Prevalence of abnormal uterine bleeding and its associated factors among undergraduate students at a university in Bahia

Prevalência de sangramento uterino anormal e fatores associados entre estudantes de uma universidade baiana

Pedro Manoel Oliveira Lopes[1], Narciso DiLorenzo Machado Dias[1], Ana Beatriz Ferreira Gusmão[1], Diana Calhau Barbosa[1], Karolaine da Costa Evangelista[1], Maurício de Oliveira Grijó Júnior[2]

[1]*Acadêmico do Curso de Medicina, Instituto Multidisciplinar em Saúde, Universidade Federal da Bahia (UFBA);* [2] *Médico Especialista em Ginecologia e Obstetrícia, Universidade Federal da Bahia, Professor Assistente do Curso de Medicina, Instituto Multidisciplinar de Saúde, Universidade Federal da Bahia (UFBA)*

Abstract
Introduction: Normal uterine bleeding corresponds to physiologic endometrial desquamation, maintaining consistent duration, frequency, regularity, and intensity over time. Abnormal Uterine Bleeding (AUB) is characterised by alterations in one or more of these parameters, with different diagnoses depending on the age group and clinical presentation. **Objective:** *to analyse the prevalence of AUB and its associated factors in university students and to identify clinically relevant correlations.* **Methodology:** *A cross-sectional analytical study was conducted, with data collected between November and December 2024 through an online survey adapted from the Menstrual Bleeding Questionnaire (MBQ). A convenience sample of 271 students with a mean age of 23.04 years was included.* **Results:** *the simple prevalence of AUB in the study population was 24.4%. Crude and adjusted prevalence ratios were calculated, identifying the following risk factors for AUB: alcohol consumption, premenstrual symptoms, use of emergency contraception, lack of contraceptive methods, diagnosis of hypothyroidism, and history of postcoital and intermenstrual bleeding. Conversely, the absence of comorbidities was identified as a protective factor among students.* **Conclusion:** *the results of this study underscore the importance of research on menstrual disorders among undergraduate students, particularly in identifying associated factors and promoting self-care and health-seeking behaviours among this population.*
Keywords: Menstruation disturbances; uterine haemorrhage; prevalence; student health; Universities.

Resumo
Introdução: o sangramento uterino normal equivale à descamação endometrial fisiológica, apresentando duração, frequência, regularidade e intensidade similares no decorrer do tempo. O sangramento uterino anormal (SUA), desse modo, é aquele que apresenta alteração em um ou mais dessas características, com diagnósticos próprios para cada faixa etária e quadro clínico característico. **Objetivo:** analisar a prevalência do SUA e fatores associados em estudantes universitárias, além de estabelecer correlações relevantes à prática clínica. **Metodologia:** realizou-se um estudo transversal analítico, com coleta entre novembro e dezembro de 2024, mediante inquérito on-line adaptado do Questionário de Sangramento Menstrual (The Menstrual Bleeding Questionnaire — MBQ). A amostra de conveniência contou com 271 estudantes, com média de idades de 23,04 anos. **Resultados:** a prevalência simples de SUA na população foi de 24,4%. Calculou-se, então, as razões de prevalência bruta e ajustada, sendo demonstrados como fatores de risco para SUA: o uso de álcool, sintomas pré-menstruais, uso de pílula do dia seguinte, não utilização de método contraceptivo, diagnóstico de hipotireoidismo, além de passado de sinusorragia e sangramento intermenstrual. Não ter alguma comorbidade foi fator de proteção entre as estudantes. **Conclusão:** assim, os dados analisados pelo estudo sinalizam a relevância da pesquisa entre as estudantes, sobretudo para identificar os fatores associados ao distúrbio menstrual, assim como para incentivar o autocuidado e a procura por assistência à saúde por essas pessoas.
Palavras-chave: Distúrbios menstruais; hemorragia uterina; prevalência; saúde do estudante; Universidades.

INTRODUCTION

Normal uterine bleeding corresponds to physiological endometrial shedding, characterised by consistent duration, frequency, regularity, and intensity over time[1]. Frequency is determined by the interval between menstrual cycles, typically ranging from 24 to 38 days. The normal duration is ≤8 days, while cycle regularity is assessed by the difference between the shortest and longest cycle, which should be less than 7 days. The amount of bleeding is the most variable parameter, defined by individual perception[1]. Therefore, abnormal uterine bleeding (AUB) is characterised as any bleeding that exceeds these parameters.

It is emphasised that AUB may present acutely, requiring medical attention, and should be managed according to its underlying etiologies, as it is a symptom rather than a diagnosis[2]. Its etiologies can be classified as structural and non-structural, according to the mnemonic

Correspondente/ Corresponding: *Pedro Manoel Oliveira Lopes – End: Rua Hormindo Barros, 58 - Quadra 17, Lote 58 | CEP: 45.029-094 - Candeias, Vitória da Conquista - BA – E-mail: pedromanoel@ufba.br

Rev. Ciênc. Méd. Biol., Salvador, v. 24, n. 2, p. 487-495, mai./jun. 2025

487

proposed by the International Federation of Gynaecology and Obstetrics (FIGO): PALM-COEIN. "PALM" refers to structural causes (polyps, adenomyosis, leiomyoma, and malignancy), while "COEIN" refers to non-structural causes (coagulopathy, ovulatory dysfunction, endometrial dysfunction, iatrogenic factors, and causes not otherwise classified)[2]. AUB has a prevalence of 10% to 30% in women of reproductive age, spotlighting its clinical relevance[2].

AUB has a significant impact on the quality of life of girls, women, and individuals with a uterus, leading to absenteeism from work or school and an increased risk of depression and anxiety[3]. Therefore, analysing the prevalence of these irregularities contributes to a better understanding of the various causes of menstrual disorders, particularly among university students. The university environment encompasses unique cultural, socioeconomic, and psychological factors that influence students and their social environment[4]. However, the clinical impact on students' menstrual cycles remains understudied. A cross-sectional study conducted in Uganda found that of 275 students questioned, 98% experienced menstrual irregularities, with 63.6% reporting dysmenorrhea during their cycle[5]. Similarly, in Saudi Arabia, it was found that of 450 respondents, 70.9% reported dysmenorrhea, 45.6% experienced prolonged menstrual periods, and 41.9% reported heavy bleeding[6]. The study also emphasises the necessity for further research in this population, given the high prevalence of menstrual disorders among students.

Therefore, the need for discussion becomes evident, as it may affect the medical care of this community and promote greater awareness of the menstrual cycle among these women and individuals with a uterus. Thus, this cross-sectional quantitative study aims to analyse the presence and characteristics of AUB, as well as factors related to the menstrual cycle, in a sample of female university students of health sciences, through an online survey, with the goal of establishing relevant correlations for clinical practice. This study hypothesises an association between abnormal uterine bleeding and socioeconomic factors or medical history of the participants.

METHODOLOGY

This is an observational, cross-sectional, analytical study with a quantitative approach, using an online questionnaire. The research was conducted in a public university located in the interior of Bahia, Brazil, in Vitória da Conquista. The campus population for the year 2024 consisted of 785 female students enrolled in undergraduate courses in Biotechnology, Biology, Nursing, Pharmacy, Medicine, Nutrition, and Psychology. A convenience sample was used. The calculated sample, with a 5% margin of error and a 95% confidence level, was 258 for a significant and representative evaluation. A total of 271 respondents completed the survey. The inclusion criterion was to be between 18 and 45 years of age. Exclusion criteria included those who had undergone a hysterectomy, those who

were pregnant or breastfeeding, and those who were transgender or gender diverse, receiving testosterone therapy at baseline. The questionnaire was distributed in classrooms, on physical campus bulletin boards, and in student groups on social media. Data collection occurs from November 1 to December 20, 2024, with questions referring to the October 2024 menstrual cycle.

The questionnaire included a sociodemographic analysis (age, colour/race, marital status, per capita income, and course) adapted from the "National Health Survey: Household Residents Questionnaire", which also includes socioeconomic level and lifestyle habits[7]. It also included medical history (comorbidities and medications) and a supplementary menstrual cycle questionnaire (associated symptoms and bleeding severity). The Menstrual Bleeding Questionnaire (MBQ), developed and validated by Matteson, Scott, Raker, Clark[8] (2015) and translated into Brazilian Portuguese was also used[9]. This questionnaire consists of four domains that assess menstrual regularity (3 questions) and intensity (8 questions), as well as the presence of pain (1 question) and quality of life (8 questions) during the participant's last menstrual cycle. The questionnaire assigns a score to each answer, with a maximum total score of 75 points. The higher the score, the greater the risk of abnormal bleeding or menstrual irregularities. In addition, the authors established a cut-off score of 24 points with 98% accuracy for the diagnosis of AUB, which was used to determine the prevalence of AUB in the study population[9].

The dependent variable was the presence or absence of AUB in the population, as determined by the MBQ cutoff score (24 points). The categorical independent variables included sociodemographic data (marital status, per capita income, ethnicity, and undergraduate course), while the continuous independent variable was age. The physiological and pathological history of the respondents was examined using categorical variables (previous diagnoses, medication use, and symptoms related to menstruation).

The study was conducted using an electronic form via Google Forms®, and data were recorded in an electronic spreadsheet using Google Sheets®. IBM SPSS® software was used to analyse the data. Descriptive analysis, including the percentage distribution of exposure factors and the prevalence of the outcome of interest, was used to test the research hypothesis. In addition, the crude and adjusted prevalence ratio (PR) was calculated for the variables "age" and "financial income" using Poisson regression with robust variance. The purpose of this calculation was to compare the prevalence of the outcome between the exposed and unexposed populations while adjusting for confounding factors. The study was approved by the UFBA-CAT Ethics Committee (No: 81999824.1.0000.5556), and all participants signed the informed consent form.

RESULTS

A total of 271 undergraduate students completed the survey. All participants (271; 100%) were cisgender

females with a mean age of 23.04 years (22.61-23.47, 95% CI), ranging from 18 to 39 years. The majority self-identified as mixed race or black (163; 60.1%), reported being single (255; 94.1%), and reported a per capita income between 1 and 2 minimum wages (86; 31.7%). Most students were enrolled in medical school (65; 24%). Table 1 illustrates the distribution of responses according to the factors investigated in the study, including sociodemographic data, lifestyle habits, and medical history.

Table 1 – *Frequency of sociodemographic factors, lifestyle habits, and medical history*

Section 1 – Sociodemographic data

Mean age: *23.04 (95% CI, 22.61–23.47)*

Variable	N	%
Age		
18-24 years old	195	72%
>24 years old	76	28%
Marital status		
Single	255	94.1%
Not single	16	5.9%
Race/Color		
Mixed race/black	163	60.1%
Not mixed race/black	108	39.9%
Undergraduate program		
Pharmacy	40	14.8%
Medicine	65	24%
Nursing	31	11.4%
Biology	23	8.5%
Nutrition	40	14.8%
Psychology	45	16.6%
Biotechnology	27	10%
Per capita Income		
Up to 1 minimum wage	62	22.9%
Between 1 and 2 minimum wages	86	31.7%
Between 2 and 5 minimum wages	78	28.8%
Above 5 minimum wages	31	11.4%
I don't know/Prefer not to answer	14	5.2%
Section 2 – lifestyle habits		
Alcohol consumption		
Yes	139	51.3%
No	132	48.7%
Tobacco use		
Currently smokes	11	4.1%
Does not currently smoke	260	95.9%
Contraceptive methods		
Does not use any method	122	45%
Calendar method (Ogino-Knaus method)	13	4.8%
Morning-after pill (emergency contraception)	7	2.6%
Combined oral contraceptive	60	22.1%
Male condom	73	26.9%
Copper intrauterine device (IUD)	10	3.7%
Levonorgestrel-based Intrauterine Device (IUD)	9	3.3%
Other methods	19	7%
Use of medications		
Psychotropic medications	55	20.3%
Does not use medications	189	69.7%
Other	27	10%
Section 3 – Medical history		
Comorbidities		
Major Depressive Disorder	26	9.6%
Generalized Anxiety Disorder	53	19.6%
Obesity	13	4.8%
Endometriosis	15	5.5%
Uterine Leiomyoma	6	2.2%
Hypothyroidism	8	3%
Adenomyosis	5	1.8%
Polycystic Ovary Syndrome (PCOS)	26	9.6%
No diagnosis	155	57.2%
Premenstrual symptoms		
Cramps	231	85.2%
Mood changes	207	76.4%
Bowel changes	165	60.9%
Headache	137	50.6%
No symptoms	8	3%
Postcoital bleeding		
Yes	86	31.7%
No	185	68.3%
Intermenstrual bleeding		
Yes	125	46.1%
No	146	53.9%

Data source: The authors

The prevalence of AUB in the sample was 24.4% (n=66), which was considered the dependent variable and calculated using the MBQ. Crude and adjusted prevalence ratios (PRs) were then estimated to assess the association between exposure and outcome. The variables "age" and "income per capita" were included in the adjustment of the PRs due to their reduction from crude to adjusted ratios in subsequent analyses. Tables 2, 3, and 4 summarise the prevalence of AUB according to sociodemographics, lifestyle, and medical history, respectively. To avoid data redundancy, the prevalence ratios for "age" and "per capita income" were adjusted separately: age was adjusted for income only, and per capita income was adjusted for age exclusively.

Rev. Ciênc. Méd. Biol., Salvador, v. 24, n. 2, p. 487-495, mai./jun. 2025

489

Table 2 – *Prevalence and crude and adjusted prevalence ratios of Abnormal Uterine Bleeding according to sociodemographic data (adjusted for age and per capita income)*

Variable	Prevalence	Crude PR	95% CI	p-value	Adjusted PR	95% CI	p-value
Age				0.052			0.07
18-24 years old	15.8%	1	.		1		
>24 years old	27.7%	0.57	0.32 - 1.01		0.6	0.34 - 1.05	
per capita income				0.1			0.11
Up to 1 minimum wage	35.5%	0.99	0.46 - 2.17		1.0	0.47 - 2.15	
Between 1 and 2 minimum wages	19.80%	0.55	0.24 - 1.26		0.56	0.25 - 1.25	
Between 2 and 5 minimum wages	21.80%	0.61	0.27 - 1.38		0.62	0.28 - 1.39	
Above 5 minimum wages	16.10%	0.45	0.16 - 1.31		0.47	0.16 - 1.34	
I don't know/Prefer not to answer		1			1		
Race/Color				0.22			0.32
Mixed race/black	27.0%	1.33	0.85 - 2.08		1.27	0.8 - 2.01	
Not mixed race/black	20.4%	1			1		
Undergraduate program				0.04			0.13
Pharmacy	32.5%	0.88	0.45 - 1.71		0.87	0.45-1.7	
Medicine	13.8%	0.37	0.17 - 0.82		0.42	0.19 - 0.96	
Nursing	22.6%	0.61	0.27 - 1.38		0.59	0.26 - 1.36	
Biology	43.5%	1.17	0.6 - 2.31		1.08	0.53 - 2.18	
Nutrition	17.5%	0.47	0.21 - 1.09		0.47	0.20 - 1.08	
Psychology	22.2%	0.60	0.29 - 1.25		0.60	0.28 - 1.29	
Biotechnology	37.0%	1			1		
Marital status				0.6			0.91
Single	24.7%	1.32	0.46-3.74		1.07	0.33 - 3.46	
Not single	18.8%	1			1		

Data source: The authors

Table 3 – *Prevalence and crude and adjusted prevalence ratios of Abnormal Uterine Bleeding according to lifestyle habits (adjusted for age and per capita income)*

Variable	Prevalence	Crude PR	95% CI	p-value	Adjusted PR	95% CI	p-value
Alcohol consumption				0.1			0.04
Yes	28.8%	1.43	0.93-2.19		1.57	1.02 - 2.42	
No	20.1%	1			1		
Tobacco use				0.64			0.65
Yes	18.2%	0.74	0.21 - 2.63		0.75	0.22 - 2.59	
No	24.6%	1			1		
Use of medications				0.95			0.9
Does not use medications	23.8%	0.94	0.56 - 1.57		0.91	0.54 - 1.52	
Other	25.9%	1.02	0.47 - 2.23		1.06	0.48 - 2.33	
Psychotropic medications	25.5%	1			1		
Contraceptive methods				0.02			0.04
Does not use any method	31.1%	1.66	1.08 - 2.54		1.57	1.03 - 2.41	
Uses a method	18.8%	1			1		
Calendar method (Ogino-Knaus method)				0.94			0.85
Yes	23.1%	0.95	0.34 - 2.61		0.89	0.33 - 2.43	
No	24.4%	1			1		
Morning-after pill				0.01			<0.01
Yes	57.1%	2.43	1.24 - 4.79		2.48	1.31 - 4.66	
No	23.5%	1			1		
COC*				0.04			0.06
Yes	13.3%	0.49	0.25 - 0.96		0.51	0.26 - 1.02	
No	27.5%	1			1		
Male Condom				0.95			0.8
Yes	24.7%	1.02	0.64 - 1.63		1.06	0.67 - 1.70	
No	24.2%	1			1		

	Prevalence	Crude PR	95% CI	p-value	Adjusted PR	95% CI	p-value
Cooper IUD**				0.75			0.8
Yes	20%	0.82	0.23 - 2.87		0.88	0.29 - 2.62	
No	24.5%	1			1		
Levanorgestrel-based IUD**				0.4			0.4
Yes	11.1%	0.45	0.07 - 2.88		0.44	0.06 - 3.09	
No	24.8%	1			1		
Other methods				0.2			0.18
Yes	10.5%	0.41	0.11 - 1.56		0.40	0.11 - 1.51	
No	25.4%	1			1		

*COC: Combined Oral Contraceptive; **IUD: Intrauterine Device;*

Data source: The authors

Table 4 – *Prevalence and crude and adjusted prevalence ratios of Abnormal Uterine Bleeding according to medical history (adjusted for age and per capita income)*

Variable	Prevalence	Crude PR	95% CI	p-value	Adjusted PR	95% CI	p-value
Postcoital bleeding				0.03			0.02
Yes	32.6%	1.59	1.05 - 2.40		1.63	1.08 - 2.46	
No	20.5%	1			1		
Intermenstrual bleeding				0.02			0.01
Yes	31.2%	1.69	1.10 - 2.59		1.74	1.14 - 2.65	
No	18.5%	1			1		
Premenstrual symptoms				0.05			0.06
No symptoms	12.5%	0.51	0.08 - 3.20		0.61	0.10 - 3.82	
Have symptoms	24.7%	1			1		
Cramps				0.04			0.08
Yes	26.8%	2.68	1.03 - 6.97		2.35	0.90 - 6.17	
No	10%	1			1		
Bowel changes				<0.01			<0.01
Yes	32.7%	2.89	1.63 - 5.14		2.91	1.62 - 5.23	
No	11.3%	1			1		
Headache				<0.01			<0.01
Yes	36.5%	3.06	1.84 - 5.09		3.11	1.87 - 5.17	
No	11.9%	1			1		
Mood changes				0.02			0.03
Yes	28%	2.24	1.13 - 4.44		2.13	1.09 - 4.17	
No	12.5%	1			1		
Comorbidities				<0.01			<0.01
No diagnosis	17.4%	0.52	0.34 - 0.79		0.48	0.31 - 0.74	
Have a diagnosis	33.6%	1			1		
Hypothyroidism				<0.01			<0.01
Yes	75%	3.29	2.08 - 5.20		3.71	2.22 - 6.20	
No	22.8%	1			1		
Obesity				0.9			0.9
Yes	23.1%	0.95	0.34 - 2.61		1.07	0.45 -2.56	
No	24.4%	1			1		
PCOS*				0.06			0.07
Yes	38.5%	1.68	0.98 - 2.88		1.56	0.97 - 2.52	
No	22.9%	1			1		
GAD**				0.13			0.08
Yes	32.1%	1.43	0.90 - 2.27		1.48	0.95 - 2.32	
No	22.5%	1			1		
MDD***				0.4			0.5
Yes	30.8%	1.30	0.70 - 2.41		1.26	0.68 - 2.32	
No	23.7%	1			1		

Rev. Ciênc. Méd. Biol., Salvador, v. 24, n. 2, p. 487-495, mai./jun. 2025

491

Endometriosis				0.4			0.4
Yes	33.3%	1.40	0.66 - 2.96		1.39	0.62 - 3.11	
No	23.8%	1			1		
Uterine Leiomyoma				0.6			0.25
Yes	33.3%	1.38	0.44 - 4.37		1.93	0.64 - 5.81	
No	24.2%	1			1		
Adenomyosis				0.4			0.3
Yes	40%	1.66	0.56 - 4.97		1.89	0.57 - 6.29	
No	24.1%	1			1		

*PCOS: Polycystic Ovary Syndrome; **GAD: Generalized Anxiety Disorder; ***MDD: Major Depressive Disorder

Data Source: The authors

After adjustment, several risk factors for the occurrence of AUB were identified, including alcohol consumption (adjusted PR: 1.57, 95% CI: 1.02-2.42), use of the morning-after pill (adjusted PR: 2.48, 95% CI: 1.31-4. 66), lack of contraceptive method (adjusted PR: 1.57, 95% CI: 1.03-2.41), history of intermenstrual bleeding (adjusted PR: 1.74, 95% CI: 1.14-2.65), postcoital bleeding (adjusted PR: 1.63, 95% CI: 1.08-2.46), and hypothyroidism (adjusted PR: 3.71, 95% CI: 2.22-6.20). In addition, headache (adjusted PR: 3.11, 95% CI: 1.87-5.17), gastrointestinal fluctuations (adjusted PR: 2.91, 95% CI: 1.62-5.23), and mood changes (adjusted PR: 2.13, 95% CI: 1.09-4.17) were identified as premenstrual symptoms associated with AUB, as shown in Figure 1.

Conversely, absence of comorbidities (adjusted PR: 0.48, 95% CI: 0.31-0.74) and enrollment in medical school (adjusted PR: 0.42, 95% CI: 0.19-0.96) were identified as protective factors, although the categorical variable "undergraduate program" overall had a p-value greater than 5%. These results are summarised in Figure 1 and detailed in Table 4.

Figure 1 – *Risk and protective factors in the university sample. Bahia, Brazil, 2025.*

Risk Factors for AUB Among University Students	*Protective factors for AUB Among University Students*

Alcohol consumption;
Premenstrual symptoms, such as:
   1. Headache;
   2. Mood changes;
   3. Gastrointestinal alterations.
Morning-after pill (emergency contraception);
Lack of contraceptive method;
History of intermenstrual bleeding;
History of postcoital bleeding;
Diagnosis of hypothyroidism;
	Absence of comorbidities;
	Enrolled in medical school.

Data Source: The authors

Lifestyle habits

Approximately 48.7% of respondents reported using alcohol at least once a month or more frequently, while 4.1% reported using tobacco daily or less frequently. Among self-reported current medications, the most common were psychotropic drugs (20.03%), especially anxiolytics. Other medications, such as antihypertensives or antidiabetics, accounted for a total of 10% (Table 1).

Contraceptive methods

It was found that 45% of the students were not using any contraceptive method. Of those using contraception, 26.9% reported using male condoms and 22.1% reported using a combined oral contraceptive containing estrogen and progesterone. Table 3 details the prevalence and crude and adjusted prevalence ratios of contraceptive methods used by the university sample.

DISCUSSION

Evaluation of the prevalence of AUB in the university population has revealed significant exposure factors that contribute to the risk of developing the condition, as well as protective factors. These risk factors are consistent with the literature, although they should be analysed within the local socioeconomic and cultural context[10]. The main factors associated with AUB included sociodemographic characteristics, contraceptive use, and specific risk and protective factors, which will guide the discussion.

Sociodemographic data

The sample consisted of young cisgender women (mean age: 23.04 years; 95% CI: 22.61-23.47), predominantly of mixed-race (45%), reflecting the typical profile of public university students in Northeastern Brazil[11], with an intermediate income level (31.7% earning be-

tween one and two minimum wages). Notably, these results contrast with the national trend, where white students are the majority in higher education. In Brazil, ethnicity and socioeconomic status are important determinants of access to higher education[12]. Additionally, income was used as a control variable in the adjusted analysis due to its potential association with early diagnosis and access to appropriate treatment. As shown in the literature, the prevalence of multimorbidity is high in Brazil, with higher socioeconomic status acting as a protective factor. Multimorbidity is more prevalent among individuals with lower levels of education and income, reinforcing the importance of socioeconomic factors in health outcomes[13].

Contraceptive use

The predominance of single women (94.1%) and the low prevalence of contraceptive use (45% did not use any method) are relevant in the context of the study. Among those who used contraception, the most common methods were male condoms (26.9%) and combined oral contraceptives (22.1%). Young and single students tend to have more inconsistent contraceptive use patterns, which may contribute to menstrual irregularities due to hormonal discontinuity[14]. The predominance of mixed-race self-identification in the sample reflects the racial diversity of the population. However, black and mixed-race women face significant barriers to accessing reproductive health care, which may affect the diagnosis and treatment of conditions such as AUB[15]. Although the adjusted analysis did not find a direct association between ethnicity and AUB, it is important to recognise the impact of social and racial inequalities on reproductive health. Studies suggest that black women receive inferior health care and often present with more severe conditions when they enter the health care system[16].

In another analysis, the high prevalence of AUB among university students may be directly related to low contraceptive use, as 45% of participants did not use any contraceptive method. The lack of hormonal contraception, especially progestin-based methods, may lead to a lack of proper endometrial regulation, predisposing individuals to anovulatory cycles and irregular bleeding[17]. Contraceptive methods such as levonorgestrel intrauterine systems (IUS) or oral progestins not only provide protection against unintended pregnancy, but also regulate the menstrual cycle, reducing the incidence of AUB[18].

In addition, irregular contraceptive use is directly associated with increased use of emergency contraception, as observed in the sample (57.1% reported using emergency contraception). As the morning-after pill is a hormonal emergency contraceptive, it may also contribute to changes in uterine bleeding patterns[19,20]. Thus, low adherence to regular contraceptive methods may be a significant factor in the high prevalence of AUB in this population. Lack of consistent contraceptive use may also contribute to severe and prolonged bleeding episodes that negatively impact quality of life.

Risk and protective factors

The differences observed between graduation courses, with a higher prevalence among medical students (24%) and psychology students (16.6%), suggest potential differences in knowledge regarding reproductive health. Interestingly, studying Medicine was identified as a protective factor for AUB. This finding can be explained by greater access to medical information and increased awareness of gynaecological health, corroborating studies that show how the level of health knowledge influences the adoption of preventive practices, with higher levels leading to better health decisions, greater commitment and superior efficiency in preventive medicine[21].

In counterpoint, smoking is associated with changes in the endometrium, which can negatively affect reproductive health due to the interaction of nicotine with its specific receptors, which can increase vasoconstriction and reduce uterine blood flow, resulting in hypoxia of the endometrium, aggravating conditions such as dysmenorrhea[22]. Nicotine and its main metabolite, cotinine, have multiple adverse effects, affecting both adrenal function and hormone production. Nicotine, by binding to nicotinic receptors and interfering with adrenal steroidogenesis, alters the production of steroid hormones, inhibiting the enzymes 21-hydroxylase and 11β-hydroxylase. This can result in hormonal imbalance, including reduced estrogen levels[23,24].

The reduction in estradiol levels can also be exacerbated by the presence of alcohol, which alters liver function and affects the metabolism of steroid hormones. Alcohol consumption has been shown to impact several hormonal systems, including the hypothalamic-pituitary-gonadal axis, the hypothalamic-pituitary-thyroid axis, the hypothalamic-pituitary-growth hormone/insulin-like growth factor-1 axis and the hypothalamic-pituitary posterior axis — all of which are directly or indirectly involved in hormonal balance, which may potentiate the adverse effects of alcohol on endocrine and reproductive health[20,25]. Thus, both smoking and alcohol consumption compromise estradiol production and hormonal balance, impairing ovarian function and female sexual health.

With regard to comorbidities, the high use of psychotropic drugs (25.5%) among the population was noted. This may correlate to the presence of comorbidities such as Generalized Anxiety Disorder (GAD), present in the history of 32.1% of the sample, Major Depressive Disorder (30.8%), as well as non-psychiatric disorders that cause chronic pain, which justify the use of these drugs[26], such as adenomyosis (40%), endometriosis (33.3%) and headaches (36.5%). These findings are compatible with the literature, since the various causes of SUA can be causative or accompanied by pain[27]. In addition, a literature review estimated that half of female patients with abnormal uterine bleeding have anxiety and depression[28].

Rev. Ciênc. Méd. Biol., Salvador, v. 24, n. 2, p. 487-495, mai./jun. 2025

493

Hypothyroidism was also prevalent in the sample, further illustrating the role of the hypothalamic-pituitary-gonadal axis in the context of AUB. It has been reported that hypothyroidism is common in women during menopause, a scenario in which abnormal BMI is an important risk factor for abnormal uterine bleeding, which was also present in 23.1% of the sample[29]. Menstrual disorders can occur even in subclinical hypothyroidism, since increased TRH can induce hyperprolactinemia, alter pulsatile GnRH secretion, which in turn delays or makes the ovarian response to LH deficient, culminating in defects in the luteal phase and ovulation. Thus, it is hypothesised that oligovulation or anovulation causes inadequate LH secretion, resulting in estrogen excess and menstrual disorder[30].

Associated symptoms

The most common causes of AUB in women in the fertile period are ovulatory or structural causes, such as polyps, adenomyosis, or leiomyomas[2]. Patients with altered menstrual parameters, compatible with AUB, may interpose the symptoms of these causes with the premenstrual period, thus associating abnormal bleeding with symptoms of headache, mood swings and intestinal changes, or even intermenstrual bleeding and postcoital bleeding. In a case-control study for the diagnosis of structural causes, women with intermenstrual bleeding were more likely to be diagnosed with uterine polyps[31]. Bleeding during sexual intercourse is related to pathologies in the uterine cervix, which is also associated with SUA due to cervical polyps or infectious causes such as cervicitis[32].

In adding to this, not having a previous diagnosis was observed as a protective factor, which can be explained by the already known risk factors for abnormal bleeding, such as endocrine disorders (obesity, diabetes, polycystic ovary syndrome and hypothyroidism), as well as cardiovascular disorders, such as hypertension, in the case of leiomyomas and endometrial polyps[33,34].

Study limitations

Despite the robust data analysis, including raw and adjusted prevalence ratios, this study has limitations that should be acknowledged. As a cross-sectional study, it does not allow causal inference between outcomes and exposures. Due to the sample being convenience-based, although representative of the population, there may be selection bias among participants as well as recall bias. In addition, certain associations, such as sexual practices and a detailed assessment of premenstrual mood disorders, were not examined to avoid compromising survey participation. Future studies should be encouraged to confirm these findings and to explore further psychological disorders related to the menstrual cycle in this population.

CONCLUSION

AUB is a characteristic symptom of structural causes, such as leiomyomas, uterine polyps, adenomyosis, or neoplasms, as well as non-structural causes, including coagulopathies, ovulatory disorders, systemic diseases, and iatrogenic factors. This study aimed to determine the prevalence of menstrual disorders and abnormal uterine bleeding in university students, representing a young population in their reproductive years. Significant risk and protective factors were identified, demonstrating the relevance of this research in promoting self-awareness and encouraging the pursuit of medical care among the population studied. Therefore, it is expected that the dissemination and conclusions of this study will lead to further research necessary to thoroughly investigate the causes of menstrual disorders and their psychological impact on students, as well as to stimulate health policies focused on care and awareness for this community.

REFERENCES

1. Jain V, Munro MG, Critchley H. Contemporary evaluation of women and girls with abnormal uterine bleeding: FIGO Systems 1 and 2. Int J Gynaecol Obstet. 2023 Aug 1;162(S2):29-42.doi:10.1002/ijgo.14946

2. Munro MG, Critchley HOD, Broder MS, Fraser IS. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nongravid women of reproductive age. Int J Gynecol Obstet [Internet]. 2011 [cited 2025 Jan 30] Feb 22;113(1):3-13. doi: Available from: https://www.figo.org/sites/default/files/uploads/IJGO/papers/AUB%20Classification.pdf doi: 10.1016/j.ijgo.2010.11.011

3. McKenna KA, Fogleman CD. Dysmenorrhea. American Family Physician [Internet]. 2021 [cited 2025 Jan 30];104(2):164-70. Available from: https://pubmed.ncbi.nlm.nih.gov/34383437/

4. Gür M. Assessment of Student Quality of Life in Relation to University Campus. Sustainability [Internet]. 2024 [cited 2025 Jan 30];16(20):8906. Available from: https://www.mdpi.com/2071-1050/16/20/8906 doi: https://doi.org/10.3390/su16208906

5. Odongo E, Byamugisha J, Ajeani J, Mukisa J. Prevalence and effects of menstrual disorders on quality of life of female undergraduate students in Makerere University College of health sciences, a cross sectional survey. BMC Women's Health. 2023 Mar 30;23(1). doi:10.1186/s12905-023-02290-7

6. Alhammadi MH, Albogmi AM, Alzahrani MK, Shalabi BH, Fatta FA, AlBasri SF. Menstrual cycle irregularity during examination among female medical students at King Abdulaziz University, Jeddah, Saudi Arabia. BMC Women's Health. 2022 Sep 6;22(1). doi: 10.1186/s12905-022-01952-2

7. Instituto Brasileiro de Geografia e Estatística - IBGE. Projeções da População [Internet]. 2024. [cited 2025 Jan 30]. Available from: https://www.ibge.gov.br/estatisticas/sociais/populacao/9109-projecao-da--populacao.html?edicao=41053

8. Matteson KA, Scott DM, Raker CA, Clark MA. The menstrual bleeding questionnaire: development and validation of a comprehensive patient-reported outcome instrument for heavy menstrual bleeding. BJOG. 2015 Jan;122(5):681-9. doi: 10.1111/1471-0528.13273

9. Pravatta G. Tradução, adaptação cultural e validação de um instrumento de avaliação de sangramento uterino para a língua portuguesa: "e;Menstrual Bleeding Questionnaire"e; (MBQ) [Internet]. [dissertação].

Campinas: [s.n.]; 2022 [cited 2025 Jan 20]. Available from: https://www.repositorio.unicamp.br/acervo/detalhe/1344266

10. Zahan UN, Naher S, Mina N. Abnormal Uterine Bleeding in Women<40 Years and Its Risk Factors. Sch J Appl Med Sci. 2023 Jul;11(7):1182-7. doi: 10.36347/sjams.2023.v11i07.002

11. Valente RR. The vicious circle: effects of race and class on university entrance in Brazil. Race Ethn Educ. 2016 Mar 21;20(6):851-64. doi:10.1080/13613324.2016.1150824

12. Veras RM, Fernandez CC, Feitosa CCM, Fernandes S. Perfil Socioeconômico e Expectativa de Carreira dos Estudantes de Medicina da Universidade Federal da Bahia. Rev Bras Educ Med. 2020;44(2):e056. doi: https://doi.org/10.1590/1981-5271v44.2-20190208

13. Bof de Andrade F, Thumé E, Facchini LA, Torres JL, Nunes BP. Education and income-related inequalities in multimorbidity among older Brazilian adults. PLOS One. 2022 Oct;17(10):e0275985. doi: https://doi.org/10.1371/journal.pone.0275985

14. Piantavinha BB, Machado SCM. Conhecimento sobre métodos contraceptivos de adolescentes atendidas em Ambulatório de Ginecologia. FEMINA [Internet]. 2022 [cited 2025 Jan 20];50(3):171-7. Available from: https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1367570

15. Yu L, Janga B, McAlister R, Jeffe DB, Sonn T. Disparities in Treatment Decisions for Abnormal Uterine Bleeding. J Women's Health. 2021 Feb;30(10):1519-25. doi: 10.1089/jwh.2020.8800

16. Caldwell KL. Health equity in Brazil: Intersections of gender, race, and policy. Estados Unidos: University of Illinois Press; 2017. doi:10.5406/illinois/9780252040986.001.0001

17. Critchley HOD, Maybin JA, Armstrong GM, Williams ARW. Physiology of the Endometrium and Regulation of Menstruation. Physiol Rev [Internet]. 2020 [cited 2025 Jan 20] Jul;100(3):1149-79. Available from: https://pubmed.ncbi.nlm.nih.gov/32031903/ doi: 10.1152/physrev.00031.2019

18. Jewson M, Purohit P, Lumsden MA. Progesterone and abnormal uterine bleeding/menstrual disorders. Best Pract Res Clin Obstet Gynaecol. 2020 Nov;69:62-73. doi: 10.1016/j.bpobgyn.2020.05.004

19. Pfeifer G, Stockburger M. The morning after: Prescription-free access to emergency contraceptive pills. J Health Econ [Internet]. 2023 [cited 2023 Aug 31];91:102775. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0167629623000528 doi: https://doi.org/10.1016/j.jhealeco.2023.102775

20. Rachdaoui N, Sarkar DK. Pathophysiology of the Effects of Alcohol Abuse on the Endocrine System. Alcohol Research : Current Reviews [Internet]. 2017 [cited 2025 Jan 20];38(2):255-76. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC5513689/

21. Santos P, Sá L, Couto L, Hespanhol A, Hale R. Health literacy as a key for effective preventive medicine. Cogent Soc Sci. 2017 Jan;3(1):1407522. doi: 10.1080/23311886.2017.1407522

22. Hahad O, Kuntic M, Kuntic I, Daiber A, Münzel T. Tobacco smoking and vascular biology and function: evidence from human studies. Pflügers Arch. 2023 Mar 24;475(7):797-805. doi: 10.1007/s00424-023-02805-z

23. Yeh J, Barbieri R. Effects of Smoking on Steroid Production, Metabolism, and Estrogen-Related Disease. Semin Reprod Med. 1989 Nov;7(4):326-34. doi: 10.1055/s-2007-1021415

24. Ruan X, Mueck AO. Impact of smoking on estrogenic efficacy. Climacteric. 2014 Jul; 18(1):38-46. doi: 10.3109/13697137.2014.929106

25. Jeon S, Carr R. Alcohol effects on hepatic lipid metabolism. J Lipid Res [Internet]. 2020 [cited 2025 Jan 20];61(4):470-9. Available from: https://www.jlr.org/action/showPdf?pii=S0022-2275%2820%2943498-4

26. Asmar A. Psychotropic medications for chronic pain. Curr Psych. 2022 Nov;21(11). doi: 10.12788/cp.0304

27. Bhojan C, Aaradana K, Abirami P, Joseph A, Kuriakose A. Prevalence of Abnormal Uterine Bleeding and Associated Risk Factors in Women -A Prospective Observational Analysis. IJPPR Human [Internet]. 2022 [cited 2025 Jan 20];25(1):305-16. Available from: https://ijppr.humanjournals.com/wp-content/uploads/2022/09/23.Chitra-Bhojan-Aaradana-K-Abirami-P-Anna-Joseph-Anna-Kuriakose.pdf

28. Vygivska LA, Rudenko LA, Pliekhova OO, Igor Yu. Rakytianskyi. Abnormal uterine bleeding and its causes. Literature review. Pol Merkur Lekarski. 2024 Jan;52(4):457-61. doi: 10.36740/Merkur202404112

29. Gulzar J, Salman N, Sohail D, Huma ZE. Thyroid Disorders in Reproductive Females with Abnormal Uterine Bleeding. 2023 Mar;17(3):531-3. doi: https://doi.org/10.53350/pjmhs2023173531

30. Koirala S, Pande K, Shrestha S. Correlation of Abnormal Uterine Bleeding (AUB) with Thyroid Profile and Endometrial Biopsy. Nepal Med Coll J. 2021 Dec 31;23(4):334-9. doi: https://doi.org/10.3126/nmcj.v23i4.42227

31. Xu Y, Xie D. Prediction of Factors Associated with Abnormal Uterine Bleeding by Transvaginal Ultrasound Combined with Bleeding Pattern. Comput Math Methods Med [Internet]. 2022 [cited 2022 Jul 16];2022:5653250. Available from: https://pubmed.ncbi.nlm.nih.gov/35799665/ doi: 10.1155/2022/5653250

32. Kovalenko M, Velji ZA, Cheema J, Datta S. Intermenstrual and post-coital bleeding. Obstet, Gynaecol Reprod Med. 2021 Nov;31(11):310-6. doi: https://doi.org/10.1016/j.ogrm.2015.01.009

33. Vitale SG, Haimovich S, Laganà AS, Alonso L, Di Spiezio Sardo A, Carugno J. Endometrial polyps. An evidence-based diagnosis and management guide. European J Obstet Gynecol Reprod Biol. 2021 May;260:70-7. doi: 10.1016/j.ejogrb.2021.03.017

34. Ahmad A, Kumar M, Bhoi NR, Badruddeen, Akhtar J, Irfan Khan M, et al. Diagnosis and management of uterine fibroids: current trends and future strategies. J Basic Clin Physiol Pharmacol [Internet]. 2023 [cited 2025 Jan 20];34(3):291-310. Available from: https://pubmed.ncbi.nlm.nih.gov/36989026/ doi: 10.1515/jbcpp-2022-0219

Rev. Ciênc. Méd. Biol., Salvador, v. 24, n. 2, p. 487-495, mai./jun. 2025

495