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Challenges of lithium prescription in bipolar disorders in Nigeria

Frances Nkechi Adiukwu[1], Mumeen Olaitan Salihu[2*], Nafisatu Hayatudeen[3], Yesiru Adeyemi Kareem[4], Benjamin Olamide Adegoke[5], Ijeoma Chinanuekperem Charles-Ugwuagbo[6], Emmanuel Effiong Uwah[7], Ismail Olaiitan Adesina[8], Abba Mohammed Ibrahim[9] and Muhammad Abba Fugu[10]

Abstract

Background Lithium prescription rates have witnessed a significant downward trend over the years in different continents despite evidence of its clinical efficacy in the acute and long-term maintenance treatment of Bipolar Disorder (BD). Nigeria has a paucity of data on lithium use in BD management. Hence, we aim to investigate the lithium prescription rate and factors influencing its use among Nigerian psychiatrists and trainee psychiatrists.

Methods A cross-sectional survey involving 203 respondents working in different accredited psychiatric training facilities in Nigeria was conducted between April and May 2024 using a predesigned online Google form. Information relating to lithium use in managing the different phases of BD and factors influencing its use were assessed.

Results The mean age of the respondents was 37.98 (±6.85) years. The lithium prescription rate is low (10.89%). There is a significant association between the respondents' awareness of clinical practice guidelines (CPG) and good adherence to CPG ($p=0.003$), but this did not significantly influence lithium prescription among them. Older years of practice influence prescribing lithium ($p=<0.001$). Monitoring and availability of lithium constituted significant concerns for lithium use, among other factors ($p=0.032$).

Conclusion The study revealed a low lithium prescription rate among Nigerian psychiatrists and trainee psychiatrists compared to international studies. There is a need for concerted efforts towards addressing the identified factors. A review of the existing local CPG in line with the best evidence is warranted for improved clinical outcomes.

Ethics registration The study was approved by the Hospital Research and Ethical Committee (HREC) of the University of Port Harcourt Teaching Hospital (UPTH) with approval protocol number (UPTH/ADM/90/S.11/VOL. XI/1688).

Clinical trial number Not applicable.

Keywords Bipolar disorder, Challenges, Clinical practice guideline, Prescription rate, Lithium, Psychiatrists, Trainee psychiatrists, Nigeria

*Correspondence:
Mumeen Olaitan Salihu
saliumumeen@gmail.com

Full list of author information is available at the end of the article

Introduction

Bipolar Disorder (BD) is a mood disorder characterised by episodes of depression, mania, or hypomania. Globally, it affects between 1% and 2% of the population, though this figure likely underrepresents the actual prevalence due to potential misdiagnosis and underreporting [1–4]. In Nigeria, the prevalence of BD is reported to be 1% [5]. However, this low prevalence has been attributed to a flaw in the methodological approach [5].

BD, being a chronic and debilitating disorder, takes a considerable toll on affected individuals. It impairs productivity and truncates life expectancy by an alarming 13 years [6]. The heightened risk of suicide further underscores the severity of this condition. Economically, the annual burden of BD is staggering, amounting to 195 billion US dollars [7]. Regrettably, there is a notable absence of economic data in Nigeria detailing the burden of care. Because of this data gap, the increasing human population coupled with escalating socioeconomic stressors within the country should necessitate attention to the challenges posed by BD and its management.

The treatment of BD is a multi-phased process, encompassing acute intervention, remission management, and maintenance strategies. Antipsychotics, often in conjunction with mood stabilisers, constitute the standard during the acute and maintenance treatment phase [8, 9]. Some have opined that mood stabilisers are more effective than second-generation antipsychotics in the management of BD, leading to less risk of hospitalisation and fewer hospitalisations in the subsequent year [10].

Lithium, a well-established and efficacious mood stabiliser, is considered the gold standard for managing bipolar disorder (BD) by therapeutic guidelines and expert opinions [11, 12]. It remains the first-line treatment against which other alternative treatment options are compared, particularly in the remission and maintenance treatment phases [13]. Lithium also exhibits neuroprotective properties and anti-suicidal effects, reducing the risk of BD recurrence and hospitalisation [14, 15]. Research suggests that lithium response varies, with early initiation showing better outcomes in Indian patients, where only 30–37% were categorised as non-responders [16].

Lithium prescription rates vary significantly across countries (3.3-84%) and have witnessed a significant downward trend in different continents despite mounting evidence of its clinical efficacy in the acute and long-term maintenance treatment of patients suffering from BD and against its recommendation by the therapeutic guidelines [11, 17–20]. A cross-sectional study across three continents (Australia, North America, and Europe) found an average lithium prescription rate of 29%, with fewer prescriptions in women than men (28% vs. 32%) [21]. The North American site (23%) recorded the lowest prescription rate compared to the Australian (31%) and European (36%) sites [21]. In Germany, the prevalence of lithium use dropped from 31.4 to 26.2% between 2009 and 2018 [22]. A similar trend was observed in the United States between 2000 and 2011, where a decline from 27.6 to 22.7% was reported [23]. In Canada, a lithium prescription rate of 23.4% was reported by Rej and colleagues [24]. Similarly, Lin et al. [25] in Taiwan conducted a longitudinal study among children below 20 between 2006 and 2019 and reported a 23.1% prescription rate for lithium. A cross-sectional study involving Hong Kong and the UK found a steady decline in lithium use from 25.8% in 2003 to 17.6% in 2018 in Hong Kong, and a similar trend was observed between 2001 and 2018 in the UK, where the rate fell from 30.7 to 16.1% [26]. However, a higher rate of lithium use of 38.9% and 47.5% were found in India and Japan, respectively [27, 28].

Researchers have identified several factors contributing to variations in lithium prescription rates across countries. These factors include patient profiles, illness onset and course, healthcare system considerations, availability of second-generation antipsychotics (SGAs), patient and clinician preferences, and practice settings [17, 29]. Demographic factors, such as age, gender, and family history of response to lithium, also play a crucial role in determining lithium use as a first-line option in managing bipolar disorder (BD) [17, 29).

Clinicians' reluctance to prescribe lithium stems from concerns about its narrow therapeutic index, the need for regular monitoring, and potential adverse effects on renal and thyroid functions [30, 31]. Additional concerns include acute side effects, toxicity risks, long-term adverse effects, medical comorbidities, and patients' negative attitudes towards lithium [29]. Despite these concerns, lithium offers the best cost-effectiveness balance, providing high efficacy and relatively low risks [32, 33]. However, alternative treatments like sodium valproate, carbamazepine, and SGAs are often preferred despite their lower level of recommendation and evidence and risk of adverse effects [11]. For instance, carbamazepine has been linked to severe blood dyscrasias, while valproate has been associated with thrombocytopenia [34, 35]. Other side effects include severe dermatological reactions, hyponatremia, weight gain, acute pancreatitis, and polycystic ovarian syndrome [36]. Moreover, valproate and carbamazepine have been linked to significant malformations, such as neural tube defects and cardiac defects, when used during pregnancy [37, 38].

The International Society for Bipolar Disorders (ISBD) recommends baseline and longitudinal safety monitoring for lithium, including monitoring of calcium and thyroid-stimulating hormone (TSH) at baseline, after six months and then annually, and serum lithium levels and Urea and creatinine are monitored for 3–6 monthly or as clinically

indicated [36]. Despite its superior efficacy and ease of monitoring, lithium remains underprescribed compared to other mood stabilisers [39]. In contrast, other low level evidence treatment options like carbamazepine, which equally required safety monitoring, are being considered [11, 39]. For example, baseline monitoring of complete blood counts, liver function tests (LFTs), electrolytes, and renal function is necessary for valproate and carbamazepine. Complete blood counts and LFTs are required several times within the first six months of initiating valproate [40].

Managing patients with BD can pose significant challenges in clinical practice due to the complex nature of the illness. However, clinical practice guidelines developed by professional bodies provide evidence-based tools for clinicians to treat different phases of the illness [11, 41]. Adherence to these guidelines has been shown to improve treatment outcomes in BD [42]. Nevertheless, evidence suggests that clinicians across different countries often do not follow clinical guidelines in managing their BD patients [43, 44].

In Nigeria, there is a lack of data on clinician lithium prescription rates for managing BD. Although international practice guidelines exist, such as those from the National Institute for Health & Care Excellence (NICE) UK, the Canadian Network for Mood and Anxiety Treatment (CANMAT), and ISBD, Nigeria lacks a national clinical practice guideline for BD. This absence of local guidelines may leads to varying prescriptions across different centres. Some institutions have developed local guidelines, but most treatment facilities in Nigeria lack written protocols on BD management. We hypothesise that lithium use is low in Nigeria and that many psychiatrists do not follow clinical practice guidelines. This study aims to investigate the rate of lithium use, factors affecting its use, and the application of clinical practice guidelines in managing BD in Nigeria. By exploring these issues, we seek to provide a comprehensive understanding of the challenges faced in prescribing lithium and to identify factors influencing its use. The findings of this study will inform the refinement of treatment protocols for optimal patient care and improved outcomes in BD. The results will also provide recommendations to health policymakers and stakeholders on the need for a national protocol/guideline for BD, ultimately enhancing practice and patient outcomes.

Methods

Study Design: A cross-sectional study

Study participants were consultant psychiatrists, trainee psychiatrists, and medical officers working in psychiatric facilities in Nigeria. In Nigeria, trainee psychiatrists are medical doctors currently undertaking psychiatry residency training, medical officers are early career medical doctors working in psychiatric facilities but are yet to enroll in a residency training program, and consultant psychiatrists are those who have completed residency training and are awarded either a fellow of the National Postgraduate Medical College of Nigeria, Faculty of Psychiatry or West African College of Physicians, Faculty of Psychiatry or both. Medical officers work in the psychiatric training facilities and participate in managing BD.

The Google form questionnaire was developed by the researchers and distributed online using social networks of the Association of Psychiatrists in Nigeria (APN), early career psychiatrist sections of the APN, and departmental forum of different psychiatry training centres across the six geopolitical zones in Nigeria (the North-east, Northwest, North-central, South-south, South-east and South-west) to reach the eligible participants between 2024 April and May 2024. Reminders were sent to each participant during the study to fill the questionnaire. According to the official register of the Association of Psychiatrists in Nigeria, there were 192 trainee psychiatrists and about 250 registered psychiatrists in Nigeria [45].

The questionnaire comprises 5 sections that gather information about demography of the study respondents (e.g., age, sex, years of experience, professional attainment, area of subspecialty, among others.), medications used in the management of the different phases of BD, awareness and use of clinical practice guideline (CPG), and the use of lithium in management of BD. We explored possible factors influencing the lithium prescription from each participant. Participation in the survey was voluntary, and only 203 participants returned duly signed informed consent and participated in the study, yielding a response rate of 45.9%.

Ethics consideration

The study was approved by the Hospital Research and Ethical Committee (HREC) of the University of Port Harcourt Teaching Hospital (UPTH) with approval protocol number (UPTH/ADM/90/S.11/VOL.XI/1688). This study was conducted in accordance with the principles of Declaration of Helsinki. The survey was voluntary, and only those who signed informed consent were recruited into the study.

Data analysis

Data was analysed using STATA 18. Descriptive statistics were used to report the socio-demographics of the study participants, the prevalence of lithium use and awareness, and the use of clinical practice guidelines. Normality was tested using the Shapiro-Wilks Test for normality, and the study variables were not found to be normally distributed. Non-parametric tests (chi-square or Fisher's exact) were used to determine factors associated with

Table 1 Characteristics of the respondents *N* = 203

Variables	Frequency	Percentage
Mean age (years)	37.98 ± 6.85	Range: 25–59
Gender		
Male	121	59.61
Female	82	40.39
Geopolitical zones		
North-Central	27	13.30
North-East	12	5.91
North-West	31	15.27
South-East	29	14.29
South-South	35	17.24
South-West	69	33.99
Highest medical qualification		
FWACP	39	19.21
FMCP (NPMCN)	20	9.85
MWACP	31	15.27
Associate Member (NPMCN)	62	30.54
MBBS	51	25.12
Current Job title		
Consultant	53	26.11
Senior Registrar	91	44.83
Registrar	55	27.09
Medical Officer	4	1.97
Area of specialty		
Addictions psychiatry	39	19.21
Child and adolescent psychiatry	12	5.91
Consultation liaison psychiatry	17	8.37
Forensic psychiatry	13	6.40
General adult psychiatry	105	51.72
Old age psychiatry	17	8.37
Years in practice		
< 10 years	103	50.74
10–15 years	68	33.50
> 15 years	32	15.76

FWACP-Fellow of West African College of Physicians, FMCP-Fellow member Consultant Physicians, MWACP- Member West African College of Physicians, Associate member of National Postgraduate Medical college of Nigeria (NPMCN)

lithium use in BD management in Nigeria. P value ≤ 0.05 was considered significant.

Results

The respondents were psychiatrists practising in Nigeria of varying ages, ranging from 25 to 59 years with a mean age of 37.98 (6.85) years, reflecting a relatively young population. Of the 203 respondents, the majority 121 (59.61%) were male and 69 (33.99%) were practising in the Southwest geo-political zone of the country. At the same time, the other zones were equally represented, except the Northeast which had the least representation (5.91%). Fellows of either the West African College of Physicians or the National Postgraduate Medical College of Nigeria were 59 (29.06%) and senior resident doctors constituted 91(44.83%) of the respondents (Table 1).

Table 2 Lithium prescription and clinical practice guidelines *N* = 203

Variables	Frequency	Percentage
Awareness of CPG in BD Management	***n* = 202**	
Yes	192	95.05
No	10	4.95
Use of CPG in the management of BD	*n* = 202	
Yes	165	81.68
No	37	18.32
Presence of ILG for BD		
Yes	53	26.11
No	150	73.89
Familiarities with role of Li in BD Management	*n* = 202	
Yes	198	98.02
No	4	1.98
Do you prescribe Li in BD?	*n* = 202	
Yes	22	10.89
No	180	89.11
What informs non- prescription of Li	*n* = 196	
Availability	64	32.65
Clinical practice guidelines	5	2.55
Monitoring	108	55.10
Teaching from senior colleagues	16	8.16
Personal experience with prescribing Li	1	0.51
Others	2	1.02

BD-Bipolar Disorder, Li-Lithium, CPG-Clinical Practice Guidelines, ILG-Institution Local Guidelines

Slightly above half (51.72%) of the respondents practised in General Adult psychiatry, while 103 (50.74%) have been practising in psychiatry for less than 10 years.

Nearly all (95.05%) of the respondents were aware of clinical practice guidelines (CPG) for the management of bipolar disorder, with the majority (81.68%) expressing the use of CPG in their practice (mainly the NICE guideline). Fifty-three (26.11%) admitted to having Institutional Local Guidelines (ILG) for the management of any phase of bipolar disorder (Table 2).

Almost all (98.02%) respondents were aware of the role of lithium in bipolar disorder, but only 22 (10.89%) prescribed Lithium. The main reasons for not prescribing lithium were the inability to monitor serum lithium levels (55.1%), problems with the availability of lithium (32.65%), and teachings from senior colleagues (8.16%) against using lithium.

Concerns about lithium non-prescription were explored, including the side effect profile and supply chain problems. About three-quarters of the respondents (77.5%) expressed concerns about its narrow therapeutic window. Monitoring concerns and renal complications were also commonly expressed by 141 (69.8%) and 93 (46.04%) respondents, respectively (Table 3).

When the prescription of lithium, awareness and use of clinical practice guidelines were analysed against

Table 3 Concerns about Lithium prescription *N* = 202

Variables	Frequency	Percentage
Tremor		
Yes	38	18.81
No	164	81.19
Polyuria		
Yes	33	16.34
No	169	83.66
Renal complications		
Yes	93	46.04
No	109	53.96
Seizure		
Yes	34	16.83
No	168	83.17
Loss of consciousness		
Yes	23	11.39
No	179	83.61
Narrow therapeutic window	*n* = 200	
Yes	155	77.50
No	45	22.50
Monitoring		
Yes	141	69.80
No	61	30.20
Availability of medication		
Yes	4	1.98
No	198	98.02
Cost of treatment		
Yes	1	0.50
No	201	99.50
Poor adherence		
Yes	1	0.50
No	201	99.50
Unavailability		
Yes	1	0.50
No	201	99.50
Death		
Yes	29	14.36
No	173	85.64

years of practising experience in psychiatry, we found that respondents who prescribe lithium were significantly older than those who did not prescribe lithium in the management of BD (χ^2 = 11.17, p = < 0.001) (Table 4). Adherence to CPG was significantly associated with reported awareness of such guidelines (p = 0.003). However, despite participants responding that they follow CPG, it was associated with the non-prescription of lithium (Table 4), with the monitoring of serum lithium levels and availability of lithium being significant concerns of the respondents (p = 0.032).

Discussion

This study investigated the rate of lithium use in managing BD by practising psychiatrists, trainee psychiatrists, and doctors working in psychiatric facilities in Nigeria. It explored factors responsible for its use and participants' awareness and adherence to clinical practice guidelines. The respondents were relatively young, with a mean age of 37.98 ± 6.85 years. In a recent online survey on early career psychiatrists in Nigeria, most respondents in this study were of a similar mean age with the present study [45]. This reflects Nigeria's majorly young medical population and the greater tendency for younger individuals to respond to online surveys [46]. While this implies that our study findings are not generalisable to all psychiatrists in Nigeria, it gives a glimpse into the future of psychiatric practice in the management of BD. While the southwest geopolitical zone of the country had a higher proportion of respondents than other zones, this adequately reflects the distribution of psychiatrists in Nigeria.

Lithium prescribing for bipolar disorder in Nigeria

The lithium use trend in Nigeria for BD management is unknown, and this is the first national survey on the lithium prescription rate in BD management among Nigerian psychiatrists. Our study reveals a lithium prescription rate of 10.89%, which is very low compared to the 59% average prescription rate for lithium reported in a global study that comprised 43 different countries from 5 continents, including Africa [29]. However, our findings are not at odds with those of other developing countries, where lower lithium prescription rates have been consistently found compared to developed countries [29, 47]. Higher lithium prescription rates for BD have also been seen in low and middle-income countries as Mandal et al. [31] reported lithium prescription rates by psychiatrists in India to be 35% and 60% in patients with first-episode mania and multiple episodes of mania, respectively. The possible reasons for the low rate of lithium used in Nigeria may include the poor familiarity of Nigerian psychiatrists with lithium prescriptions and a relatively young population of psychiatrists and trainee psychiatrists who were trained in an era with fewer lithium prescriptions for BD. A study reported the link between the years of practice and lithium use, where the frequency of lithium use in the first episode of mania (25% vs. 8.8%) and multiple episodes of mania (38.8% vs. 19.4%) were higher among psychiatrists with more than five years of experience in practice when compared with those who have spent less than five years in practice [31]. A similar survey in Saskatchewan, Canada, reported an association between older age and a reduction in hesitancy toward lithium use, consistent with the findings in the present study [48]. The possible reasons highlighted were that the older physicians may be familiar with lithium use, and the younger physicians may be deficient in opportunities to learn about lithium and gain clinical experience with it during their training. Educating the early career psychiatrists about lithium prescribing will address this

Table 4a Factors associated with years of experience of clinicians

NUMBER OF YEARS IN PRACTICE	NO	YES			*p*
	PRESCRIPTION OF LITHIUM				
10-15years,	61	7	68	11.17	< 0.001
< 10 years,	96	7	103		
> 15 years	23	9	32		
Total	180	23	203		
	AWARENESS OF CPG				
10-15years,	4	64	68	0.49	0.78
< 10 years,	4	99	103		
> 15 years	2	30	32		
Total	10	193	203		
	USE OF CPG				
10-15years,	14	54	68	0.47	0.79
< 10 years,	17	86	103		
> 15 years	6	26	32		
Total	37	166	203		

BD = Bipolar Disorder; CPG = Clinical Practice Guideline; Li = Lithium; $p < 0.050$ (significant); t = student's t-test; χ^2 = chi square test;

Table 4b Factors associated with adherence to clinical practice guidelines

	FOLLOWING OF CPG				
AWARENESS OF CPG	NO	YES	Total	Fishers Exact	*p*
NO	6	4	10	12.21	0.003
YES	31	161	192		
Total	**37**	**165**	**202**		
	FOLLOWING CPG				
DO YOU PRESCRIBE Li FOR BD?	NO	YES	Total	Fishers Exact	*p*
NO	37	143	180	5.54	0.016
YES	0	22	22		
Total	**37**	**165**	**202**		

BD = Bipolar Disorder; CPG = Clinical Practice Guideline; Li = Lithium; $p < 0.050$ (significant); t = student's t-test; χ^2 = chi square test;

Table 4c Factors associated with adherence to clinical practice guidelines

	FOLLOWING OF CPG				
AWARENESS OF CPG	NO	YES	Total	Fishers Exact	*p*
NO	6	4	10	12.21	0.003
YES	31	161	192		
Total	**37**	**165**	**202**		
	FOLLOWING CPG				
DO YOU PRESCRIBE Li FOR BD?	NO	YES	Total	Fishers Exact	*p*
NO	37	143	180	5.54	0.016
YES	0	22	22		
Total	**37**	**165**	**202**		

BD = Bipolar Disorder; CPG = Clinical Practice Guideline; Li = Lithium; $p < 0.050$ (significant); t = student's t-test; χ^2 = chi square test;

area. Other factors for low lithium use are clinicians' false beliefs, misconceptions, lack of training and inadequate resources for lithium monitoring [29]. The implication of low lithium prescription in Nigeria is that other second-line mood-stabilising anticonvulsants are becoming the mainstay in the management of BD, consistent with global trends [22, 23, 43], against the therapeutic guidelines and experts' opinion in the field, which positioned Lithium as the first choice agent.

Clinical practice guideline and Lithium prescription

This study found that the awareness of clinical practice guidelines (CPG) among study respondents was high, reflecting that the knowledge about lithium's position and efficacy in managing BD exists. Despite this high level of awareness, the rate of lithium prescription among the respondents is very low. Respondents reported their perceived difficulty in monitoring serum lithium levels and the availability of lithium carbonate in the country as the main reasons for their non-prescription of lithium despite their awareness of its role in the management of BD. The difficulty of monitoring the serum lithium was the biggest reason reported for its non-prescription by the respondents. However, methods for assaying serum lithium have been available since the 1970s, and these and more advanced methods are currently being used in chemical pathology laboratories of most hospitals around Nigeria to assay sodium (Na), amongst others [49, 50]. Despite the availability of methods of monitoring lithium, respondents still state that this is a significant impediment to their use of lithium in managing BD. This may suggest that serum lithium trough measurement is not being done routinely in places where these respondents practice or may be due to poor awareness of availability of such test in those institutions.

Low and middle-income countries, such as Nigeria, struggle with the supply chain management of essential medications [51], including lithium. Concerns about its availability were also commonly reported in this study. These challenges are likely age-long, furthering the unfamiliarity with the use of lithium in Nigeria. This unfamiliarity with the use of lithium would most likely be passed down from older generation to younger generation psychiatrists, as seen in about 8% of our participants. With the low prescription rate of lithium, there would inevitably be a fall in the demand for lithium, and as such, many outlet pharmacies would tend not to restock lithium due to its low demand. The availability of lithium in Nigeria is thus limited to a few regional Federal Neuropsychiatric institutions located in major cities where the demand for lithium is still available. This is probably because these institutions are major psychiatry referral centres in Nigeria.

The low lithium use among respondents in this study could also suggest non-compliance with international CPG and, in contrast, compliance with local CPG, which may not recommend lithium in the management of BD due to local nuances. Interestingly, a novel finding in this study is the availability of local institutional guidelines, as reported by about a fourth of the participants. This is a positive finding on our part as it highlights the move towards standardisation of psychiatry clinical practice in Nigeria in light of previous reports from Nigeria affirming the opposite [52]. This finding in our study is a welcome development for better operational guidelines specific to the Nigerian context. It also creates room for studies on the efficacy, feasibility of use, and cost-benefit analysis of medications in managing psychiatric disorders. The study also suggests the need for further education on prescribing lithium for early career psychiatrists and psychiatrist trainees in Nigeria.

This is the first national survey on the lithium prescription rate in Nigeria with fair representative samples of psychiatrists and trainee psychiatrists spread across the six geopolitical zones, and this is expected to strengthen the study. The study is, however, limited by the possibility of response bias since it is a self-administered online questionnaire and experienced older psychiatrists who use lithium in their practice might have been excluded and may have yet to participate in the online survey, which might affect the results of the findings.

Conclusion

When it comes to treating bipolar disorder, lithium remained the first choice agent [11]. However, in actual clinical practice, various challenges and precautions may hinder its use as the primary drug for treatment, including difficulties in monitoring and limited availability of lithium in Nigeria. Adhering to clinical guidelines and taking appropriate measures to promote the use of lithium in treating bipolar disorder can lead to improved treatment outcomes.

Abbreviations

BD	Bipolar disorder
CANMAT	Canadian Network for Mood and Anxiety Treatment
CPG	Clinical practice guideline
ISBD	International Society for bipolar disorders
Li	Lithium
ILG	Institution Local Guidelines
SGA	Second generation antipsychotics

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12888-025-06736-0.

Supplementary Material 1

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Author contributions

F.N.A. conceptualized the study. F.N.A., M.O.S., Y.A.K., N.H., I.C.C., A.M.I., and E.E.U. wrote the study protocol. All authors participated in data collection. F.N.A., M.O.S., N.H., Y.A.K., and B.O.A. analysed the data. F.N.A., M.O.S., Y.A.K., N.H., B.O.A., and E.E.U. wrote the first draft of the manuscript. All authors contributed to the revision of the article with a critical contribution to the intellectual content. All authors of this article have contributed sufficiently to the manuscript and read and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Ethical approval and consent to participation

The study was approved by the Ethics and Research Committee (ERC) of the University of Port Harcourt Teaching Hospital (UPTH) with approval protocol number (UPTH/ADM/90/S.11/VOL.XI/1688).

Author details

[1]Department of Mental Health, University of Port Harcourt, Port Harcourt, Rivers State, Nigeria
[2]Department of Behavioural Sciences, Kwara State University Teaching Hospital, Ilorin, Kwara State, Nigeria
[3]Department of Clinical Services, Federal Neuropsychiatric Hospital, Barnawa, Kaduna State, Nigeria
[4]Department of Clinical Services, Neuropsychiatric Hospital, Aro, Abeokuta, Nigeria
[5]Department of Psychiatry, Ekiti State University Teaching Hospital, Ado-Ekiti, Ekiti State, Nigeria
[6]Department of Clinical Services, Federal Neuropsychiatric Hospital, Enugu, Enugu State, Nigeria
[7]Department of Clinical Services, Federal Neuropsychiatric Hospital, Calabar, Cross River State, Nigeria

[8]Department of Clinical Services, Neuropsychiatric Hospital, Yaba, Lagos State, Nigeria
[9]Department of Psychiatry, University of Maiduguri Teaching Hospital, Maiduguri, Borno State, Nigeria
[10]Department of Medical Services, Federal Neuropsychiatric Hospital, Maiduguri, Borno State, Nigeria

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