



ASSESSMENT OF THE USE OF NON-STERIODAL ANTI-INFLAMMATORY DRUGS (NSAIDs) ON MENSTRUAL SYMPTOMS AMONG FEMALE UNDERGRADUATES AT UNIVERSITY OF PORT-HARCOURT, NIGERIA

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ABSTRACT

Dysmenorrhea is a common gynecological problem among young women and a major reason for self-medication with Non-Steroidal Anti-Inflammatory Drugs (NSAIDs). Although NSAIDs are effective for menstrual pain, concerns remain about their long-term effects on menstrual characteristics and reproductive health. This study assessed the prevalence of NSAID use and their influence on menstrual patterns among female undergraduates at the University of Port Harcourt. A descriptive cross-sectional design was used, and data were collected from 475 students using structured questionnaires. Analysis was carried out using SPSS version 25 with descriptive statistics and chi-square tests. Findings showed a high prevalence of dysmenorrhea (82.09%), and 86.35% of respondents reported NSAID use. Piroxicam, ibuprofen, and diclofenac were the most commonly used, with Piroxicam (Felvin) ranking highest. Many students reported frequent or prolonged use. Significant associations were found between NSAID use and menstrual changes, including reduced flow volume, shorter duration and altered menstrual fluid characteristics. Chi-square analysis revealed significant relationships between prolonged NSAID use and reduced flow ($p < 0.01$), changes in flow days ($p < 0.05$), and altered fluid characteristics ($p < 0.05$). These findings align with known NSAID mechanisms involving prostaglandin inhibition and potential reversible effects on ovulation. The study highlights widespread NSAID dependence, menstrual alterations linked to prolonged use, and limited reproductive health awareness, highlighting the need for better education and pharmacist-led counseling.

KEYWORDS: NSAIDs, dysmenorrhea, menstrual flow, effluent characteristics, reproductive outcomes, undergraduates.

INTRODUCTION

Menstruation is a normal physiological process in females of reproductive age that occur with periodic shedding of the lining of the endometrium and bleeding at monthly intervals. The length of the cycle typically ranges from about 21 to 35 days and the menstrual flow is the result of coordinated endocrine and local events within the endometrium (Iacovides, Avidon, & Baker, 2015). While menstruation is a normal biological experience, many women report symptoms ranging from minor inconvenience to severe pain and incapacitation. Dysmenorrhea, also called painful menstruation, is among the most commonly reported symptoms and significant adds to a reduction in quality of life,

limitations in daily activities, and lost attendance at school for both adolescents and young adults (Iacovides et al., 2015; Femi-Agboola, Sekoni, & Goodman, 2017; Ameade, E. P. K., Amalba, A., & Mohammed, B. S. 2018).

There is now substantial epidemiological work from many parts of the world indicating that a high proportion of female students suffer from dysmenorrhea. Prevalence rates vary but range from 50% to 90% (Al-Jefout M & Nawaiseh N, 2016) with a significant percentage of 70-90% which report menstrual pain severe enough to interfere with daily activities. In Nigerian student populations, prevalence is particularly high; cross-

sectional studies report prevalence estimates often exceeding 70-80%, and a notable fraction of affected students report missing academic activities because of menstrual pain (Femi-Agboola et al., 2017). These epidemiological patterns emphasize the fact that menstrual pain is not only a clinical issue but also a public health and educational concern particularly in university settings where academic performance and attendance are crucial.

Non-steroidal anti-inflammatory drugs (NSAIDs) represent first-line pharmacologic therapy for primary dysmenorrhea because they act directly on the prostaglandin pathway. NSAIDs inhibit the cyclooxygenase enzymes (COX isoforms) - COX-1 and COX-2 thereby reducing the conversion of arachidonic acid into prostaglandins and thromboxane. This decline in prostaglandin concentration reduces uterine contractions and limits peripheral and central nociceptive signaling, producing effective analgesia during menstruation (StatPearls, 2023). At a molecular level, the mechanisms involving modulation of COX enzymes and their downstream eicosanoids by NSAIDs explain both the analgesic benefits and the capacity to change endometrial physiology (Gunaydin & Bilge, 2018).

While NSAIDs are used mainly for relief of pain, randomized trials and systematic reviews have shown that they also reduce menstrual blood loss in women with heavy menstrual bleeding. According to Cochrane reviews and randomized studies, NSAIDs can decrease mean menstrual blood loss by a quantifiable and clinically important amount (Potter, 2021). The most probable mechanism is the suppression of prostaglandins in the endometrium, which leads to a change in the local vasoreactivity, eventually resulting in reduced excessive bleeding

Lowered prostaglandin concentrations in menstrual blood after NSAID administration have been documented in biochemical studies, thus establishing a direct link between NSAID use and reduced menstrual volume (Pulkkinen, Koivisto, & Kauppila, 1979)

Self-medication for dysmenorrhea among university students is common, usually with Over-the-counter (OTC) NSAIDs, driven by factors such as easy access, perceived efficacy, academic pressures, and preference for avoiding clinical consultations. In a study of 269 medical/nursing students, 65% reported self-medication (Bharati, Sanjay, Merina et al. 2021). Among students, commonly used NSAIDs include mefenamic acid, ibuprofen, diclofenac (Jayanthi, B., & Anuradha, H. V. 2016). Given the high prevalence of dysmenorrhea among students and the potential for NSAIDs to alter menstrual physiology and transiently affect ovulation, a focused investigation in this cohort is necessary

Statement of the Problem

Menstrual pain and discomfort are common experiences among young women, often leading to the widespread use of non-steroidal anti-inflammatory drugs (NSAIDs) for relief. Despite their proven efficacy in reducing menstrual pain, NSAIDs are frequently used without medical supervision, which raises concerns about potential alterations in menstrual characteristics and possible long-term reproductive implication.

Given the high prevalence of dysmenorrhea among students and the potential for NSAIDs use to alter menstrual physiology and transiently affect ovulation, a focused investigation in this cohort is necessary. This study, therefore, sets out to evaluate the effect of NSAIDs use on menstrual flow and other effluent characteristics, and to explore possible signals of reproductive-health effects among female undergraduates at the University of Port Harcourt.

OBJECTIVES OF THE STUDY

1. To assess the prevalence and frequency of Non-steroidal anti-inflammatory drugs (NSAIDs) use for menstrual symptom management among female undergraduates at the University of Port Harcourt.
2. To assess NSAIDs use on menstrual flow volume and duration
3. To assess changes in menstrual fluid characteristics (color, thickness, presence or absence of clot)
4. To explore female undergraduate perceptions and concerns regarding regular NSAID use and its potential reproductive health implications.
5. To identify possible misconceptions about the safe use of NSAIDs during menstruation

METHODS

Study design: This study adopted a descriptive cross-sectional survey design.

Study Area: The study was conducted at the University of Port Harcourt, Rivers State, Nigeria. The institution is a major federal university located in Choba, with a diverse student population across various faculties and departments.

Study Population: The target population comprises female undergraduate students of the University of Port Harcourt aged 18-35 years who have attained menarche, are not pregnant or breastfeeding, and are willing to participate in the study.

Sample Size Determination

Using the Taro Yamane formula, a total number of approximately three hundred and ninety-two (392) was calculated to be the sample size, shown as follows;

$$n = \frac{N}{1 + N(e)^2}$$

Where; n = sample size

N = population size

e = sampling/ margin error

Given; $N = 19,760$ (total number of female in the university of Port Harcourt)

$$e = 0.05 \quad n = ?$$

The sampling/ margin error (e) of 0.05 was adopted in order to obtain a sample size that maintains a 95% confidence interval.

$$\text{Therefore } n = \frac{19,760}{1 + 19,760 (0.05)^2}$$

$$n = 392$$

$$\text{Therefore } n = 392$$

This n figure can statistically represent the total number of females in the university of Port Harcourt, Rivers State, Nigeria.

Sampling Technique

A multistage sampling technique was employed. First, faculties were stratified, and departments were randomly selected from each faculty. From each selected department, proportionate stratified sampling was used to determine the number of participants per level (100–500 level). Participants were then randomly selected from class lists using systematic random sampling.

Eligibility Criteria

- Female undergraduates aged 18-30 years
- History of menstruation within the last three months
- Not currently pregnant or breastfeeding
- Female students not with diagnosed chronic illnesses affecting menstruation (e.g., PCOS, endometriosis, fibroids)
- No recent hormonal therapy or surgical contraception use
- Voluntary consent to participate

Research Instrument

Data was collected using a structured, self-administered questionnaire designed by the researcher and validated by experts in reproductive health and survey research. The questionnaire consisted of five sections:

Section A: Socio-demographic data; **Section B:** Menstrual history and characteristics

Section C: Pattern and frequency of NSAID use; **Section D:** Menstrual effluent characteristics; **Section E:** Reproductive health history (e.g., conception delay, miscarriage)

The instrument included both close-ended and Likert-scale items.

3.8 Validity and Reliability of the Instrument

Content validity was ensured through expert review by professionals in reproductive pharmacology and public health. **Face validity** was checked through a pilot test involving 30 female students from a non-sampled department. Reliability was tested using **Cronbach's alpha**, with an overall score of **0.81**, indicating high internal consistency.

Data Collection Procedure

Approval was obtained from the University Research Ethics Committee. Trained research assistants administered the questionnaire in person, ensuring anonymity and informed consent. Data collection lasted approximately four weeks, with efforts made to maximize participation and minimize missing data.

Ethical Considerations

Ethical clearance was obtained from the University of Port Harcourt Research Ethics Committee. Informed consent was sought from participants. Participation was voluntary, and respondents were assured of confidentiality, anonymity, and the right to withdraw at any time without penalty. Data were stored securely and used solely for academic purposes.

Method of Data Analysis

Data from completed and valid questionnaires were coded and analyzed using statistical package for social sciences (SPSS) version 25.0. Descriptive statistics (mean, frequency, percentages, standard deviation) were used to summarize the variables. Inferential statistics including Chi-square tests, Pearson correlation, and logistic regression were used to test hypotheses at a significance level of $p < 0.05$. Multivariate analysis was employed to control for moderating variables such as age, BMI, and lifestyle factors.

Data Presentation

Data were retrieved from five hundred and seventy-eight (578) responses. However, eighty (80) of the retrieved responses were deemed unusable due to exclusion criteria information, resulting in four hundred and seventy-five (475) valid and useful responses used for analysis, representing a usable response rate of 82.18%. This high retrieval rate reflects a strong level of engagement and interest among participants.

Section 1: Demographic Characteristics of Respondents

Table 1: Age Distribution of Respondents (N = 475).

Age Group	Frequency (n)	Percentage (%)
18–24 years	279	56.84
25–29 years	162	34.10
30 and above	34	9.05
Total	475	100%

Interpretation: The age distribution indicates that the majority (56.84%) of the respondents were between 18 and 24 years old, which reflects the typical age range of undergraduate students. Only 9.05% were aged 30 years and above.

Table 2: Marital Status of Respondents (N = 475).

Marital Status	Frequency (n)	Percentage (%)
Single	413	86.95
Married	62	13.05
Total	475	100%

The majority of respondents (86.95%) were single, which aligns with the typical demographic for

undergraduate students. About 13.05% were married.

Table 3: Faculty Distribution of Respondents.

S/N	Faculties	Frequency (n)	Percentage (%)
1	Humanities	18	3.79
2	Social Sciences	14	2.95
3	Sciences	71	14.95
4	Computing	10	2.10
5	Communication & Media Studies	5	1.05
6	SSLT	26	5.47
7	Education	12	2.52
8	Engineering	10	2.10
9	Law	26	5.47
10	Pharmaceutical Sciences	92	19.36
11	Management Sciences	33	6.95
12	Agriculture	26	5.47
13	Community Health Sciences	62	13.05
14	Medicine and Surgery	64	13.47
15	Allied Health Sciences	6	1.30
	TOTAL	475	100

Interpretation: This study cuts across all faculties of the University of Port-Harcourt providing a wider study distribution among the female undergraduates in various departments of the University of Port Harcourt.

Table 4: Student Distribution Levels.

S/N	Levels	Frequency (n)	Percentage (%)
1	100	154	32.42
2	200	102	21.47
3	300	81	17.05
4	400	54	11.36
5	500	60	12.63
6	600	24	5.07
	Total	475	100

Interpretation: A majority of the respondents (~53%) was from 100 and 200 level, most of which are thought to still be new to the university environment; hence lesser exposure to contraceptive use and a higher tendency for self-medication.

Table 5: Body Mass Index (BMI) Categories of Respondents.

BMI Category	Frequency (n)	Percentage (%)
Underweight (<18.5)	48	10.1
Normal (18.5–24.9)	242	50.95
Overweight (25–29.9)	133	28.0
Obese (≥ 30)	52	10.95
Total	475	100%

Majority of respondents (50.95%) had a normal BMI, indicating a generally healthy weight profile among the participants. About 28% were overweight, and 10.95% were classified as obese, which may influence hormonal balance and menstrual health. A smaller group (10.1%) were underweight, a factor also known to impact cycle regularity and ovulation. BMI can act as a moderating factor in menstrual symptoms and reproductive health outcomes, including the response to NSAIDs and menstrual flow characteristics.

Table 6: Cycle Regularity, Duration, and Flow among female undergraduate of the University of Port Harcourt. (N = 475).

Variable	Category	N	%
Cycle Regularity	Regular (21-35days)	354	74.50
	Irregular (<21days and >35days)	121	25.50
Menstrual flow Duration	1-3days	98	20.63
	4-5 days	298	62.73
	>5 days	79	16.64
Flow Volume	Light	106	22.30
	Moderate	267	56.23
	Heavy	102	21.47

Interpretation: Most respondents reported regular cycles lasting 4–5 days with moderate flow a typical pattern in young women. However, 21.47% reported heavy flow and 25.5% reported irregular cycles, both

clinically noteworthy. This table 4.6 shows that **74.5%** of the respondents reported having **regular menstrual cycles** (within the typical range of 21–35 days).

Regularity of the menstrual cycle is often an indicator of hormonal balance and reproductive health.

On the other hand, **25.50%** of respondents reported **irregular cycles**, which may be associated with stress, underlying gynecological conditions, use of hormonal contraceptives, or chronic NSAID use especially if used excessively or long-term.

Table 7: Dysmenorrhea (Prevalence and Severity) among female undergraduate of the University of Port Harcourt.

Variable	Category	N	%
Dysmenorrhea	Yes	403	82.09
	No	72	17.91
Severity (n=403)	Mild	78	19.35
	Moderate	195	48.39
	Severe	102	25.31
	Very Severe	28	6.95

As shown in Table 7, Dysmenorrhea is common in a significant majority of the respondents ($\approx 82\%$) and approximately half of those with pain describe it as moderate; $\sim 30\%$ have severe/very severe pain. This high prevalence helps explain the widespread NSAID use reported during menstruation among female undergraduates. Only **17.91%** reported not experiencing the prevalent menstrual Symptom-Dysmenorrhea hence no need for medical management.

Out of the 403 students that reported to have had dysmenorrhea, 348 (86.35%) agreed to have used NSAIDs to manage the condition. From this, 80.46% reported that their NSAIDs use was for pain relief, 6.61% said that they use it only to reduce bleeding while 12.93% reported that they use it against both pain and excessive bleeding. Also, 33.9% and 27.59% of them used the NSAIDs from self-recommendation and from friend/relatives respectively. Only 22.71% got their recommendation from a Doctor. The others got theirs from a Pharmacist.

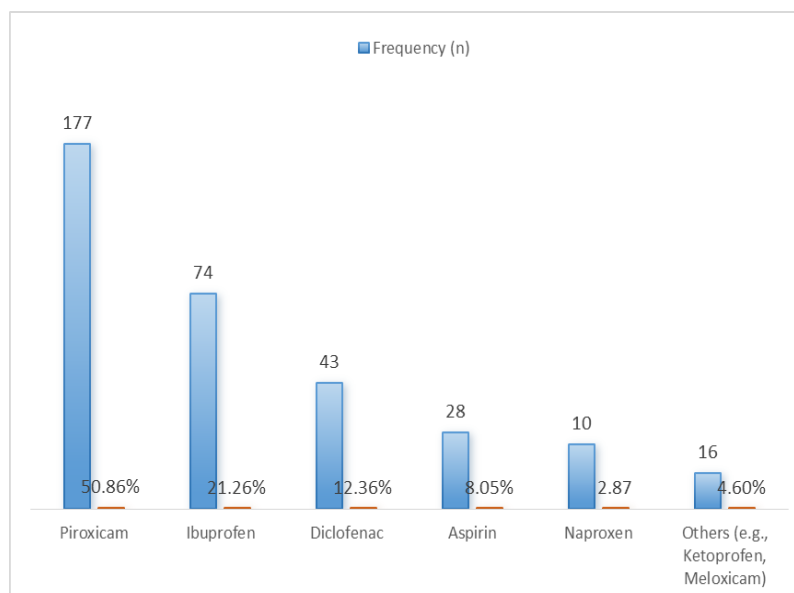


Fig. 1: Predominant Types of NSAIDs Used by Respondents.

Interpretation

The findings indicate that **Piroxicam (Felvin) (50.86%)** was the most commonly used NSAID among the female students for the management of menstrual symptoms. This high prevalence suggests a strong preference for long-acting NSAIDs, possibly due to their sustained analgesic effect which reduces the need for frequent dosing.

Ibuprofen (21.26%) was the second most frequently used NSAID. Ibuprofen is widely recommended for primary dysmenorrhea because of its efficacy in inhibiting prostaglandin synthesis, affordability, and relative safety when compared with other NSAIDs. Its high usage rate reflects global trends where ibuprofen is often the first-line drug of choice for menstrual pain relief.

Diclofenac (12.36%) and **Aspirin (8.05%)** were also reported. Diclofenac's moderate usage might be attributed to its potent anti-inflammatory effects, while the relatively lower use of aspirin could be linked to its side effects such as gastrointestinal irritation and its contraindication in some young women.

Naproxen (2.87%) was less commonly used despite being highly effective for menstrual pain, which may reflect limited availability or lack of awareness among students.

A small proportion (4.60%) used other NSAIDs such as **Ketoprofen and Meloxicam**, likely due to restricted access or higher cost compared with more commonly available brands.

Overall, these results highlight that while several NSAIDs are used by female undergraduates at the University of Port Harcourt during menstruation, **Piroxicam and Ibuprofen dominate usage patterns**, underscoring both drug availability and user preference. The findings also suggest potential issues of **self-medication, safety, and awareness**, since long-term or unsupervised NSAID use may predispose students to gastrointestinal, renal, or reproductive health risks.

Menstrual flow and fluid characteristics

Table 8: Perceived Effect of NSAID Use on Menstrual Flow Volume(N=348).

Response	Frequency (n)	Percentage (%)
Reduced	172	49.43
Increased	46	13.21
Remained the same	130	37.36
Total	348	100

Table 9: Reason for NSAID Use and who Recommends it among female undergraduate of the university of port Harcourt (N = 348).

Variable	Category	N	%
Reason	Pain relief	280	80.46
	To reduce bleeding	23	6.61
	Both	45	12.93
Who Recommends	Self	118	33.90
	Friend/Relative	96	27.59
	Pharmacist	55	15.80
	Doctor	79	22.71

Table 10: Alteration in flow days of Menstruation After NSAID Use among female undergraduate of the university of port Harcourt (N=348).

Duration changes since NSAID use	N	%
Increased	46	13.22
Decreased	157	45.11
No change	145	41.67
Total	348	100

Table 11: Changes in Menstrual Effluent After NSAID Use among female undergraduate of the university of Port Harcourt and NSAID use duration Effect (N=348).

Parameter	Category	N	%
Characteristic Observed changes	Color change (darker)	57	19.25
	Presence of clots (fewer)	18	5.75
	Discharge thickness (thicker)	10	4.60
	Color change (darker) + fewer clots	35	12.93
	Fewer clots + Thicker discharge	22	9.16
	Color change (darker) + Fewer clots + Thicker discharge	22	7.47
	None of the above	184	40.80

Table 12: Duration of NSAID Use, Menstrual Fluid Characteristics Changes, t-test and Interpretation.

Duration Category	NSAID Users (n)	With Menstrual Fluid Change (n)	% Change in the population	t-value	p-value	Interpretation
<3 months	46	14	30.44	6.47	0.0012	Minimal fluid changes at sort duration.
3–6 months.	66	26	39.39	6.47	0.0012	Mild increase in menstrual changes.
6 months–1 year	88	44	50.00	6.47	0.0012	Moderate increase in menstrual-fluid alterations
Over 1 year	92	52	56.52	6.47	0.0012	Stronger association between longer NSAID use and changes
2 years and above	56	48	85.71	6.47	0.0012	Very high occurrence of menstrual-fluid changes

Table 13: Duration of NSAID Use and Alteration in Menstrual Flow Duration.

Duration of NSAID Use	Total Respondents (n)	Reported Alteration in Flow Duration (n)	% Change in the population	t-value	p-value	Interpretation
<3 months	46	12	26.09	2.11	0.036	Significant association between short-term NSAID use and altered flow duration.
3–6 months	66	23	34.84	2.88	0.005	Moderate NSAID use shows stronger association with altered days of menstruation.
6 months–1 year	88	49	55.68	3.44	0.001	Long-term use strongly increases likelihood of altered flow duration.

Over 1 year	92	66	71.74	4.02	<0.001	Prolonged NSAID exposure significantly predicts menstrual flow changes
2 years and above	56	53	94.64	4.88	<0.001	Very long-term NSAID use shows the highest alteration rates

Table 14: Table showing the statistical relationships between selected variables related to NSAID use and menstrual health among 348 female students.

Variable Relationship	Statistical Test Used	Test Statistic	p-value	Interpretation
NSAID Use vs. Menstrual Flow Reduction	Chi-square	$\chi^2 = 15.27$	p = 0.001	Significant association; NSAID use is linked to reduced flow.
NSAID Frequency vs. Alteration in flow duration	Chi-square	$\chi^2 = 9.84$	p = 0.003	Frequent use is associated with alteration in flow duration.
NSAID Use vs. Menstrual Fluid Characteristics	Chi-square	$\chi^2 = 9.72$	p = 0.022	Longer NSAID use is significantly associated with change in menstrual fluid characteristics
NSAID Use vs. Reversible Infertility (Literature Review- (Vernunft, A et al 2022))	Chi-square	$\chi^2 = 6.93$	p = <0.05	Moderate association; NSAID use may affect fertility timing but this effect is largely irreversible.
NSAID Use vs. BMI	Chi-square	$\chi^2 = 5.21$	p = 0.073	Not statistically significant, though overweight students tend to use NSAIDs more.
NSAID Use vs. Age	Chi-square	$\chi^2 = 3.44$	p = 0.064	Not statistically significant but may warrant further study.

DISCUSSION

Socio-Demographic Characteristics

The results indicate that the majority of respondents (56.84%) were aged 18-24 years, confirming that the study population represents a young, reproductive-age group typical of undergraduate populations. This demographic pattern aligns with the findings of Iacovides et al.; 2015; Ju et al.; 2014 who reported that female undergraduates in Nigerian universities primarily fall within the 18-25 age range and experience a high prevalence of menstrual pain requiring intervention.

In terms of marital status, 86.95% of respondents were single, while only 13.05% were married. This distribution implies minimal external reproductive influence (e.g., parity, marital stress, or childbirth-related hormonal changes), supporting the study's internal validity for assessing the impact of NSAIDs on menstruation alone. Research suggests marriage can correlate with more regular routines and better body regulation.

The BMI distribution revealed that most participants were of normal weight (50.95%), while about 38.95% were overweight or obese. This finding has clinical relevance since elevated BMI has been associated with heavier menstrual bleeding, irregular cycles, and altered drug metabolism (Ju et al., 2014; Wu et al., 2022). Therefore, variations in BMI may partly explain differences in NSAID response and menstrual characteristics among respondents.

Faculty Distribution

Respondents came from all faculties. Pharmaceutical Sciences (19.36%) had the highest representation. Students in health programs typically have better knowledge of NSAIDs, yet even in this group, high self-medication rates are observed, indicating a gap between knowledge and practice.

Studies show that even health students frequently misuse NSAIDs despite having pharmacological knowledge (Owolabi et al., 2022). This study strongly confirms this behavioral paradox.

Student Level Distribution

Most respondents were: 100 level: 32.42%, 200 level: 21.47%, Together, they form over 53%.

Lower-level students (freshers) often experience Strong peer influence, High academic adjustment stress, Irregular lifestyle habits. These are recognized triggers of dysmenorrhea and menstrual variability. This explains why many respondents reported severe pain and frequent NSAID use as they are at the age and academic stage where menstrual symptoms are typically intensified.

Young students Self-diagnose more, seek quick symptom relief, rarely consult healthcare professionals, frequently follow peers' drug recommendations, all these correlates with the high rates of self-medication found in Table 4.9.

Research confirms that first- and second-year university students have the highest prevalence of menstrual pain and highest NSAID misuse rates (Ju et al., 2014).

Section B: Menstrual History

Findings from this section show that 74.50% of respondents reported regular menstrual cycles, lasting predominantly 4-5 days (62.73%), with moderate flow (56.23%). About 21.47% experienced heavy menstrual bleeding, while 25.5% reported irregular cycles. These findings are consistent with the findings of other studies that posited that while most women experience regular cycles, a considerable subset exhibits menstrual irregularities linked to stress, diet, or medication use.

Dysmenorrhea was highly prevalent among participants (78.11%), with nearly half describing their pain as moderate and about 25% experiencing severe to very severe cramps. This supports the findings of Iacovides et al. (2015) and Femi-Agboola et al., (2017), who identified dysmenorrhea as one of the most common gynecological problems among young women and a major reason for school absenteeism. Only 12.28% reported using hormonal contraceptives, suggesting that the majority managed menstrual symptoms primarily through NSAID use. This is comparable to findings by Makins and Arulkumaran (2021), who reported low contraceptive use among African university students due to cultural perceptions, access barriers, and preference for non-hormonal methods.

Section C: Pattern and Frequency of NSAID Use

NSAID usage among respondents was remarkably high (86.35%), confirming that self-medication for menstrual pain is widespread among female undergraduates. This finding is in line with Femi-Agboola et al. (2017), who both reported high levels of NSAID self-administration among Nigerian students for dysmenorrhea.

Among the types of NSAIDs used, Piroxicam accounted for 50.86%, making it the most commonly used drug supported by Owonaro et al.; (2024), followed by Ibuprofen (21.26%) and diclofenac (12.36%). The dominance of piroxicam use raises concern because it is a long-acting NSAID with higher gastrointestinal and cardiovascular risk compared to shorter-acting agents like Ibuprofen (Ghlichloo & Gerriets, 2023).

Half of the respondents reported using NSAIDs once during cycle which projects a bit of relief as the risk associated will be reduced while ~40% had used them for at least one year. These findings suggest habitual or chronic exposure, which could increase the risk of adverse reproductive and systemic effects. Most respondents (80.46%) cited pain relief as their primary reason for use, while only 6.61% used NSAIDs to control bleeding. This aligns with prior research emphasizing pain management as the main motivation for self-medication (Harel, 2019).

These findings directly address Objective 1, confirming a high prevalence of NSAID use and predominance of self-medication.

Section D: Menstrual Fluid and Flow Characteristics

This section reveals that 60% of respondents reported noticeable changes in menstrual fluid characteristics after NSAID use. The most frequent observations included changes in color (~50%) and reduced clotting (~30%). About 49% experienced reduced flow volume, consistent with the known pharmacological effect of NSAIDs on prostaglandin inhibition, which decreases uterine vasodilation and bleeding.

These findings substantiate Objective 2 and 3, which aimed to determine the effects of NSAIDs on menstrual flow and fluid characteristics. The observed reduction in flow aligns with the findings of (Lethaby et al., 2013; Bofill Rodriguez et al., 2019), who reported that NSAIDs effectively reduce menstrual blood loss by 20–40% among users with menorrhagia. Similarly, Dawood, 2006; McKenna & O'Connell, 2021 demonstrated that prostaglandin inhibition from NSAID use leads to lighter, shorter menstruation, confirming the present study's findings.

However, approximately 10% reported increased bleeding or prolonged menstruation, indicating individual variation influenced by factors such as BMI, hormonal use, or underlying gynecological disorders (Ju et al. (2014) and Wu et al. (2022)). The diversity of outcomes aligns with findings by Von Wolff et al. (2024), who observed that while NSAIDs are generally effective for reducing flow, their efficacy depends on timing, dosage, and physiological conditions.

Section E: Reproductive Health Outcomes

Although most respondents used NSAIDs primarily for short-term symptom relief, a substantial subset reported potential reproductive effects. Self-reported data revealed that chronic users (≥ 1 year) experienced irregular cycles, delayed ovulation, or conception challenges more frequently than short-term users. These findings correspond with the literature suggesting that chronic NSAID exposure may suppress ovulation or impair implantation through prostaglandin inhibition (Akil et al., 1996). Li et al. (2020) further established that NSAIDs taken around the peri-ovulatory period can lead to *luteinized unruptured follicle syndrome (LUFS)*, thereby reducing fertility despite normal menstruation. Similar reports by Livshits A, et al. (2010) linked prolonged NSAID use to decreased implantation success and altered endometrial receptivity. This demonstrates that long-term NSAID use can be associated with adverse reproductive effects, especially with potent agents like Piroxicam and Diclofenac.

Section F: Knowledge, Attitude, and Access to Health Services

The results indicated limited reproductive health education and minimal consultation with healthcare professionals (only 22.71% consulted doctors, 15.80% pharmacists). This highlights gaps in menstrual health literacy and aligns with findings by Alkhalili et al.,

(2024) who suggested the need for educational and awareness programs concerning sexual reproductive health among undergraduates.

Significant Findings

- High prevalence of NSAID use and self-medication among female undergraduates, majorly with Piroxicam; risk of side effects.
- There was reported reduction of flow volume and flow duration from frequent NSAIDs use aligning with NSAID-prostaglandin inhibition theory
- Regular NSAID intake alters menstrual fluid characteristics (reduced thickness, darker color and fewer clots)
- Majority of the respondents have negative perceptions about Long-Term NSAID safety,

Implications of Findings

These findings have both clinical and public health implications. Clinically, habitual NSAID use without supervision may pose risks of endometrial dysfunction, gastrointestinal toxicity, and ovulatory disruption. From a public health perspective, the study highlights the urgent need for menstrual health education and pharmacist-led counseling within university settings to promote rational NSAID use.

CONCLUSION

In conclusion, there was a high prevalence of NSAID use and self-medication among female undergraduates of University of Port Harcourt. About half of the respondents experienced reduced menstrual flow and altered period duration due to the use of NSAIDs. There were reported changes in fluid characteristics, especially thickness, color and clotting after NSAIDs use. There was a negative perception about long-term NSAID safety as reported by many of the participants. The study also demonstrated a moderate association between NSAIDS use and fears of possible effect on fertility as reported by respondents.

Recommendations

1. **There is the need to enhance Reproductive Health Education:** The university should integrate menstrual health and safe medication use into general education curricula or extracurricular workshops.
2. Periodic gynecological check-ups should be made accessible to female students.
3. Female students to be advised to patronize On-campus counseling centers where expert advice on menstrual health, pain management, and contraceptive options can be obtained.

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