Menstrual Cycle Patterns among Adult Females Attending a Neuropsychiatric Facility in Kaduna, Northwestern Nigeria

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Abstract

INTRODUCTION

Menstruation is a very important aspect of any woman's life. Changing levels of reproductive hormones during the menstrual cycle can impact the incidence and pattern of neuropsychiatric illnesses. However, little is known about the impact of neuropsychiatric illness on the menstrual cycle. Abnormal patterns of menstruation may cause difficulties in this set of patients, from issues related to hygiene, to missed comorbidities. This study aimed to study menstrual patterns and characteristics among patients with neuropsychiatric illness.

METHODOLOGY

A cross-sectional study was conducted between November 1st 2022 to January 31st 2023. Participants were adult female patients diagnosed with neuropsychiatric illness. Data were collected using the Mini International Neuropsychiatric Interview, and a questionnaire with information on general socio-demographic characteristics, menstrual characteristics and possible confounding variables which may affect cycle regularity. Data were analysed using SPSS version 22, presented in frequency tables for descriptive purposes, and the relationship between categorical variables was analysed using chi-square or Likelihood ratio. A p-value of <0.05 was considered statistically significant.

RESULTS

All 285 participants were aged 18 – 40 years. Majority were Hausa (179, 62.8%), Muslims (192, 67.4%), married (149, 52.3%), had secondary/post-secondary education (200, 70.2%) and unemployed (174, 61.1%). Most participants were parous (175, 61.4%), attained menarche normally between the ages of 10 and 16 (215, 75.4%). Eighty -one participants (28.4%) had normal cycle lengths, duration of menstrual flow was abnormal in majority (193, 67.7%), most had normal volume of menstrual flow (188, 66.0%), and dysmenorrhea (212, 74.4%) which was mostly mild. The commonest diagnosis was schizophrenia (131,46%), depressive disorders (55, 19.3%) and seizure disorders (40, 14.0%). Most participants' duration of illness was 1 -5 years (132, 46.3%), and stable (129, 45.3%). There was no significant association between diagnosis and cycle length, duration of menstrual flow and menstrual pain (p-value >0.05). Volume of menstrual flow was associated with diagnosis (p-value <0.05).

CONCLUSION

The duration of menstrual flow was abnormal in majority of participants. Those with seizure disorders appeared to have more abnormal volumes of menstrual flow, as compared to depressive disorders or schizophrenia. Carers should routinely screen for menstrual abnormalities.

Keywords: *Menstrual Cycle, Patterns, Characteristics, Neuropsychiatric Patients, Kaduna.*

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Introduction

Menstruation is a very important aspect of any woman's life as it affects her reproductive, physical, mental and social health in many complex ways. Normal menstrual characteristics may differ from one woman to another. In the same woman, however, changes are only minor within the reproductive age group. Apart from age, the pattern of menstrual characteristics may be affected by several factors like lifestyle choices, pathology or other factors.

Changing menstrual characteristics and patterns have been associated with neuropsychiatric disorders in several ways: affective, behavioral and biologic mechanisms [1,2,3,4,5,6]. Fluctuating levels of reproductive hormones may alter predisposition to neuropsychiatric illnesses. Estrogen mimics antidopaminergic action and reinforces memory by activating the hippocampus, while Progesterone has both anxiolytic effects (increased GABA potentiation) and may increase response to stress via the cortisol pathway [6].

Absent or abnormal patterns of menstruation may produce difficulties in everyday activities such as maintaining menstrual hygiene, effective use of contraception, pseudocyesis or denial of pregnancy, erroneous perception of early menopause, or loss of the feeling of femininity[7]. Coping with abnormal menstruation may be even more difficult in women with neuropsychiatric disorders.

Nothing stops women with neuropsychiatric disorders from having gynecologic co-morbidities (such as polyps, adenomyosis, leimyomas, gynaecologic malignancies) which may affect menstrual cycle characteristics. The prevalence of psychiatric disorders was found to be as high as 30 to 54% in a gynaecology clinic in Nigeria and Sweden [8,9,10,] though reasons were not explored. Patients with psychiatric disorders can present with physical symptoms [11], and vice versa. Gynaecologic conditions or surgery may also further heighten patient anxiety levels [12].

Various medical and neuropsychiatric health conditions may be exacerbated depending on the phase of the menstrual cycle. The premenstrual dysphoric disorder is a mood disorder specific to the luteal phase of the menstrual cycle. Medical disorders (like migraines, catamenial epilepsy effects, asthma, cardiovascular disease, diabetes mellitus, and breast cancer) and mental disorders (anxiety, bipolar, psychotic, and eating disorders) are associated with menstruation [1,2,3,4,5,6]. The risk of depression is thought to be higher in women with heavier menstrual flow and cycle irregularity during the first 5 years of menstruation [3]. Several studies also indicate that women with bipolar disorder are more likely to report menstrual irregularities than those with unipolar disorder, or women in the general population [13]. A higher incidence of abnormal menstruation may also occur with PTSD (Post Traumatic Stress Disorder), somatisation disorder, obsessive-compulsive disorder, phobic anxiety, and diet and sleep disorders [14].

Menstrual irregularity may also be due to the adverse effects of some antipsychotic medications, inducing hyperprolactinaemia. Some studies found varying point prevalence rates of between 26% - 78% for menstrual irregularities in women with severe psychiatric illnesses receiving conventional antipsychotic agents**,** [15], though these studies were limited by their small sample sizes and cross-sectional designs. Evidence is strengthened by case reports of amenorrhoeic women with schizophrenia who resumed menstruation after the antipsychotic medication was discontinued or switched to a prolactin-sparing agent [16]. Illness severity in itself may be associated with menstrual and ovarian dysfunction, independent of prolactin levels, suggesting reproductive function might be affected by other mechanisms [15, 17].

Overall, specific biological pathways by which reproductive hormones modulate neuropsychiatric symptoms, or vice versa, are not well elucidated. Several possible mechanisms and theories have been postulated. These include the fluctuating levels of, and sensitivity to estrogen and progesterone, dysregulation of allopregnanolone (the major metabolite of progesterone), altered interaction with several neurotransmitter pathways (serotonergic, gamma aminobutyric acid (GABA)ergic, dopaminergic, and glutamatergic) and Abnormal regulatation of gene and epigenetic mechanisms [18, 19, 20, 21, 22, 23, 24].

The aim of the study was to characterise menstrual cycle patterns among female neuropsychiatric patients. A correct understanding of the association between neuro-psychiatric disorders and menstrual characteristics may support the proper assessment and care of women [4], yet a few studies, especially in this environment, have examined this. Findings from this study may further help in the holistic care of female Neuropsychiatric Patients.

Methodology

Study design and setting

This was a cross-sectional study conducted from November 1st 2022, to January 31st 2023. The study was conducted at the Federal Neuropsychiatric Hospital Barnawa, Kaduna, a tertiary health centre with both in and outpatient facilities. The hospital runs the outpatient clinic 5 days a week, with an average of 500 patients attending weekly, out of which about 50% are female.

Participants and eligibility criteria

The study participants were adult female patients diagnosed with neuropsychiatric illness, seen consecutively at the General Outpatient Clinic and the Neurology clinic. Female patients between the ages of 18 and 40 years who fulfilled the requirements of the Structured Clinical Interview Diagnostic Schedule IV for current and lifetime neuropsychiatric illness were included. Participants also needed to have attained menarche and been on medication for their psychiatric illness for at least six months.

Those excluded were patients who were too ill to give valid responses or refused to give consent. Additionally, patients who were using any form of contraception or had used one in the preceding three months, those who did not know their last menstrual period, or had obvious conditions that could affect menstruation were excluded from the study.

Sample size

The sample size was calculated using the formula for estimating a population proportion (proportion of individuals possessing a given characteristic) with an absolute precision of [25] as shown below:

$$N = Z^2P(1-P)/ d^2$$

Where, N = minimum sample size, d = precision of the study/ degree of accuracy (set at 0.05), p = anticipated proportion of the target population in this case 14%, derived from a previous and similar study [4] (where 103 out of 744 women with psychiatric disorders had irregular menstrual cycles, Z = constant value is 1.96 at 95% confidence interval. N = 185 + 10% attrition = 204

Data collection Instruments

Data was collected using the following instruments**:** The Mini International Neuropsychiatric Interview (MINI)[26] which is a semi-structured instrument that asks a series of questions related to mental health, and is used in research and clinical practice to diagnose common psychiatric disorders, including schizophrenia, depression, anxiety and bipolar affective disorders. It was used to confirm the diagnoses in the study participants. Its good psychometric properties and short administration time (approximately 15 minutes), compared to other standard diagnostic interview instruments, make it the most widely used psychiatric structured clinical interview worldwide. The current version 7.0.2 is compatible with the ICD-

11 and DSM-5. The MINI has been validated and used in Nigeria.

The designed questionnaire was adapted from a previous study [4], and face validation was done by four experts (two consultant psychiatrists and two consultant gynaecologists). The questionnaire had three sections: the first section captured the general socio-demographic characteristics such as age, educational level, occupation, marital status, ethnic group and religion. The second section focused on menstrual characteristics such as patient age at menarche, last menstrual period and included the menstrual characteristics of the patients.

The interpretation of menstrual characteristics was based on the suggested normal limits by Frazer et al [27]. Frequency: menses was regarded as "frequent" if it occurred <24 days, "normal" if it occurred 24-38 days and infrequent if it occurred >38 days. Regularity of cycle with cycle-to-cycle variation over 12 months; menses was defined as "absent" if there was no menses, "regular" if variation was between 2-20 days, and "irregular" if variation was > 20 days. Duration of flow was regarded as "prolonged" if > 8 days, "normal" if 4-8 days" and "shortened" if < 4 days. An additional parameter by Hahn et al (2013) was added to define volume of flow to make it easy to quantify, hence flow was regarded as "heavy" if > 80 mls or using more than 21 pieces of sanitary pads (or its equivalent) for the entire period of the menses, "normal" as 5-80mls or less than 21 pads, and "light" as < 5mls or spotting.

The last section included possible confounding variables which may affect cycle regularity, such as body mass index, breastfeeding, smoking, medications and co-morbid medical or gynaecological conditions.

Ethical considerations

Approval to conduct the study was sought from the Research and Ethics Committee of the Federal Neuropsychiatric Hospital, Kaduna (FNPH/KD/40/1/302). Permission was also sought from the hospital and various consultants who supervise the various clinic days.

Informed written consent was obtained from respondents, with the assurance that confidentiality will be provided. Time and effort were made by the researcher to ensure participants understood the consent process as much as possible, despite possible cognitive or emotional deficits, sometimes with the aid of carers (staff and family). Participation was voluntary, and acceptance/ refusal to participate did not affect usual care. The study carried little or no risk to the patient, and those with abnormal menstrual patterns were referred to a gynaecologist for further care.

Data collection procedure

First, a pilot study was conducted in the same hospital among 20 consenting patients who fulfilled the inclusion criteria for the study to assess understanding of the instruments by the participants and clarify any areas of ambiguity. Difficulties were corrected, and an estimate of the time taken to complete the interview was established. When this was completed, the study was conducted, collecting data on every outpatient clinic day.

Participants were selected using the consecutive sampling technique. On each data collection day, the pre-identified files of patients were pulled out with the assistance of the health information management department of the hospital. Patients who met the inclusion criteria were seen serially after obtaining their written informed consent.

Data analysis

Data were analysed using the SPSS software version 22, presented in frequency tables for descriptive purposes, and the relationship between categorical variables was analyzed using chi-square or Likelihood ratio. A p-value of <0.05 was considered statistically significant.

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Table 1

Demographic, Reproductive and Menstrual Characteristics of Participants

Variable	Categories	FREQUENCY (%) (N=285)
Age	<25	75 (26.3)
	25-29	52 (18.2)
	30-34	73 (25.7)
	35-40	85 (29.8)
Ethnicity	Hausa/Fulani	179 (62.8)
	Igbo	11 (3.9)
	Yoruba	13 (4.5)
	Others	82(28.8)
Religion	Christianity	93 (32.6)
	Islam	192 (67.4)
Marital status	Widowed/divorced	23 (8.1)
	Married	149 (52.3)
	Single	113 (39.6)
Education	None	15 (5.3)
	Primary	50 (17.5)
	Quranic	20 (7.0)
	Secondary	117 (41.1)
	Tertiary	83 (29.1)
Employment	Employed	111 (38.9)
	Unemployed	174 (61.1)
Parity	0	110 (38.6)
	1-4	87 (30.5)
	≥5	88 (30.9)
Last menstrual period	Within the last month	235 (82.5)
	>1 month to <1year	23 (8.5)
	>1year (Menopausal)	5 (1.8)
	Pregnant/Nursing	8 (2.8)
	Not stated	21 (5.6)
Age at menarche	<10	4 (1.4)
	10-16	215 (75.4)
	>16	54 (18.9)
	Not sure	12 (4.2)
Cycle length (days)	<24 or >38	77 (27.0)
	24-38	81 (28.4)
	Not sure/variable	127 (44.6)
Duration of menstrual flow (days)	<4.5 or >8	193 (67.7)
	4.5 to 8	83 (29.1)
	Not sure/variable	9 (3.2)
Volume of menstrual flow	Heavy or Light	94 (33.0)
	Normal	188 (66.0)
	Not sure/variable	3 (1.1)
Dysmenorrhea	None	73 (25.6)
	Mild	105 (36.8)
	Moderate	62 (21.8)
	Severe	45 (15.8)

Results

All 285 participants were aged 18 – 40 years with 29.8% (85) aged 35-40 years (table 1). Majority were Hausa (179, 62.8%), Muslims (192, 67.4%), married (149, 52.3%), had secondary/post-secondary education (200, 70.2%) and were unemployed (174, 61.1%) (Table 1). Most participants were parous (175, 61.4%), attained menarche normally between the ages of 10 and 16 (215, 75.4%) (Table 1). Regarding menstrual cycle length, a significant number of participants (127, 44.6%) could either not recall or had variable lengths, while 81 participants (28.4%) had normal cycle lengths of between 24-38 days. (table 1). Duration of menstrual flow was abnormal (<4.5 or >8 days) in majority of participants (193, 67.7%) (table 1). Most participants had normal volume of menstrual flow (188, 66.0%). Also, most participants had dysmenorrhea (212, 74.4%) of variable severity; in most cases, the pain was mild (105, 36.8%) (Table 1).

The top three diagnoses among participants were schizophrenia (131,46%), depressive disorders (55, 19.3%) and seizure disorders (40 14.0%) (table 2). Most participants had been ill for a duration of 1 -5 years (132, 46.3%), and in stable condition (129, 45.3%) (Table 2).

Table 2

Diagnosis and Treatment Characteristics of Participants

Variable	Catregory	Frequency (%)
Diagnosis	Schizophrenia	131 (46.0)
	Bipolar affective disorder	10 (3.5)
	Depressive disorder	55 (19.3)
	Anxiety disorder	15 (5.3)
	Insomnia	1 (0.4)
	Substance use disorder	5 (1.8)
	Seizure disorder	40 (14.0)
	Headache syndrome	19 (6.7)
	Organic mental illness	5 (1.8)
	Intellectual disability/Cerebral palsy	4 (1.5)
Comorbidity	Down syndrome	1
	Hypertension	16
	Sickle cell disorder	1
Duration of illness (years)	<1	46 (16.2)
	1-5	132 (46.3)
	6-10	51 (17.9)
	>10	48 (16.8)
	Not stated	8 (2.8)
Current clinical state	Settling	123 (43.2)
	Stable	129 (45.3)
	Unstable/relapsed	33 (11.85
Drugs	More than one class	97 (34.0)
	One class	188 (66.0)
Drugs	Antidepressants	92
	Antipsychotics	183
	Antiepileptic drugs	96
	Sedatives	6
	Mood stabilizers	1
	Anxiolytics	2

Comparison of menstrual characteristics based on diagnosis showed no significant association with cycle length (table 3), duration of menstrual flow (table 3) and menstrual pain (table 3), p value >0.05. However, there is a significant association between volume of menstrual flow and the type of neuropsychiatric illness, p value <0.05, (table 3).

Discussion

While numerous studies have been conducted to examine the influence of the menstrual cycle on neuropsychiatric symptoms, fewer studies have investigated whether the reverse is the case. In India, one study reported menstrual irregularities were present in 22% of psychiatric patients studied [5]. In the present study, 81 participants (28.4%) had normal cycle lengths of between 24-38 days. However, a significant number of participants could either not recall or had variable cycle lengths. Duration of menstrual flow was abnormal (<4.5 or >8 days) in majority of participants (193, 67.7%). Most participants had normal volume of menstrual flow (188, 66.0%). Dysmenorrhea is highly prevalent among adolescents and appears to be associated with depressive mood, a tendency to aggressive behaviour and sleep disorders among adolescent girls [28].

Table 3

Comparison of participant diagnosis and menstrual cycle characteristics

	Diagnosis					
Cycle characteristics	**Schizophrenia Frequency (%)**	**Depressive disorder Frequency (%)**	**Seizure disorders Frequency (%)**	**Others Frequency (%)**	**Total (%)**	**P Value**
Cycle length (days)						
24-38	37 (28.2)	16(29.1)	11(27.5)	17(6.0)	81(28.4)	χ^2=1.862, P= 0.932
<24 or >38	34 (26.0)	18(32.7)	9(22.5)	16(27.1)	77(27.0)	
Not sure/variable	60(45.8)	21(38.2)	20(50.0)	16(27.1)	127(44.6)	
Total	131(100)	55(100)	40(100)	59(100)	285(100)	
Duration of menstrual flow (days)						
4.5 to 8	37 (28.2)	14(25.4)	14(35.0)	18(30.5)	83(29.1)	Likelihood ratio = 3.945 P = 0.684
<4.5 or >8	92 (70.2)	38(69.1)	25(62.5)	38(64.4)	193(67.7)	
Not sure/variable	2 (1.5)	3(5.5)	1(2.5)	3(5.1)	9.(3.2)	
Total	131(100)	55(100)	40(100)	59(100)	285(100)	
Volume of menstrual flow						
Normal	92 (70.2)	42(76.4)	27(67.5)	27(45.8)	188(66.0)	Likelihood ratio =17.380 P= 0.008
Heavy/Light	38 (29.0)	12(21.8)	12(30)	32(54.2)	94(33.0)	
Not sure/variable	1(0.8)	1(1.8)	1(2.5)	0(0.0)	3(1.1)	
Total	131(100)	55(100)	40(100)	59(100)	285(100)	
Dysmenorrhea						
No	31 (23.7)	21(38.2)	9(22.5)	12(20.3)	73(25.6)	
Yes	100 (76.3)	34(61.8)	31(77.5)	47(79.7)	212(74.4)	χ= 5.886, P= 0.117
Total	131(100)	55(100)	40(100)	59(100)	285(100)	

In our study, most participants had some form of dysmenorrhea (212, 74.4%), mostly perceived to be mild (105, 36.8%). This is much higher than found in another study, where 35% of psychiatric patients studied reported having dysmenorrhoea [5]. In the same study, more than half of the patients (53.1%) of MDD had dysmenorrhea, 26.6% in patients with anxiety disorder, 23.8% in patients with Bipolar Mood Disorder, and it did not occur in any patient with psychotic disorders [5].

In the current study, the comparison of other menstrual characteristics based on diagnosis showed no significant association with cycle length, duration of menstrual flow and menstrual pain. However, there is a significant association between the volume of menstrual flow and the type of neuropsychiatric illness. Among the most frequently made diagnoses, those with seizure disorders appeared to have abnormal volumes of menstrual flow, as compared to depressive disorders or schizophrenia. The reason for this is unclear and may involve a complex interplay of various factors. Women with seizure disorders such as epilepsy have, however, been shown in other studies to have a higher frequency of menstrual disorders, more so in those with higher seizure frequency, and polytherapy [29,30]. Perimenstrual and menstrual hormonal changes, estrogen surge and reduction of progesterone trigger catamenial exacerbation of seizures in 30-50% of epileptic women [31,32]. The reduced progesterone, in turn, desensitises inhibitory neurotransmitters [33]. Seizures also lead to dysfunction in the hypothalamic-thalamic pituitary axis by disrupting the cortical regulation of hypothalamic hormone production [34] .

Another study reported that shorter menstrual cycles (≤28 days), especially in Caucasians, were 1-2 times more likely to occur in patients with current affective disorder, lifetime affective disorder, lifetime anxiety disorder, lifetime substance use or dependence disorder and lifetime drug abuse or dependence; but was not associated with current or lifetime major depression [4]. Other studies observed that the menstrual irregularities were more common among patients with Bipolar Mood Disorder (28.6%) and MDD (26.5%) as compared to anxiety and psychotic disorders (6.6%) [5]. One study found a higher prevalence of menstrual disorders in neurotic patients, a normal prevalence in patients with affective disorders and a reduced prevalence in women with schizophrenia [359]. Other studies have also explored a relationship between depression and menstrual history [36,37,]. Another study showed that 65% of the women with Bipolar Mood Disorders were suffering from menstrual irregularities [38].

Study Limitations

The study had several limitations. It was a single-centre hospital study, so findings may be difficult to generalise to the community. Design also fails to assess causal connections or time trends between neuropsychiatric illnesses and menstrual abnormalities. The sampling method used could potentially introduce selection bias. Some participants may have found it hard to recall details of their menstrual cycle, thus introducing some information bias. Not all confounders for abnormal menstruation could be explored (e.g., diet, stress), and multivariate analysis was not performed, but could be done in future studies.

Conclusion

The duration of menstrual flow was abnormal (<4.5 or >8 days) in majority of participants in our study. There was also a significant association between volume of menstrual flow and the type of neuropsychiatric illness. Those with seizure disorders appeared to have abnormal volumes of menstrual flow, as compared to depressive disorders or schizophrenia. Perhaps menstrual disruptions in psychiatric patients could reflect larger systemic

healthcare problems, such as a lack of access to specialised care.

Recommendations

It is recommended that health policy be modified to allow integrated care for neuropsychiatric and reproductive health. Menstrual assessments should be incorporated into mental healthcare frameworks and this can positively impact mental health treatment and quality of life. Healthcare providers also need to be better trained to identify reproductive health issues in psychiatric settings. Carers should not overlook this aspect of care in neuropsychiatric patients and should routinely take a detailed menstrual history and monitor its effects. Women (or their caretakers/givers) should be encouraged to keep menstrual diaries for better tracking and monitoring of their menstrual cycle.

Future studies should address dependence on self-reported data and absence of longitudinal follow-up. This may impact how menstrual irregularities and their relationship with psychiatric conditions are interpreted.

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