IMR Press

Original Research

Clinical factors associated with anxiety and depression in Korean women with abnormal uterine bleeding

Hae Nam Lee[1], Hui Ryeon Ju[1], Ji Min Seo[1], Gi Soo Um[1], Min Jeong Kim[1,*]

[1] *Department of Obstetrics and Gynecology, Bucheon St. Mary's Hospital, College of Medicine, The Catholic University of Korea, 14647 Seoul, Republic of Korea*

*Correspondence: poouh74@catholic.ac.kr (Min Jeong Kim)

DOI:10.31083/j.ceog.2021.02.2329

Submitted: 18 October 2020 Revised: 04 January 2021 Accepted: 25 January 2021 Published: 15 April 2021

The aims of the study were to investigate the prevalence of anxiety and depression and to correlate symptoms of anxiety and depression with abnormal uterine bleeding (AUB) in Korean women. Our study included 124 Korean premenopausal women aged 15--55 without treatment of psychiatric disorders, who visited one university hospital due to AUB between September 2015 and December 2019. The Korean Beck Anxiety Inventory (K-BAI) and the Korean Beck Depression-II (K-BDI-II) were used to assess Anxiety and depression symptoms. We also analyzed obstetrical and clinical data to assess the association between anxiety and depression with AUB. The cut-off scores for possible anxiety disorder were met by 37.9% (47 women) of the patients and for possible depression disorder by 19.5% (24 women). The most common menstrual associated symptoms were heavy menstrual bleeding (80.6%), dysmenorrhea (55.6%), 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 than general Korean population. A history of abortion and cesarean section (C/sec) 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. According to age, variable factors affect anxiety (history of abortion, history of C/sec, minor surgery, Body mass index [BMI], history of OCs) and depression (BMI ≥ 25, history of minor surgery). We have found that anxiety and depression seem to be underestimated in Korean women with AUB symptoms. The relationship between the development of anxiety and depression with variable factors are unknown and therefore, further study is needed to clarify and understand the effects of AUB. To improve the health of women with AUB, screening for mental health issues is needed for early detection and treatment of anxiety and depression.

Keywords

Abnormal uterine bleeding; Heavy menstrual bleeding; Anxiety; Depression

1. Introduction

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 worldwide [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% to 35% in the general population [3–5]. Menstrual problems are common among premenopausal women, especially just before and during the perimenopause. AUB can interfere with quality of life and lead women to seek medical care. Although distress and mood disorders have been associated with menstrual problems, the relationship between the two remains unclear. Furthermore, depression and anxiety are probably the two most common psychological symptoms associated with AUB and they can often co-occur leading to a more negative course and outcome [6–8].

Anxiety and depressive disorders are 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. Therefore, the identification of these impacts might lead to an understanding of the potential risk of psychological problems and heighten awareness of mental health and associated with women's health problems [9]. If these negative impacts are identified early, they might lead to prompt recognition and interventions, thus reducing any potential psychological problems.

To the best of our knowledge, no studies have yet examined a potential association between anxiety and depression with AUB in Korean premenopausal women. The purpose of this study was therefore, to identify correlations between anxiety and depression in Korean women with AUB and its goals were to identify (1) general characteristics and menstrual problems, (2) the prevalence and risk of anxiety and/or depression, (3) the correlation between anxiety and depression with AUB (4) and the correlation between AUB with anxiety, and depression according to age.

2. Materials and methods

This study was conducted with 124 consecutive patients who visited the Department of Obstetrics and Gynecology with complaints of menstrual problems and who were diagnosed with AUB between September 2015 and December 2019.

The inclusion criteria were ages between 15 and 55 years (15–20 years, 21–40 years, 41–55 years), and premenopausal women and menstrual irregularities continuing for at least three months. The exclusion criteria included subjects taking psychotropic drugs, such as antidepressants, anxiolytics,

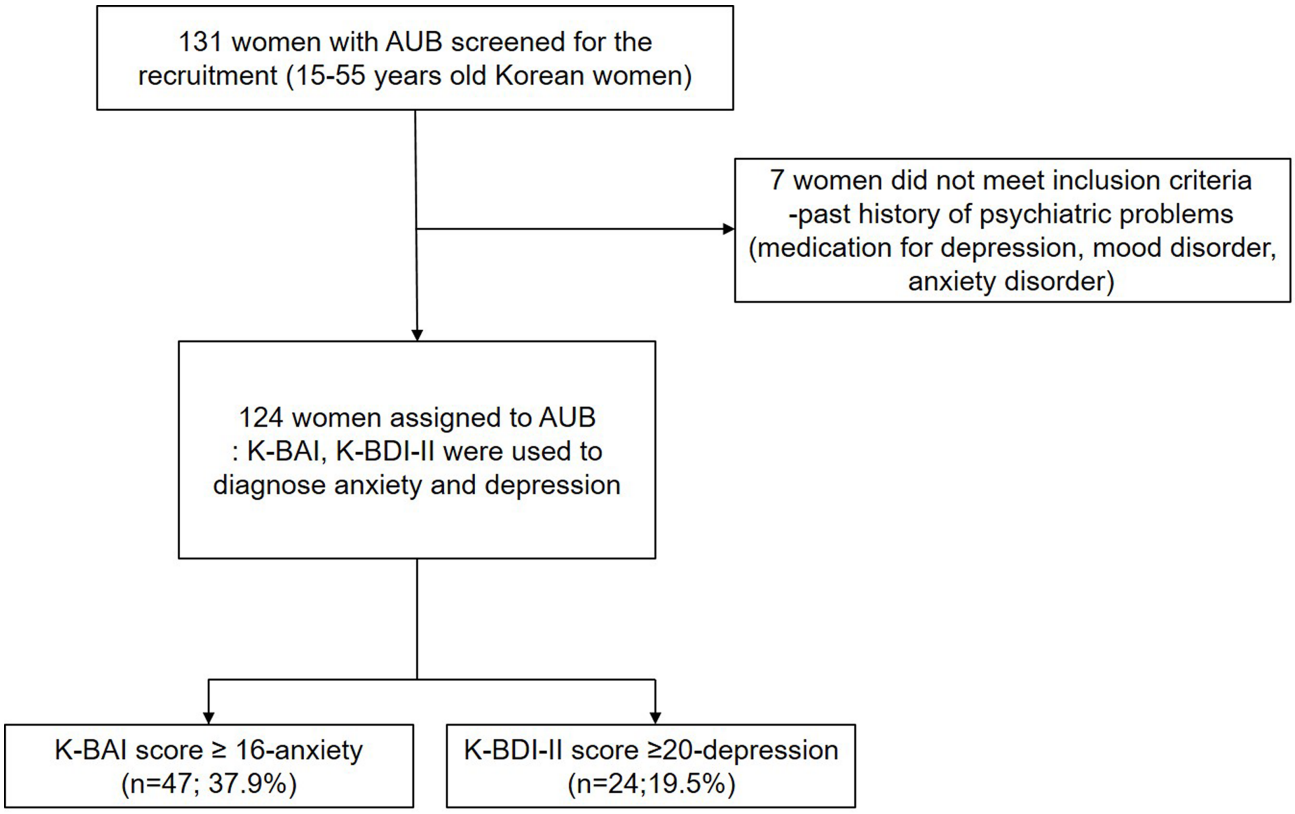

Fig. 1. Flow chart of the participants throughout the trial. AUB, Abnormal uterine bleeding; K-BAI, Korean Beck Anxiety Inventory; K-BDI-II, Korean version of Beck Depression Inventory-II.

or antipsychotics, for any reason in the last six months; a diagnosis of gynecological cancer, currently taking oral contraceptive (OCs), or any hormonal therapy, menopause, and pregnancy. The flow chart in Fig. 1 summarizes the inclusion and exclusion criteria for these patients.

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". A duration of AUB of over eight days was defined as prolonged. The definition of intermenstrual bleeding was spontaneous bleeding occurring between menstrual periods [10–12].

After the survey, the patients were followed up for four years and their AUB was treated medically or surgically. Major surgery included total hysterectomy, myomectomy, or ovarian surgery. Minor surgery included endobiopsy, dilatation and curettage, and hysteroscopy.

2.1 Measurements of anxiety and depression

The self-rated Korean Beck Anxiety Inventory (K-BAI) and the Korean Beck Depression Inventory-II (K-BDI-II) were used to measure self-reported depression and anxiety related symptomatology.

The BAI is a 21-item instrument measuring the severity of anxiety symptoms [13]. The total scores ranged from 0 to 63, with higher scores indicating more severe anxiety symptoms. We used K-BAI and found it 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 is a 21-item questionnaire designed to assess the degree of depressive symptoms present over a two-week period. 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 represents mild depression, 20–28 points is moderate, and 29–63 points is severe as defined by the K-BDI-II [14]. 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.

Table 1. Comparison of patient characteristics in the anxiety score and depression score.

	Total	Anxiety score < 16	Anxiety score ≥ 16	*P*	Depression score < 20	Depression score ≥ 20	*P*
	(n = 124)	(n = 77)	(n = 47)		(n = 99)	(n = 24)	
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)							
mean ± sd	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)	0.678	4 (100.0)	0 (0.0)	0.499
≥ 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 (18.5)	15 (65.2)	8 (34.8)	0.733	18 (78.3)	5 (21.7)	0.774
marriage	101 (81.5)	62 (61.4)	39 (38.6)		81 (81.0)	19 (19.0)	
Parity (%)							
mean ± sd	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)	0.434	28 (82.4)	6 (17.6)	0.747
≥ 1	90 (72.6)	54 (60.0)	36 (40.0)		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
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)	0.334
irregular	42 (33.9)	30 (71.4)	12 (28.6)		35 (85.4)	6 (14.6)	
Dysmenorrhea (%)							
no	55 (44.4)	33 (60.0)	22 (40.0)	0.667	44 (81.5)	10 (18.5)	0.806
yes	69 (55.6)	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 (80.6)	62 (62.0)	38 (38.0)		80 (80.8)	19 (19.2)	
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 (43.5)	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 (68.5)	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)	
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 (g/dL)							
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, HTN, 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.

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

*statistically significant as $P < 0.05$.

AUB, Abnormal uterine bleeding; BMI, Body mass index; C/sec, Cesarean section; DM, Diabetes mellitus, HTN, Hypertension.

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

Anxiety score		Depression score	
n	124	n	123
Mean ± sd	14.2 ± 10.3	Mean ± sd	12.7 ± 9.0
Median (range)	12 (0–55)	Median (range)	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)

IQR, Interquartile Range; K-BAI, Korean Beck Anxiety Inventory; Ocs, Oral contraceptive.

2.2 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 $\geq$ 16, depression score $\geq$ 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. The analysis of the differences according to age is presented as a supplementary table.

3. Results

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 therefore, the final study was conducted on 124 women with AUB. Informed consent was obtained from the initial 131 women, and the questionnaires were completed, and demographic data and comorbidities were collected from their medical records.

The average age of the cohort was 43.9 $\pm$ 7.9 years (range, 15–55), the mean body mass was 24.9 $\pm$ 4.4 kg/m^2, and 101 women (81.5%) were married and 90 (72.6%) were multiparous. The average number of abortions in the women was 0.9 $\pm$ 1.3 (range, 0–8), and 65 (52.4%) women had not had abortions.

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 had used the intrauterine device (Mirena). After surgery, the pathological findings revealed that 76 women (61.3%) had uterine disorders (leiomyoma and adenomyosis), 34 women (27.4%) had endometrial disorders (endometrial hyperplasia and endometrial polyps), and three women (2.4%) had endometrial malignancies (atypical endometrial hyperplasia and endometrial cancer).

The most common menstrual problems seen in our study were HMB (n = 100, 80.6%), followed by dysmenorrhea (n = 69, 55.6%) and then irregular menstruation (n = 42, 33.9%, Table 1).

A total of 124 patients underwent the K-BAI assessment and the mean score was 14.2 $\pm$ 10.3 (median 12, range 0–55). Forty-seven women (37.9%) met the criteria for possible moderate anxiety ($\geq$ 16). Furthermore, the average score of K-BDI-II was checked 12.7 $\pm$ 9.0 (median 11, range 0–47) in 123 patients. Twenty-four women (19.5%) met the criteria for possible moderate depression ($\geq$ 20) (Table 2).

A K-BAI score of 16 or higher was more frequently seen in the AUB group and among women with a history of abortion (P = 0.014, Table 1). Among women who had given birth, 54 (43.5%) had a history of cesarean section (C/sec) and these women reported significantly lower anxiety levels when compared to women with no history of the procedure (P = 0.041, Table 1).

We also analyzed associations between AUB and anxiety according to different age groups (15–20 years, 21–40 years, 41–55 years, Table S1). In the 21–40 year old women (n = 24), a higher K-BAI score was associated with the high BMI (23.5 $\pm$ 5.3; 29.4 $\pm$ 4.8, P = 0.011), and history of minor surgery groups (P = 0.035). In the 41–55 year old women (n = 97), a high K-BAI score group was evaluated in low BMI group (25.2 $\pm$ 3.9; 23.6 $\pm$ 3.2, P = 0.042), history of abortion (P = 0.036), without C/sec history (P = 0.043), with no history of OCs (P = 0.005, Table S1).

In our study, we performed univariable and multivariable logistic regression of the K-BAI scores, and clinical and gynecological data (cutoffs: anxiety score $\geq$ 16, Table 3). The odds ratio ((OR) = 2.48 (1.18–5.23), P = 0.017) for the anxiety scores for 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.

In the 21–40 year old women, history of minor surgery was associated with anxiety (OR = 7.04 (1.14–43.36), P = 0.035). In 41–55 year old women, history of abortion (OR = 2.44 (1.03–5.80), P = 0.043) was associated with anxiety and high BMI ($\geq$ 25, OR = 0.37 (0.15–0.94), P = 0.037), history of C/sec (OR = 0.43 (0.18–1.0), P = 0.050) and OCs (OR = 0.25 (0.09–0.72), P = 0.010) were lower in the anxiety state (Table S3).

There were 73 women (58.9%) with a history of minor surgery and the degree of depression measured by the K-BDI-II was higher than seen in women with AUB who had a history of minor surgery (P = 0.028) in 123 women (Table 1).

Table 3. Univariable and multivariable logistic regression in the anxiety score and depression score with AUB.

	anxiety score ≥ 16				depression score ≥ 20	
	Univariable analysis		Multivariable analysis		Univariable analysis	
	OR (95% CI)	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*
Age (years)	1.00 (0.95–1.05)	0.978	0.98 (0.93–1.03)	0.468	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	0.30 (0.01–8.34)	0.476
≥ 18.5 ≤ 23	reference		reference		reference	
≥ 23 ≤ 25	0.99 (0.30–3.31)	0.985	0.54 (0.11–2.53)	0.431	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	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	0.93 (0.66–1.30)	0.653
Marriage						
No	reference		reference		reference	
Yes	1.15 (0.45–2.96)	0.768	0.80 (0.27–2.40)	0.697	0.80 (0.27–2.40)	0.697
Parity						
0	reference		reference		reference	
≥ 1	1.37 (0.60–3.14)	0.459	1.13 (0.42–3.10)	0.806	1.13 (0.42–3.10)	0.806
Abortion						
0	reference		reference		reference	
≥ 1	2.48 (1.18–5.23)	0.017*	1.65 (0.68–4.04)	0.270	1.65 (0.68–4.04)	0.270
Delivery mode						
no	reference		reference		reference	
NSD	2.15 (0.82–5.64)	0.118	1.67 (0.54–5.16)	0.369	1.67 (0.54–5.16)	0.369
C/sec	0.98 (0.39–2.45)	0.965	0.84 (0.27–2.61)	0.760	0.84 (0.27–2.61)	0.760
Menstrual regularity						
regular	reference		reference		reference	
irregular	0.55 (0.25–1.22)	0.140	0.64 (0.24–1.72)	0.376	0.64 (0.24–1.72)	0.376
Dysmenorrhea						
no	reference		reference		reference	
yes	0.85 (0.41–1.77)	0.669	1.11 (0.45–2.71)	0.823	1.11 (0.45–2.71)	0.823
Heavy menstrual bleeding						
no	reference		reference		reference	
yes	1.01 (0.40–2.52)	0.991	0.86 (0.29–2.55)	0.784	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*	0.62 (0.25–1.56)	0.306	0.62 (0.25–1.56)	0.306
History of minor surgery						
no	reference		reference		reference	
yes	1.04 (0.50–2.18)	0.909	2.96 (1.05–8.33)	0.040*	2.96 (1.05–8.33)	0.040*
History of Ocs						
no	reference		reference		reference	
yes	0.46 (0.20–1.06)	0.068	0.70 (0.26–1.89)	0.478	0.70 (0.26–1.89)	0.478
History of admission due to AUB						
no	reference		reference		reference	
yes	0.75 (0.35–1.64)	0.472	1.22 (0.49–3.04)	0.675	1.22 (0.49–3.04)	0.675
History of transfusion						
no	reference		reference		reference	
yes	0.82 (0.36–1.85)	0.626	1.08 (0.41–2.84)	0.884	1.08 (0.41–2.84)	0.884
History of iron supplementation						
no	reference		reference		reference	
yes	0.87 (0.41–1.84)	0.713	0.62 (0.25–1.52)	0.293	0.62 (0.25–1.52)	0.293
Hgb (g/dL)	1.07 (0.92–1.23)	0.383	1.04 (0.87–1.24)	0.662	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	1.02 (0.95–1.09)	0.646
Medical disorders (DM, HTN, Cancer, thyroid disorder)						
no	reference		reference		reference	
yes	0.74 (0.31–1.73)	0.483	1.08 (0.39–2.99)	0.878	1.08 (0.39–2.99)	0.878

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

AUB, Abnormal uterine bleeding; BMI, Body mass index; C/sec, Cesarean section; DM, Diabetes mellitus; HTN, Hypertension; NSD, Normal spontaneous delivery; Ocs, Oral contraceptive.

In our study, we performed univariable logistic regression of the K-BDI-II scores, and clinical and gynecological data (cutoffs: depression score $\geq$ 20). 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).

We also analyzed associations between AUB and depression according to different age groups (15–20 years, 21–40 years, 41–55 years, Table S2). In the 41–55 year old women (n = 96), a high K-BDI-II score was found in low BMI (25.0 $\pm$ 3.8, 22.8 $\pm$ 3.2, P = 0.029) group, and history of minor surgery group (P = 0.031, Table S2). In the 41–55 year old women, higher BMI ($\geq$ 25 kg/m^2) was lower in the depression state (OR = 0.33 (0.10–1.05), P = 0.061), and history of minor surgery was related to depression state (OR = 4.03 (0.96–16.80), P = 0.056) without statistical significance (Table S3).

The following factors were not associated with anxiety and depression in 124 women: age, marital status, parity, menstrual regularity, dysmenorrhea, HMB, a history of admission to hospital with AUB, OC use, transfusion history, or iron supplementation, underlying disease, and hemoglobin and hematocrit levels at the time of the assessment.

When the relationship between anxiety and depression was analyzed, Pearson's correlation coefficient was found to be 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).

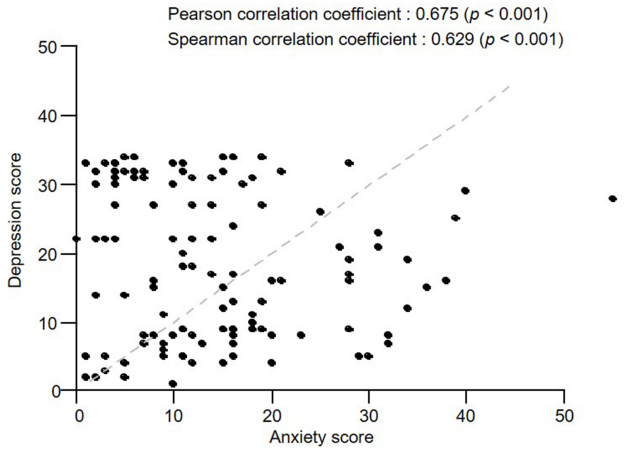

Fig. 2. Correlation coefficients for anxiety with depression.

4. Discussion

In the present study, two of the most widely used self-reporting assessment instruments for anxiety and depression were used, K-BAI and K-BDI-II, to evaluate the relationships between anxiety, depression and AUB and then used to analyze the association according to age.

The lifetime prevalence of mental illness in the Korean population has been estimated to be 25.4%. According to an epidemiological survey of mental disorders 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%) [15]. However, 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, 15].

The impact of AUB in reproductive aged women is high, with a prevalence of approximately 3% to 30%. Many published studies have only reported estimates of the prevalence of symptoms of HMB. However, when other symptoms, particularly those associated with irregular and intermenstrual bleeding are included, the prevalence rises to 35% or higher [16].

Several studies have reported that depression is more frequently diagnosed in women during premenstrual, postnatal, and menopausal periods due to fluctuations in hormonal levels [17]. However, it has been difficult to clearly confirm the relationship between psychological aspects and physical symptoms and there are no studies that have looked at the association of AUB with anxiety or depression.

A bidirectional relationship between AUB and psychiatric disorders has been suggested by Kayhan *et al.* [1]. They reported that psychiatric disorders may play a more important role than AUB. AUB frequently occurs together with stressful events and psychiatric disorders, but once these are resolved, the menstrual cycle becomes regular again. These results are interesting and further research on the relationship between AUB, anxiety and depression are warranted.

The results in this study show a higher percentage of reported anxiety and depression in AUB patients when compared to the general population: 37.9% of the women with AUB reported anxiety measured by the K-BAI, compared to 7.5% in the general population and 19.5% reported depression measured by K-BDI-II compared to 5% in the general population.

Menstrual-related problems (menstrual irregularity, dysmenorrhea, HMB) have been associated with substantial psychological distress. These findings have been confirmed in clinical cases and strongly support the notion that menstrual-related problems may have important public health implications [18, 19]. For example, these problems have been reported by nearly 19% of U.S. women [4]. Furthermore, women with menstrual-related problems have been reported to be 1.7 and 3.0 times more likely to report insomnia, sleepiness, recurrent pain, sadness, nervousness, restlessness, hopelessness, and feelings of worthlessness. Mood and anxiety disorders have frequently been observed in patients with AUB, including major depression (15.6%), generalized anxiety disorder (18.8%), and obsessive-compulsive disorder (22.9%) [1].

Mental illness is highly prevalent among Korean population and AUB plays an important part in aspect of women's health.

Here, we hypothesized that age, BMI, obesity, abortion history, surgery-related child delivery or gynecological problems, menstruation cycle, dysmenorrhea, anemia, and medical disorders may be associated with anxiety and depression in the presence of AUB.

In our study, history of abortion and C/sec were associated with anxiety disorder (although the interpretation of these findings is difficult, but it seems that anxiety may be connected to the experience of a loss, such as abortion), whereas a history of minor surgery was related to depressive disorder (which seemed to be due to its effect on patient mood in the presence of AUB).

We found that age factor did not affect anxiety and depression associated AUB but there were differences in factors that were influenced by different age groups (15–20 years, 21–40 years, 41–55 years) in anxiety and depression related to AUB.

In anxiety related to AUB, high BMI and history of minor surgery were affected in young women, and BMI, history of abortion, history of C/sec, and Ocs were related in women over 41 years of age.

There was no statistical significance regarding depression, but low BMI and history of minor surgery were associated with women over 40 years of age.

Although our study found no differences in changes in anxiety and depression according to age, it seems necessary to study and analyze the social, physical, and environmental multilateral effects of life as age increases.

Furthermore, anxiety and depression had a moderately positive correlation with AUB, which indicates that it may be wise to closely monitor possible symptom of anxiety and/or depression in women with AUB.

Women with a history of 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. Mood disorder has been shown to be a risk factor for subsequent development of important health disorders, such as diabetes, cardiovascular disease, pain, backache, and dizziness [3, 20]. Mood-related disorders are diverse and affected by several factors.

In AUB patients who visit hospital with anxiety and depression, proper management is necessary, however, the importance of psychological and risk evaluations has been underestimated. Because AUB is affected by age, obstetric history, social environment, and health status, it is difficult to assess their individual contributions to AUB.

There were several limitations to our study. We did not investigate whether psychological distress and adverse health behavior were related to AUB and did not ask for exactly where during the menstrual cycle the psychological and behavioral associations were more profound.

We were unable to determine whether psychological distress and adverse health behaviors were related to AUB and were unable to exactly identify where during the menstrual cycle the psychological and behavioral associations were more profound. The total age range was 15–55 years (although all women were premenopausal), making it difficult to clearly analyze the various effects of age. We were asking for symptoms of possible anxiety and depression in our study using the K-BAI and K-BDI-II. Our study also, 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 errors because AUB symptoms interfere with daily life. 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.

To the best of our knowledge, this study is the first to examine the correlation between AUB and symptoms of possible mood and anxiety disorders.

5. Conclusions

Women with AUB seem to be exposed to higher risk of anxiety and depression and furthermore, when there is a history of abortion, C/sec or minor surgery, it is necessary to address the issue of possible anxiety and depression.

Although anxiety and depression were assessed using both K-BAI, K-BDI-II, respectively, this is a meaningful study because it has found that anxiety and depression can be severe in women with AUB. Therefore, including an assessment of AUB as party of the standard evaluation of women, may better enable healthcare providers to recognize and treat potential manifestations of these symptoms.

Author contributions

HNL and MJK designed the research study. HRJ, JMS and GSU performed informed consent from patients. MJK wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

Ethical approval for the study was obtained from the local ethics committee (HC15QISI0078). The purpose of the study were explained to all participants and written consent was obtained.

Acknowledgment

Not applicable.

Funding

This work was supported by the Institute of Clinical Medicine Research of Bucheon St. Mary's Hospital, Research Fund, 2020. The statistical consultation (interpretation of data) was supported by a grant (HC14C1062) from the Korea Health Technology R&D Project through the Korean Health Industry Development Institute (KHIDI) funded by the Ministry of Health & Welfare, Republic of Korea.

Conflict of interest

The authors declare no competing interests.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at https://ceog.imrpress.com/EN/10.31083/j.ceog.2021.02.2329.

References

[1] Kayhan F, Alptekin H, Kayhan A. Mood and anxiety disorders in patients with abnormal uterine bleeding. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2016; 199: 192–197.

[2] Spencer CP, Whitehead MI. Endometrial assessment re-visited. British Journal of Obstetrics and Gynaecology. 1999; 106: 623–632.

[3] Bromberger JT, Schott LL, Matthews KA, Kravitz HM, Randolph JF, Harlow S, *et al.* Association of past and recent major depression and menstrual characteristics in midlife: study of Women's Health Across the Nation. Menopause. 2012; 19: 959–966.

[4] Strine TW, Chapman DP, Ahluwalia IB. Menstrual-related problems and psychological distress among women in the United States. Journal of Women's Health. 2005; 14: 316–323.

[5] Hurskainen R, Aalto A, Teperi J, Grenman S, Kivela A, Kujansuu E, *et al.* Psychosocial and other characteristics of women complaining of menorrhagia, with and without actual increased menstrual blood loss. BJOG: An International Journal of Obstetrics and Gynaecology. 2001; 108: 281–285.

[6] Lee K, Kim D, Cho Y. Exploratory factor analysis of the beck anxiety inventory and the beck depression inventory-II in a psychiatric outpatient population. Journal of Korean Medical Science. 2018; 33: e128.

[7] Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the national comorbidity survey replication. Archives of General Psychiatry. 2005; 62: 617.

[8] Lamers F, van Oppen P, Comijs HC, Smit JH, Spinhoven P, van Balkom AJLM, *et al.* Comorbidity patterns of anxiety and depressive disorders in a large cohort study: the Netherlands Study of Depression and Anxiety (NESDA). The Journal of Clinical Psychiatry. 2011; 72: 341–348.

[9] Nur Azurah AG, Sanci L, Moore E, Grover S. The quality of life of adolescents with menstrual problems. Journal of Pediatric and Adolescent Gynecology. 2013; 26: 102–108.

[10] Munro MG, Critchley HOD, Fraser IS. The two FIGO systems for normal and abnormal uterine bleeding symptoms and classification of causes of abnormal uterine bleeding in the reproductive years: 2018 revisions. International Journal of Gynecology & Obstetrics. 2018; 143: 393–408.

[11] Harlow SD, Lin X, Ho MJ. Analysis of menstrual diary data across the reproductive life span applicability of the bipartite model approach and the importance of within-woman variance. Journal of Clinical Epidemiology. 2000; 53: 722–733.

[12] National Institute for Health and Care Excellence. Heavy menstrual bleeding: assessment and management. London: National Institute for Health and Care Excellence. 2018. Available at: https://www.nice.org.uk/guidance/ (Accessed: 27 November 2018).

[13] Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. Journal of Consulting and Clinical Psychology. 1988; 56: 893–897.

[14] Jo SA, Park MH, Jo I, Ryu S, Han C. Usefulness of Beck Depression Inventory (BDI) in the Korean elderly population. International Journal of Geriatric Psychiatry. 2007; 22: 218–223.

[15] Ministry of Health and Welfare. Mental disease survey. Seoul: Statistics Korea. 2016. Available at: https://meta.narastat.kr/metasvc/index.do?confmNo=117050 (Accessed: 27 November 2018).

[16] Kazemijaliseh H, Ramezani Tehrani F, Behboudi-Gandevani S, Khalili D, Hosseinpanah F, Azizi F. A population-based study of the prevalence of abnormal uterine bleeding and its related factors among iranian reproductive-age women: an updated data. Archives of Iranian Medicine. 2017; 20: 558–563.

[17] Studd JW. A guide to the treatment of depression in women by estrogens. Climacteric. 2011; 14: 637–642.

[18] Halbreich U, Borenstein J, Pearlstein T, Kahn LS. The prevalence, impairment, impact, and burden of premenstrual dysphoric disorder (PMS/PMDD). Psychoneuroendocrinology. 2003; 28: 1–23.

[19] Sternfeld B, Swindle R, Chawla A, Long S, Kennedy S. Severity of premenstrual symptoms in a health maintenance organization population. Obstetrics and Gynecology. 2002; 99: 1014–1024.

[20] Hotopf M, Mayou R, Wadsworth M, Wessely S. Temporal relationships between physical symptoms and psychiatric disorder. British Journal of Psychiatry. 1998; 173: 255–261.