

Research Article

Pattern and Determinants of Cognitive Impairment among Cigarette-Smoking Patients with Schizophrenia: A Cross-Sectional Study from Pakistan

Bakhtawar Shaikh^{1*}, Inayatullah Awan², Amber u Nissa³, Maria Iqbal⁴, Jamil Junejo⁵, Benazir⁶

^{1*}Consultant Psychiatrist, Department of Psychiatry, Ghulam Muhammad Mahar Medical College Hospital, Sukkur, Pakistan.

²Associate Professor of Psychiatry, Ghulam Muhammad Mahar Medical College, Sukkur, Pakistan.

³Consultant Gynaecologist, Shaikh Zayed women hospital, Shaheed Mohtarma Benazir Bhutto Medical University, Larkana, Pakistan.

⁴Department of Dermatology, JPMC, Karachi, Pakistan.

⁵Associate Professor Psychiatry, Liaquat University of Medical and Health Sciences, Jamshoro, Pakistan.

⁶Gynecologist, Anwer Paracha Hospital, Sukkur, Pakistan.

Corresponding Author: Dr. Bakhtawar Shaikh,

Consultant Psychiatrist, Department of Psychiatry, Ghulam Muhammad Mahar Medical College Hospital, Sukkur, Pakistan.

Email: shaikhbakhtawar7@gmail.com

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ABSTRACT

Background: Schizophrenia is a chronic psychiatric disorder that can affect several aspects of cognition, including attention, memory, executive functioning, and information processing. Cognitive difficulties may persist even when prominent psychotic symptoms improve. Cigarette smoking is also considerably more common among people with schizophrenia than in the general population, although the relationship between smoking and cognitive functioning remains complex.

Objective: This study aimed to assess cognitive functioning in patients with schizophrenia who smoke cigarettes and to identify demographic and clinical factors associated with cognitive performance.

Methods: A hospital-based cross-sectional study was conducted at Sir Cowasjee Jahangir Institute of Psychiatry, Hyderabad, Pakistan. A total of 323 patients with schizophrenia who were active cigarette smokers were enrolled using non-probability consecutive sampling. Cognitive functioning was assessed with the Mini-Mental State Examination (MMSE), and the data were analyzed using SPSS version 20.

Results: The mean age of participants was 44.11 ± 10.63 years, and the mean MMSE score was 18.65 ± 4.09 . Lower MMSE scores were significantly associated with increasing age ($p=0.004$), lower educational attainment ($p=0.0005$), lower socioeconomic status ($p=0.0005$), and longer duration of cigarette smoking ($p=0.0005$). No statistically significant association was found between duration of schizophrenia and cognitive performance.

Conclusion: Cognitive impairment was common among cigarette-smoking patients with schizophrenia. Older age, longer smoking exposure, lower educational attainment, and lower socioeconomic status were associated with poorer cognitive performance. These findings support the value of routine cognitive assessment and smoking-cessation interventions as part of comprehensive psychiatric care.

Keywords: Schizophrenia, Cognitive Dysfunction, Smoking, Mmse, Neurocognition.

INTRODUCTION

Schizophrenia is a chronic psychiatric disorder characterized by disturbances in thought, perception, emotional expression, and behavior. Cognitive dysfunction is now recognized as an important component of the illness because it can substantially affect everyday functioning, disability, and social outcomes.[1-4]

Patients with schizophrenia may experience difficulties in attention, memory, executive

functioning, and the speed of information processing. These problems may remain evident even after psychotic symptoms have improved and can therefore contribute to persistent functional difficulties.[2,4,5,13]

Cigarette smoking is particularly common among people with schizophrenia. Several explanations have been proposed, including the possibility that nicotine is used as a form of self-medication to relieve symptoms or temporarily improve aspects of cognition.[6,12] However,

evidence has also raised concerns that prolonged tobacco exposure may be associated with adverse cognitive effects.[7-9,15,16]

Nicotine acts on nicotinic acetylcholine receptors and interacts with dopaminergic and other neural pathways involved in cognition, reward, and the pathophysiology of schizophrenia.[11,17,19] These mechanisms may partly explain the complex relationship between nicotine exposure and cognitive performance in schizophrenia.

Evidence from Pakistan on cognitive functioning among cigarette-smoking patients with schizophrenia remains limited. The present study was therefore undertaken to assess cognitive performance in this population and to examine demographic and clinical factors associated with cognitive outcomes.

MATERIALS AND METHODS

Study Design: A hospital-based cross-sectional study was conducted.

Study Setting: The study was carried out at Sir Cowasjee Jahangir Institute of Psychiatry, Hyderabad, Pakistan.

Study Population: The study included 323 patients diagnosed with schizophrenia who were actively smoking cigarettes.

Sampling Technique: Participants were recruited using a non-probability consecutive sampling method.

Inclusion Criteria: Patients aged 18–65 years with a confirmed diagnosis of schizophrenia and current cigarette-smoking behavior were included in the study.

Assessment Instrument: Cognitive functioning was assessed using the Mini-Mental State Examination (MMSE).

Statistical Analysis: Data were analyzed using SPSS version 20. Descriptive statistics were presented as mean $\pm$ standard deviation (SD), and associations were assessed using a significance threshold of $p \leq 0.05$.

RESULTS

A total of 323 patients diagnosed with schizophrenia who reported active cigarette smoking participated in the study.

The mean age of the participants was 44.11 ± 10.63 years. The mean duration of cigarette smoking was 8.35 ± 3.35 years, while the mean duration of schizophrenia was 4.66 ± 1.70 years.

The mean total MMSE score was 18.65 ± 4.09 , with a 95% confidence interval (CI) of 18.21–19.10, indicating a substantial degree of cognitive impairment in the study population.

Table 1. Baseline Demographic and Clinical Characteristics of Participants

Variable	Mean $\pm$ SD	Median	IQR
Age (years)	44.11 ± 10.63	45	17
Duration of Smoking (years)	8.35 ± 3.35	8	2
Duration of Schizophrenia (years)	4.66 ± 1.70	5	2
Total MMSE Score	18.65 ± 4.09	18	7

The participants were predominantly middle-aged and had a history of sustained cigarette exposure. The mean MMSE score indicated

reduced overall cognitive functioning in the study sample.

Table 2. Mmse Cognitive Domain Scores

MMSE Domain	Mean $\pm$ SD	Median	IQR
Orientation	6.49 ± 1.61	6	3
Registration	1.97 ± 0.65	2	0
Attention	3.46 ± 1.38	3	3
Recall	1.93 ± 0.53	2	0
Language	4.17 ± 1.60	4	3
Copying	0.64 ± 0.48	1	1

Lower scores were particularly evident in the attention, language, and copying domains,

suggesting difficulties in several areas of cognitive functioning.

Table 3. Association between Participant Characteristics and MMSE Score

Variable	Mean MMSE	P value	Statistical Significance
Age ≤40 years	Higher	0.004	Significant
Age >40 years	Lower		
Higher Education	Higher	0.0005	Significant
Lower Education	Lower		
Higher Socioeconomic Status	Higher	0.0005	Significant
Lower Socioeconomic Status	Lower		
Smoking Duration ≤10 years	Higher	0.0005	Significant
Smoking Duration >10 years	Lower		
Duration of Schizophrenia	No meaningful difference	>0.05	Not Significant
Gender	No meaningful difference	>0.05	Not Significant

Increasing age, lower educational attainment, lower socioeconomic status, and longer

duration of cigarette smoking were significantly associated with poorer cognitive performance.

Table 4. Summary of Overall Cognitive Performance

Statistic	Value
Mean MMSE	18.65
Standard Deviation	4.09
Median	18
Interquartile Range	7
95% Confidence Interval	18.21–19.10

The relatively narrow 95% confidence interval suggests that the estimated mean cognitive score was reasonably precise within this study sample.

Overall, the findings showed a consistent pattern of cognitive impairment among cigarette-smoking patients with schizophrenia. Poorer cognitive performance was more evident among older participants and those with longer smoking histories, whereas higher educational attainment and better socioeconomic status were associated with higher MMSE scores. Duration of schizophrenia itself was not significantly associated with MMSE performance.

DISCUSSION

This study found substantial cognitive impairment among cigarette-smoking patients with schizophrenia. The mean MMSE score of 18.65 ± 4.09 suggests that cognitive difficulties were common in this sample. This finding is in keeping with the established evidence that cognitive dysfunction is an important determinant of functional limitation and long-term disability in schizophrenia.[2,4,5]

Age was significantly associated with cognitive performance, with older participants showing lower MMSE scores. This finding is consistent with evidence describing age-related changes in neurocognitive functioning among people with schizophrenia and supports the

importance of considering age when evaluating cognition in this population.[4,5]

Educational attainment was also significantly associated with cognitive performance. Participants with higher levels of education tended to have higher MMSE scores. One possible explanation is the concept of cognitive reserve, whereby greater educational and intellectual experience may provide some resilience against cognitive difficulties.[14] This finding should, however, be interpreted as an association rather than proof of a protective causal effect.

Longer duration of cigarette smoking was significantly associated with lower cognitive performance. This observation is broadly consistent with studies examining smoking and cognition in schizophrenia, which have reported complex relationships between nicotine exposure and neurocognitive functioning.[7-9,15,16] Although nicotine can produce short-term effects on attention and cognition, these effects should not be interpreted as evidence that long-term cigarette smoking provides sustained cognitive benefit.[6-9,12]

The biological relationship between nicotine and cognition is complex. Nicotine acts at nicotinic acetylcholine receptors and affects neural systems, including dopaminergic pathways that are relevant to both cognition and schizophrenia.[10,11,17,19] This may partly explain why smoking has historically

been considered a possible form of self-medication while, at the same time, chronic smoking exposure has been associated with adverse health and cognitive outcomes.

In the present study, duration of schizophrenia was not significantly associated with MMSE scores. This finding suggests that, within this particular sample, demographic factors and smoking exposure were more clearly related to cognitive performance than the reported duration of illness. Because this was a cross-sectional study, however, the observed associations cannot establish temporal or causal relationships.

The findings have practical implications for psychiatric services. Cognitive assessment can help clinicians recognize patients who may require additional support, while smoking-cessation interventions can address an important modifiable health risk. Integrating physical-health and smoking-related interventions into the care of people with severe mental disorders is consistent with the broader approach recommended by the World Health Organization.[20]

CONCLUSION

Cognitive dysfunction was common among cigarette-smoking patients with schizophrenia in this study. Older age, longer smoking exposure, lower educational attainment, and lower socioeconomic status were associated with poorer cognitive performance, whereas duration of schizophrenia was not significantly associated with MMSE scores.

These findings emphasize the importance of paying attention to cognitive functioning as part of routine psychiatric care. Incorporating appropriate cognitive assessment and structured smoking-cessation support may help clinicians address both neurocognitive difficulties and an important modifiable health risk.[20]

REFERENCES

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Washington, DC: American Psychiatric Association; 2013.
2. Green MF. Cognitive impairment and functional outcome in schizophrenia and bipolar disorder. *J Clin Psychiatry*. 2006;67(Suppl 9):3-8.
3. Kahn RS, Sommer IE. The neurobiology and treatment of first-episode schizophrenia. *Mol Psychiatry*. 2015;20(1):84-97.
4. Keefe RS, Harvey PD. Cognitive impairment in schizophrenia. *Handb Exp Pharmacol*. 2012;213:11-37.
5. Harvey PD, Bowie CR. Cognitive enhancement in schizophrenia. *CNS Drugs*. 2012;26(1):1-15.
6. Winterer G. Why do patients with schizophrenia smoke? *Curr Opin Psychiatry*. 2010;23(2):112-119.
7. Barr RS, Culhane MA, Jubelt LE, Mufti RS, Dyer MA, Weiss AP, et al. The effects of smoking on cognition in schizophrenia. *Schizophr Res*. 2008;99(1-3):252-259.
8. Boggs DL, Surti T, Gupta A, Gupta S. Nicotine and cognition in schizophrenia. *Schizophr Res*. 2013;149(1-3):79-87.
9. Zhang XY, Chen DC, Xiu MH, Yang FD, Kosten TA, Kosten TR. Cigarette smoking and cognitive function in schizophrenia. *Psychiatry Res*. 2012;198(1):1-7.
10. D'Souza MS, Markou A. Neural mechanisms underlying nicotine dependence. *Pharmacol Biochem Behav*. 2011;97(2):205-213.
11. Freedman R. Schizophrenia and nicotinic receptors. *Harv Rev Psychiatry*. 2007;15(4):181-192.
12. Kumari V, Postma P. Nicotine use in schizophrenia. *Br J Psychiatry*. 2005;187:306-312.
13. Nuechterlein KH, Barch DM, Gold JM, Goldberg TE, Green MF, Heaton RK. Identification of separable cognitive factors. *Schizophr Res*. 2004;72(1):29-39.
14. Stern Y. Cognitive reserve. *Neuropsychologia*. 2009;47(10):2015-2028.
15. Depp CA, Bowie CR, Mausbach BT, Wolyniec P, Thornquist MH, Luke J, et al. Current smoking and cognition. *Schizophr Res*. 2015;162(1-3):140-146.
16. Reed SC, Woods SW, Calkins ME, Tsuang MT, Seidman LJ. Smoking and MATRICS cognition. *Schizophr Res*. 2015;163(1-3):137-143.
17. Sacco KA, Bannon KL, George TP. Nicotinic receptor mechanisms. *J Dual Diagn*. 2004;1(1):61-94.
18. Jubelt LE, Barr RS, Goff DC, Logvinenko T, Weiss AP. Effects of transdermal nicotine. *Schizophr Res*. 2008;105(1-3):243-250.

19. Wing VC, Bacher I, Sacco KA, George TP. Neurobiology of nicotine and schizophrenia. *Prog Neuropsychopharmacol Biol Psychiatry*. 2012;38(2):317-328.
20. World Health Organization. Guidelines for the management of physical health conditions in adults with severe mental disorders. Geneva: World Health Organization; 2018.