

Clinical Factors Associated With Anxiety and Depression in Korean Women With Abnormal Uterine Bleeding

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Abstract

Background: Abnormal uterine bleeding (AUB) is defined as an abnormality in menstrual bleeding and is a common gynecological problem in premenopausal women. Anxiety and depressive disorders were frequently observed in patients with AUB. This study was conducted to investigate the prevalence and the relationship of anxiety and depression in Korean women with AUB.

Methods: The study was a questionnaire study of 124 Korean women aged 15–55 who admitted a single university hospital due to AUB between September 2015 and December 2019. Anxiety, depression were assessed using the Korean Beck Anxiety Inventory (K-BAI), the Korean Beck Depression Inventory-II (K-BDI-II). The obstetrical and clinical data were analyzed to assess the association of anxiety and depression with AUB.

Results: Out of 124 patients, 47 (37.9%) met the criteria for anxiety, and 24 (19.5%) met the criteria for depression. The most common menstrual problems seen were heavy menstrual bleeding (80.7%), followed by irregular bleeding (62.9%), dysmenorrhea (55.7%), and irregular menstrual cycles (33.9%). More women with AUB in our study had anxiety as measured by the K-BAI and depression as measured by the K-BDI-II. A history of abortion and cesarean section were related with anxiety, whereas a history of minor surgery was related to depression. Anxiety and depression ($r = 0.629$, $p < 0.001$) were correlated with AUB.

Conclusions: Anxiety and depression are underdiagnosed and undertreated in Korean women with AUB symptoms. Screening and appropriate mental health management are needed for women with AUB for women's health.

Background

Abnormal uterine bleeding (AUB) is defined as an abnormality in the frequency, regularity, amount, or duration of menstrual bleeding and is one of the most common gynecological problems [1, 2]. Estimates of the prevalence of menstrual problems, such as heavy menstrual bleeding (HMB), intermenstrual bleeding, abnormal menstrual cycles, and premenstrual symptoms, range from 19–35% [3–5]. Menstrual problems are common among premenopausal women, especially just before and during perimenopause. AUB can interfere with the quality of life, and lead women to seek medical care. Although distress is associated with menstrual problems, it is unclear whether mood problems, such as anxiety and depression may increase the susceptibility to menstrual problems. Depression and anxiety are probably the two most common psychological symptoms and they often co-occur. The negative impact of anxiety-depression comorbidity is also significant, associated with a more negative course and more negative outcomes [6–8].

Anxiety and depressive disorders were frequently observed in patients with AUB. Although menstrual problems are not life-threatening, they can impose a significant impact on the quality of life of these patients. The identification of these impacts might lead to recognizing the potential risk of psychological

problems and heighten awareness of mental health and women's health [9]. Understanding the characteristics that predict anxiety and depression may help a clinician identify patients at risk for anxiety or depressive disorders.

To the best of our knowledge, no studies have yet examined the association of anxiety and depression with AUB in Korean women. The purpose of this study was to identify correlations between anxiety and depression in Korean women with AUB. The goals were to identify 1) the general characteristics and menstrual problems, 2) the prevalence and risk of anxiety, depression, and 3) the correlations of anxiety and depression with AUB.

Methods

The study was conducted with 124 consecutive patients who admitted the Department of Obstetrics and Gynecology with complaints of menstrual problems and who were diagnosed according to the FIGO classification system (PALM-COEIN) with AUB between September 2015 and December 2019.

The inclusion criteria were age between 15 and 55 years, premenopausal women and menstrual irregularities continuing for at least three months. The exclusion criteria of the study were the use of psychotropic drugs, such as antidepressants, anxiolytics, or antipsychotics, for any reason in the last six months; a diagnosis of gynecologic cancer; current oral contraceptives or any hormonal therapy, and pregnancy. The flow chart in Fig. 1 indicates the inclusion and exclusion criteria for the patients. This study was obtained from the local ethics committee (The Catholic University of Korea Catholic Medical Center, HC15QISI0078).

The definition of menstrual regularity has changed from one where the shortest to the longest variation was up to 20 days, to a variation of seven to nine days. For practical purposes, this normal variation in cycle length can be alternatively expressed as ± 4 days. Clinically included is the term HMB, a symptom (not a diagnosis), that has been defined (in clinical situations) by the National Institute for Health and Clinical Excellence as "excessive menstrual blood loss, which interferes with a woman's physical, social, emotional and/or material quality of life" [10-12].

After the survey, the patients were followed-up and treated medically or surgically. Major surgery included total hysterectomy, myomectomy, and ovarian surgery. Minor surgery included endobiospy, dilatation and curettage, and hysteroscopy.

Measurements

The Korean Beck Anxiety Inventory (K-BAI) and Korean Beck Depression Inventory-II (K-BDI-II) were used to diagnose anxiety and depression.

The BAI is a 21-item instrument measuring the severity of anxiety symptoms [13]. The total scores range from 0 to 63, with higher scores indicating more severe anxiety symptoms. We used K-BAI that showed excellent internal consistency and good discriminant validity for anxiety disorders [6]. The normal range

is 0–7 points (minimal), 8–15 points is mild, 16–25 points is moderate, and 26–63 points is severe. The presence of anxiety was determined based on the K-BAI score, and the subjects were classified into normal subjects (K-BAI score range: 0–15) and subjects with anxiety (K-BAI score range: 16–63).

The BDI was originally developed by Beck in 1961 [14] and revised to BDI-II in 1996 in response to changes in the DSM-IV criteria for the diagnosis of depressive symptoms [15]. The total score ranges from 0 to 63, with higher scores indicating more severe depressive symptoms. The normal range is 0–3 points, 4–19 points is mild depression, 20–28 points is moderate, and 29–63 points is severe on the K-BDI-II [16]. The presence of depression was determined based on the K-BDI-II score and the subjects were classified as either normal subjects (BDI score range: 0–19) or depressed subjects (BDI score range: 20–63) in our study.

Statistical analysis

All statistical analyses were performed using SAS software ver. 9.4 (SAS Institute Inc., Cary, NC, USA). The Kolmogorov Smirnov test was applied to data that conformed to a normal distribution. For continuous variables that were not normally distributed, the significance of the differences between the groups was tested using the Wilcoxon rank-sum test. The categorical variables were analyzed using the chi-squared test. Pearson's correlation and Spearman's rank correlation were used to analyze the distribution of the anxiety and depression scores. The association between anxiety and depression and clinical data were analyzed by univariable and multivariable logistic regression (anxiety score ≥ 16 , depression score ≥ 20). Multivariable logistic regression was conducted using p -values of < 0.05 in the univariate analysis. For depression, only one variable with statistical significance was not used to perform the multivariable analysis. A p -value of 0.05 was considered significant.

Results

General characteristics of the women

From September 1, 2015, to December 30, 2019, a total of 131 women with AUB participated in the survey. Seven patients with psychiatric problems confirmed in the past were excluded, and the final research was conducted on 124 women with AUB. Informed consent was obtained from 131 women, the questionnaires were completed, and demographic data and comorbidities were collected from the medical records.

The average age of the study participants was 43.9 ± 7.9 years (range, 15–55) and the average body mass index (BMI) was 24.9 ± 4.4 kg/m². Among the participants, 95 women (76.6%) were married state, and 90 women (72.6%) were multiparous.

The most common menstrual problems seen in our study were HMB ($n = 100$, 80.7%), followed by dysmenorrhea ($n = 69$, 55.7%) and irregular menstruation ($n = 42$, 33.9%; Table 1).

Table 1
Comparison of the patients characteristics in the anxiety, depression score

	Total (n = 124)	Anxiety score < 16 (n = 77)	Anxiety score ≥ 16 (n = 47)	p value	Depression score < 20 (n = 99)	Depression score ≥ 20 (n = 24)	p value
Age (years)	43.9 ± 7.9	43.9 ± 8.0	43.9 ± 7.8	0.975	44.1 ± 8.0	43.0 ± 7.3	0.306
BMI (kg/m ²)	24.9 ± 4.4	25.0 ± 4.4	24.7 ± 4.4	0.637	25.0 ± 4.3	24.5 ± 4.8	0.431
< 18.5 (%)	4 (3.2)	3 (75.0)	1 (25.0)		4 (100.0)	0 (0.0)	
≥ 18.5-<23 (%)	46 (37.1)	26 (56.5)	20 (43.5)		33 (73.3)	12 (26.7)	
≥ 23-<25 (%)	14 (11.3)	8 (57.1)	6 (42.9)		12 (85.7)	2 (14.3)	
≥ 25 (%)	60 (48.4)	40 (66.7)	20 (33.3)		50 (83.3)	10 (16.7)	
Menarche (years)	14.3 ± 1.4	14.4 ± 1.3	14.2 ± 1.5	0.566	14.3 ± 1.3	14.2 ± 1.7	0.821
Marriage (%)							
no	23 (18.6)	15 (65.2)	8 (34.8)	0.896	18 (78.3)	5 (21.7)	0.405
marriage	95 (76.6)	58 (61.1)	37 (38.9)		77 (81.9)	17 (18.1)	
Parity	1.4 ± 1.0	1.4 ± 1.1	1.5 ± 1.0	0.565	1.4 ± 1.0	1.4 ± 1.1	0.878
0	34 (27.4)	23 (67.6)	11 (32.4)		28 (82.4)	6 (17.6)	0.747
≥ 1	90 (72.6)	54 (60.0)	36 (40.0)	0.434	71 (79.8)	18 (20.2)	
Abortion							
mean ± sd	0.9 ± 1.3	0.8 ± 1.4	0.9 ± 0.9	0.094	0.8 ± 1.2	1.2 ± 1.3	0.163

Data are presented as the n (%) for categorical variable, unless otherwise indicated.

p value for difference were determined by using chi-square or the wilcoxon rank sum test.

*statistically significant as $p < 0.05$.

BMI, Body mass index; NSD, Normal spontaneous delivery; C/sec, Cesarean section; OC, Oral contraceptives; AUB, Abnormal uterine bleeding; Hgb, Hemoglobin ; Hct, Hematocrit; DM, Diabetes mellitus

	Total (n = 124)	Anxiety score < 16 (n = 77)	Anxiety score ≥ 16 (n = 47)	p value	Depression score < 20 (n = 99)	Depression score ≥ 20 (n = 24)	p value
0	65 (52.4)	47 (72.3)	18 (27.7)	0.014*	54 (84.4)	10 (15.6)	0.257
≥ 1	59 (47.6)	30 (50.8)	29 (49.2)		45 (76.3)	14 (23.7)	
Delivery mode							
no	34 (27.4)	23 (67.6)	11 (32.4)	0.132	28 (82.4)	6 (17.6)	0.373
NSD	37 (29.8)	18 (48.6)	19 (51.4)		27 (73.0)	10 (27.0)	
C/sec	53 (42.7)	36 (67.9)	17 (32.1)		44 (84.6)	8 (15.4)	
Menstrual regularity							
regular	82 (66.1)	47 (57.3)	35 (42.7)	0.125	64 (78.0)	18 (22.0)	0.196
irregular	42 (33.9)	30 (75.0)	12 (25.0)		34 (87.2)	5 (12.8)	
Dysmenorrhea							
no	55 (44.4)	33 (60.0)	22 (40.0)	0.667	44 (81.5)	10 (18.5)	0.806
yes	69 (55.7)	44 (63.8)	25 (36.2)		55 (79.7)	14 (20.3)	
Heavy menstrual bleeding							
no	24 (19.4)	15 (62.5)	9 (37.5)	0.964	19 (79.2)	5 (20.8)	> 0.999
yes	100 (80.7)	62 (62.0)	38 (38.0)		80 (80.8)	19 (19.2)	

Data are presented as the n (%) for categorical variable, unless otherwise indicated.

p value for difference were determined by using chi-square or the wilcoxon rank sum test.

*statistically significant as $p < 0.05$.

BMI, Body mass index; NSD, Normal spontaneous delivery; C/sec, Cesarean section; OC, Oral contraceptives; AUB, Abnormal uterine bleeding; Hgb, Hemoglobin ; Hct, Hematocrit; DM, Diabetes mellitus

	Total (n = 124)	Anxiety score < 16 (n = 77)	Anxiety score ≥ 16 (n = 47)	p value	Depression score < 20 (n = 99)	Depression score ≥ 20 (n = 24)	p value
History of C/sec							
no	70 (56.5)	38 (54.3)	32 (45.7)	0.041*	54 (77.1)	16 (22.9)	0.282
yes	54 (43.6)	39 (72.2)	15 (27.8)		45 (84.9)	8 (15.1)	
History of minor surgery							
no	51 (41.1)	32 (62.7)	19 (37.3)	0.901	45 (90.0)	5 (10.0)	0.028*
yes	73 (58.9)	45 (61.6)	28 (38.4)		54 (74.0)	19 (26.0)	
History of OCs							
no	85 (68.6)	48 (56.5)	37 (43.5)	0.057	66 (78.6)	18 (21.4)	0.431
yes	39 (31.5)	29 (74.4)	10 (25.6)		33 (84.6)	6 (15.4)	
History of admission due to AUB							
no	82 (66.1)	49 (59.8)	33 (40.2)	0.453	66 (81.5)	15 (18.5)	0.699
yes	42 (33.9)	28 (66.7)	14 (33.3)		33 (78.6)	9 (21.4)	
History of transfusion							
no	89 (71.8)	54 (60.7)	35 (39.3)	0.603	71 (80.7)	17 (19.3)	0.931
yes	35 (28.2)	23 (65.7)	12 (34.3)		28 (80.0)	7 (20.0)	

Data are presented as the n (%) for categorical variable, unless otherwise indicated.

p value for difference were determined by using chi-square or the wilcoxon rank sum test.

*statistically significant as $p < 0.05$.

BMI, Body mass index; NSD, Normal spontaneous delivery; C/sec, Cesarean section; OC, Oral contraceptives; AUB, Abnormal uterine bleeding; Hgb, Hemoglobin ; Hct, Hematocrit; DM, Diabetes mellitus

	Total (n = 124)	Anxiety score < 16 (n = 77)	Anxiety score ≥ 16 (n = 47)	p value	Depression score < 20 (n = 99)	Depression score ≥ 20 (n = 24)	p value
History of iron supplementation							
no	45 (36.3)	27 (60.0)	18 (40.0)	0.716	34 (75.6)	11 (24.4)	0.294
yes	79 (63.7)	50 (63.3)	29 (36.7)		65 (83.3)	13 (16.7)	
Hgb							
mean ± sd	10.4 ± 2.6	10.3 ± 2.6	10.7 ± 2.6	0.371	10.3 ± 2.5	10.6 ± 3.0	0.419
Median (range)	10.5 (4.0- 15.9)	10.2 (4.0- 15.6)	10.8 (4.7- 15.9)		10.2 (5.4- 15.9)	11.2 (4.0- 14.5)	
Hct							
mean ± sd	32.5 ± 6.6	32.1 ± 6.8	33.2 ± 6.2	0.343	32.3 ± 6.4	33.0 ± 7.5	0.396
Median (range)	32.5 (14.9- 47.0)	31.9 (14.9- 47.0)	33.1 (18.7- 45.5)		32.0 (18.8- 47.0)	34.2 (14.9- 42.9)	
Medical disorders (DM, Hypertension, Cancer, Thyroid disorder)							
no	93 (75.0)	56 (60.2)	37 (39.8)	0.454	75 (80.6)	18 (19.4)	0.938
yes	31 (25.0)	21 (67.7)	10 (32.3)		24 (80.0)	6 (20.0)	
Data are presented as the n (%) for categorical variable, unless otherwise indicated.							
<i>p</i> value for difference were determined by using chi-square or the wilcoxon rank sum test.							
*statistically significant as <i>p</i> < 0.05.							
BMI, Body mass index; NSD, Normal spontaneous delivery; C/sec, Cesarean section; OC, Oral contraceptives; AUB, Abnormal uterine bleeding; Hgb, Hemoglobin ; Hct, Hematocrit; DM, Diabetes mellitus							

In the obstetrical and gynecological history, parity, menstrual irregularity, dysmenorrhea, and HMB did not affect the anxiety and depressive state. In the treatment aspect, anxiety and depression were not associated with oral contraceptives use, history of hospitalization due to AUB, transfusion history, or iron

supplementation. Anxiety and depression scores did not differ according to underlying disease, and hemoglobin and hematocrit levels at the time of the examination (Table 1).

The average number of abortions in the women was 0.9 ± 1.3 (range, 0–8), and 65 (52.4%) women had not had abortions history. In the anxiety group with a K-BAI score of 16 or higher, higher scores were seen in women with AUB and a history of abortion ($p = 0.014$; Table 1).

Among women who delivered, history of Cesarean section (C/sec) was 54 (43.6%) women, and anxiety was higher than in the women without C/sec history ($p = 0.041$). There were 73 women (58.9%) with AUB and a history of minor surgery and the degree of depression measured by the K-BDI-II was higher than in AUB women who had a history of minor surgery ($p = 0.028$). History of abortion and C/sec were associated with anxiety disorder, whereas a history of minor surgery was related to depressive disorder (Table 1).

A total of 124 patients underwent K-BAI evaluation, with a mean score of 14.2 ± 10.3 (median 12, range 0–55). Forty-seven women (37.9%) met the criteria for anxiety on the K-BAI evaluation (≥ 16). A total of 123 patients underwent K-BDI-II evaluations, with an average score of 12.7 ± 9.0 (median 11, range 0–47). Twenty-four women (19.5%) met the criteria for depression on the K-BDI-II (≥ 20) (Table 2).

Table 2
Distribution of anxiety score (K-BAI) and depression score (K-BDI-II)

	Anxiety score		Depression score
n	124		123
mean \pm sd	14.2 ± 10.3		12.7 ± 9.0
median(range)	12 (0–55)		11 (0–47)
IQR	6, 19	IQR	6, 16
0–7	37 (29.8)	0–13	75 (61.0)
08–15	40 (32.3)	14–19	24 (19.5)
16–25	27 (21.8)	20–28	16 (13.0)
26–63	20 (16.1)	29–63	8 (6.5)
K-BAI, Korean-Beck Anxiety Inventory; K-BDI-II, Korean-Beck Depression Inventory II; IQR, Interquartile range.			

When the relationship between anxiety and depression was analyzed, Pearson’s correlation coefficient was $r = 0.675$ ($p < 0.001$) and Spearman’s rank correlation coefficient was $r = 0.629$ ($p < 0.001$), showing a moderately positive correlation (Fig. 2).

In this study, we performed univariable and multivariable logistic regression of the K-BAI scores, K-BDI-II scores, and clinical and gynecological data (cutoffs: anxiety score ≥ 16 , depression score ≥ 20). Age, BMI, marriage, parity, delivery mode, menstrual regularity, dysmenorrhea, HMB, and history of admission with AUB were not associated with anxiety and depression.

The odds ratio ((OR) = 2.48 (1.18–5.23), $p = 0.017$) for the anxiety scores in univariable logistic regression in the patients with past abortions was high, and the OR was low for anxiety (OR = 0.47 (0.22–0.9), $p = 0.047$) in patients with a history of C/sec. The OR for depression in AUB patients with a history of minor surgery was high (OR = 2.96 (1.05–8.33), $p = 0.04$, Table 3).

Table 3

Univariable and multivariable logistic regression (predicted: anxiety score ≥ 16 , depression score ≥ 20)

	Univariable analysis (predicted : anxiety score ≥ 16)		Multivariable analysis		Univariable analysis (predicted: depression score ≥ 20)	
	OR (95% CI)	p value	adjusted OR (95% CI)	p value	OR (95% CI)	p value
Age(years)	1.00 (0.95–1.05)	0.978			0.98 (0.93–1.03)	0.468
BMI (kg/m ²)						
< 18.5	0.55 (0.06–5.08)	0.601			0.30 (0.01–8.34)	0.476
≥ 18.5 -<23	reference				reference	
≥ 23 -<25	0.99 (0.30–3.31)	0.985			0.54 (0.11–2.53)	0.431
≥ 25	1.51 (0.46–4.94)	0.495			0.56 (0.22–1.42)	0.222
Menarche(years)	0.65 (0.30–1.44)	0.294			0.93 (0.66–1.30)	0.653
Marriage						
no	reference				reference	
marriage	1.17 (0.45–3.02)	0.747			0.76 (0.25–2.29)	0.625
Parity						
0	reference				reference	
≥ 1	1.37 (0.60–3.14)	0.459			1.13 (0.42–3.10)	0.806
Abortion						
0	reference		reference		reference	
≥ 1	2.48 (1.18–5.23)	0.017*	2.96 (1.35–6.49)	0.007*	1.65 (0.68–4.04)	0.27
Delivery mode						

*statistically significant as $p < 0.05$ in univariate analyses were included in a multivariate analysis. $p < 0.05$ in univariate analyses were included in a multivariate analysis.

	Univariable analysis (predicted : anxiety score \geq 16)		Multivariable analysis		Univariable analysis (predicted: depression score \geq 20)	
no	reference				reference	
NSD	2.15 (0.82–5.64)	0.118			1.67 (0.54– 5.16)	0.369
C/sec	0.98 (0.39–2.45)	0.965			0.84 (0.27– 2.61)	0.76
Menstrual regularity						
regular	reference				reference	
irregular	0.46 (0.20–1.06)	0.069			0.56 (0.20– 1.59)	0.273
Dysmenorrhea						
no	reference				reference	
yes	0.85 (0.41–1.77)	0.669			1.11 (0.45– 2.71)	0.823
Heavy menstrual bleeding						
no	reference				reference	
yes	1.01 (0.40–2.52)	0.991			0.86 (0.29– 2.55)	0.784
History of C/sec						
no	reference		reference		reference	
yes	0.47 (0.22–0.99)	0.047*	0.38 (0.17– 0.85)	0.018*	0.62 (0.25– 1.56)	0.306
History of minor surgery						
no	reference				reference	
yes	1.04 (0.50–2.18)	0.909			2.96 (1.05– 8.33)	0.04*
History of OCs						
no	reference				reference	

*statistically significant as $p < 0.05$ in univariate analyses were included in a multivariate analysis.

$p < 0.05$ in univariate analyses were included in a multivariate analysis.

	Univariable analysis (predicted : anxiety score \geq 16)		Multivariable analysis	Univariable analysis (predicted: depression score \geq 20)	
yes	0.46 (0.20–1.06)	0.068		0.70 (0.26– 1.89)	0.478
History of admission due to AUB					
no	reference			reference	
yes	0.75 (0.35–1.64)	0.472		1.22 (0.49– 3.04)	0.675
History of transfusion					
no	reference			reference	
yes,	0.82 (0.36–1.85)	0.626		1.08 (0.41– 2.84)	0.884
History of iron supplementation					
no	reference			reference	
yes	0.87 (0.41–1.84)	0.713		0.62 (0.25– 1.52)	0.293
Hgb	1.07 (0.92–1.23)	0.383		1.04 (0.87– 1.24)	0.662
Hct	1.03 (0.97–1.09)	0.374		1.02 (0.95– 1.09)	0.646
Medical disorders (DM, HTN, Cancer, Thyroid disorder)					
no	reference			reference	
yes	0.74 (0.31–1.73)	0.483		1.08 (0.39– 2.99)	0.878
*statistically significant as $p < 0.05$ in univariate analyses were included in a multivariate analysis.					
$p < 0.05$ in univariate analyses were included in a multivariate analysis.					

Among the patients, 60 women (48.4%) had undergone hysterectomy, five women had undergone myomectomy, 45 women had undergone hysteroscopy or endobiopsy, and 16 women used the intrauterine device (Mirena). After surgery, the pathologic findings revealed that 76 women (61.3%) had uterine disorders (leiomyoma and adenomyosis), 34 (27.4%) women had endometrial disorders (endometrial hyperplasia and endometrial polyps), and three (2.4%) women had endometrial malignancies (atypical endometrial hyperplasia and endometrial cancer).

Discussion

The worldwide impact of AUB in the reproductive years is noteworthy, with a prevalence of approximately 3–30% among reproductive-aged women. Many of the published studies are restricted to estimates of the prevalence of the symptoms of HMB. When other symptoms, particularly those of irregular and intermenstrual bleeding are included, the prevalence rises to 35% or higher [17]. AUB not only gives discomfort and anxiety to women, but it can be accompanied by depression when there is persistent AUB. In AUB patients who visit the hospital with anxiety and depression, proper management is necessary, but the importance of psychological and risk evaluations has been underestimated.

Menstrual-related problems are associated with substantial psychological distress, a finding that confirms results reported in clinical cases and strongly supports the claim that menstrual-related problems pose important public health implications [18, 19]. Mood and anxiety disorders, particularly major depression (15.6%), generalized anxiety disorder (18.8%), and obsessive-compulsive disorder (22.9%) were frequently observed in patients with AUB [1].

Strine et al. [4] suggested that menstrual-related problems in women pose considerable public health implications as they were reported by nearly 19% of U.S. women. Additionally, those with menstrual-related problems are between 1.7 and 3.0 times more likely to report insomnia, sleepiness, recurrent pain, sadness, nervousness, restlessness, hopelessness, and worthlessness.

The lifetime prevalence of mental illness in Koreans is known to be 25.4%. According to an epidemiological survey of mental disorders in Korea conducted by the Ministry of Health and Welfare, the estimated lifetime prevalence of anxiety disorders for Korean adults was 9.3% (male 6.7%, female 11.7%) and the 1-year prevalence of anxiety disorders in Korean adults was 5.7% (male 3.8%, female 7.5%) [20]. The prevalence of major depression is quite wide and ranges between 8.2 and 67%. According to the level of mental health among Koreans, the rate of experience of depression was 13%, and the prevalence of depression was 5.0% [1, 20].

More women with AUB in our study had anxiety as measured by the K-BAI (7.5% in the general population and 37.9% in this study) and depression as measured by the K-BDI-II (5% in the general population and 19.5% in this study). Our study found that the prevalence of anxiety and depression was higher in AUB patients.

Mood and anxiety disorders associated with irregular menstruation may also be associated with different etiologies. It is well-documented that depression is seen more frequently in women during premenstrual, postnatal, and menopausal periods due to the fluctuations in hormonal levels during these periods [21]. However, it is difficult to clearly confirm the relationship between psychological aspects and physical symptoms.

When all factors are taken into consideration, a bidirectional relationship between AUB and psychiatric disorders may be observed. Kayhan et al. [1] reported that psychiatric disorders play a more important role than AUB because the latter frequently occurs together with stressful events and psychiatric disorders, but once these events or disorders are resolved, the menstrual cycle becomes regular again.

Although the relationship between AUB and anxiety, depression is difficult to know clearly, research on the association has important implications for women's health.

We hypothesized that age, BMI, obesity, abortion history, surgery-related delivery or gynecologic problems, menstruation cycles, dysmenorrhea, anemia, and medical disorders may be associated with anxiety and depression in the presence of AUB, but there was no clear relationship in our study.

In this study, anxiety and depression showed a moderately positive correlation with AUB, indicating that it is necessary to closely monitor and manage whether anxiety or depression accompany women with AUB.

Women with past mood disorders were more likely to report heavy bleeding symptoms, independent of known risk factors for heavy bleeding, such as high BMI, fibroids, early perimenopause, and mood disorders, occurring simultaneously with heavy bleeding. Mood disorder has been shown to be a risk factor for the subsequent development of important health disorders, such as diabetes, cardiovascular disease, pain, backache, and dizziness [3, 22].

In the case of AUB, anxiety increased with a history of abortion, and anxiety scores were low in women with a history of C/sec. Although it is difficult to know the relationship clearly, it seems that anxiety increases when a loss is experienced, such as abortion, and sensitivity to anxiety decreases when a major operation such as C/sec has already been performed. However, it seems that parity, irregular menstruation, and dysmenorrhea did not significantly affect anxiety, especially in the presence of AUB in our study.

The degree of depression was increased in women with a history of minor surgery, which seemed to be because it affected patient mood in the presence of AUB. However, minor surgery did not appear to affect anxiety.

There were several limitations to our study. We were unable to determine if psychological distress and adverse health behaviors were related to AUB, and unable to exactly identify where during the menstrual cycle the psychological and behavioral associations were more evident. The K-BAI and K-BDI-II were not originally developed as diagnostic tools. Our study could not conclude a causal relationship between menstrual-related problems, emotional well-being, and psychological problems.

The women who participated in the survey are likely to have sampling bias error because AUB symptoms interfere with daily life and all participated women were admitted hospital due to management of AUB. Due to a lack of other similar studies in the literature, an analysis of the difficulties and limitations of the current study in comparison to other studies was not possible.

Conclusions

In Korean women, AUB seems to increase the risk of anxiety and depression. Although anxiety and depression were assessed through the K-BAI, K-BDI-II, respectively, this is a meaningful study by suggesting that anxiety and depression can be severe in women with AUB. Thus, including an

assessment of AUB as part of the standard evaluation of women may better enable healthcare providers to recognize and treat potential manifestations of these symptoms.

Abbreviations

AUB
abnormal uterine bleeding; K-BAI:Korean Beck Anxiety Inventory; K-BDI-II:Korean Beck Depression Inventory-II; C/sec:cesarean section; HMB:heavy menstrual bleeding

Declarations

Acknowledgements

Not applicable.

Author's contributions

HNL, MJK–designed the study concept and wrote the manuscript. JMS–interpreted data, statistical analysis of the results. GSU, MJK contributed to data analysis. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets used during the current study can also be obtained the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the Catholic University of Korea (approval number: HC15QISI0078). This study was retrospective clinical study using medical record, written informed consent was waived by the ethics committee.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures

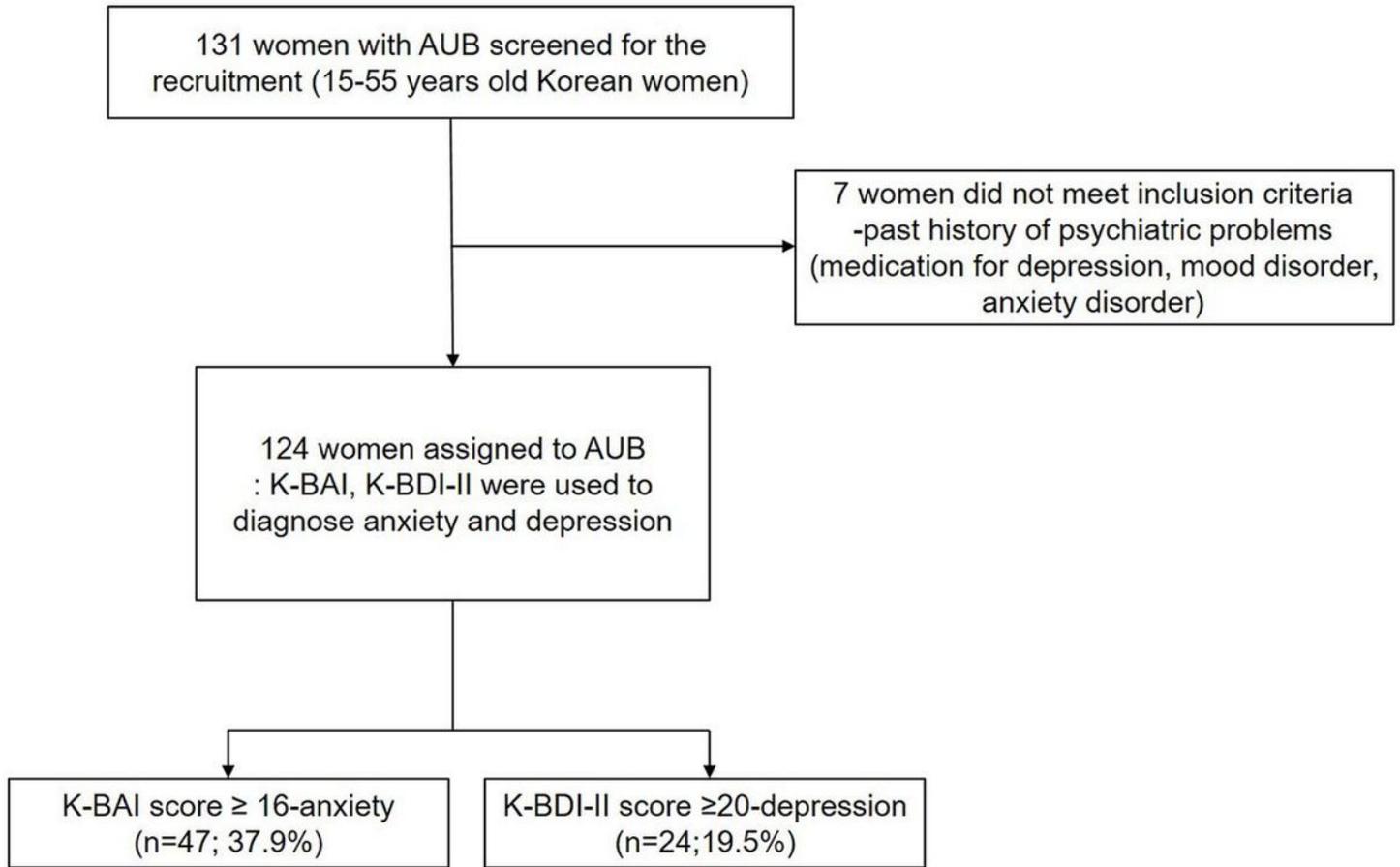


Figure 1

Flow chart of the participants through the trial. AUB, Abnormal uterine bleeding; K-BAI, Korean Beck Anxiety Inventory; K-BDI-II, Korean Beck Depression Inventory-II

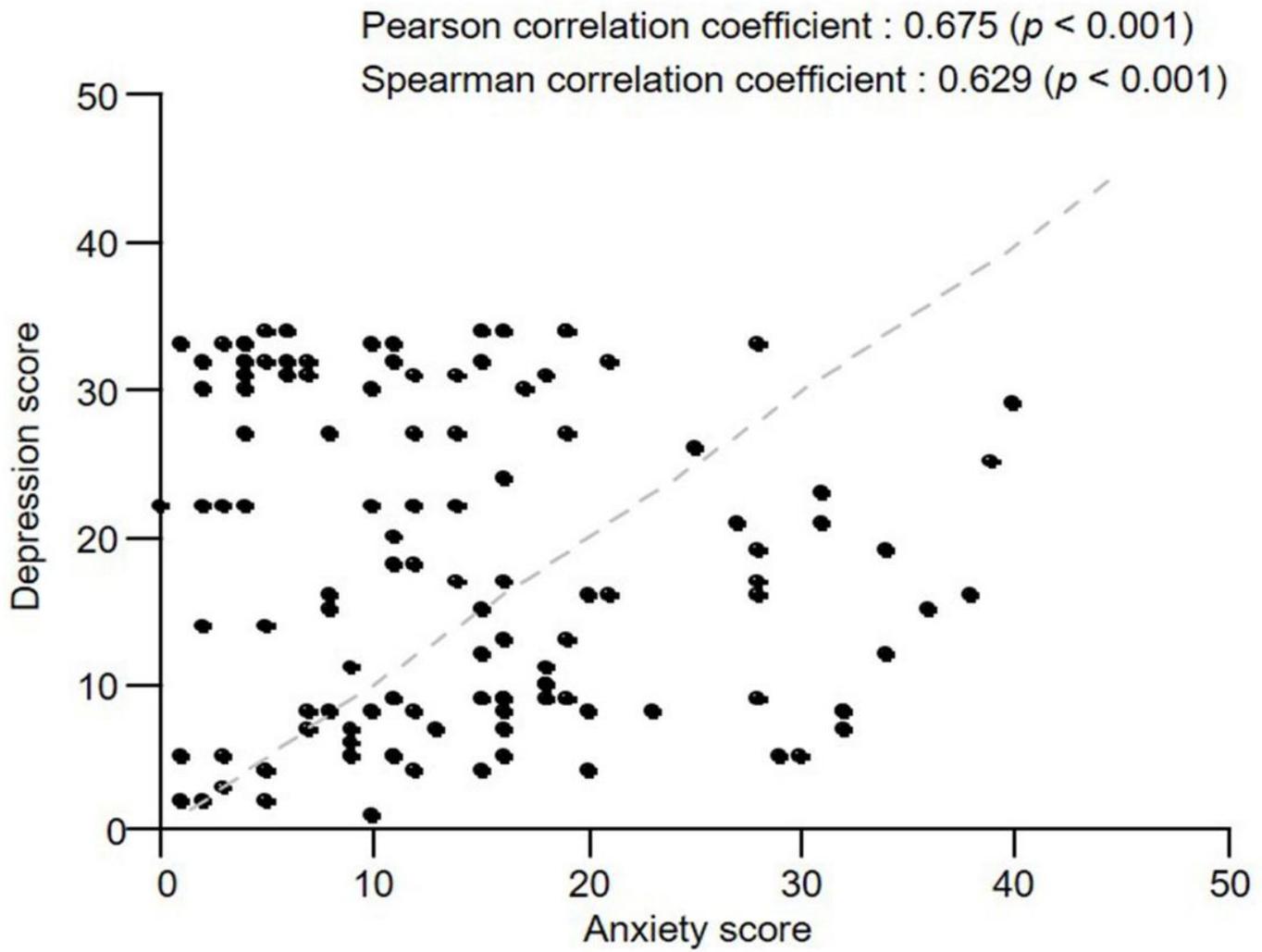


Figure 2

Correlation coefficients for anxiety with depression.