.08)	16.60 (5.51)	16.46 (4.62)	15.04 (4.27)	15.69 (2.65)	97.21 (18.00)
	P value	0.924‡	0.043†	0.913†	0.721†	0.449†	0.011†	0.036†
Occupation	Employed	13.83 (3.55)	14.94 (4.35)	16.72 (5.40)	16.50 (4.56)	14.55 (4.10)	12.83 (2.28)	89.38 (16.94)
	Unemployed	13.95 (3.14)	15 (4.71)	16.60 (5.52)	16.85 (5.36)	14.80 (5.00)	12.75 (2.63)	89.95 (18.14)
	Student	13.62 (3.77)	14.98 (3.94)	16.93 (5.91)	17.24 (5.29)	14.98 (4.19)	12.76 (3.15)	90.50 (19.41)
	Other	14.00 (2.98)	14.24 (4.06)	16.40 (4.71)	17.12 (5.22)	14.58 (4.14)	12.08 (2.54)	88.42 (16.54)
	P value	0.958†	0.656‡	0.972†	0.884†	0.96†	0.46†	0.953†
Duration of PCOS	<1 year	13.65 (3.27)	14.16 (4.22)	16.62 (5.25)	17.06 (5.33)	14.71 (4.06)	12.68 (2.74)	88.88 (17.27)
	1–3 years	14.54 (3.62)	17.83 (4.51)	16.48 (5.37)	16.23 (4.67)	14.31 (4.16)	15.40 (2.47)	94.79 (17.72)
	4–6 years	12.67 (2.81)	13.83 (4.17)	16.67 (5.96)	17.83 (3.25)	15.67 (4.76)	10.83 (2.56)	87.50 (19.35)
	>7 years	11.75 (2.63)	13.12 (2.31)	16.25 (6.02)	18.00 (3.83)	17.75 (7.93)	9.14 (2.58)	86.01 (21.70)
	P value	0.185†	0.028‡	0.599†	0.428†	0.416†	0.042†	0.011‡
	Yes	13.72 (3.26)	14.61 (3.49)	16.97 (5.22)	16.89 (5.05)	14.62 (4.21)	15.29 (2.48)	92.10 (17.35)
Desire for pregnancy	No	15.99 (3.53)	11.93 (4.05)	16.27 (5.43)	16.92 (4.97)	15.79 (4.25)	10.93 (2.78)	87.83 (17.71)
	P value	0.614*	0.22*	0.393*	0.972*	0.747§	0.024§	0.017§

*T.
†F.
‡Kruskal-Wallis test.
§Mann-Whitney U test.
HPLP-II, Health-Promoting Lifestyle Profile II; PCOS, polycystic ovary syndrome.

anxiety (B=−0.333, p<0.001) and self-efficacy (B=0.938, p=0.002) were factors associated with health-promoting behaviours. The model showed 74.40% variance shared between the dependent and independent variables (R^2=74.40, F=264.633, p<0.001).

Figure 1 shows that depressed patients had lower HPLP-II scale scores than non-depressed patients (p<0.01). Patients with anxiety scored lower on the HPLP-II scale than those without anxiety (p<0.01).

Table 4 Associations and differences of HPLP-II mean scores with demographic variables (N=366)

Variable	Health responsibility	Nutrition	Interpersonal relations	Spiritual growth	Stress management	Physical activity	Total HPLP score
Age	0.013	0.051	0.79**	0.76**	0.78	0.75**	0.28**
BMI	−0.033	−0.041	−0.07	−0.09	−0.038	−0.03	−0.06**
WC	−0.056*	−0.009	−0.01	−0.02	−0.066*	−0.001	−0.15*
Depression scores	−0.19*	−0.36*	−0.41**	−0.42**	−0.42**	−0.106*	−0.49**
Anxiety scores	−0.26*	−0.32**	−0.41**	−0.35**	−0.38**	−0.30*	−0.46**
Self-efficacy	0.27*	0.44	0.43	0.42**	0.38**	0.20	0.53**

**P<0.01; *p<0.05.
BMI, body mass index; HPLP-II, Health-Promoting Lifestyle Profile II; WC, waist circumference.

DISCUSSION

In the present study, we found that patients with PCOS had minimal health-promoting lifestyle behaviours (88.54±17.44).[15] However, in another study conducted in Nanjing, China, patients with PCOS had a moderate level of health-promoting behaviours. Previous studies[29–31] have also shown that college students, nursing students or cardiovascular patients had moderate health-promoting lifestyle behaviour scores possibly because patients with PCOS are younger and more sensitive to body image. Self-image disorders (hair, acne and obesity) may reduce the initiative and enthusiasm of patients for lifestyle management.[32 33] Moreover, women with PCOS often lack information about their condition. In a previous study conducted on women with PCOS in Taif City, 34% of participants had acquired knowledge through health education.[34 35] Although the present study could not confirm a direct relationship between the awareness rate about health-promoting behaviours and low levels of these behaviours, a low awareness rate may be a risk factor.

In the present study, we found significant relationships between negative emotional scores (depression and anxiety scores) and health-promoting lifestyle behaviours. This may explain why reproductive and metabolic disorders deteriorate and menstrual disturbances become more severe in patients with negative emotions, making them unable to imbibe health-promoting behaviours.[36] The present study also shows that non-depressed patients had higher HPLP scale scores than depressed patients, and non-anxious patients had higher HPLP scale scores than anxious patients. Chang *et al* also found significant relationships between negative emotions and health-promoting behaviours.[37] However, only a few studies have explored the relationship between negative emotions and health-promoting behaviours among patients with PCOS. Therefore, there is an urgent need to address negative emotions to encourage health-promoting behaviours in patients with PCOS.

There was a significant positive association between self-efficacy and the mean HPLP score in the present study. We also observed low self-efficacy scores (6.18±3.59) in

Table 5 Multivariate analysis (stepwise) of predictors for health-promoting behaviour (HPLP-II score)

		Unstandardised coefficients		Standardised coefficients			95.0% CI for B		R^2	F	P value
Model	Variable	B	SE	Beta	t	Sig.	Lower bound	Upper bound			
1	Education	13.346	0.466	0.833	28.617	0.000	12.429	14.263	69.50	418.955	0.000
2	Education	12.153	0.481	0.759	25.266	0.000	11.207	13.099	72.40	374.285	0.000
	Depression	−0.473	0.074	−0.191	−6.352	0.000	−0.62	−0.327			
3	Education	11.622	0.482	0.725	24.116	0.000	10.674	12.57	73.80	341.125	0.000
	Depression	−0.363	0.076	−0.146	−4.752	0.000	−0.513	−0.213			
	Anxiety	−0.367	0.079	−0.14	−4.616	0.000	−0.523	−0.21			
4	Education	10.788	0.545	0.673	19.793	0.000	9.717	11.86	74.40	264.633	0.000
	Depression	−0.377	0.076	−0.152	−4.986	0.000	−0.525	−0.228			
	Anxiety	−0.333	0.079	−0.127	−4.203	0.000	−0.489	−0.177			
	Self-efficacy	0.938	0.298	0.1	3.142	0.002	0.351	1.525			

HPLP-II, Health-Promoting Lifestyle Profile II.

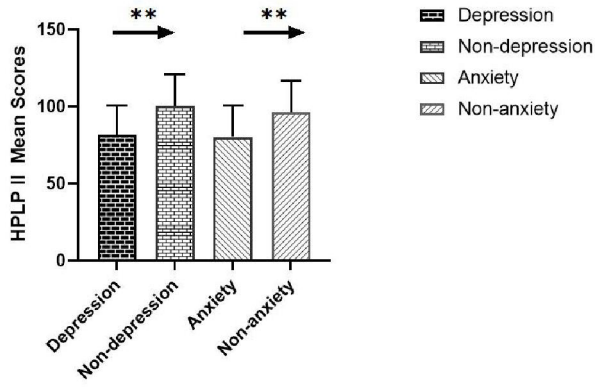

Figure 1 Depressed patients had higher HPLP-II scale scores than non-depressed patients (p<0.01). Patients with anxiety scored higher on the HPLP-II scale than those without anxiety (p<0.01). HPLP-II, Health-Promoting Lifestyle Profile II.

patients with PCOS, probably because younger participants have lower performance and self-management ability and cannot strike a balance between work (study or family) and maintaining health-promoting behaviours. However, the direct reason may be a lack of motivation. A previous study has demonstrated that self-efficacy is a central component, a significant outcome variable, an important indicator for deciding on health education programmes, a major part of behavioural change processes and a precondition for successful self-management of chronic diseases.[38] People with greater self-efficacy are thought to perceive fewer barriers to behavioural change and goal attainment,[39] mediated by the implementation of self-management to pursue their desired goal. This may explain the low self-efficacy and health-promoting behaviour scores in our study. Moreover, previous studies have indicated that improved self-efficacy leads to improved lifestyle behaviours in other chronic conditions such as bipolar disorder, chronic obstructive pulmonary disease, stroke, chronic kidney disease, cardiovascular disease, cancer and diabetes.[40–42] Therefore, there is an urgent need for further research to assess and enhance the self-efficacy and lifestyle management of patients with PCOS before the implementation of health-promoting behaviours.

In our study, higher education levels of patients with PCOS were associated with better health-promoting behaviours. This shows that educational level is a significant factor in developing and maintaining healthy behaviour. Since PCOS is a chronic disease that requires long-term management, enhancing health education for patients with low education levels may help prevent the occurrence of long-term complications and reduce the number of hospitalisation.

The strengths of our study are that it is the first survey to identify health-promoting lifestyle status in patients with PCOS and validate the associated risk factors. Moreover, we assessed multidimensional health-promoting behaviours in patients with PCOS, not only nutritional intake or physical activity. However, this study had some limitations. First, participant selection was performed by convenience sampling from only one hospital in China. Second, participants self-reported the measures, thus their answers are subject to reporting bias. Third, the cross-sectional nature of the study hinders our ability to make causal inferences regarding risk factors and diseases that exist concurrently. Finally, the reliability and validity of HPLP-II in patients with PCOS were not verified, which might have resulted in biased results. In a subsequent study, we will continue to complete the construction and verification of a specific scale to evaluate the multidimensional health behaviours of patients with PCOS.

CONCLUSION

In summary, we found that patients with PCOS had minimal health-promoting behaviours. Moreover, our research suggests that four main factors (depression, anxiety, self-efficacy and education) play critical roles in adopting health-promoting behaviours in patients with PCOS. Therefore, future studies should focus on evaluating and improving patients' negative emotions and enhancing their awareness of behavioural change and self-efficacy to improve their lifestyles. The present study results fill an information gap and provide some preliminary insights for designing life management protocols and health-promoting behavioural interventions.

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