

Knowledge and Practice of Psychiatric Nurses toward Side Effects of Clozapine Drug on Co-morbid Psychiatric Patients

Yara Mohamed Fargaly Abdel-Aty¹, Somaya El Sayed Abou –Abdou², Ola Ali Abed El-Fatah Ali³

(1) B.Sc. in Nursing, Faculty of Nursing, Suez Canal University, Egypt.

(2) Professor of Psychiatric and Mental Health Nursing, Faculty of Nursing, Suez Canal University, Egypt.

(3) Assistant professor of psychiatric and mental health nursing, Faculty of Nursing, Suez Canal University, Egypt

Abstract

Background: Clozapine is an antipsychotic with superior efficacy for treatment resistant schizophrenia, and has unique anti-suicidal properties and a low propensity to cause extrapyramidal side-effects. Despite these advantages, clozapine causes a number of potentially lethal side effects. Psychiatric nurses play a crucial role in the long-term management of psychiatric patient's undertaken clozapine **Aim:** This study aimed to explore psychiatric nurses' knowledge and practice toward side effects of clozapine drug on co-morbid psychiatric patients. **Design:** Descriptive research design was used for this study. **Subjects:** comprehensive sample includes all psychiatric nurses (100) working in Port-said psychiatric and mental health hospital. **Tools of data collection:** The data was gathered through a self-administered questionnaire where the tools were divided into two parts: first part includes personal characteristics and professional background and second part includes two tools: Psychiatric nurse's knowledge regarding clozapine and its side effects and Psychiatric nurse's practice regarding clozapine and its side effects. **Results:** Psychiatric nurses obtained unsatisfactory knowledge regarding clozapine drug administration and management of side effects. However, psychiatric nurses obtained satisfactory practice level regarding clozapine drug administration and management of side effects. In addition, there was significant correlation between psychiatric nurse's knowledge and practice regarding clozapine side effects. **Conclusion:** There is a wide gap between psychiatric nurse's knowledge and their practice regarding clozapine administration and management of side effects on co-morbid psychiatric patients. **Recommendations:** Updating knowledge of psychiatric nurses regarding clozapine drug administration and management of side effects at undergraduate education and through educational packages at the service level.

Keywords: Clozapine, Co-morbid psychiatric patient, Treatment refractory patients.

1- Introduction

Clozapine is an atypical antipsychotic agent effective in treatment of psychiatric patient with psychotic symptoms, clozapine, sold under the brand name Clozaril, is an

antipsychotic medication prescribed since the 1970s as an effective treatment for individuals with treatment resistant schizophrenia (Sanjeevi & Cocoman, 2021).

Moreover, Clozapine is the only drug with proven efficacy in schizophrenia

that does not respond to other antipsychotics (treatment resistant schizophrenia TRS) while schizophrenia is a severe, chronic mental disorder characterized by disturbances in thought, perception and behavior. Schizophrenia involves a range of cognitive, behavioral, and emotional symptoms, and as clinicians know, it can be difficult to diagnose. There's no simple physical or lab test for schizophrenia, and diagnosis involves the recognition of a constellation of symptoms negatively impacting social or occupational functioning (Sadock & Sadock, 2020).

Vermeulen et al.,(2019) reported that, in addition to improving positive symptoms, clozapine has been found effective in reducing aggression, suicidal behavior, long-term mortality, and re-hospitalization, as well as in improving overall functioning. Despite evidence for the superiority of clozapine as drug for Non-Affective Psychotic Disorder (NAPD), Clozapine is associated with a range of adverse effects of varying prevalence and potential danger to the patient. These

may be generally categorized as adverse effects that typically appear early and present an immediate danger such as agraniolocytosis (Farooq, 2019).

Furthermore, psychiatric patients tend to present with physical complaints at a later, more serious stage, they also have a significantly higher incidence of type 2 diabetes mellitus, coronary heart disease and chronic obstructive pulmonary disease than the whole population. Patients with schizophrenia have an elevated mortality risk compared to the general population, with cardiovascular-related deaths being the leading cause. The role of clozapine use in the long-term mortality risk is unclear. While clozapine treatment may increase the risk for cardiovascular mortality, it may have protective effects regarding suicidal behavior (Vermeulen, 2019).

Psychiatric and mental health nurses play a vital role as an advocate in clozapine administration procedure and early detection and monitoring of side-effects for schizophrenic patient with medical co-morbid illness. In addition, Psycho-education is an integral part of a

comprehensive treatment approach of psychotic disorders in which nurses also have an important role. In order to provide effective education nurses should possess adequate knowledge about the clozapine administration and management of side effects (**De Hert, 2016**).

Significance of the study:

Worldwide, Clozapine has become a source of controversy, with reports of unexpected and potentially preventable deaths. Clozapine-related deaths might be caused by the long term consequences of its metabolic side effects, such as weight gain, diabetes and dyslipidemia (**Dyer, 2018**) & (**Cho et al., 2019**). However, **Rose et al; (2020)** reported that about thirty-three clozapine-treated people died between 2009 and 2018, making the average mortality yearly rate (incidence of deaths per year) in clozapine-treated patients 0.8%.

In Egypt, **Abdel-Wahab, (2014); Abdelwahab& Elwahab, (2020)** reported that there are associated complications and mortality levels for schizophrenic patients with physical co-

morbid illness undertaken clozapine drug. Up to 2% of patients treated with clozapine can develop agranulocytosis, with a risk of 2 to 4% mortality of the affected cases .Other potentially lethal side-effects of clozapine are cardiac side-effects, metabolic disorders with ketoacidosis, epileptic seizures, constipation and malignant neuroleptic syndrome leading to clozapine -related deaths.

There is consistent evidence suggesting that psychiatric nurses in general have inadequate working knowledge of psychopharmacology (**Keijsers et al., 2012; Wiernik & Public Policy Committee of the American College of Clinical, 2015**). And this has frequently resulted in suboptimal care to patients. Furthermore, it is estimated that 40% of a nurse's clinical time is to the repertoire of mental health medicines, thus making the decision-making process more complex (**Glick & Rush, 2016**).

Aim of the study

This study aimed to explore the psychiatric nurses' knowledge and practice toward side effects of clozapine drug on co-morbid psychiatric patients.

Study questions:

- 1- Dose psychiatric nurse has knowledge about side effects of clozapine on co-morbid psychiatric patients?
- 2- Dose psychiatric nurse provide nursing care for side effects of clozapine on co-morbid psychiatric patients?

2. Subjects and Method

Research design:

A descriptive research design was utilized in the current study.

Setting:

The study was conducted in Port-Said governorate at Port-Said Psychiatric and Mental Health Hospital (PSPMHH). The hospital was under supervision of ministry of health at 2007 and then fall under supervision of General Secretariat

of Mental Health 2008. The hospital consists of five in-patient departments (three males and two females' units) with 95 bed capacity and outpatient clinics (child psychiatry, addiction and neurology clinics.

Sample size:

Total sample includes all psychiatric nurses working in port- said psychiatric and mental health hospital (PSPMHH) 100 (males & females) ; distributed as 4 in outpatient clinic, 96 in inpatient unit, including the administrative nursing staff.

Sampling technique:

Comprehensive sampling technique was used in this study.

Tools for data collection:

The data were collected through a self-administered questionnaire was designed by the researcher after reviewing literature (**Clozapine REMS, 2022**), (**Correll et al, 2022**), (**Sanjeevi, 2021**)and (**De Hert et al, 2016**).

The tools of data collection were used in

this study divided into two tools:

Tool I

A- Personal characteristics:

It includes age, gender, level of education and hospital department.

B- Professional background data:

It includes years of experience, types of co-morbid illness and number of workshops.

Tool II

Psychiatric nurse's knowledge regarding clozapine and its side effects

The tool divided into two parts:

Part I: Psychiatric nurse's knowledge regarding clozapine

The tool was designed by the researcher to measure psychiatric nurse's general knowledge regarding clozapine among co-morbid psychiatric patients. The tool Consist of 25 questionnaire statements includes knowledge about pharmacokinetics and pharmacodynamics of clozapine (17 items) and knowledge about clinical

assessment of clozapine (8 items).

Part II: Psychiatric nurse's knowledge regarding side effects of clozapine drug

The questionnaire was designed by researcher to measure psychiatric nurse's knowledge regarding side effects of clozapine drug on co-morbid psychiatric patients. The tool Consist of 24 questionnaire statements categorized into five dimensions. Knowledge about metabolic side effects (5 items), Knowledge about cardiovascular side effects (5 items), Knowledge about side effects (5 items), Knowledge about urinary side effects (4 items) and complications of clozapine (8 items).

Tool III

Psychiatric nurse's practice regarding side effects of clozapine drug

The tool was divided into two sections:

Part I: Psychiatric nurse's practice regarding clozapine

The tool was designed by researcher to

measure psychiatric nurse's general practice skills regarding clozapine drug among co-morbid psychiatric patients. The tool consist of 22 statements includes nursing skills before initiation of clozapine drug (8 items), initiation of clozapine drug (9 items) and education about clozapine (discharge plan) (5 items).

Part II: Psychiatric nurse's practice regarding side effects of clozapine drug

The tool was designed by researcher to measure psychiatric nurse's self-reported practice regarding side effects of clozapine drug on co-morbid psychiatric patients. The tool consist of 28 questionnaire statements categorized into five dimensions. Management of cardiovascular side effects (8 items), Management of hematological side effects (6 items), Management of metabolic side effects (5 items), Management of urinary side effects (5 items) and management of clozapine toxicity (4 items).

Scoring system:

Psychiatric nurse's knowledge and practice regarding side effects of clozapine drug questionnaires were scored to determine satisfactory and unsatisfactory level of knowledge and practice. The participant was evaluated on their answer is correct or false. Each correct answer was scored one grade and each false answer was scored zero score. Finally, the scores were calculated summed up. The total scores ranged from 0 to 50. The Satisfactory knowledge and practice level was considered to be $\geq 75\%$. And unsatisfactory knowledge and practice level < 75 (Sanjeevi & Cocoman, 2021).

Face and content validity

Content validity was done to identify the degree to which the used tools measure what was supposed to be measured. The developed tools were examined by a panel of five experts in the field of psychiatric and mental health nursing department {Port Said University and Assuit University} Faculty of Nursing. All jury members agreed that current study tools were valid and relevant to the

aim of the study. Reliability was done to identify the extent to which the tools items were measurable with the study concept and its correlation with each other, and the interclass correlation coefficient revealed $r=0.9$.

Reliability of the tools

Internal consistency, which is the consistency of psychiatric nurses' responses across the items of questionnaire on a multiple-item measure. In general, all the items on such measures are supposed to reflect the same underlying construct, so psychiatric nurses scores on those items should be correlated with each other. Split-half correlation involves splitting the questionnaire items into two sets (knowledge and practice), the even practice items- and knowledge odd-numbered items. Pearson's r for these data is $\pm.88$, which is good internal consistency among the questionnaire items.

Cronbach's alpha (α) performed by SPSS version 25 across 7 categories of **Psychiatric nurse's knowledge**

regarding side effects of clozapine drug ranged from (0.92- 0.82) and across 8 categories of **Psychiatric nurse's practice regarding side effects of clozapine drug** ranged from (0.83- 0.71) and it was considered within the acceptable range.

Field work

The data was collected in Port-Said Psychiatric and Mental Health Hospital (PSPMHH). It worth noting that, at time of data collection Port-Said Psychiatric and Mental Health Hospital (PSPMHH) was undergoing new developments and buildings reconstruction to prepare hospital to follow comprehensive health insurance protocol guidelines in port-said governorate, Egypt.

The data collection conducted over three months starting from first of November2022 to end of January 2023. The approval of Port-Said Psychiatric and Mental Health Hospital (PSPMHH) and General Secretariat of Mental Health in Abbasia hospital in Cairo took 4 months and the official paper was signed by security each time of collecting data.

The researcher was available 2 days/week (Saturday and Thursday) in all shifts (morning, afternoon and night) lasts from 2-3 hours each day. Regarding night shifts, the researcher was present at early morning from 6 AM to 8AM to complete data collection form staff working in night shifts. Regarding afternoon shifts, the researcher was available from 2 PM to 4.30 PM to collect data.

The data collection was carried out at four inpatient psychiatric units male 1, male 2, female, and 1 addiction, outpatient units, and ECT room. In addition, the administrative staff includes 9 nurses were included in data collection. The data collection took place at nursing station in each department. An informed consent to voluntary participate in research was obtained from each participant after full explanation of the study. Regarding the missing data, the researcher reviews the collected questionnaire at end of each day and return to nurses to complete the missing items which constitute financial and physical burden on the researcher.

The time allowed for nurses to complete the knowledge and practice questionnaires was 20 minutes. Two self-administered questionnaires developed by researcher, was explained to each nurse to fill it in the presence of the researcher for any clarification. The researcher divided nurses into 3 groups each day. Therapeutic relationship had been established between researcher and psychiatric nurses started by introducing myself and the innate scientific nature of the study purpose, emphasizing on trust relationship, offering self for explanation of any difficulties in understanding the questionnaire statements, and termination of therapeutic relationship by opening a room for any questions regarding clozapine drug administration and side effects managements.

Administrative design

An official permission for collection of data was obtained using proper channels of communication. Official letters were sent from the Faculty of Nursing, Suez Canal University (SCU) to the director of study setting, explaining the aim of

the study and its expected outcome. Permission from director of hospital and its head nurse was approved to conduct the study at this hospital after obtaining permission from General Secretariat of Mental Health in Abbasia hospital in Cairo. Psychiatric nurses were asked to fill a written consent to participate in the study after full explanation of the nature of the study and its expected beneficial outcomes.

Ethical consideration

Primary written consent was obtained from the psychiatric nurses prior to the administration of the questionnaire. The psychiatric nurses were informed of the purpose of the study, and that they had the right to refuse to participate. Also, the voluntary nature of participation was stressed as well as confidentiality. Furthermore, the psychiatric nurses were

told that they can refrain from answering any questions and they can terminate at any time. No harmful procedure and no hazards were anticipated. Confidentiality was maintained during all steps of the study.

Data analysis:

The collected data were organized, revised, stored, tabulated and analyzed. Statistical analysis was done by computer using Statistical Package of Social Science (SPSS) program version 25.

The following statistical techniques were used:

- Percentage.
- Chi-square (X²) for categorical data.
- Independent t test
- Proportion probability of error (P-value).

3. Results

Table (1): Shows that the mean age of psychiatric nurses was 27.77 ± 3.749 and most of them were female (81%) and have diploma in nursing. The majority of psychiatric nurses were working as staff nurse at morning shifts in inpatient hospital departments and slightly more than half of them had (5-10) years of experience in psychiatric nursing. While, the majority of psychiatric nurses were informed that patient had co-morbid illness; only (23%) of psychiatric nurses had attended training course regarding clozapine.

Figure(1): Shows that the most common co-morbid disorders which psychiatric nurses faced among psychiatric patients undertaken clozapine drug are metabolic disorders followed by cardiovascular disorders (44%) & (40%) respectively.

Figure (2): Shows that the most common complications of clozapine drug that challenge psychiatric nurses are agranulocytosis followed by metabolic syndrome and cardiomyopathy (42%), (31%) & (27%)

respectively.

Figure (3): Illustrate that psychiatric nurses had obtained un-satisfactory knowledge regarding cardiovascular side effects followed by urinary side effects and complications of clozapine (71%, 69% and, 66% respectively). However, (64%) of psychiatric nurses obtain satisfactory knowledge regarding hematological side effects.

Figure (4): Represents that most of psychiatric nurses obtained satisfactory practice level regarding clozapine drug administration and management of side effects (78%, 83%, 77%, 68%, 86%, 69% & 65% respectively).

Figure (5): Illustrate that almost two third of psychiatric nurses (84%) have un satisfactory knowledge regarding clozapine side effects, while more than half of them (67%) have satisfactory practice regarding clozapine side effects.

Table (2): represents that level of

education is statistically significant independent positive predictor of psychiatric nurses' knowledge regarding clozapine side effects on co-morbid illness patients in which the odds of having knowledge were 3.27 times (95% CI 1.97–5.43) higher among nurses who held degrees and above than diploma holders. Moreover, years of experience in psychiatric field represents a highly significant independent predictor of psychiatric nurses' knowledge in which nurses with more years of experience were 3.71 times (95% CI 2.37–5.81) more likely to have good knowledge than their counterparts.

Table (3): Represents that hospital department, nursing position, nursing shifts and years of experience were a highly statistically significant positive predictors of psychiatric nurses practice regarding clozapine side effects among co-morbid illness patients in which the odds of having practice were 3.49 times (95%CI 1.89- 5.46) higher among nurses working in inpatient units, 3.37 times (95% CI 1.97–5.43) higher among shift

senior nurses, and 3.31 times (95%CI 3.21-3.41) higher among nurses working in morning shifts. Nurses with more years of experience were 1.82 times (1.16, 2.85) more likely to have satisfactory practice than their counterparts.

4. Discussion

Psychiatric nurses play an important role in the early detection and monitoring of clozapine side-effects. Patients should be able to trust psychiatric nurses to involve therapeutically and actively listen to their needs and concerns, responding using communication skills that are helpful and providing information that is clear, accurate, meaningful and free from jargon.

The current study clarified that the majority of psychiatric nurses obtained unsatisfactory knowledge level regarding clozapine pharmacokinetics and pharmacodynamics; especially knowledge about clozapine drug classifications and knowledge about

psychiatric nursing consideration for clozapine. In addition most of psychiatric nurses obtain unsatisfactory knowledge about clozapine clinical assessment; in particular knowledge about necessary blood test for clozapine and phases of clozapine drug.

The prior results came in the same line with the study of *De Hert, (2016)* who reported that greater than half of the studied sample had incomplete satisfactory knowledge regarding clozapine. In addition, the majority of studied psychiatric nurses obtain unsatisfactory knowledge about phases of clozapine drug and necessary psychiatric nursing consideration during clozapine drug administration.

In addition, the results of the current study agreed with **Fraser & Oyama, (2013)** they emphasized that suboptimal knowledge of antipsychotic medication is not unique to mental health nurses as previous studies have indicated. The study that assessed the confidence of psychiatric nurses to antipsychotic medications found that majority of the

psychiatric nurses reported that they prescribe psychotropic medication to their patients despite often assessing their own knowledge of these drugs.

In contrast, the results of the current study incongruent with descriptive study conducted by **Gee et al. (2013)** they evaluated psychiatric practitioner attitude to clozapine initiation in 144 health professionals reported that 26 (18%) of which were psychiatric nurses. The majority of psychiatric nurses (81%) were knowledgeable with clozapine prescription guidelines. Psychiatric nurse's knowledge was indicated as possible solutions to facilitate clozapine prescribing.

The researcher explains the suboptimal knowledge of psychiatric nurses regarding clozapine drug through various reasons first the majorities of studied psychiatric nurses in port-said psychiatric and mental hospital were diploma nurses; second the undergraduate education regarding psychopharmacology was not covering the clinical part of

psychopharmacological medication administration especially clozapine drug, finally the hospital did not provide in-service education regarding psychopharmacology regarding clozapine administration and management of side effects.

Moreover, the current study revealed that more than two thirds of psychiatric nurses obtained un-satisfactory knowledge regarding clozapine cardiovascular, urinary and metabolic side effects and complications of clozapine. However; on the other hand, more than half of psychiatric nurses obtain satisfactory knowledge regarding hematological side effects of clozapine (agranulocytosis and neutropenia).

The preceding results came in the same consequence with **Nielsen, (2013)** who studied “Psychiatrists’ attitude and knowledge of clozapine treatment.” reported that the majority of psychiatric nurses have poor knowledge regarding metabolic syndrome and cardiovascular side effects. Emphasizing the gap in psychiatric nurses’ knowledge regarding

the early detection and monitoring of these side-effects.

However, the result of the current study came in contrast with **Nielsen & Meyer, (2012)** They reported that about half of the psychiatric nurses were aware of the gastrointestinal risk of clozapine. In addition, early detection is warranted because of the risk paralytic ileus, bowel obstruction and eventually mortality that has been associated with clozapine the most among antipsychotics. In addition, **Gee et al. (2013)** reports that the main barriers for prescribing clozapine were the obligatory blood monitoring and common somatic complications.

The researcher interprets these findings by the fact that about one thirds of psychiatric nurses were newly hired and according to hospital policies, they don’t handle psychiatric co- morbid illness patients undertaken clozapine drug. In addition, the present study revealed that more than half of studied nurses were in diploma degree five years, in the light of this fact undergraduate education regarding

clozapine drug management was received in diploma nursing courses at short period during course curriculum.

Additionally, the current study revealed that more than two thirds of studied psychiatric nurses did not receive training courses in clozapine side effects management for co- morbid psychiatric patients. From researcher point of view this may be due to the great concern form general secretariat of psychiatric and mental health is given to psychiatric patient ethical principles in treating psychiatric patients training courses rather than psychopharmacology courses. Another explanation for lack of knowledge is psychiatric nurses' exhaustion due to increased workload in in-patient psychiatric unit which may limit their ability to read and update their knowledge and the inadequate training area in port-said psychiatric and mental health hospital.

However, the satisfactory knowledge of psychiatric nurses regarding clozapine hematological side effects is explained by the frequently occurring

hematological side effects (neutropenia, agranulocytosis) and obligatory nursing implications for hematological side effects (complete blood count for total leucocytes count done weekly) that makes psychiatric nurses more knowledgeable about hematological side effects.

The current study revealed that more than two thirds of psychiatric nurses obtain satisfactory practice level before initiation of clozapine drug especially; baseline nursing measurements and obtaining patient medical history. In addition, psychiatric nurses obtain satisfactory practice level during clozapine drug especially; measuring vital signs and patient follow up. On the other hand, more than half of psychiatric nurses obtain un-satisfactory practice skills regarding patient and family education in particular; provide patient and family with information about food and drug interaction with clozapine drug.

In harmony with the current study findings a study by **Gee et al. (2013)**

who reported that the majority of psychiatric nurses were familiar with clozapine prescription guidelines. The main barriers for prescribing clozapine were the obligatory blood monitoring and common somatic complications. Both dedicated staff and facilities were indicated as possible solutions to facilitate clozapine prescribing. In addition, the role of nurses in early detection of clinical signs such as fever, flu like symptoms or a sore throat, an opportunity that would be missed if nurses do know about the potential connection of these general symptoms and a potentially life-threatening side-effect during clozapine drug which strengthens the result of current study about high response rate regarding hematological side effects and nursing implication.

In addition, the current study came in accordance with **van der Zalm, et al.,(2020)** who reported that monitoring by a psychiatric nurse is at least as safe as monitoring by a psychiatrist, and that delegation of side effects monitoring tasks to an advanced nursing practitioner

is associated with a longer retention on clozapine side effects. Clozapine monitoring by advanced nursing practitioner seems as safe, as that done by a psychiatrist. Patients monitored by an ANP tended to stay on treatment for longer than patients monitored by a psychiatrist, but the difference was small and statistically not significant.

A contradictory finding reported by **Stomski., (2016)** illustrate that mental health nurses' knowledge of antipsychotic medication side-effect assessment tools is limited and these tools are not used regularly in clinical practice. This lack in the routine use of these tools will probably lead to a poorly estimation of antipsychotic medication side effects. Such underestimation may result in some side effects remaining unaddressed, which can promote discontinuation of medication since side effects are a primary determinant of non-adherence. Electing not to adhere to medication regimes may have important clinical consequences because non-adherence has been associated with increased risk of relapse, re-

hospitalization and self-harm.

The current study revealed that more than two thirds of nurses obtained satisfactory practice level regarding clozapine cardiovascular, hematological, metabolic and urinary side effects and nursing implication for clozapine toxicity.

The prior results came in contrary with **De Hert et al.,(2016)** they reported that most of psychiatric nurses obtain satisfactory practice level about cardio-metabolic side effects and hematological side effects especially agraiolocytosis emphasizing the role of nurse in early detection of signs of infection(flu like symptoms). On the other hand, the results of the current study came in contrast with **Stark & Scott, (2012)** they reported that most of psychiatric nurses obtain un satisfactory practice level regarding clozapine dose related seizures risks, smoking cessation can lead to an increase in plasma levels of clozapine of up to 20% to 70% putting patients at higher risk not only for a seizure without

any change of daily ,but also for clozapine intoxication.

Form researcher point of view, this may be due to the psychiatric nurses obligatory apply physician order for clozapine administration and monitoring of side effects especially in co-morbid psychiatric (Random blood Sugar monitoring, Electrocardiogram, liver enzymes and lipid profile) patient regardless the underlying understanding of the reason of the physician's order. In addition, the current study revealed that near to two thirds of them had experiences in psychiatric settings more than ten years, most of them work in in-patient department and as staff nurse at early (morning) shifts. From researcher's point of view, this may due to increased number of psychiatric patients in inpatient departments than outpatient clinics which lead to increase psychiatric nurse's workload at morning shifts especially for staff psychiatric nurses.

Moreover, , findings from this study also suggest mental health nurses'

knowledge regarding clozapine side effects tends to increase with experience and this is supported by previous findings of **Perehudoff et al., (2016)** they reported that regardless of how much effort goes into improving experiential learning it will always be hampered by time constraints and competing clinical demands.

Additionally, the finding of this study also suggests that psychiatric nurses who have a bachelor degree and above was a positive contributing factor to psychiatric nurses's knowledge about clozapine side effects. The odds of having knowledge about clozapine side effects were 3.27 times higher among nurses who had degree and above educational qualification than diploma holders. This might be due to bachelor's degree and above holders having a deeper knowledge base on which to draw in such areas as clinical practice and critical thinking. The inadequate knowledge of clozapine side effects has been attributed to the method by which psychiatric nurses are trained as previous studies have suggested.

The prior findings came along with **Sanjeevi&Cocoman (2020) (2020)** who contemplated a descriptive study entitled "Mental Health Nurses' Knowledge of Clozapine" concluded that psychiatric nurses are poorly trained in psychopharmacology and have recommended changes in curriculum that accommodates more psychopharmacology in view of the growth of psychiatric nurse's knowledge. Other investigators have indicated for improvement in the teaching of psychopharmacology not only for nurses, but for doctors and pharmacists as well. This is because current teaching in this field of psycho-pharmacology appears insufficient for undergraduate psychiatric nurses (**Gardner, 2014**). Improvement in the teaching methodology of psychopharmacology not only for nurses, but for doctors and pharmacists as well. This is because current teaching in this field appears insufficient for undergraduate psychiatric nurses (**Gardner, 2014**).

Lastly, findings of current study also indicates that psychiatric nurses'

practice regarding clozapine side effects on co-morbid psychiatric patients tends to increase with years of experience in psychiatric settings and working inpatient psychosis unit rather than outpatient. This could be explained by the fact that when experience in psychiatric settings at inpatient unit increases, psychopharmacological practice skills grow, they take on more responsibility to handle psychiatric co-morbid illness patient undertaking clozapine drug who require nursing consideration during assessment, monitoring and management of life threatening side effects

This could be explained in the light of the fact that when experience increases, psychopharmacological practice skills grow, they take on more responsibility, skill development and interest in practices develops as well, and also due to the fact that as psychiatric nurses' years of experience in psychiatric settings increase, they are more likely to be exposed to clozapine administration and management of side effects among co-morbid illness psychiatric patients on

a regular basis and gain experience through working at morning shifts as psychiatric senior staff nurses.

The prior findings came along with **Sanjeevi&Cocoman (2020)** who concluded that psychiatric nurses worked in psychosis unit tends to perform better than out-patient clinics. In addition, the more experience the psychiatric nurses tends to have, the better performance regarding psychopharmacology they got. Besides, psychiatric nurses working as registered nurse (RN) in psychosis unit tends to have more practice skills. However, the current study came in contrast with the same author who reported that registered nurses working at all nursing shifts tend to perform in equal excellence regarding clozapine drug administration and management of its side effects.

5. Conclusion

Based on the findings of the present

study, it can be concluded that, there is a wide gap between psychiatric nurses' knowledge and their practice regarding side effects of clozapine on co-morbid psychiatric patients. This can be explained through that the majority of psychiatric nurses demonstrate satisfactory practice regarding management of clozapine side effects on co-morbid psychiatric patients. However, the majority of psychiatric nurses don't have satisfactory knowledge regarding clozapine side effects on co-morbid psychiatric patients.

6. Recommendations

Based upon the result of this study, the following recommendations can be suggested:

1. Updating knowledge of psychiatric nurses regarding psychopharmacology through continuing in-service educational programs.
2. Strategies should be implemented to improve the routine use of clozapine side-effect assessment tools, which would enhance the identification of side effects and improve clinical outcomes for mental health service users in Egypt.
3. Further studies are recommended on the psychopharmacological nursing to ensure safe working environment in psychiatric and mental health hospital in Egypt.

Table 1: Personal characteristics and professional backgrounds of psychiatric nurses (n=100).

Personal characteristics	Percentage %
Psychiatric nurse age (in years)	
20≥30	67
31≥ 40	23
>41	10
Mean ± SD 27.77 ±3.749	
Gender	
Male	19
Female	81
Educational qualification	
Diploma	92
Bachelor	7
Master	1
Hospital departments	
In-patient units	96
Out-patient units	4
Nursing job satisfaction	
Staff nurse	90
Shift senior	6
Head nurse	4
Nursing Shifts	
Morning	73
Evening	10
Night	17
Experience in psychiatric nursing	
1≥5 years	27
6≥10 years	52
<11 years	20
Attending clozapine workshops	
Yes	13
No	87
Informed about co-morbid illness patients	
Yes	77
No	23

Figure (1) Distribution of co- morbid disorders which psychiatric nurses faced among psychiatric patients undertaken clozapine drug (n=100).

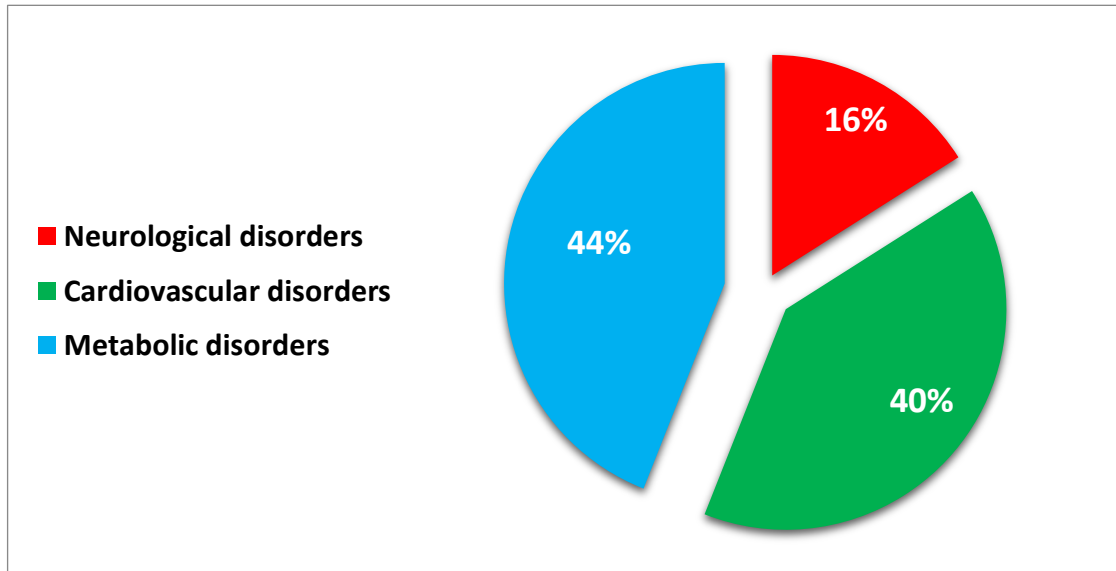


Figure (2) Distribution of clozapine complications challenge psychiatric nurses during clozapine drug (n=100)

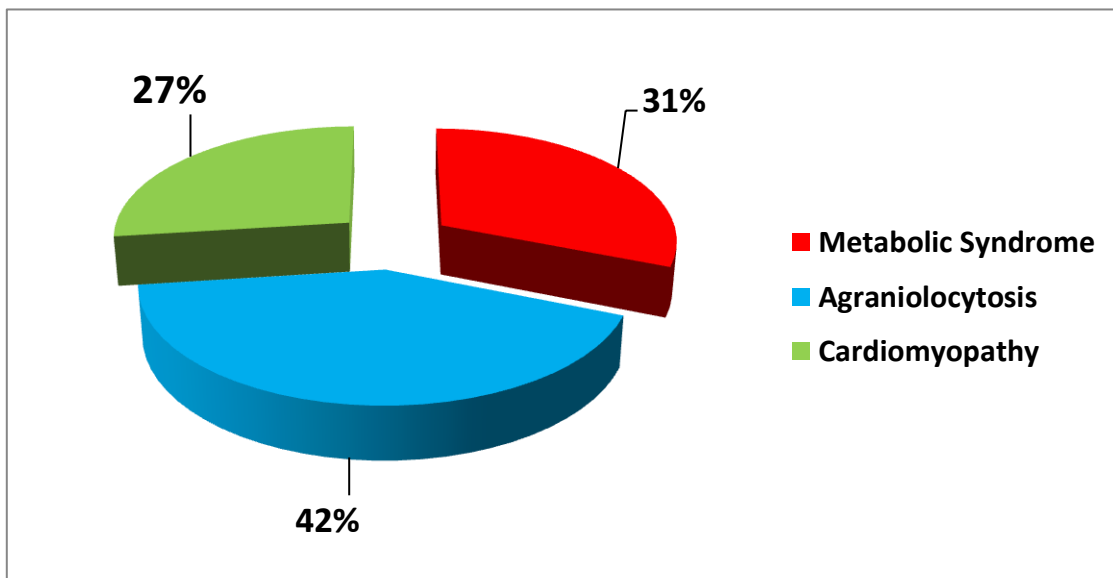


Figure (3) Distribution of Psychiatric nurses's knowledge about side effects of clozapine drug among co-morbid psychiatric patient (n=100)

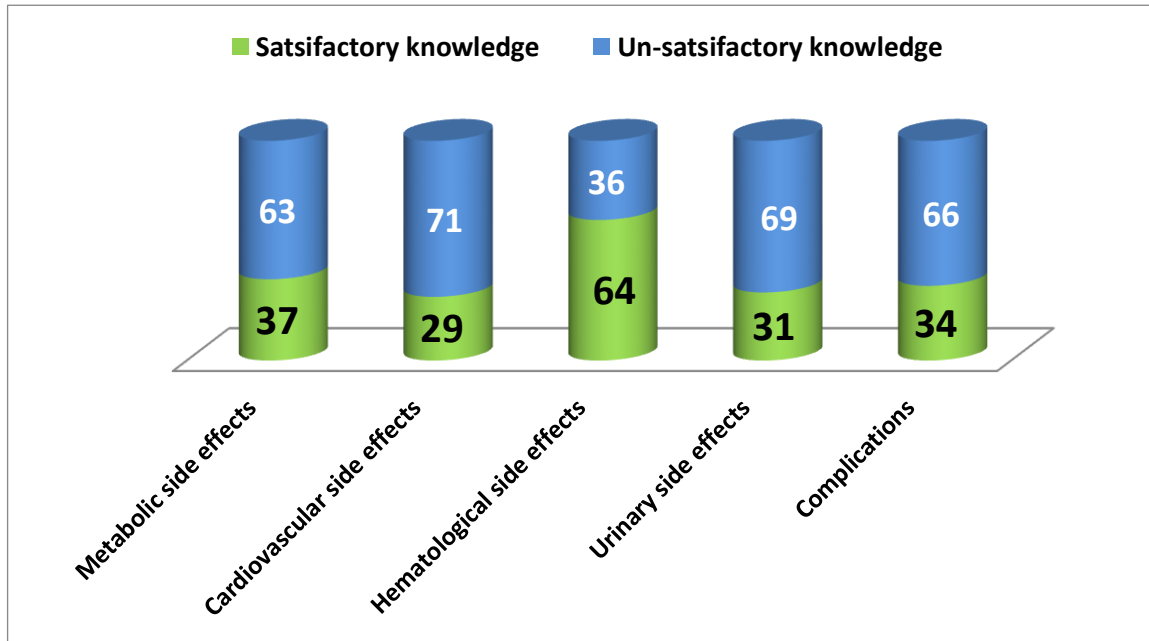


Figure (4) Level of Psychiatric nurses's practice about side effects of clozapine (n=100)

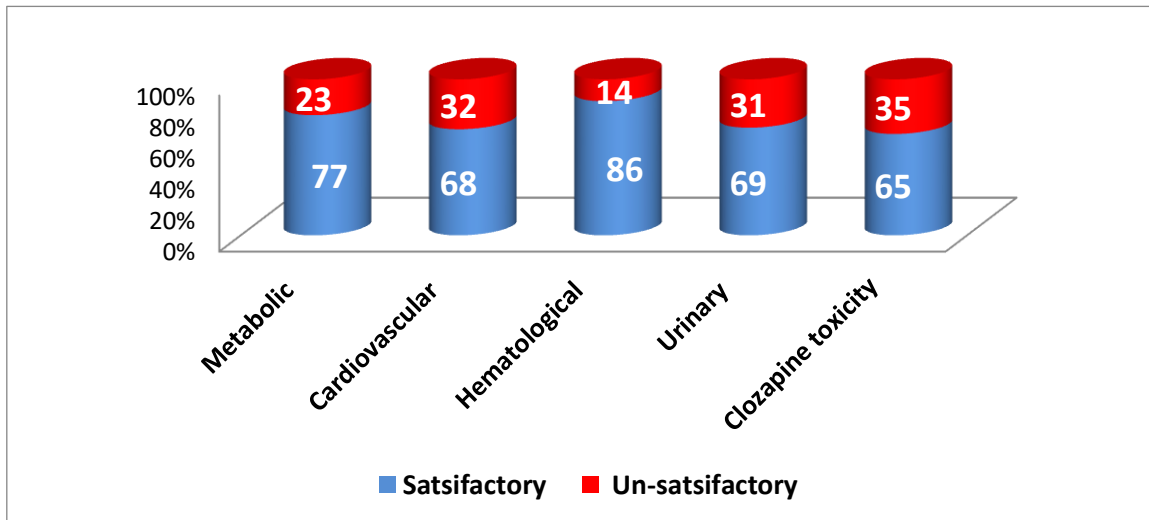


Figure (5) Distribution of nurses’ knowledge and practice regarding side effects of clozapine drug among co-morbid psychiatric patients (n=100).

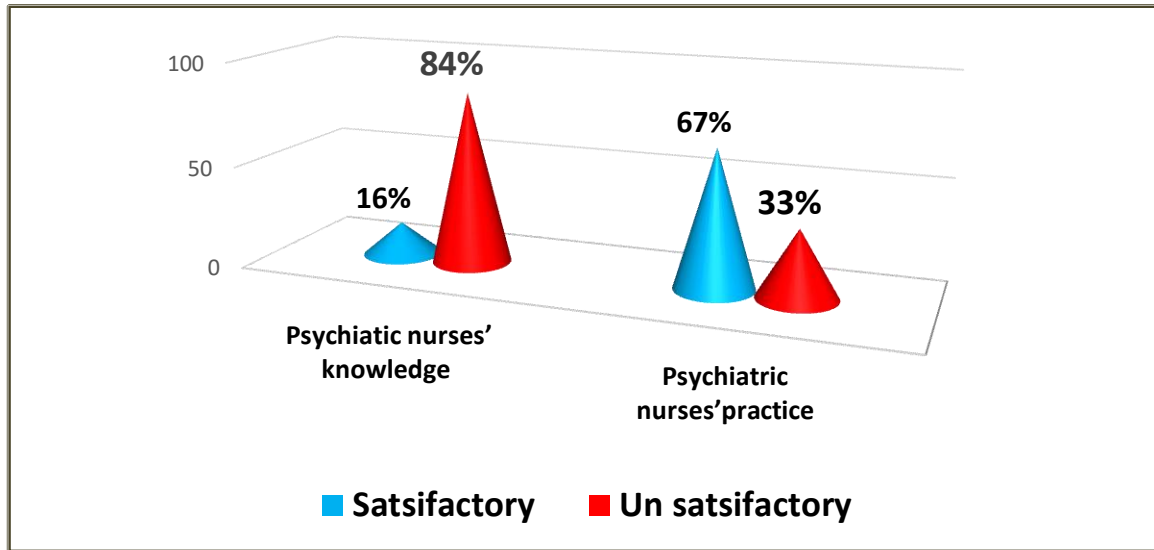


Table 3: Binary and multivariate logistic regression on predictors of psychiatric nurses’ knowledge (n=100).

Personal characteristics & Professional background		Psychiatric nurse Knowledge		95% CL	
		Satisfactory	Un satisfactory	COR	AOR
Level of education	Diploma	8	84	1	1
	Bachelor or higher degree	8	0	3.16 (1.96,5.10)	3.27 (1.97, 5.43)*
Years of experience in psychiatric nursing	5-10 years	3	25	1.44 (0.96, 2.11)	1.48 (0.96, 2.11)
	11-20years	6	46	0.23 (0.12–0.91)	0.29 (0.12–0.91)
	<21 years	7	13	3.44 (2.25,5.20)	3.71 (2.37, 5.81)**

COR= crude odd ratio

AOR=adjusted odd ratio

CL= confidence level (*Significant at P< 0.05

**highly significant at P< 0.001)

Table 4: Binary and multivariate logistic regression on predictors of practice (n=100).

Personal characteristics & professional background		Practice		95% CL	
		Satisfactory	Un satisfactory	COR	AOR
Hospital department	In patient units	76	29	3.44 (1.86,5.13)	3.49 (1.89, 5.46) *
	Outpatient units	0	4	1	1
Nursing job description	Staff nurse	57	33	0.55 (0.23,1.31)	0.56 (0.23,1.31)
	Shift senior	6	0	3.31 (0.29, 1.52)	3.37 (0.29, 1.52) **
	Head nurse	4	0	0.81 (0.34, 1.64)	0.86 (0.34, 1.64)
Nursing Shifts	Morning	55	18	3.31(3.21, 3.41)	3.31(3.21, 3.41) **
	Evening	5	5	0.61 (0.24, 1.54)	0.64 (0.24, 1.54)
	Night	7	10	1	1
Years of experience in psychiatric nursing	5-10 years	2	25	1.44 (0.96, 2.11)	1.48 (0.96, 2.11)
	11-20years	46	6	3.44 (2.25,5.20)	1.82(1.16, 2.85) *
	<21 years	16	4	0.23 (0.12–0.91)	0.29 (0.12–0.91)

COR= crude odd ratio

AOR=adjusted odd ratio

CL= confidence level (*Significant at P< 0.05

****highly significant at P< 0.001)**

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