

Physical Health in Schizophrenia and Role of Clinical Pharmacist: A Narrative Review

Deepak C G¹, Juno Jerold Joel^{1,*}, Shrinivasa Undaru Bhat²

¹Department of Pharmacy Practice, NITTE (Deemed to be University), NGSM Institute of Pharmaceutical Sciences, Deralakatte, Mangalore, Karnataka, INDIA.

²Department of Psychiatry, NITTE (Deemed to be University), KS Hegde Medical Academy, Deralakatte, Mangaluru, Karnataka, INDIA.

ABSTRACT

Schizophrenia is a complex psychiatric disease with an unknown aetiology affecting the biological functions of the brain. It is a psychiatric condition affecting both genders irrespective of race, social class and residential status. Globally lifetime of disease is 0.4%, with a 2.5% mortality rate. Schizophrenic patients die at a young age, about 15-20 years earlier than the general population. Premature death in schizophrenic patients is mainly due to physical illness in the form of cardiovascular and metabolic diseases. Seventy-five percent of patients with a diagnosis of schizophrenia exhibit a minimum of one physical illness and it is more complicated if symptoms are severe. Long-term drug therapy is an eminent risk factor for developing physical illnesses. There is no known cure for schizophrenia; thus, it requires lifelong treatment with antipsychotics. Second-Generation Antipsychotics (SGAs), except clozapine are the first-line drugs for treating schizophrenia. These agents are likely to develop cardiovascular and metabolic side effects like hypertension, hyperlipidemia, weight gain, diabetes mellitus and obesity. Another contributing factor is a sedentary lifestyle. Ignoring these factors while undergoing treatment may result in increased burden, decreased quality of life and shorter life expectancy. Clinical pharmacists have a vital role in managing these patients through proper counselling and medication monitoring for better control of the illness.

Keywords: Schizophrenia, Physical illness, Cardiovascular diseases, Metabolic diseases, Clinical pharmacist.

Correspondence:

Dr. Juno J Joel

Associate Professor and Head,
Department of Pharmacy Practice,
NITTE (Deemed to be University), NGSM
Institute of Pharmaceutical Sciences,
Deralakatte, Mangalore-575018,
Karnataka, INDIA.
Email: junujoel@yahoo.co.in

Received: 02-03-2024;

Revised: 21-05-2024;

Accepted: 19-07-2024.

INTRODUCTION

Schizophrenia (SCZ) is a Serious Mental Illness (SMI) marked by persistent mental disruptions affecting consciousness, language, awareness and sense of identity. Psychotic experiences such as hearing voices, delusions and cognitive and psychosocial impairment are common in SCZ.¹ Schizophrenia spectrum disorders have a significantly higher Cardiovascular Disease (CVD) related morbidity and premature mortality rate than other severe mental disorders. Several factors contribute to cardio-metabolic morbidity a few significant ones are a sedentary lifestyle, abnormal dietary habits and adverse effects from Antipsychotics (AP) due to long-term use.²

Developing countries experience the highest morbidity and mortality rate due to CVD, with an estimated prevalence of 54.4 million due to Physical Illnesses (PI). In addition to shorter life

expectancy of 10 to 20 years, individuals with SMI including SCZ and bipolar disorder also represent a higher incidence of PI and a higher mortality rate.³ The patients with SMI require lifelong therapy with AP and the most common Adverse Drug Reaction (ADR) reported is metabolic syndrome, which increases the risk of chronic cardiovascular diseases such as diabetes mellitus, hypertension, dyslipidemia and metabolic issues such as weight gain and obesity.⁴ A significant portion of hospital readmissions in SCZ is due to ADR and is a major contributor to escalating health care costs.⁵

SCZ patients with reduced ability to access adequate healthcare due to low economic status are at an increased risk of PI.⁶ There are numerous guidelines around the world alerting the need to monitor this vulnerable group's physical health. However, the screening strategies to identify at-risk patients are still inadequate worldwide. This might be due to barriers involved in the Patient and System domains (Figure 1). These barriers can be overcome by the collaboration of healthcare professionals as a whole.⁷ This review aims to explore factors related to physical health in schizophrenia and the pharmacist's role in improving the outcomes.



DOI: 10.5530/jyp.2024.16.78

Copyright Information :

Copyright Author (s) 2024 Distributed under
Creative Commons CC-BY 4.0

Publishing Partner : Manuscript Technomedia. [www.mstechnomedia.com]

PATIENT-RELATED FACTORSS

Health literacy

Low educational level may influence schizophrenic's knowledge of the PI. Patients are more concerned about treating psychotic symptoms than their general health. It is also less critical for them to worry about the likelihood of severe PI which makes it challenging to proper recognition of somatic symptoms.⁸

Low economic status

Living in disadvantaged economic circumstances, compounded by the stress and isolation associated with low income, poses formidable obstacles to timely and effective screening and treatment of the illness.⁹

Social deprivation

Their solitary behaviour may be associated with cognitive prejudices that impact mental and physical health more than those in the healthy population. Furthermore, patients are more likely to agonize over challenging socio-environmental situations (e.g. poverty, low occupation rates, stumpy marriage) than the general population.¹⁰

Physical inactivity

There are specific reasons responsible for physical inactivity (Table 1). First, a reduction in physical activity and an increase in the time spent on sedentary behaviour may be related to unemployment and social isolation allied with low communal functioning in persons with SCZ. Second, these patients may experience a decline in physical fitness due to antipsychotic-induced extrapyramidal symptoms or weight gain, which may hamper their activity levels. Third, there is a higher level of psychopathology and a lower level of social engagement in those physically inactive than in those involved in physical activities.^{11,12}

Poor diet

Poor diets in patients are related to low socioeconomic status and reduced access to healthy foods. Several studies have been conducted and the results suggest that the diets of these patients tend to contain a lower intake of fresh fruits, vegetables and more saturated fats.¹³

Anti-psychotic medications

Second-Generation Antipsychotics (SGA) are well known for increasing appetite, which can contribute to weight gain and obesity when lifelong drug therapy is recommended (Table 2).¹⁴ The initiation of AP therapy is accompanied by a marked acceleration in appetite and early triglyceride escalation, resulting in a new or deteriorated dyslipidaemia and glucose dysregulation. A premature weight gain may also occur during

drug therapy and persist for months or years and may lead to treatment denial, reduced self-confidence, shame and deteriorating physical health.^{15,16}

Alcohol use disorder

In those suffering from psychiatric conditions like SCZ, alcohol use disorder is more prevalent making the condition worse and affecting their treatment outcomes. Excessive drinking has been related to various physical health conditions, such as CVD, liver disease and digestive problems.¹⁷

Smoking

SCZ patients smoke at an average rate of two to four times greater than those without the condition. Consequently, tobacco smoke increases the risk of natural cause mortality by a factor of more than two. In addition, there is an additive effect on cardiovascular and respiratory health. Furthermore, research has found that in the majority of cases of SCZ, there is a high risk for CVD as a result of lifestyle influences like smoking, even before the onset of psychosis.¹⁸

Sleep disorders

Research has shown that those SCZ patients who slept poorly had higher levels of depression, anxiety and more likelihood of ADR than those who slept well.¹⁹ It is generally accepted that patients with concurrent sleep disorders have a poorer Quality of Life (QoL).²⁰

HEALTH SYSTEM-RELATED FACTORS

Lack of sufficient personnel, knowledge and time in healthcare professionals

Most physicians involved in treating SCZ acknowledge that primary care has a significant role to play in physical health. Unfortunately, in practice, they may fail to address and treat metabolic challenges in this population. Receiving treatment advice in a busy medical clinic can be challenging. Further worsening of the situation may arise when there is no adequate number of professional rehabilitators with expertise and functional abilities to treat SCZ patients with complex behaviours and substance abuse.²¹

Poor screening

The main reasons for the poor screening in SCZ are the lengthy screening process and the extra paperwork required in addition to the admission assessment. In some situations, a physical examination may be postponed due to the patient's uncooperative or hostile nature. Finally, the question of responsibility for physical screening remained unclear: should it be the psychiatrist or the hospitalist? If no screening occurs, an ideal chance to lower health risks and death rates among these vulnerable individuals will be missed.²²

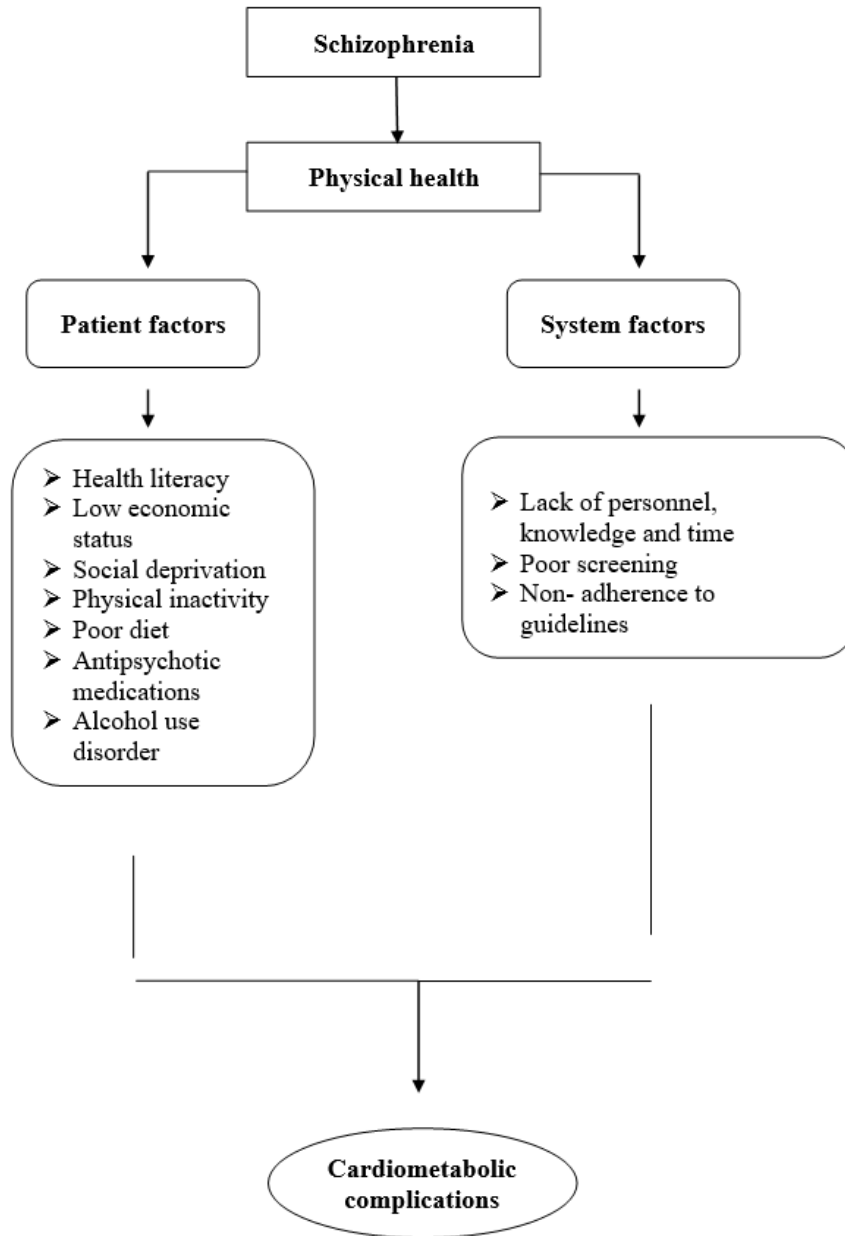


Figure 1: Depicts the typical representation of factors affecting physical health in schizophrenia. There are numerous patient and system-related factors that source for the deterioration of physical health and development of cardiometabolic complications in schizophrenia.

Non-adherence to the guidelines

Most guidelines recommend physical examination for people with SMI like SCZ, without including specific standards for monitoring adverse cardiometabolic effects of AP. Moreover, these guidelines differ from one another when it comes to monitoring the nature, extent and range of physical health domains to be assessed. Some guidelines recommend 'frequent' surveillance when monitoring indications, primarily only when risk factors are present. However, only a few of them suggest frequent monitoring following the use of AP medication.²³⁻²⁵

Cost of Screening

Literature indicates that current screening procedures using blood samples for assessment of physical health of SCZ in low and middle-income countries are relatively expensive.²⁶ This disparity is probably due to differences in economic status between the countries, availability of resources and mental health personnel and government funding allocation to mental health. Another main factor contributing to increased cost is that most large psychiatric facilities are situated in urban settings and charge a massive amount for screening cardiovascular complications that hinder patient access in the rural setting.²⁷

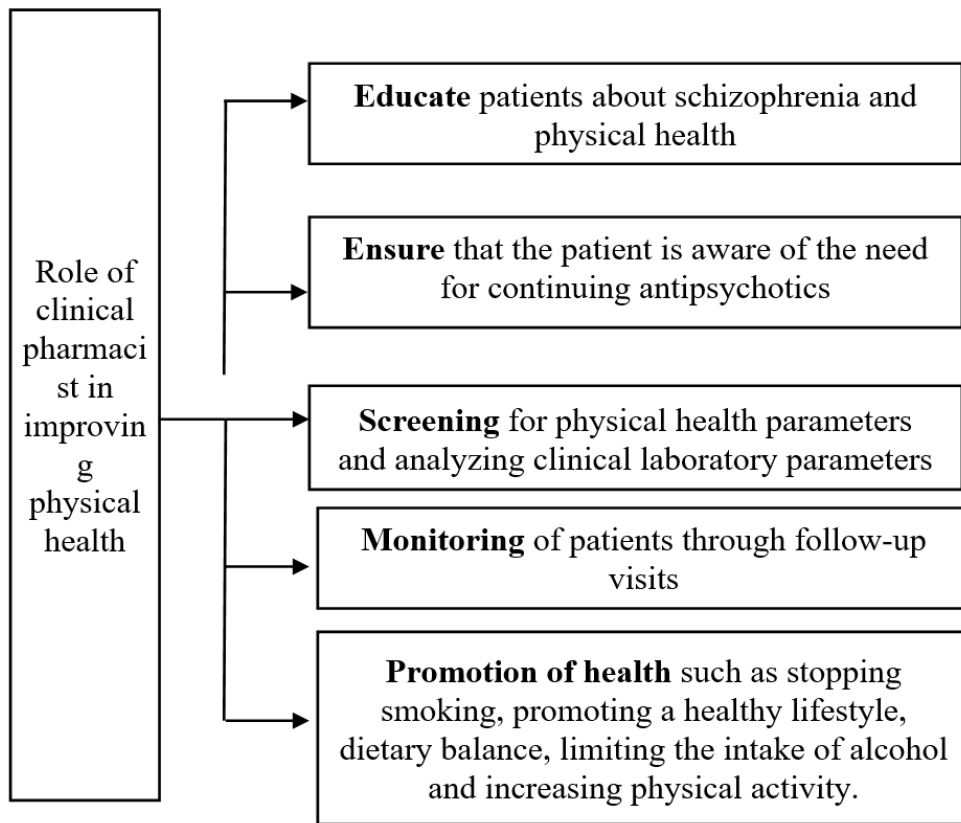


Figure 2: An overview of the role of a pharmacist . A clinical pharmacist is capable of educating, spread awareness and promote the health of patients through interventions. But in many of the countries their services are unrecognised or underutilised.

ROLE OF CLINICAL PHARMACIST IN IMPROVING PHYSICAL HEALTH

An integrated and holistic approach to monitoring physical health can contribute to better patient outcomes in SCZ when guided by psychiatrists, nurses, pharmacists, dieticians and counsellors when working independently or in collaboration.²⁸ Preliminary evidence supports that pharmacist-managed cardiovascular risk reduction interventions in a population with SMI can improve clinical outcomes.²⁹ Clinical complications, such as diabetes and dyslipidemia, have been improved with patient interventions offered by pharmacists.³⁰

The psychiatrist relies on the caregivers to develop a patient-centred treatment plan since patients are mentally impaired. Caregivers will be better able to support SCZ only if they are educated on patient health. To effectively communicate information, it is essential to use various strategies, including caregiver workshops, psychoeducational therapy, media and educational materials like leaflets. A clinical pharmacist can educate caregivers on mental health diagnoses and manage physical health through these interventions.^{29,31} Pharmacists can provide printed resources that contain information on disease, prescribed medications and lifestyle choices. The use of such written resources has been shown to improve patient outcomes despite their differing levels of health literacy. When patients ask

face-to-face with their pharmacists or any healthcare provider, they better understand the disease which aids in recognizing the symptoms properly and knows what aggravates those symptoms in SCZ.^{32,33} It is also possible for pharmacists to serve as guides and counsellors for individuals seeking treatment for substance abuse. Patients can be taught and warned about the consequences of substance abuse and it can be prevented. Patients can be encouraged to quit smoking by their pharmacists at the point of care. Using pharmaceutically based smoking cessation programs can result in improved health outcomes and lower healthcare costs.³⁴

A pharmacist can provide tailored education strategies to improve diet.³⁵ Dietary education should be focused on calorie restriction, healthy eating and discouraging maladaptive eating behaviours. A patient's concerns can be minimized if they are thoroughly informed about psychiatric medications before receiving medication. Nicotine replacement therapy and obesity management interventions through exercise are a few examples of services that pharmacists can offer to patients using the requisite level of guidance or coaching.³⁶ In addition, a pharmacist can also take part in medication therapy management; help patients adhere to medication regimens; recognize, manage and mitigate drug-related problems; perform patient evaluations; recommend and modify treatment options, order and assess clinical parameters.^{37,29} Delivering medication counselling to patients is

Table 1: General obstacles to physical activities in schizophrenia patients. It is very crucial to take these factors into consideration to improve the overall quality of life in schizophrenia.

Sl. No.	Obstacles
1	Lack of knowledge about the benefits of physical activity among patients.
2	Lack of support from the family and caregivers.
3	The presence of negative symptoms causes a low level of motivation in patients leading to poor initiation and adherence.
4	Side effects of antipsychotic medications like sedation and cardiometabolic issues like weight gain and obesity.
5	Limited availability of resources due to the financial constraints.
6	Limited access to spaces for physical activity due to stigma and discrimination in the society.

Table 2: Weight gain potential of different antipsychotics. Almost all antipsychotics irrespective of their class and generation show a certain degree of weight gain potential towards treatment. Antipsychotics Clozapine and Olanzapine found to cause high weight gain potential.

Antipsychotics	Weight gain potential
Clozapine	High
Olanzapine	High
Chlorpromazine	Moderate
Quetiapine	Moderate
Risperidone	Moderate
Paliperidone	Moderate
Amisulpride	Low
Asenapine	Low
Haloperidol	Low
Ziprasidone	Low
Lurasidone	Low

not only the pharmacist's single task in the health care system. They are also responsible for preventing weight gain and obesity in this vulnerable group by enhancing physical activity through interventions. Exercise interventions may aid functional recovery if implemented early in any illness. Thus, people with SCZ can improve their QoL, psychiatric symptoms, cardiovascular complications and daily functioning through exercise. A pharmacist can help people with SCZ engage in physical activity through personalized encouragement or feedback from each patient and by promoting group-based exercise sessions that may overcome several common obstacles such as lack of confidence in exercising, injury concerns and insufficient knowledge about exercise.³⁴

A supportive environment and open communication between patients and pharmacists in mental health settings improve social connectivity. Education combined with an appropriate conversation with patients is considered more effective than awareness-enhancing approaches alone in the case of socially deprived schizophrenics.³⁸ A pharmacist can provide awareness of the importance of sleep hygiene in SCZ patients. Since no single intervention was found to be ideal in treating sleep disorders concerning the patient's perception, a pharmacist can non-pharmacologically intervene by advising schizophrenics about developing self-strategies such as keeping routine timing for bedtime to improve sleep. Using pharmacological strategies such as consuming medications that induce sleep may aggravate psychotic symptoms in schizophrenia.³⁹

In developing countries diabetes, hypertension and high cholesterol are increasingly prevalent in the adult and elderly, with a 24% mortality rate. It is challenging to screen for cardiovascular and metabolic risk factors in such a large population with conventional blood sampling techniques. High expenditure, increased analysis time and sensitive procedures may limit the patients to volunteer to evaluate clinical parameters. This issue can be minimised with the help of risk scores. The use of risk scores could prove to be extremely useful. It eliminates the need for biochemical assessments, reducing the time and cost associated with screening.²⁶ One example of such a tool is the World Health Organization (WHO)'s mhGAP Intervention Guide for Mental and Neurological Disorders. Guidelines for care of coexisting physical health conditions in SMI are included in the guide. Prioritization is evident at the policy level. Reducing excess mortality in persons with SMI should become part of the broader health agenda. To resolve complex, multifaceted issues, we must establish a standard for integrating various programs (e.g., physical exercise, nutrition and tobacco cessation).⁴⁰ Figure 2 outlines an overview of the role of pharmacists in improving physical health.

CONCLUSION

The physical health problems related to SMI, like SCZ, are a significant health burden worldwide. There is a need to bring the attention of healthcare, government and policymakers regarding the aspects of the importance of physical health in severe mental illnesses like schizophrenics to improve their QoL. Clinical pharmacists who are experienced in psychiatric pharmaceutical care are best suited to assist with the physical, mental and psychological needs of the schizophrenia communities they serve. However, their contribution and impact on mental healthcare remain rarely evaluated, investigated and reported in research papers due to a lack of funding and clarity about the effectiveness of the services pharmacists provide. There is a growing need to develop standardized, economically feasible interventions to prevent or reduce cardiometabolic complications.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

ABBREVIATIONS

ADR: Adverse Drug Reaction; **AP:** Antipsychotics; **CVD:** Cardiovascular Disease; **PI:** Physical Illness; **QOL:** Quality of Life; **SMI:** Serious Mental Illness; **SCZ:** Schizophrenia; **SGA:** Second-Generation Antipsychotics; **WHO:** World Health Organization.

REFERENCES

- Rawal KB, Chand S, Luhar MB, Sreekath B, Muralidhar Reddy N, Shivaraj B, et al. A Comparative Study on Relative Safety and Efficacy of chlorpromazine and risperidone in Schizophrenia patients. *Int J Res Pharm Sci.* 2020;11:1539-44.
- Luciano M, Sampogna G, Del Vecchio V, Giallonardo V, Palumbo C andriola I, et al. The impact of clinical and social factors on the physical health of people with severe mental illness: results from an Italian multicentre study. *Psychiatry Res.* 2021;303:1-6.
- Padmavati R, Kantipudi SJ, Balasubramanian S, Raghavan V. Cardiovascular diseases and Schizophrenia in India: evidence, Gaps and Way Forward. *Front Psychiatry.* 2021;12:639295. doi: 10.3389/fpsy.2021.639295, PMID 34248694.
- Joseph JG, Prabhu S, Chand S, Roy DA, Nandakumar UP, George SM, et al. Assessment of metabolic risk factors in patients undergoing antipsychotic drug therapy: a pharmacist-led study. *Pharm Hosp Clin.* 2021;56(4):361-67. doi: 10.1016/j.phclin.2021.03.005.
- Khalil H, Huang C. Adverse drug reactions in primary care: a scoping review. *BMC Health Serv Res.* 2020;20(1):5. doi: 10.1186/s12913-019-4651-7, PMID 31902367.
- Firth J, Siddiqi N, Koyanagi AI, Siskind D, Rosenbaum S, Galletly C, et al. The Lancet Psychiatry Commission: a blueprint for protecting physical health in people with mental illness. *Lancet Psychiatry.* 2019;6(8):675-712. doi: 10.1016/S2215-0366(19)30132-4, PMID 31324560.
- Nielsen RE, Banner J, Jensen SE. Cardiovascular disease in patients with severe mental illness. *Nat Rev Cardiol.* 2021;18(2):136-45. doi: 10.1038/s41569-020-00463-7, PMID 33128044.
- Kim SW, Park WY, Jhon M, Kim M, Lee JY, Kim SY, et al. Physical health literacy and health-related behaviors in patients with psychosis. *Clin Psychopharmacol Neurosci.* 2019;17(2):279-87. doi: 10.9758/cpn.2019.17.2.279, PMID 30905128.
- Seeman MV. Schizophrenia mortality: barriers to progress. *Psychiatr Q.* 2019;90(3):553-63. doi: 10.1007/s11126-019-09645-0, PMID 31147816.
- Eglt GM, Palmer BW, Martin AS, Tu X, Jeste DV. Loneliness in schizophrenia: construct clarification, measurement and clinical relevance. *PLOS ONE.* 2018;13(3):0194021. doi: 10.1371/journal.pone.0194021, PMID 29566046.
- Lee SH, Kim G, Kim CE, Ryu S. Physical activity of patients with chronic schizophrenia and related clinical factors. *Psychiatry Investig.* 2018;15(8):811-17. doi: 10.30773/pi.2018.04.15.1, PMID 29969851.
- Chen MD, I JH, Pellegrini CA, Chen HF, Su CY, Chang YC. The facilitators and barriers to physical activity scale for people with mental illness in Taiwan: development and validation. *Disabil Rehabil.* 2022;44:4879-87.
- Jakobsen AS, Speyer H, Nørgaard HC, Karlsen M, Hjorthøj C, Krogh J, et al. Dietary patterns and physical activity in people with schizophrenia and increased waist circumference. *Schizophr Res.* 2018;199:109-15. doi: 10.1016/j.schres.2018.03.016, PMID 29555213.
- Costa R, Teasdale S, Abreu S, Bastos T, Probst M, Rosenbaum S, et al. Dietary intake, adherence to Mediterranean diet and lifestyle-related factors in people with schizophrenia. *Issues Ment Health Nurs.* 2019;40(10):851-60. doi: 10.1080/01612840.2019.1642426, PMID 31339786.
- Pringsheim T, Kelly M, Urness D, Teehan M, Ismail Z, Gardner D. Physical health and drug safety in individuals with schizophrenia. *Can J Psychiatry.* 2017;62(9):673-83. doi: 10.1177/07067437171719898, PMID 28718324.
- Dayabandara M, Hanwella R, Ratnatunga S, Seneviratne S, Suraweera C, de Silva VA. Antipsychotic-associated weight gain: management strategies and impact on treatment adherence. *Neuropsychiatr Dis Treat.* 2017;Volume(13):2231-41. doi: 10.2147/NDT.S113099.
- Subramaniam M, Mahesh MV, Peh CX, Tan J, Fauziana R, Satghare P, et al. Hazardous alcohol use among patients with schizophrenia and depression. *Alcohol.* 2017;65:63-9. doi: 10.1016/j.alcohol.2017.07.008, PMID 29084631.
- Šimunović Filipčić I, Filipčić I. Schizophrenia and physical comorbidity. *Psychiatr Danub.* 2018;30; Suppl 4: 152-7. PMID 29864751.
- Kaskie RE, Graziano B, Ferrarelli F. Schizophrenia and sleep disorders: links, risks and management challenges. *Nat Sci Sleep.* 2017;9:227-39. doi: 10.2147/NSS.S121076, PMID 29033618.
- Kiwan N, Mahfoud Z, Ghuloum S, Chamali R, Yehya A, Hammoudeh S, et al. Self-reported sleep and exercise patterns in patients with schizophrenia: A cross-sectional comparative study. *Int J Behav Med.* 2020;27(4):366-77. doi: 10.1007/s12529-019-09830-2, PMID 31848893.
- Eskelinen S, Sailas E, Joutsenniemi K, Holli M, Koskela TH, Suvisaari J. Multiple physical healthcare needs among outpatients with schizophrenia: findings from a health examination study. *Nord J Psychiatry.* 2017;71(6):448-54. doi: 10.1080/08039488.2017.1319497, PMID 28497707.
- Munshi T, Asmer MS, Penfold S, Pikard J, Mauer-Vakil D, Banwell E. Physical exam in mental health: implementation of a form to guide medical assessment of acute psychiatric inpatients. *Clin Audit.* 2017;Volume(9):1-7. doi: 10.2147/CA.S129425.
- Ali RS, Jalal Z, Paudyal V. Guidelines versus practice in screening and monitoring of cardiometabolic risks in patients taking antipsychotic medications: where do we stand? *Gen Psychiatry.* 2021;34:1-5.
- Castle DJ, Galletly CA, Dark F, Humberstone V, Morgan VA, Killackey E, et al. The 2016 Royal Australian and New Zealand College of Psychiatrists guidelines for the management of schizophrenia and related disorders. *Med J Aust.* 2017;206(11):501-5. doi: 10.5694/mja16.01159, PMID 28918734.
- Taylor DM, Barnes TR, Young AH. The Maudsley prescribing guidelines in psychiatry. 13th ed. Hoboken, NJ: John Wiley & Sons; 2018. p. 8p.
- Pandit-Agrawal D, Khadilkar A, Chiplonkar S, Khadilkar V, Patwardhan V. Screening score for early detection of cardio-metabolic risk in Indian adults. *Int J Public Health.* 2017;62(7):787-93. doi: 10.1007/s00038-017-0994-1, PMID 28638978.
- Sahithya BR, Reddy RP. Burden of mental illness: a review in an Indian context. *Int J Cult Ment Health.* 2018;11(4):553-63. doi: 10.1080/17542863.2018.1442869.
- Kuppili PP, Nebhinani N. Role of integrated and multidisciplinary approach in combating metabolic syndrome in patients with severe mental illness. *Indian J Psychol Med.* 2019;41(5):466-71. doi: 10.4103/IJPSYM.IJPSYM_48_19, PMID 31548771.
- Eaves S, Gonzalez J, Hamm JA, Williams G, Ott C. The evolving role of the pharmacist for individuals with serious mental illness. *J Am Pharm Assoc.* 2020;60(5):11-4. doi: 10.1016/j.japh.2020.04.017.
- Sud D, Loughton E, McAskill R, Bradley E, Maidment I. The role of pharmacy in the management of cardiometabolic risk, metabolic syndrome and related diseases in severe mental illness: a mixed-methods systematic literature review. *Syst Res.* 2021;10:1-35.
- Yalçın N, Ak S, Gürel ŞÇ, Çeliker A. Compliance in schizophrenia spectrum disorders: the role of clinical pharmacist. *Int Clin Psychopharmacol.* 2019;34(6):298-304. doi: 10.1097/YIC.0000000000000280.
- Edna A, Onyango AC, Mwenda C. Caregiver's knowledge and attitude regarding care of schizophrenia at Mathari Teaching and Referral Hospital, Kenya. *Am J Psychiatry Neurosci.* 2018;6(1):15-27. doi: 10.11648/j.ajpn.20180601.13.
- Zhou Z, Wang Y, Feng P, Li T, Tebes JK, Luan R, et al. Associations of caregiving knowledge and skills with caregiver burden, psychological well-being and coping styles among primary family caregivers of people living with schizophrenia in China. *Front Psychiatry.* 2021;12:1-11.
- McBane SE, Corelli RL, Albano CB, Conry JM, Della Paolera MA, Kennedy AK, et al. The role of academic pharmacy in tobacco cessation and control. *Am J Pharm Educ.* 2013;77(5):93. doi: 10.5688/ajpe77593, PMID 23788804.
- Bingham J, Axon DR, Scovis N, Taylor AM. Evaluating the effectiveness of clinical pharmacy consultations on nutrition, physical activity and sleep in improving patient-reported psychiatric outcomes for individuals with mental illnesses. *Pharmacy (Basel).* 2018;7(1):1-11. doi: 10.3390/pharmacy7010002, PMID 30583547.
- El-Den S, Collins JC, Chen TF, O'reilly CL. Pharmacists' roles in mental healthcare: past, present and future. *Pharm Pract (Granada).* 2021;19(3):2545. doi: 10.18549/PharmPract.2021.3.2545, PMID 34621456.
- Shivaprasad S, Mateti UV, Shenoy P, Shastry CS, Dharmagadda S. Clinical pharmacists' scope of knowledge for medication therapy management in chronic kidney disease patients. *Pharm Educ.* 2021;21:781-8. doi: 10.46542/pe.2021.211.781788.
- Ryu J, Jung JH, Kim J, Kim CH, Lee HB, Kim DH, et al. Outdoor cycling improves clinical symptoms, cognition and objectively measured physical activity in patients with schizophrenia: A randomized controlled trial. *J Psychiatr Res.* 2020;120:144-53. doi: 10.1016/j.jpsychires.2019.10.015, PMID 31678749.
- Kaskie RE, Graziano B, Ferrarelli F. Schizophrenia and sleep disorders: links, risks and management challenges. *Nat Sci Sleep.* 2017;9:227-39. doi: 10.2147/NSS.S121076, PMID 29033618.
- Saxena S, Maj M. Physical health of people with severe mental disorders: leave no one behind. *World Psychiatry.* 2017;16(1):1-2. doi: 10.1002/wps.20403.

Cite this article: Joel JJ, Deepak CG, Bhat SU. Physical Health in Schizophrenia and Role of Clinical Pharmacist: A Narrative Review. *J Young Pharm.* 2024;16(4):607-12.