AFRICAN JOURNAL OF MEDICINE and medical sciences

VOLUME 43 NUMBER 4 DECEMBER 2014

ISSN 1116-4077

Afr. J. Med. med. Sci. (2014) 43, 315-325

Tobacco smoking and medical co-morbidities among patients with schizophrenia in a Nigerian clinical setting

VO Lasebikan
Department of Psychiatry, College of Medicine, University of Ibadan, Nigeria

Abstract

Background: Smoking is highly prevalent in patients living with schizophrenia and is associated with medical and psychiatric morbidities

Methods: In this descriptive, consecutive patients with schizophrenia (368) were interviewed at State Hospital Ibadan between January and December 2008. Information on demography and tobacco smoking, medication adherence and self reports of chronic common health conditions were obtained. The PANSS was used to determine level of psychopathology. Univariate associations were determined using Chi square statistics and multivariate analysis was used for further exploration of variables that were significant during univariate analysis. All analyses were performed using the SPSS (17.0).

Results: Prevalence of lifetime tobacco use was 198 (53.8%), current use 122 (33.1%). Current use was highest in respondents less than 25 years of age X^2 = 11.8, p = 0.003 and reduced with increasing education, X^2 = 21.6, p = 0.00, higher in non medication adherent patients, X^2 = 19.9, p = 0.00 and was associated with health conditions such as haemopoetic diseases X^2 = 6.8, p = 0.01 and respiratory diseases. Mean score of positive, negative, general psychopathology, total psychopathology subscales of PANSS were respectively significantly higher among current user, compared with abstainers, t= 6.7, p = 0.00, t=5.1, p = 0.00, t= 6.2, p = 0.00, t= 6.7, p = 0.00. Only general psychopathology subscale of PANSS, OR = 3.5, 95% CI (1.2-6.5), p = 0.02 remained associated with current tobacco use after adjusting for gender.

Conclusion: The present study demonstrates high rate of tobacco use in patients with schizophrenia. Thus, such patients require additional screening for tobacco and tobacco cessation program.

Keywords: *Schizophrenia, Tobacco, PANSS, Health Conditions, Psychopathology*

Correspondence: Dr. Victor O. Lasebikan, Department of Psychiatry, College of Medicine, University of Ibadan, Nigeria.
E-mail: victorlash @yahoo.com

Résumé

Contexte: Le tabagisme est très répandu chez les patients souffrant de la schizophrénie et est associé avec morbidités médicales et psychiatriques

Méthodes: Dans cette étude descriptive, des patients consécutifs atteints de la schizophrénie (368) ont été interrogés à l'Hôpital d'État d'Ibadan entre Janvier et Décembre 2008. Information sur la démographie et la consommation du tabac, adhérence aux médicaments et auto rapports de conditions chroniques de santé courante ont été obtenus. Le PANSS a été utilisé pour déterminer le niveau de psychopathologie. Les associations uni-variées ont été déterminées à l'aide des statistiques Chi carrés et l'analyse multi-variée a été utilisée pour une ample exploration des variables qui étaient significatives lors de l'analyse uni-variée. Toutes les analyses ont été effectuées en utilisant SPSS (17,0).

Résultats: La prévalence, pour une durée de vie, de l'usage du tabac était 198 (53,8%), l'utilisation actuelle 122 (33,1%). L'utilisation actuelle était plus élevée parmi les répondants de moins de 25 ans X^2 = 11,8, p = 0,003 et réduisait avec l'accroissement d'éducation, X^2 = 21,6, p = 0,00, plus élevé chez les patients non adhérents aux médications, X^2 = 19,9, p = 0,00 et a été associé avec des conditions de santé telles que les maladies hématopoïétiques X^2 = 6,8, p = 0,01 et les maladies respiratoires. Le score moyen de positif, négatif, psychopathologie générale, total des sous-niveaux de psychopathologie du PANSS ont été respectivement significativement plus élevée chez les utilisateurs courant, par rapport aux abstinents, t = 6,7, p = 0,00, t = 5,1, p = 0,00, t = 6,2, p = 0,00, t = 6,7, p = 0,00. Seulement les sous-niveaux de psychopathologie générale du PANSS, OR = 3,5, IC à 95% (1,2 – 6,5), p = 0,02 demeuraient associés à la consommation actuelle du tabac après ajustement pour le genre.

Conclusion: La présente étude démontre le taux élevé de l'usage du tabac chez les patients atteints de la schizophrénie. Ainsi, ces patients ont besoin d'un contrôle supplémentaire pour le programme du tabac et sevrage tabagique.

Mots-clés: *schizophrénie, tabac, PANSS, conditions de santé, Psychopathologie*

Introduction

Tobacco use is a leading cause of morbidity and mortality all over the world [1]. This is as a result of several diseases such as malignancies, ischemic heart indicating worse adherence. The scale was

associated with it [2] of which more than 70% of these deaths are expected to occur in developing countries [1].

There are indications that the prevalence rate of tobacco consumption in patients living with schizophrenia is higher than in the general populations [3-6]. This high rate of smoking among this vulnerable group has been attributed to a number of controversial hypotheses, that patients living with schizophrenia smoke as a form of self-medication [7], that smoking cessation aggravates [8] or ameliorates [9] their clinical symptoms and that they may have immunity to tobacco-related diseases such as malignancies because of high natural killer cell activity [10].

Although smoking among mentally ill individuals may have socio-cultural [11], environmental, [12] and genetic [13] correlates, there are reports that presence of psychopathology is a dominant factor in continued smoking [14]. The "Psychological Tool" construct posits that tobacco use in patients living with schizophrenia enhances attention, arousal and memory [15]. This is because patients with schizophrenia have dysfunction in cholinergic neurotransmission. Thus, smoking in patients living with schizophrenia is reinforced because of the cognitive enhancing profile of nicotine [16]. Thus, the potential of nicotine in clinical populations and for therapeutics for cognitive enhancement is being investigated for schizophrenia [17].

In terms of smoking and symptom profile of schizophrenia, nicotine has been reported to have therapeutic effects on negative symptoms of schizophrenia [18].Among patients with schizophrenia, smokers have been reported to significantly have fewer medication induced extrapyramidal symptoms [19]. The association with tardive dyskinesia is controversial; while some studies have reported lack of any association [20], some have reported lower rates [21], and some others higher rates [22,23].

Despite substantial evidences that smoking in patients living with schizophrenia have clinical symptoms and medication-induced side effects correlates, there is a dearth of information on the prevalence of smoking in patients living with schizophrenia and its associated factors in Nigeria. Studies of this nature are very relevant considering the high morbidity and mortality associated with tobacco use [1] and schizophrenia [24] and especially in Nigeria, where patient living with schizophrenia have limited access to treatment [25].

The main objective of this study therefore was to investigate the prevalence of smoking and its associations with clinical symptoms and self reported health problems within a Nigerian Clinical population.

Study area

The present study was carried out at the Psychiatric Unit of the State Specialists Hospital Ring Road Ibadan, Nigeria between January and December 2008. This study was part of profile and correlates of disabilities among patients with psychosis in Ibadan. The city has an estimated population of 3.85 million people [26].

Study design

This was a multistage cross sectional and descriptive study that utilized total sampling of patients with psychosis that regularly attended the psychiatric unit of the state hospital between January and December 2008.

In the first stage of the study, 982 participants who consecutively attended the psychiatric outpatient department of the study site during the study period were screened with the psychosis screen [27]. Seven hundred and sixty two screened positive as demonstrated by any yes to the six questions of the 6 – item psychosis screening questionnaire. These 762 respondents proceeded to the second stage of the study.

In the second stage, the Structured Clinical Interview for DSM IV axis I disorder (SCID) [28] was administered to these participants and 368 met the DSM IV criteria for schizophrenia, 70 for schizoaffective disorder, 151 for mania with psychosis, and 63 for severe depression with psychosis.

These participants proceeded to the third stage of the study in which other instruments of data collection were administered to them. These were the Self Administered Co-morbidity Questionnaire [29], Positive and Negative Syndrome Scale (PANSS) [30] and the Medication Adherence Questionnaire [31].

Inclusion criteria

All participants were required to meet DSM IV criteria for schizophrenia and were also required to be accompanied by a principal caregiver with whom collateral information could be obtained.

Exclusion criteria

Excluded were respondents with schizoaffective disorder, mania with psychosis and severe depression with psychosis.

Ethical considerations

Permission for the study was obtained from the Ethical and Review Board of the department of planning, research and statistics, ministry of health Oyo state, to ascertain that the methodology of the study did not contravene laid down guidelines for experiments involving human beings.Informed consent was obtained from each of the patients and or their relations and the objective of the exercise explained to them.

Measures

Information about socio-demographic characteristics of respondents including age of respondents, gender, educational background, age of onset of illness, duration of untreated psychosis was obtained.

Tobacco use

Information about lifetime and current tobacco use was obtained from the substance use section of the Mental Health Structural Clinical Interview for Diagnostic and Statistical Manual (DSM) IV Axis 1 Disorder 2000-1 Version (SCID)[28]. Tobacco use in this study was limited to cigarette smoking. The draft instrument was field tested and then issued for use with DSM IV. It can be used by the clinician as part of a normal assessment procedure to confirm a particular diagnosis or in research or screening as systematic evaluation of a whole range of medical states. The instrument covers all the criteria of the diagnosis included in the various modules and the interviewer makes a clinical judgment as to whether each criterion is met. It is available in a patient edition for use with subjects who have been identified as psychiatric patients and in a non-patients edition which is suitable for use in epidemiological studies. In addition, the SCID II is available for making axis II, (personality disorder) diagnosis in DSMIV. The SCID II has a screening module which complemented the psychosis screen, in screening out those who hadn't any psychosis.

Health problems

Information was obtained from either the patients or primary caregivers on presence of any general medical condition by self report using a questionnaire that classified medical comorbidities using some of the general classification as contained in the "Self Administered Co-morbidity Questionnaire" [29] supplemented by questions about the common tropical diseases such as infections. This format enabled self reported general medical conditions to be classified into systems, for example, hypertension was classified under disease of the cardiovascular system etc. In the pilot study carried out to determine the reliability of the "Self Administered Co-morbidity Questionnaire" (SARQ), the SARQ was found to be significantly correlated with case file reports of the patients, $r = 0.87$. It also has significant inter-rater reliability, $r = 0.82$.

The SARQ was pretested during the pilot study during which it was translated to Yoruba language and back translated back to English language to ensure that the original meanings of all disease conditions were maintained. The SARQ was available in both English and Yoruba languages, the languages of instructions during the study.

Positive and Negative Syndrome Scale (PANSS) is a 30-item valid and reliable instrument, 7-point rating instrument that was adapted 18 items from the Brief Psychiatric Rating Scale (BPRS) [32] and 12 items from the Psychopathology Rating Schedule (PRS) [33]. Each item on the PANSS is accompanied by a complete definition as well as detailed anchoring criteria for all seven rating points, which represent increasing levels of psychopathology from 1 indicating absence, to 7 which denotes extreme symptoms. The PANSS addresses both the presence and severity of symptoms, and the highest applicable rating point is always assigned, even if the patient meets criteria for lower ratings as well. Of the 30 psychiatric parameters assessed on the PANSS, 7 were chosen a priori to constitute a Positive Scale, 7 make up a Negative Scale, and the remaining 16 General Psychopathology. In the pilot study carried out before the commencement of this study using a different sample, the internal consistency of the positive scale was 0.83 , negative scale 0.74 and general psychopathology 0.79. The inter-rater reliability was 0.72, 0.76 and 0.74 respectively for those scales. The PANSS has also been used in several previous studies in Nigeria [34].

Medication adherence

Medication adherence was assessed by the original version of the Medication Adherence Questionnaire, a 4-item self-report scale [31]. This scale identifies or addresses ways in which patients may fail to take their prescribed medications e.g. by forgetting, not taking it because they feel better or not taking it because it makes them feel worse. It has two versions, the first being the original version with a binary response option (no/yes) and with scores ranging from 0-4. The second version is a 5-point response version (never/rarely/sometimes/often/always having scores that range from 0-16), higher scores indicating worse adherence. The scale was successful

successful in predicting positive therapeutic outcomes and has been validated and previously used in Nigeria [35,36].

Data management and analyses

The questionnaires were serialized, cleaned, edited and safely stored; thereafter information yielded by each subject was entered directly into the computer using the SPSS Software Version 17.0 (SPSS Inc, Chicago, Illinois) [37]. Chi square statistics was used to analyse categorical 2 by 2 data, student t test was used to test for differences between the mean scores of the two groups. All analyses were carried out within 95% CI, $p < 0.05$.

Results

Mean age of all respondents was 27.7 ±7.6 years, 207 (56.2%) were men, larger proportion 295 (80.1%) were unmarried, 251 (68.2%) were unemployed.

Lifetime prevalence of smoking was 198 (53.8%) and current smoking 122 (33.2%), 76 (20.7%) had quit smoking. Lifetime prevalence of tobacco use reduced with increasing age $X^2 = 23.9$, $p < 0.001$, and education, $X^2 = 16.3$, $p = 0.001$. Lifetime prevalence was higher in males $X^2 = 127.7$, $p < 0.001$, among the unmarried $X^2 = 8.7$, $p = 0.003$, those adherent with medication $X^2 = 32.8$, $p < 0.001$, among respondents with long duration of untreated psychosis $X^2 = 24.2$, $p < 0.001$.

Means positive PANSS score was significantly higher among lifetime smokers compared with lifetime abstainers, $t = 7.9$, $p < 0.001$. Mean negative PANSS score was significantly higher among lifetime smokers compared with lifetime abstainers, $t = 7.7$, $p < 0.001$. Mean general psychopathology PANSS score was significantly higher among lifetime smokers compared with lifetime abstainers, $t = 7.1$, $p < 0.001$. Mean total PANSS score was significantly higher among lifetime smokers compared with lifetime abstainers, $t = 8.4$, $p < 0.001$ (Table 1).

Table 1: Sociodemographic and clinical profile of lifetime smokers

Age group (Years)	Lifetime Use N	%	Lifetime Abstainers n	%	X^2	Sig
< 25	133	65.2	71	34.8	23.9	0.00
25-34	59	39.9	89	60.1		
35-44	6	37.5	10	62.5		
>44	-	-	-	-		
Years of Education						
0	53	69.7	23	30.3	16.3	0.001
1-6	90	51.1	86	48.9		
7-12	47	54.0	40	46.0		
>12	8	27.7	21	72.4		
Gender						
Male	165	79.7	42	20.3	127.7	0.00
Female	33	20.5	128	79.5		
Marital Status						
Currently married	28	38.4	45	61.6	8.7	0.003
Unmarried	170	57.6	125	42.4		
Employment						
In Employment	137	54.6	114	45.4	0.1	0.7
Unemployed	61	52.1	56	47.9		
Medication Adherent						
Yes	174	62.1	106	37.9	32.8	0.00
No	24	27.3	64	72.7		
Duration of untreated psychosis						
<3 years	12	22.6	41	77.4	24.2	0.00
≥ 3 years	186	59.0	129	41.0		

Mean positive PANSS score was significantly higher among current users compared with current abstainers, $t = 6.7$, $p < 0.001$, mean negative PANSS

score was significantly higher among current users compared with current abstainers, t = 5.1, p < 0.001, mean general psychopathology PANSS score was significantly higher among current users compared with current abstainers, t = 6.2, p < 0.001, mean total PANSS score was significantly higher among

Table 2: Relationship between clinical symptom profile and smoking

Age group (Years)	Lifetime Users Mean	SD	Lifetime Abstainers Mean	SD	t	Sig
PANSS (Positive)	22.6	8.6	15.2	9.3	7.9	0.00
PANSS (Negative)	23.4	12.1	14.5	9.9	7.7	0.00
PANSS (General Psychopathology)	50.4	12.7	40.0	5.4	7.1	0.00
PANSS (Total)	92.3	28.6	65.7	32.2	8.4	0.00
	Current Users	Current Abstainers				
PANSS (Positive)	23.7	8.4	16.9	9.4	6.7	0.00
PANSS (Negative)	23.7	11.7	17.1	11.5	5.1	0.00
PANSS (General Psychopathology)	52.1	12.0	42.3	15.2	6.2	0.00
PANSS (Total)	95.5	26.2	72.4	33.5	6.7	0.00

Table 3: Sociodemographic and clinical profile of current smokers

Age group (Years)	Current Use N	%	Current Abstainers N	%	Statistics	Sig
< 25	83	40.7	121	59.3	11.8	0.003
25-34	35	23.6	113	76.4		
35-44	4	25.0	12	75.0		
>44	-	-				
Years of Education						
0	41	53.9	35	46.1	21.6	0.00
1-6	55	31.3	121	68.8		
7-12	21	24.1	66	75.9		
>12	5	17.2	24	82.8		
Gender						
Male	101	48.8	106	51.2	52.2	0.00
Female	21	13.0	140	87.0		
Marital Status						
Currently married	18	24.7	55	75.3	3.0	0.09
Unmarried	104	35.3	191	64.7		
Employment						
Unemployed	80	31.9	171	68.1	0.6	0.3
Employed	42	45.9	75	64.1		
Medication Adherent						
Yes	110	39.3	170	60.7	19.9	0.00
No	12	13.6	76	86.4		
Duration of untreated psychosis (DUP)						
<3 years	3	5.7	50	94.3	21.1	0.00
≥ 3 years	119	37.8	196	62.2		
Mean DUP	2.93	SD1.93	3.17	SD1.89	1.1	0.27
Mean duration of smoking	4.03	SD 3.16	-	-	-	-

current users compared with current abstainers, t=6.7, p<0.001 (Table 2).

Prevalence of current tobacco was significantly lowest among respondents who were less than 25 years, X^2= 11.8, p = 0.003, significantly reduced with increasing level of education, X^2 = 21.6, p < 0.001 respectively; and was higher in males, X^2 = 52.2 p < 0.001. Prevalence of current smoking was also higher among respondents who were medication adherent X^2 = 19.9, p < 0001, and among those with long duration of untreated psychosis X^2 = 21.1, p < 0.001.(Table 3).

There was a significant association between lifetime prevalence of smoking and haematological diseases X^2 = 6.7 p = 0.01, respiratory diseases X^2 = 9.1, p = 0.003, gastrointestinal diseases X^2 = 4.3, p = 0.04 and infections X^2 = 10.1, p = 0.002 (Table 4).

There was also a significant association between current prevalence of smoking and haematological diseases X^2 = 6.8 p = 0.01, respiratory diseases X^2 = 9.6, p = 0.002, gastrointestinal diseases X^2 = 6.5, p = 0.01 and infections X^2 = 7.9, p = 0.005 (Table 5).

After multivariate analysis and adjusting for gender, the only significant variable that remained associated with lifetime tobacco use was negative subscale of PANSS, OR = 2.3, 95% CI (1.1-5.2), p = 0.03 (Not shown in any table), while general psychopathology subscale of schizophrenia was the only variable that was associated with

Table 4: Disease conditions among lifetime smokers

Disease condition	N	Lifetime Abstainers n	%	Lifetime Users n	%	X^2	Sig
Haemopoetic (Anaemia)							
Yes	61	19	31.1	42	68.9	6.7	0.01
No	307	151	49.2	156	50.8		
Cardiovascular (Hypertension)							
Yes	26	9	34.6	17	65.4	1.5	0.2
No	342	61	47.1	281	52.9		
Respiratory (COAD)							
Yes	52	14	26.9	38	73.1	9.1	0.003
No	316	156	49.4	160	50.6		
Musculoskeletal (Arthritic Pain)							
Yes	9	4	44.4	5	55.6	0.01	1.0
No	359	166	46.2	193	53.8		
Dermatological (Dermatitis)							
Yes	41	13	32.5	28	67.5	2.7	0.1
No	327	157	47.7	170	52.3		
Endocrine (Diabetes Mellitus)							
Yes	12	5	41.7	7	58.3	0.1	0.8
No	356	195	46.3	161	53.7		
Neurological (Neuropathy)							
Yes	17	8	47.1	9	52.9	0.01	1.0
No	351	162	46.2	189	53.8		
BMI > normal							
Yes	22	8	36.4	14	46.8	0.9	0.4
No	346	162	63.6	184	53.2		
Ear/Nose/Throat (Sinusitis)							
Yes	25	11	44.0	14	56.0	0.05	0.8
No	343	159	46.4	189	53.6		
GIT diseases (Peptic Ulcer)							
Yes	59	20	33.9	39	66.1	4.3	0.04
No	309	150	48.5	159	51.5		
Infections (Pneumonia)							
Yes	167	62	37.1	105	62.9	10.1	0.002
No	201	108	53.7	93	46.3		

associated with current tobacco use, OR = 3.5, 95% CI (1.2-6.5), p = 0.02 (Not shown in any table).

psychopathologies with both lifetime and current tobacco use. Haemopoetic disorders, respiratory

Table 5: Disease conditions among current smokers

Disease condition	N	Current Abstainers %	Current Users %	X^2	Sig
Haemopoetic (Anaemia)					
Yes	61	52.5	47.5	6.8	0.01
No	307	69.7	30.0		
Cardiovascular (Hypertension)					
Yes	26	53.8	45.2	0.1	0.1
No	342	67.8	32.2		
Respiratory (COAD)					
Yes	52	48.1	51.9	9.6	0.002
No	316	69.9	30.1		
Musculoskeletal (Arthritic Pain)					
Yes	9	44.4	55.6	0.01	1.0
No	359	46.2	53.8		
Dermatological (Dermatitis)					
Yes	40	65.0	35.0	0.5	0.8
No	328	87.0	33.0		
Endocrine (Diabetes Mellitus)					
Yes	12	83.3	16.7	1.5	0.4
No	356	66.3	33.7		
Neurological (Neuropathy)					
Yes	17	70.6	29.4	0.1	1.0
No	351	66.7	33.3		
BMI > normal					
Yes	22	77.3	22.7	1.1	0.4
No	346	66.2	33.8		
Ear/Nose/Throat (Sinusitis)					
Yes	25	56.0	44.0	1.4	0.2
No	343	67.6	32.4		
GIT diseases (Peptic Ulcer)					
Yes	59	52.5	47.5	6.5	0.01
No	309	69.6	30.4		
Infections (Pneumonia)					
Yes	167	59.3	40.7	7.9	0.005
No	201	73.1	26.9		

Discussion

In this study that was aimed at determining the prevalence of smoking and its associations with clinical symptoms and self reported health problems among patients living with schizophrenia within a Nigerian Clinical population, briefly stated, the results indicate that over a half of respondents were lifetime smokers and over a third were current smokers.

The results of the univariate analyses showed significant association between younger age, male gender, fewer years of education, being unmarried, relatively long duration of illness and presence of diseases, gastrointestinal diseases and infections were also found to have significant associations with both lifetime and current smoking.

Although, a similar study was recently reported in Nigeria [38], this will be first published report that studied the association of common general health conditions with tobacco use in patients living with schizophrenia. Both the lifetime and current prevalence of smoking in patients living with schizophrenia are higher in the present study (53.9% versus 25.9%) and (33.2% versus 20.4%) respectively when compared with the report of Aguocha and colleagues in South Eastern part of

Aguocha and colleagues in South Eastern part of Nigeria [38]. The reason for the higher prevalence of smoking in the present study could be adduced to several reasons. One is differences in instruments used in obtaining history of tobacco use. Another potential reason is the aggressive marketing activities of leading players in the sale of cigarettes, the British American Tobacco company which has a factory in the Ibadan, Nigeria where this study was carried out. The company has had a presence in Nigeria for almost a century. However, similarly high prevalence of smoking in patients living with schizophrenia has been reported in other parts of the world [39].

According to the present study, smoking was more prevalent in the younger age, male gender, low level of education and those who were unmarried. These findings are in support of well documented evidences of smoking being more prevalent among the younger age group, men, among those with low educational attainment and those who are not married [40]. This could be adduced to common demographic correlates between schizophrenia and substance use and abuse. For example, schizophrenia starts early in life and the chronic course of the illness makes many sufferers of the illness to have poor scholastic functioning and a vast majority live alone and unmarried.

In this study, five of every ten respondents were lifetime smokers and three of every ten were current smokers. Contrary to the work of Aguocha and colleagues in South Eastern part of Nigeria [38], these rates are considerably high. Thus, findings from this current study tend to favour the self medication hypothesis in schizophrenia. It has been reported that nicotine ameliorates schizophrenia symptoms and thus is being used by patients with schizophrenia to "treat" negative symptoms [17, 19]. To strengthen this association, negative subscale of PANSS was found to be associated with lifetime tobacco smoking in the present study after multivariate analysis. An additional area that requires consideration is a common aetiological pathway. This may explain why subjects with long duration of untreated psychosis as observed in this study were more likely to be smokers.

In the present study, univariate analysis shows that positive symptoms of schizophrenia were associated with current smoking; however, this association was lost during multivariate analysis. Although, Zhang and colleagues found no association between smoking and positive symptoms [41], Ucok and colleagues found a similar association between smoking and positive symptoms [42]. It is plausible that patients with high degree of positive symptoms would require relatively higher dose of antipsychotics, higher tendency of having extrapyramidal side effects and may self medicate with tobacco to treat such extrapyramidal side effects of the antipsychotic.

The significant high scores reported in the general psychopathology subscale of PANSS among smokers as reported in the current study, further corroborates reports indicating that smokers were more likely to have severe psychopathologies [14]. To strengthen this association, after adjusting for gender during multivariate analysis, the present study found that the general psychopathology subscale of PANSS was the only variable that remained associated with current tobacco use in schizophrenia. A possible mechanism for the high rate of smoking in patients living with schizophrenia is that, nicotine affects several neurotransmitter systems, including dopamine, γ-aminobutyric acid, glutamate and some of the neuropsychological deficits that are related to these neurotransmitters. These neuropsychological deficits include reaction time, sustained emotion, sensory gait and spatial working memory, all of which are alleviated with tobacco use [43].

In support of well documented evidences of associations between smoking and various health conditions [2], the results of univariate analysis show significant association between lifetime and current smoking and haematological, respiratory, gastrointestinal disease and infections. The health hazards of smoking have been attributed to the contents of tobacco smoke. Tobacco smoke contains over 70 carcinogens, hundreds of other toxins, and nicotine a highly addictive drug [44].

The finding that a little more than half of this study sample was lifetime smokers and a third was current users is a useful epidemiological tool regarding prevention of tobacco use among patients living with schizophrenia. This is because of research evidence suggesting that high rates of smoking in psychotic patients may partly account for the 20% reduction in life expectancy reported in this population [45]. This is particularly relevant considering the finding that the mean duration of smoking initiation is longer than duration of the illness. A genetic neurophysiological dysfunction which is associated with hippocampal alpha 7 nicotine receptors dysfunction, and which is ameliorated by nicotine, has been reported in patients with schizophrenia [46]. This has been attributed to the link between the 15q13-14 region of the genome coding for the α7 nicotinic receptor and schizophrenia [46]. Recent epidemiological surveys have indicated smokers are more likely to develop new psychotic symptoms compared with non smokers

[47] and their first degree relatives are also more likely to have greater stereotypy [48]. Thus, genetic factors could make persons who are vulnerable to schizophrenia to be susceptible to cigarette smoking and to commence early in life [49].

Clinical implications: Although results from the present study may not be generalizable to other clinical population within the country or elsewhere, prevalence of smoking in patients living with schizophrenia has been found to be high in the present study. Despite this, only about a fifth of lifetime smokers had quit. Thus, patients undergoing treatment for schizophrenia require screening for tobacco smoking in order to institute tobacco cessation program simultaneously with their treatment for schizophrenia.

Although none of the health conditions studied was found to be associated with smoking after multivariate analysis, identifying and treating nicotine use/dependence is an epidemiological tool that may be helpful in reducing morbidity and mortality in schizophrenia. There is the need for longitudinal studies in order to establish the possibility of a causal relationship between cigarette smoking and psychopathology.

This study has a number of limitations. Health conditions were by self reports; this could have led to significant under-reporting. Also the possibility of recall bias could have affected the estimates of both lifetime and current tobacco consumption. Diagnosis of nicotine dependence was not allocated to subjects in this study; this could have restricted comparability of variables.

Acknowledgements

Acknowledgement is given to the Director of Planning, Research and Statistics, Oyo state Ministry of Health, Ibadan for granting ethical approval for this study. Acknowledge with thanks is also given to Christianah Alabi (NWPSH) for providing support during data collection.

References

1. Bennett DA, Krishnamurthi RV, Barker-Collo S, *et al.* Global Burden of Diseases, Injuries, and Risk Factors 2010 Study Stroke Expert Group. The Global Burden of Ischemic Stroke: Findings of the GBD 2010 Study. Glob Heart, 2014; 9(1):107-112.
2. Centre for Disease Control and Prevention. Smoking and Tobacco Use. Tobacco –Related Mortality. Updated February 2014. Accessed November 2014: http://www.cdc.gov/tobacco/data_statistics/ fact_sheets/health_ effects/ tobacco_related_mortality/
3. Sagud M, Mihaljević-Peles A, Mück-Seler D, *et al.* Smoking and schizophrenia. Psychiatr Danub, 2009; 21: 371–375
4. Dome P, Lazary J, Kalapos MP and Rihmer Z. Smoking, nicotine and neuropsychiatric disorders. Neurosci Biobehav Rev, 2010; 34:295–342.
5. Chandra PS, Carey MP, Carey KB, *et al.* Prevalence and correlates of tobacco use and nicotine dependence among psychiatric patients in India. Addict Behav, 2005; 30:1290–1299.
6. de Leon J and Diaz FJ. A meta-analysis of worldwide studies demonstrates an association between schizophrenia and tobacco smoking behaviours. Schizophr Res, 2005; 76:135–157.
7. Kumari V and Postma P. Nicotine use in schizophrenia: the self medication hypotheses. Neurosci Biobehav Rev 2005, 29: 1021–1034
8. Weinberger A, Reutenauer E, Vessichio J. *et al.* Survey of clinician attitude towards smoking cessation for psychiatric and substance abusing clients. J Addict Dis, 2008, 27: 55–63
9. Ragg M, Gordon R, Ahmed T and Allan J. The impact of smoking cessation on schizophrenia and major depression. Australas Psychiatry, 2013; 21(3):238-245.
10. Yovel G, Sirota P, Mazeh D, *et al.* Higher natural killer cell activity in schizophrenic patients: the impact of serum factors, medication, and smoking. Brain Behav Immun. 2000, 14(3):153-169.
11. Srinivasan TN and Thara R. Smoking in schizophrenia — all is not biological. Schizophr Res, 2002; 56:67–74.
12. Quednow BB, Brinkmeyer J, Mobascher A, *et al.* Schizophrenia risk polymorphisms in the TCF4 gene interact with smoking in the modulation of auditory sensory gating. Proc Natl Acad Sci U S A, 2012; 109: 6271–6276
13. Bierut LJ, Madden PA, Breslau N, *et al.* Novel genes identified in a high-density genome wide association study for nicotine dependence. Hum Mol Genet, 2007; 16:24–35.
14. Kobayashi M, Ito H, Okumura Y, *et al.* Hospital readmission in first-time admitted patients with schizophrenia: smoking patients had higher hospital readmission rate than non-smoking patients. Int J Psychiatry Med, 2010; 40: 247–257.
15. George TP, Vessicchio JC, Termine A, *et al.* Effects of smoking abstinence on visuospatial

working memory function in schizophrenia. Neuropsychopharmacology, 2002;26:75–85.
16. Sacco KA, Termine A, Seyal A, *et al.* Effects of cigarette smoking on spatial working memory and attentional deficits in schizophrenia: involvement of nicotinic receptor mechanisms. Arch Gen Psychiatry, 2005; 62(6):649-659.
17. Freedman R. α7-nicotinic acetylcholine receptor agonists for cognitive enhancement in schizophrenia. Annu Rev Med, 2014; 65:245-261.
18. Dome P, Lazary J, Kalapos MP and Rihmer Z. Smoking, nicotine and neuropsychiatric disorders. Neurosci Biobehav Rev, 2010; 34:295–342.
19. Barr AM, Procyshyn RM, Hui P, *et al.* Self-reported motivation to smoke in schizophrenia is related to antipsychotic drug treatment, Schizophr Res. 2008; 100:252–260.
20. Barnes M, Lawford BR, Burton SC, *et al.* Smoking and schizophrenia: is symptom profile related to smoking and which antipsychotic medication is of benefit in reducing cigarette use? Aust N Z J Psychiatry, 2006; 40:575–580.
21. Silvestri S, Negrete JC, Seeman MV, *et al.* Does nicotine affect D2 receptor upregulation? A case-control study. Acta Psychiatr Scand, 2004; 109:313–317.
22. Chong SA, Tan EC and Tan CH, Mythily Smoking and tardive dyskinesia: lack of involvement of the CYP1A2 gene. J Psychiatry Neurosci, 2003; 28:185–189.
23. Diehl A, Reinhard I, Schmitt A, Mann K and Gattaz WF. Does the degree of smoking effect the severity of tardive dyskinesia? A longitudinal clinical trial. Eur Psychiatry, 2009; 24:33–40.
24. Lawrence D, Hancock KJ and Kisely S. The gap in life expectancy from preventable physical illness in psychiatric patients in Western Australia: retrospective analysis of population based registers. BMJ, 2013; 346: f2539.
25. Gureje O and Lasebikan V O. Use of mental health services in a developing country, Result from the Nigerian Survey of mental health and Well being. Soc Psych Psych Epid, 2005; 41: 44-49.
26. National Population Commission of Nigeria. National Population Facts and Figures. National Population Commission of Nigeria, Abuja Nigeria. www.population.gov.ng/index.php.htm, 2003.
27. Bebbington, P and Nayati, T. The psychosis screening questionnaire. The International Journal of Methods In Psychiatric Research, 1994: (5) 11-19.
28. First MB, Spitzer RL, Gibbon M and Williams JBW. Structured Clinical Interview for DSM-IV Axis I Disorders, Clinical Version, (SCID-CV). Washington, DC: American Psychiatric Press, Inc; 1996.
29. Katz JN, Chang LC, Samgha O *et al.* Can Co-morbidity be measured by questionnaire rather than medical record review? Medical care, 1996; 34, (1) 72 – 84.
30. Kay SR, Flazbein A and Opler LA. The Positive and Negative Syndrome Scale. Schizophrenia Bulletin, 1967 13 (2); 261-275.
31. Morisky, D. E., Green, I. W., and Levine, D. M. Concurrent and predictive validity of a self-reported measure of medication adherence. Medical Care, 1986; 24: 67 – 74.
32. Overall JE and Gorham DR. The Brief Psychiatric Rating Scale. Psychol Rep, 1962; 10:799–812.
33. Singh MM and Kay SR. A comparative study of haloperidol and chlorpromazine in terms of clinical effects and therapeutic reversal with benztropine in schizophrenia. Theoretical implications for potency differences among neuroleptics. Psychopharmacologia 1975; 43:103–113.
34. Ohaeri JU. Naturalistic study of olanzapine in treatment-resistant schizophrenia and acute mania, depression and obsessional disorder. East Afr Med J, 2000; 77(2):86-92
35. Adewuya, A and Ola, A. Medication adherence In Nigerian Patients with Bipolar Disorder. Schizophrenia Research, 2008; 98: 193–199
36. Lasebikan VO and Ayinde OO. Effect of Antipsychotic Intervention on Prevalence of Caregivers' Burden among Caregivers of Patients with Schizophrenia. Indian Journal of Psychological Medicine, 2013; 35 (2); 135-140.
37. Statistical Package for Social Sciences: version 13.0 Illinois, Chicago.
38. Aguocha CM, Aguocha JK, Igwe M, *et al.* Prevalence and correlates of cigarette smoking among patients with schizophrenia in southeast Nigeria. Acta Psychiatr Scand 2014 Sep 11. doi: 10.1111/acps.12334. [Epub ahead of print]
39. Jiang J, See YM, Subramaniam M and Lee J. Investigation of Cigarette Smoking among Male Schizophrenia Patients. Priller J, ed. *PLoS ONE* 2013;8(8):e71343. doi:10.1371/journal.pone.0071343.
40. Lasebikan V and Ojediran B. Profile of Problems and Risk Factors Associated with Tobacco

Consumption among professional drivers in Nigeria. International Scholarly Research Network (Public Health) Volume 2012 (2012), Article ID 580484, 6 pages

41. Zhang X, Liang J, Chen DC, *et al.* Cigarette Smoking in Male Patients with Chronic Schizophrenia in a Chinese Population: Prevalence and Relationship to Clinical Phenotypes. PLoS One. 2012;7(2):e30937
42. Ucok A, Aslihan P, Bozkurt O and Meteris H. Cigarette smoking among patients with schizophrenia and bipolar disorders. J Neuropsychiatry Clin Neurosci, 2004; 58:434-437.
43. Mackowick KM, Barr MS, Wing VC, *et al.* Neurocognitive endophenotypes in schizophrenia: modulation by nicotinic receptor systems. Prog Neuropsychopharmacol Biol Psychiatry, 2014; 52:79-85.
44. Cancer Research UK. Available at www.cancerresearchuk.org. *2012.*
45. Hennekens CH, Hennekens AR, Hollar D and Casey DE. Schizophrenia and increased risks of cardiovascular disease. Am Heart J, 2005;150: 1115–1121.
46. Olincy A and Freedman R. Nicotinic mechanisms in the treatment of psychotic disorders: a focus on the α7 nicotinic receptor. Handb Exp Pharmacol, 2012 ;(213):211-232.
47. Wiles NJ, Zammit S, Bebbington P, *et al.* Self-reported psychotic symptoms in the general population: results from the longitudinal study of the British National Psychiatric Morbidity Survey. Br J Psychiatry, 2006; 188: 519–526.
48. Esterberg ML, Jones EM, Compton MT and Walker EF. Nicotine consumption and schizotypy in first-degree relatives of individuals with schizophrenia and non-psychiatric controls. Schizophr Res, 2007; 97: 6–13.
49. de Leon J and Diaz FJ. A meta-analysis of worldwide studies demonstrates an association between schizophrenia and tobacco smoking behaviours. Schizophr Res, 2005; 76: 135–157.