

Nicotine use in individuals with schizophrenia and its relation with clinical severity



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ABSTRACT

Background: Schizophrenia is a major psychiatric disorder with diverse clinical presentations and comorbidities. Comorbid nicotine use worsens the clinical symptomatology, predisposes the individuals to other chronic illnesses, and is associated with poorer outcomes in schizophrenia. It is thus clinically essential to assess the presence of tobacco use, the severity of nicotine dependence, and its correlation with psychopathology in patients with schizophrenia. **Aims and Objectives:** (i) To describe the pattern of tobacco use and severity of nicotine dependence in schizophrenia patients. (ii) To compare the socio-demographic variables and symptom severity of schizophrenia between tobacco users and non-users. (iii) To determine the correlation between the severity of nicotine dependence and clinical and nicotine related variables in patients of schizophrenia. **Materials and Methods:** It was a cross-sectional observational study conducted in a tertiary care level psychiatric hospital in the northeast of India. The study included 100 male schizophrenia patients. Fagerstrom Test for Nicotine Dependence (FTND) and FTND - Smokeless Tobacco, and the Positive and Negative Syndrome Scale five-factor model was used for assessment of the severity of nicotine dependence and symptoms of Schizophrenia, respectively. **Results:** 70% of the study sample used some form of tobacco. The severity of nicotine dependence was significantly higher in patients using both forms of tobacco. Tobacco use was significantly associated with lower educational status, employment status, and positive symptoms of Schizophrenia. Finally, the severity of nicotine dependence was significantly correlated with the severity of positive and emotional symptoms of schizophrenia. **Conclusion:** Higher positive and emotional symptoms of schizophrenia predicted severity of nicotine use. Study needs to be replicated in larger population of patients suffering from schizophrenia.

Key words: Nicotine dependence; Psychopathology; Schizophrenia; Tobacco use disorders

INTRODUCTION

Schizophrenia is a major psychiatric disorder affecting around 20 million people worldwide.¹ The disease has a diverse clinical presentation and comorbidities, the most prominent being depression, anxiety spectrum disorders, and substance use disorders. These comorbidities are associated with a severe illness and poor prognosis. Comorbid substance use is associated with more positive symptoms and relapse, increased risk of violence and suicide, heightened medical comorbidities, poorer drug compliance, and legal problems.^{2,3} Some studies have found

associations between the type of comorbid substance use and psychopathology in schizophrenia with more frequent positive symptoms in alcohol-dependent patients and more negative symptoms in patients who are smokers than non-smokers.⁴

In the Clinical Antipsychotic Trials of Intervention Effectiveness study, a total of 68 per cent of schizophrenia patients were nicotine dependent.⁵ A review by Thoma and Dauma, 2013 on comorbid substance use disorder in schizophrenia reported that patients with schizophrenia are 3 times more likely than the general population to initiate

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smoking and are 5 times less likely to quit smoking, with current prevalence rates of up to 80%.⁶

Nicotine use behavior in schizophrenia may likely result from a complex interplay between the psychopathological, biochemical, neuropharmacological and socio-cultural aspects of nicotine use and schizophrenia.⁷ Previous studies proposed that the higher occurrence of smoking and use of smokeless tobacco among schizophrenia patients might reflect their effort to remediate cognitive dysfunction by themselves.⁸ Irrespective of the cause, the high degree of tobacco use and nicotine dependence among patients with schizophrenia warrants attention because nicotine interferes with pharmacological treatment, worsens the clinical symptomatology, predisposes these individuals to other chronic illnesses and is associated with poorer outcomes, higher rates of morbidity and mortality.⁹

In India, especially in the northeastern states, smokeless tobacco use is increasing along with smoking. The National Mental Health Survey 2016 reported a prevalence of 20.9% of tobacco use disorders in the general population of India and 25.79% in the state of Assam.^{10,11} However, the research on the extent and pattern of tobacco use, the severity of nicotine dependence, and its relationship with the clinical severity of schizophrenia patients is sparse in this region and other parts of India. It is clinically essential to assess the presence and extent of tobacco use, the severity of nicotine dependence in patients with schizophrenia, and its correlation with psychopathology. Furthermore, it would guide us to plan a holistic, individually tailored treatment approach targeting both the conditions and their relation.

Objectives

Given this, the present study was being undertaken with the following objectives:

- i. To describe the pattern of tobacco use and severity of nicotine dependence in patients with schizophrenia.
- ii. To compare the socio-demographic variables and symptom severity of schizophrenia between tobacco users and non-users.
- iii. To determine the correlation between the severity of nicotine dependence and psychopathology in patients with schizophrenia.

MATERIALS AND METHODS

The study was a hospital-based cross-sectional study conducted in a tertiary care psychiatry institute in the northeastern state of Assam in India over 1 year. The institute provides outpatient and in-patient mental health services to patients with mental illness from the entire northeast region of India. A purposive sampling technique

was employed. Drug naive male patients attending outpatient department, diagnosed with Schizophrenia as per ICD-10 criteria, aged 18–60 years, who could read and understand either English or Assamese were included. Patients with other comorbid psychiatric disorders and substance dependence other than nicotine and caffeine, intellectual disability, and uncooperative patients were excluded from the study.

A total of 100 cases were taken. After obtaining informed consent, the patient's socio-demographic and clinical details were collected with the help of a semi-structured socio-demographic and clinical study proforma. After that, tobacco-using patients completed the Fagerstrom Test for Nicotine Dependence (FTND), followed by the administration of the Positive and Negative Syndrome Scale (PANSS) five-factor model on all subjects. They were fully explained about the need and nature of the research and the protection of their identity in a comprehensible language before taking their consent. They were also informed that their participation in the study was entirely voluntary, and non-participation would not in any way affect their treatment.

Tools

Socio-demographic proforma

To collect data on the socioeconomic characteristics of the study sample. Updated B.J. Prasad socioeconomic classification for 2016 was used for information on the socioeconomic status.¹²

PANSS

The PANSS measurement derives from behavioral information plus a four-phase 35–45-min clinical interview. A seven-point rating on 30 symptoms is used, which provide summary scores on a seven-item (P1 to P7) positive scale, seven-item (N1 to N7) negative scale, sixteen items (G1 to G16) general psychopathology scale, a composite (positive minus negative) index, and a total score ranging from 30 to 210.

The PANSS is still the most frequently used instrument for rating Schizophrenia symptoms, which are currently clustered into five factors that are more appropriate for the description of relevant heuristic clinical dimensions called “positive,” “negative,” “emotional,” “excitement,” and “disorganization.” The total scores for these five individual dimensions are computed utilizing a different combination of items from the original 30 items three subscale PANSS, with an overlap of some items in the five dimensions. The five-factor model has a satisfactory goodness-of-fit (Comparative Fit Index=0.905; Root Mean Square Error of Approximation=0.052) (Kumar A and Khess CR, 2012). This five-factor model of PANSS has

been used in the present study. Being an observer-rated tool, it did not need translation into the local language. The scale was applied earlier to the Indian population and has been found to suit its purpose.¹³

FTND

The FTND is a self-administered standard six items scale for assessing the intensity of physical nicotine dependence. The test provides an ordinal measure of nicotine dependence related to cigarette smoking. The “yes/no” items are scored 0 or 1, and multiple-choice items are scored from 0 to 3. Finally, the items are summed to give a total score of 0–10. Likewise, FTND - Smokeless Tobacco (FTND-ST), another six items scale, measures the quantity of smokeless tobacco consumption, the compulsion to use, and dependence with a maximum score of 10. The higher the Fagerstrom score, the more intense the patient’s physical dependence on nicotine.¹⁴

Both of the above tools, FTND and FTND-ST, were translated into Assamese and back-translated into English before being administered. The translated version was tested for reliability and was statistically reliable with a Cronbach’s alpha of 0.9.

Ethical consideration

The institutional ethical committee approval has been duly taken before the commencement of the study.

Statistical analysis

Statistical Package for the Social Science, version 20, was used. All continuous variables were checked for normal distributions using the Kolmogorov–Smirnov test. Frequency distribution was used for descriptive statistics. Pearson’s correlation and chi-square tests were used for inferential statistics.

RESULTS

Socio-demographic and clinical variables of the study sample

The mean age of our total study sample was 31.5 ± 9.6 years. Less than 1/3rd (31%) of our patients were currently married. Majority of them were either never married, or separated. In addition, most of the patients were from a rural background (88%), Hindu by religion (62%), lived in a nuclear family (66%), unemployed (50%), had at least 6 years of formal education (65%) and belonged to lower-middle socioeconomic status (43%). Our study sample’s mean age of onset of Schizophrenia was 27 ± 9.6 years, and the mean duration of illness was 55.4 ± 54.2 months. Twenty-nine percent of our study sample had a family history of psychiatric illness and a history of other substance use.

The pattern of nicotine use and severity of nicotine dependence

Table 1 shows the use and severity of nicotine dependence pattern in our study sample. The FTND and FTND-ST scores were significantly higher for those using both forms of nicotine ($F=3.740$, $P=0.029$).

Nicotine related variables

The mean age of starting any form of nicotine use in our study sample was 17.1 years ($SD \pm 3.3$ years) and 19.8 years ($SD \pm 3.8$ years) was the mean age of daily tobacco consumption. The average number of smoking or serving of smokeless nicotine per day was 8.6 ($SD \pm 5.0$), and the average amount of money spent per day on tobacco products was Rs 13.4 ($SD \pm 18.6$).

Socio-demographic variables of Nicotine users and non-users

Nicotine use was significantly higher in patients with 10 or lesser years of formal education, and in those who were employed. No other socio-demographic variables showed significant correlation with nicotine use status. Kindly refer to Table 2 for further details.

Schizophrenia symptom severity in nicotine users and non-users

Table 3 shows the difference in symptom severity of schizophrenia between tobacco non-users and users.

Correlation of severity of nicotine dependence with clinical severity

The severity of nicotine dependence had a significant positive correlation with positive and emotional dimensions of PANSS (Table 4).

DISCUSSION

The mean age of the study population was 31.5 years ($SD \pm 9.6$ years). Other researchers have also documented similar findings.^{15,16} The majority of our study sample was unmarried. Almost two-thirds (66%) of our study sample belonged to a nuclear family, which matches the latest Census of India (2011) data that depicts nuclear families to form the majority of Indian households (70%).¹⁷ On the other hand, the percentage of literate patients in our study (85%) is higher than the literacy rate of males in this region, which has been 77.85% as per the latest Census of India (2011) data.¹⁸ Greater awareness to seek treatment for mental illness among the literates may explain this discrepancy in the study sample.

Seventy percent of our study sample used some or other form of nicotine. This finding is similar to a cross-sectional study conducted in Kerman where smoking prevalence

Table 1: FTND and FTND-ST scores among nicotine users

Mode of nicotine use	Number of users (%)	Mean	Std. deviation	Minimum value	Maximum value	Range	df	F value	P-value
Smoked	24 (34.3)	5.29	2.053	2	8	6			
Smokeless	36 (51.4)	6.14	2.031	3	9	6			
Both (Smoked and Smokeless)	10 (14.3)	7.30	1.636	4	10	6	2	3.740	0.029*
Total	70 (100)	6.01	2.068	2	10	8			

*P-value significant. FTND: Fagerstrom test for nicotine dependence FTND-ST: Fagerstrom test for nicotine dependence - Smokeless tobacco

Table 2: Comparison of socio-demographic variables among nicotine users and non-users

Demographic parameters	Nicotine users N (%)	Nicotine non-users N (%)	Statistics#	df	P-value
Age (mean)	32 years	29.4 years	0.138	-	0.171
Years of formal education					
≤10 years	58 (83)	17 (57)	7.683	1	0.006*
More than 10 years	12 (17)	13 (43)			
Marital status					
Currently married	25 (36)	6 (20)	2.424	1	0.119
Single	45 (64)	24 (80)			
Occupation					
Unemployed	30 (43)	20 (70)	4.762	1	0.029*
Employed	40 (57)	10 (30)			
Socio-economic status					
Upper class	2 (3)	2 (7)		4	0.725 ^a
Upper middle class	5 (7)	4 (13)	2.06		
Middle class	19 (27)	8 (27)			
Lower middle class	32 (46)	11 (36)			
Lower class	12 (17)	5 (17)			
Family history of psychiatric illness					
Present	23 (33)	6 (20)	1.686	1	0.194
Absent	47 (67)	24 (80)			

#For Age (mean) point biserial correlation has been done, for rest of the statistics Chi-square has been used. *P value statistically significant (<0.05); ^aFisher's exact test applied

Table 3: Comparison of Schizophrenia symptom severity in nicotine users and non-users

Variable	Nicotine non-users (Mean±SD)	Nicotine users (Mean±SD)	t value	P-value
PANSS	17.2333±4.74657	20.4429±5.35314	2.839	0.006**
Positive				
PANSS	20.2667±9.21742	19.5286±6.40136	0.460	0.646
Negative				
PANSS	24.3667±5.17609	22.7714±5.76640	1.306	0.195
Disorganization				
PANSS	21.2000±4.82379	21.5286±4.38615	0.333	0.740
Excitement				
PANSS	16.5333±5.38025	17.9571±4.36201	1.392	0.167
Emotional				

**P-value statistically significant. PANSS: Positive and negative syndrome scale

Table 4: Correlation of severity of nicotine dependence with PANSS scores

Variables	R value	P value
PANSS positive	0.313	0.008**
PANSS negative	0.008	0.947
PANSS disorganization	-0.151	0.213
PANSS emotional	0.291	0.014*
PANSS excitement	0.098	0.418
PANSS total	0.040	0.742

*Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed). PANSS: Positive and negative syndrome scale

was 71.6% in Schizophrenia patients.¹⁹ In addition, a meta-analysis of worldwide studies of Schizophrenia and tobacco smoking behaviors found that the prevalence of active smoker among patients with Schizophrenia was 62%.²⁰

The prevalence of tobacco use among male schizophrenia patients in our study (70%) is higher than the average rate of tobacco use for the Indian male population.^{21,22}

More than half (51.4%) of nicotine users used smokeless forms of tobacco, whereas 34.3% smoked (either bidis or

cigarette), and only 14.3% used both smoked and smokeless forms of tobacco. The mean FTND score of the study sample was 6 (SD \pm 2.1). This finding is comparable to a cross-sectional survey of clinical measures and measures of nicotine dependence in schizophrenia patients in Nithsdale, Scotland, by Krishnadas et al., 2012.²³

The mean age of starting any form of nicotine use in our study sample was 17.1 years (SD \pm 3.3 years). It is similar to the findings of other previous studies conducted by Ziaaddini et al., 2009 and Edrissinghe et al., 2014.^{19,24}

In our study, the mean number of smoking or servings of smokeless tobacco per day was 8.6. This is lower than the mean daily consumption observed in the Schizophrenia group by de Leon et al., 1995 (19/day) and Herrán et al., 2000 (22.4/day).^{25,26} Differences in socio-cultural, economic factors, and methodological differences like study sample, type of tobacco product assessed may explain this difference.

The presence of nicotine use was significantly higher in patients with 10 years or less of formal education. This is similar to previous studies with higher smoking prevalence in illiterate patients.^{14,23} In our study, the presence of nicotine use was greater in employed subjects. In contrast to it, Krishnadas et al., 2012 and Reddy et al., 2013 in their study had reported that unemployment was higher in schizophrenic patients who smoke.^{14,23}

The mean PANSS positive score between nicotine users and non-users was significantly different, whereas both groups' mean negative, disorganization, emotional and excitement scores were largely comparable. On the contrary, a study done by Saliba et al., 2016 found a significantly lower mean PANSS negative symptoms score in the smoking group than the non-smoking group and no significant difference for the positive score.²⁷ A different profile of schizophrenia patients included in the study may explain the difference in these findings. Our finding of PANSS disorganization, emotional and excitement score could not be compared with other studies due to the dearth of studies taking the five-factor model of PANSS in assessing schizophrenia psychopathology in similar studies.

Our result showed that FTND score was significantly positively correlated with PANSS positive score ($P=0.008$, $r=0.313$) and emotional score ($P=0.014$, $r=0.291$). Some other studies have depicted severe nicotine-dependent Schizophrenia patients had higher mean scores on the positive subscale, which is similar to our result. However, unlike multiple other studies (Ziedonis et al., 1994, Patkar et al., 2002, Reddy et al., 2013), we have not found any significant correlation between FTND score and PANSS negative score.^{28,29} In a recent animal study by Koukouli et al., 2017³⁰ showed how cholinergic transmission, acting through $\alpha 5$,

$\alpha 7$, and $\beta 2$ nicotinic acetylcholine receptors—can regulate higher-level cortical circuits. The animal model demonstrated that the deficits in these receptors might contribute to the hypofrontality that characterizes Schizophrenia. Hence, this finding partially supports our findings.

Limitations of the study

A hospital-based study involving a small sample size, a non-probability sampling technique, and lack of control group are some of the limitations of the present study.

CONCLUSION

The findings of the study thus give some insight into the problem of nicotine use and dependence among schizophrenia patients and the relation of nicotine dependence with psychopathology. This highlights the need for detailed evaluation of comorbid nicotine use in clinical settings amongst schizophrenia patients.

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