

Evaluation of Medication Adherence and its Predictors Among Psychiatric Outpatients at a Mental Healthcare Hospital in Lahore, Pakistan: A Cross-Sectional Study

Ayesha Shaheen Sarwar^a, Ahmad Khan^{b*}, Tahir Mehmood^c, Jallat Khan^d,
Obaidullah Malik^e, Munira Johar^f

^{a,b}Department of Pharmacy, Quaid-i-Azam University, Islamabad, Pakistan

^cSchool of Natural Sciences, National University of Sciences and Technology, Islamabad, Pakistan

^dDepartment of Chemistry, Khuwaja Fareed University of Engineering and Information Technology, Rahim Yar Khan, Punjab, Pakistan

^eDrug Regulatory Authority of Pakistan, Islamabad, Pakistan

^fSaeed Akhtar College of Nursing, DAKSON Institute of Health Sciences, Islamabad, Pakistan

^aEmail: akhan@qau.edu.pk

^bEmail: ayeshashaheensarwar@gmail.com

^cEmail: tahime@gmail.com

^dEmail: jallat.khan@kfueit.edu.pk

^eEmail: obaidr@yahoo.com

^fEmail: munirajohar03@gmail.com

Abstract

The study aimed to assess the level of medication adherence among psychiatric outpatients and to determine the main predictors associated with medication non-adherence. A cross sectional study was conducted among 298 psychiatric outpatients at Punjab Institute of Mental Health (PIMH), Lahore, Pakistan. A designed questionnaire was used as data collection tool and adherence was evaluated using MARS (Medication Adherence Rating Scale). Data was analyzed using SPSS version 21.0. Logistic regression was applied to determine the predictors of non-adherence. Medication adherence rate varied from low (39.3%) to high (60.7%) adherence. The impact of demographic factors such as age, gender, diagnosis, employment status and comorbidity on medication adherence were insignificant.

* Corresponding author.

Results of chi-square found that marital status, duration of illness from last visit, patient factors, medication factors, disease factors were significantly associated with adherence ($p < 0.05$). Multivariate binary logistic regression indicated that qualification, marital status, number of tablets per day, duration of illness from last visit, patient factors, disease factors were the main predictors of medication non-adherence.

Key words: Predictors; non-adherence; psychiatry; psychotropic medication; mental disorders; outpatients.

1. Introduction

World Health Organization (WHO) stated that almost 450 million people suffered from a mental and behavioral disorders globally and 33% of all years lived with disability (YLDs) because of neuropsychiatric disorders [1]. In Pakistan, more than 14 million, 10-16% of population, is suffering from mild to moderate psychiatric issues and mental health remains the most neglected field [2]. Psychiatric illness is important concern for public health and adherence is the foremost component of treatment in recent years [3,4]. Medication adherence is defined as “the extent to which patient’s behavior matches agreed recommendations from the prescriber”[5]. WHO stated that in industrialized countries on average only 50% of patients with chronic ailment follows treatment recommendations [6]. In systematic review by Cramer, psychiatrically ill patients treated with antipsychotic medications have adherence in the range of 24-90% whereas among those on antidepressants were in the range of 40-90% [7]. Several patients never start taking their medicines or even stop treatment entirely within the first 12 months and only few continue therapy as advised by their doctor[8]. Velligan found that partial adherence, non-adherence and provider under estimation about adherence frequently lead to excessive medication therapy, complex regimen and incidence of adverse drug reactions. Estimations of adherence by provider are overly optimistic and are the least trustworthy [9]. Moreover, pharmacists are at well position to address medication non adherence. A recent meta-analysis showed that interventions provided by health care teams with pharmacists significantly affect patient care as compared to without pharmacist interventions [10]. Medication non-adherence has major influence on patient recovery and can result in relapse, functional disability, re-hospitalization and subsequently increased costs to patients and healthcare system [11,12]. According to a comprehensive literature survey by Cutler and his colleagues yearly cost of non-adherence on mental health for each patient ranged from \$3252 to \$19363. With every 25% decline in rate of adherence, non-adherence total cost increase incredibly[13]. Non adherence is a global challenge but still remains hidden within patient consultations. Patients may be hesitant in raising their concerns and troubles with their doctors, that doctors will misinterpret it as lack of trust in their medicines and skills. However, when patients were allowed to negotiate treatment therapy with their doctors, medication adherence tends to increase up to 80%, highlighting the need of patient involvement in course of treatment. Therefore, a strong and trustworthy relationship between patient and doctor can defend against non-adherence(Chapman and Horne, 2013; Hardeman and his colleagues 2010). Risk factors associated with non-adherence include negative attitude, symptom severity, shorter duration of illness, past experience, comorbidity, substance abuse, adverse drug reaction, cultural or religious beliefs about medication, living alone or lack of social support [11,16,17]. Typical reasons of non-adherence are numerous and include forgetfulness, felt better, decide to omit dose, lack of information, medication cost, sedation, too many pills and alternative medicine [4,18]. The main purpose of this study was to assess the level of medication adherence and to determine the main predictors associated with medication non-adherence among psychiatric

outpatients at a mental healthcare hospital of Lahore, Pakistan.

2. Methods

2.1 Study setting

A hospital based cross-sectional study was conducted in psychiatric outpatient department in Punjab Institute of Mental Health (PIMH), Lahore. It is 1400 bedded hospital with major facilities for mentally sick patients, in South Asia. PIMH was founded in 1900AD as “Lunatic Asylum” only facility to provide care to psychiatric patients and named into “Government Mental Hospital” and renamed as “Government Hospital for Psychiatric Diseases” in 1996, and was renamed as “Punjab Institute of Mental Health” in 2002.

2.2 Study participants

The source population comprised of all psychiatric patients visiting outpatient department in the hospital; while study population consisted of outpatients who were on treatment and receiving psychotropic drugs for at least one month with age of 18 years or above, mentally stable, able to understand the nature of study and gave consent. Inpatients, patients with epilepsy, with severe mental retardation and unconsciousness or who had history of drug abuse were excluded from the study. The study was conducted between 14th November 2018 and 30th December, 2018. Sample size was calculated using the single proportion formula for the present study (Daniel formula, 1995): $n = Z^2 P (1-P)/d^2$. Sample size was determined to be 298 with employing Z-score of 1.96 with 5% degree of precision.

2.3 Data collection and assessment

The data was collected in specially designed questionnaire which include following details

2.3.1 Demographic and clinical characteristics of patient

It consisted of name, age, gender, residence, qualification, marital status, employment status, monthly income, diagnosis, comorbidities, duration of illness, duration of continuous therapy, duration of illness from last visit, number of tablets patient take per day, administration of medication and physician follow up.

2.3.2 Medication Adherence Rating Scale (MARS)

Patients’ medication adherence to psychotherapeutic drugs was assessed by Medication Adherence Rating Scale (MARS), which is highly specific for psychiatric illness. The MARS comprised of 10 items with response yes or no. The first 4 items are based on Medication Adherence Questionnaire MAQ and coded as no = 1 and yes = 0 while other items are based on Drug Attitude Inventory DAI and are coded as Q5, Q6, Q9, Q10 n = 1 and yes = 0; Q7, Q8, no=0 and yes=1. A total score will then reveal the level of adherence, scoring less than 6 is considered as low adherence and above 6 as high level of adherence.

2.3.3 Factors associated with non-adherence

It consisted of various factors associated with non-adherence to medication questions based on 10 item scale with responses from a 5 point Likert scale with A=strongly disagree, B=disagree, C=neutral, D=agree, E=strongly agree. The items included I don't adhere to medication because of 1) Forgetting, 2) Un-conducive timings of medication, 3) Cost of medicines , 4) After becoming better, 5) They have little benefit, 6) I have alternative medicine, 7) Little availability of medicine, 8) Bad society belief on psychiatric medicine, 9) Frequent travelling, 10) There are too many pills.

2.4 Ethical approval

Approval for this study was obtained from the Bioethics Review Committee of Quaid-i-Azam University, and "Punjab Institute of Mental health, Lahore". This study was observational with no interventions. There was no direct or indirect hazardous risk to the patient, prescriber or the researcher. A written consent was obtained from patients or their attendants.

2.5 Data analysis

Data was managed using SPSS for Window Version 21.0". Descriptive statistics were obtained for data summarization. Chi-square tests were used to determine association between categorical response i.e. adherence and categorical factors. Similarly independent sample t-test was used to determine the association between categorical response i.e. adherence and continuous factors. Principal Component Analysis (PCA), a dimension reduction tool, was used specifically for adherence scores computation based on several questions. Multivariate binary logistic regression was applied to identify the main predictors of medication non-adherence among psychiatric patients. The significance level for independent variables was set at 0.05 (two-tailed).

3. Results

3.1 Demographic and clinical characteristic of patients

Out of 298 patients, 56.7% (169) were males, and 43.3% (129) were females. Almost half of the patients 56.7% (169) were rural, and 43.3% (129) were urban. About 33.9% of the patients were of age >18-29 years, 26.8% of 30-39 years, 20.1% of 40-49 years, 9.4% of 50-59 years and 9.7% of 60->65 years. The highest number of patients were found in adult age (<18-29). Majority of the patients 69.5% were illiterate while only 30.5% were literate (21.8% had precollege education and only 8.7% were highly educated). Majority of the patients 40.3% (120) were diagnosed with psychotic disorders followed by 26.5% (79) patients with bipolar disorders, 24.8% (74) with depressive disorders, and 8.4% (25) with anxiety disorder. Only 16.4% (49) patients had some comorbidities while 83.9% (249) had no comorbidity.

3.2 Measure of medication adherence

MARS scale was used to evaluate the level of medication adherence. It is 10 item scale with response yes/no. Figure 1 shows the response of sample population. Most of the patients (72.5%) respond that they can prevent

getting sick by staying medicines, 61.0% said that medication makes them feel tired and sluggish, 58.7% respond that they forget to take medicine and 54% said that they are careless about taking medicine. While 46.6% and 40.9% patients stop taking medicines when they feel worse and better respectively. Scores less than 6 is marked as low adherence and above 6 as high adherence. Adherence response based on MARS scale states that 39.9% of sample population had low adherence and 60.7% had high adherence.

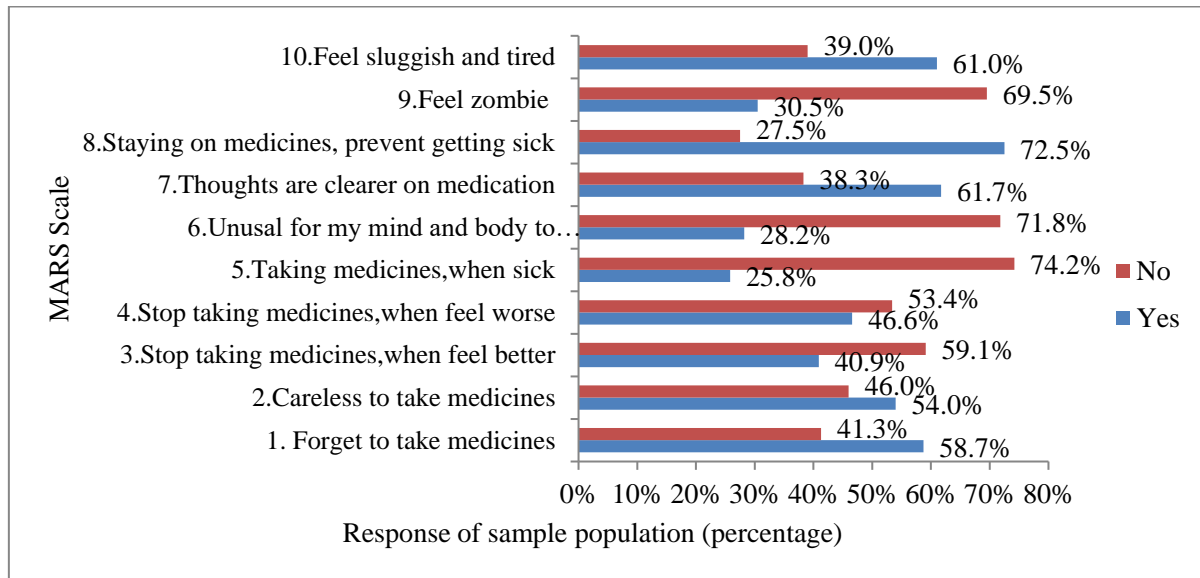


Figure 1: Distribution of Medication Adherence Rating Scale (MARS) of sample population ($n=298$)

3.3 Predictors of medication non-adherence

Chi-square tests were used to determine association between categorical response i.e. adherence (low, high) and categorical factors (demographic and clinical). Similarly independent t-test was used to determine the association between categorical response i.e. adherence (low, high) and continuous factor (duration of illness from last visit). Table 1 shows the significant relationship between marital status and adherence ($p < 0.05$). Number of tablets patients take per day is statistically associated with medication non-adherence ($p < 0.05$). Duration of illness from last visit and medication adherence is also significant ($p < 0.05$). Chi-square test was applied to factors associated with medication non-adherence mentioned in Table 1.

Table 1: Predictors of medication non-adherence among the study population (n=298)

	Adherence		Chi square p-value
	Low n (%)	High n (%)	
	n=117	n=181	
Demographic characteristics of patients			
Gender			0.382
Male	70(41.4%)	99(58.6%)	
Female	47(36.4%)	82(63.6%)	
Residence			0.382
Rural	70(41.4%)	99(58.6%)	
Urban	47(36.4%)	82(63.6%)	
Qualification			0.656
Illiterate	83(40.1%)	124(59.9%)	
Literate	34(52.3%)	57(62.6%)	
Age (years)			0.515
18-29	43(42.6%)	58(57.4%)	
30-39	31(38.8%)	49(61.3%)	
40-49	23(38.3%)	37(61.7%)	
50-59	7(25.0%)	21(75.0%)	
>60	13(44.8%)	16(55.2%)	
Marital status			0.043
Single	47(45.6%)	56(54.4%)	
Married	63(38.9%)	99(61.1%)	
Divorced/widow	7(21.2%)	26(78.8%)	
Employment status			0.665
Employed	39(41.1%)	56(58.9%)	
Unemployed	78(38.4%)	125(61.6%)	
Monthly income			0.558
Less than 15000PKR	83(38.2%)	134(61.8%)	
More than 15000PKR	34(42.0%)	47(58.0%)	
Clinical characteristics of patients			
Diagnosis of patient			0.784
Depressive disorder	28(37.8%)	46(62.2%)	
Psychotic disorder	50(41.7%)	70(58.3%)	
Bipolar disorder	28(35.4%)	51(64.6%)	
Anxiety disorder	11(44.0%)	14(56.0%)	
Comorbidity			0.474
Yes	17(34.7%)	32(65.3%)	
No	100(40.2%)	149(59.8%)	
Duration of illness			0.575
Less than 1yr	31(34.8%)	58(65.2%)	
1-4yrs	63(40.6%)	92(59.4%)	
More than 4yrs	23(42.6%)	31(57.4%)	
Duration of continuous therapy			0.217
Less than 4yr	107(38.4%)	172(61.6%)	
More than 4yrs	10(52.6%)	9(47.4%)	
Number of tablets patients take per day			0.000
1-3 tablets	16(21.6%)	58(78.4%)	
4-6 tablets	66(39.5%)	101(60.5%)	
7-9 tablets	27(56.3%)	21(43.8%)	
>10 tablets	8(88.9%)	1(11.1%)	
Administration of medication			0.558

Self	81(38.2%)	131(61.8%)	
Relative	36(41.9%)	50(58.1%)	
Physician make follow up			0.930
Yes	107(39.3%)	165(60.7%)	
No	10(38.5%)	16(61.5%)	
Duration of illness from last visit*	2.11±1.55	1.40±0.947	0.000

Factors associated with non- adherence	
Forget to take medication	0.000
Un-conductive timing of medication	0.000
Cost of medication	0.372
Stop taking medication after becoming better	0.000
Psychiatric medication have little benefits	
Use of alternative medicine	0.000
Little availability of medicines	
Bad society belief on psychiatric	0.001
Frequent travelling	0.020
Too many pills	0.000
	0.000
	0.001

*Independent t- test

Table 2: Multivariate binary logistic regression analysis evaluating effect of demographic, clinical characteristics and factors on medication non-adherence

Variables	Levels	B	S.E.	Sig.	Odds Ratios	Confidence Interval 95%
Qualification	Illiterate	Reference				
	Literate	0.797	0.386	0.039*	2.219	1.04 - 4.72
Marital status	Single	Reference				
	Married	0.528	0.370	0.153	1.695	0.82 – 3.49
	Divorced/widow	1.891	0.607	0.002*	6.626	2.01 – 21.7
Duration of illness from last visit		-0.252	0.131	0.05*	0.777	0.60 – 1.00
Number of tablets patients take per day	1-3 tablets	Reference				
	4-6 tablets	-1.20	0.412	0.003*	0.300	0.13 - 0.67
	7-9 tablets	-2.029	0.536	0.000*	0.131	0.04 - 0.37
	>10 tablets	-4.198	1.238	0.001*	0.015	0.00 – 0.17
f1(Patient factors)	No	Reference				
	Yes	-1.244	0.331	0.000*	0.288	0.15 – 0.55
f2(Medication factors)	No	Reference				
	Yes	-0.593	.342	.083	.553	0.28 – 1.08
f3(Disease factors)	No	Reference				
	Yes	-2.187	.348	.000*	.112	0.57 – 0.22

*p-value< 0.05; 95% confidence interval

Principal Component Analysis was applied to factors associated with medication non-adherence mentioned in Table 1. In Principal Component Analysis, 3 components were identified. The first component contained patient related factors (such as forgetting, un-conductive timing of medicine). Second component contained medication related factors (such as cost of medicines and alternative medicines) while third component contained disease factors (feeling better, little benefit). Results of multivariate binary logistic regression of independent variables and adherence are shown in Table 2. Finding from the logistic regression indicates that qualification, marital status, number of tablets per day, patient factors, disease factors were remain factors associated with medication non-adherence.

3. Discussion

In present study, 39.3% (117) patients were poorly adherent with psychiatric medications. This outcome is consistent with non-adherence rates stated in Southwest Ethiopia, 41.2% [19]; in South Africa, 37% [20]; in Central Ethiopia, 41.0% [21]. However, this finding of non-adherence is much lower than rates in Saudi Arabia, 74% [16]; in Egypt 74.0% [22]; in Jordan 64.0% [22]. The difference in studies might be because of different study population, study design, study settings, sample size, inclusion exclusion criteria, measuring scale used. In our study, we used MARS which is 10 item scale with response yes/no. Score less than 6 is marked as low adherence and above 6 as high adherence. Effect of demographic characteristics such as age, gender, residence, employment status, monthly income on medication adherence were insignificant ($p > 0.05$). This consonant with the findings of Sanele study in South Africa [20]. In contrast to other studies, where age was significantly associated with medication adherence. A younger person with high risk of non-adherence implies that they have more negative perception towards psychiatric medications [12,23]. However, qualification ($p < 0.05$) and marital status ($p < 0.05$) had significant impact on adherence. Literate individuals have more insight regarding adhering to medication possibility knowing the long run consequences [24,25]; People with marital status divorced/window were found to be statistically significant with adherence. This controversial finding about marital status and adherence was also found by study in Mekelle, Northern Ethiopia [12]. Some studies concluded that adherence did not differ significantly on marital status [26] and [27]. Another study noted that married status had significant association with poor adherence [28]. Duration of illness from last visit ($P < 0.05$) and number of tablets patient take per day ($P < 0.05$) is significantly associated with greater adherence. Patients who visited doctor after every one month were more adherent to their medicines as it enhances patient doctor relationship which is quite important and keystone for patient care thus enhancing medication adherence. In addition, as number of tablets increases adherence reduced drastically and higher number of medicines is more frequently associated non adherence. Among different diagnosis of disease, patients suffering from anxiety disorder (44.0%) were the least to comply, followed by psychotic disorder (41.7%), depressive disorder and bipolar disorder (35.4%). Prevalence of different disorders varies from society to society. A former study shows that 74% of schizophrenic outpatients stop taking neuroleptics or antipsychotics within two years of leaving hospital and 20-25% bipolar patients are non-compliant [29]. In our study, feeling tired and sluggish (61%), forget to take medicine (58.7%), careless to take medicine (54%), stop taking medicine when feel worse (46.6%), stop taking medicine when feel better (40.9%), unnatural to be controlled by medication (28.2%) were the major findings according to the MARS. Moreover, considering the realization because of illiteracy and lack of knowledge patients stop taking medicines. This attitude is further precipitated by the stigma to

mental illnesses, treatment from quacks and traditional faith healers and improper education of patients (Taj and Khan, 2005). Patient related factors such as forgetting ($p < 0.05$), un-conductive timing of medicine ($p < 0.05$), bad society belief on psychiatric medicine ($p < 0.05$) and frequent travelling ($p < 0.05$) were significantly associated with adherence. Forgetfulness is the foremost factor affecting medication adherence and patients stopped medication when feel worse are in line with many previous research [4,8,31]. Medicines related factors such as alternative medicine ($p < 0.05$), little availability ($p < 0.05$), too many pills ($p < 0.05$) were statistically significant. Unlike former studies in Pakistan [4] and (Taj and Khan, 2005), our study did not show treatment cost as the most common reason of non-adherence because of highly effective welfare programme and government free medicine facilities in our hospital. Disease related or condition related factors such as feeling better ($P > 0.05$) is significantly associated with adherence because on long term use patient have few and little symptoms which is a major barrier to take medicines and moreover little benefit ($P > 0.05$) is also significant based on psychiatric patients negative belief that medicines are less essential. This finding coincides with study on belief about medicines which found that psychiatric group attained lower on the need of taking medication and non-adherent patients felt medication to be less necessary [32].

4. Limitation

Every study has some limitations. First limitation to our study is a cross sectional study design conducted in only single setting hospital; although PIMH is the largest facility for psychiatrically ill patients in South Asia but still our findings cannot be generalized. Small sample size and use of self-reporting scale for medication adherence may underestimate the magnitude of the reality as there may be a response bias as concomitant with self-reporting. Moreover, because of cross sectional nature of the study design cause-effect relationship cannot be established although study is helpful to probe associations between variables.

5. Conclusion

Mental health remains a serious and immensely increasing dispute in Pakistan. Many of the patients had low adherence to psychiatric medications. Efforts should be made to improve the medication adherence. Psycho education and counseling should be employed to overcome the patient related factors which further improve medication adherence. Phone reminders and pillboxes with paging system of medication can also be employed. Family members or caregivers should be advised to help patients to take their medications. Pharmacist should be employed along with psychiatrists, as they have better knowledge in patient care, treatment assessment, medication management, monitoring of potential adverse drug reactions and interactions can educate patients and their families in much better way.

Acknowledgment

We would like to acknowledge Dr. Tayyab, Head of OPD, whose moral support made this study possible.

6. Informed consent

Informed consent was obtained from all the patients or their attendants included in study.

7. Conflict of interest declaration

The authors state no conflict of interest.

8. Funding sources

None.

References

- [1]. WHO, "Investing in mental health," Who, pp. 3–49, 2003.
- [2]. I. Ansari, "Mental Health Pakistan: Optimizing brains," *Int. J. Emerg. Ment. Health*, vol. 17, no. 1, p. 288, 2015.
- [3]. K. B. Thakkar, M. M. Jain, G. Billa, A. Joshi, and A. A. Khobragade, "A drug utilization study of psychotropic drugs prescribed in the psychiatry outpatient department of a tertiary care hospital," *J. Clin. Diagnostic Res.*, vol. 7, no. 12, pp. 2759–2764, 2013.
- [4]. F. Taj et al., "Factors associated with non-adherence among psychiatric patients at a tertiary care hospital, Karachi, Pakistan: a questionnaire based cross-sectional study," *J. Pak. Med. Assoc.*, vol. 58, no. 8, pp. 432–436, 2008.
- [5]. R. Horne, J. Weinman, N. Barber, and R. Elliott, "Concordance, adherence and compliance in medicine taking Report for the National Co-ordinating Centre for NHS Service Delivery and Organisation R & D (NCCSDO)," *Natl. Co-ord. Cent. NHS Serv. Deliv. Organ. R D*, pp. 1–331, 2005.
- [6]. World Health Organization, "Adherence to long term therapies; evidence for action," 2003.
- [7]. J. A. Cramer, "Compliance with medication regimens for mental and physical disorders," *Psychiatr. Serv.*, vol. 49, 1998.
- [8]. H. Odo, S. Olotu, J. Soni, B. James, I. Agbonile, and P. Esan, "Assessment of adherence to psychotropic medications among out-patients at the Pharmacy Department of a Psychiatric Hospital, in Benin City, Nigeria," *Asian J. Pharm.*, vol. 8, no. 4, p. 211, 2014.
- [9]. D. I. Velligan et al., "Relationships Among Subjective and Objective Measures of Adherence to Oral Antipsychotic Medications," *Psychiatr. Serv.*, vol. 58, no. 9, pp. 1187–1192, Sep. 2014.
- [10]. M. A. Chisholm-burns et al., "ORIGINAL ARTICLE US Pharmacists ' Effect as Team Members on Patient Care Systematic Review and Meta-Analyses," *Med. Care*, vol. 48, no. 10, pp. 923–933, 2010.
- [11]. P. Sharmila Nirojini, M. Bollu, and R. R. Nadendla, "Prevalence of medication non-adherence among the psychiatric patients - Results from a survey conducted in a tertiary care hospital," *Int. J. Pharm. Pharm. Sci.*, vol. 6, no. 4, pp. 461–463, 2014.
- [12]. T. Eticha, A. Teklu, D. Ali, G. Solomon, and A. Alemayehu, "Factors associated with medication adherence among patients with schizophrenia in Mekelle, Northern Ethiopia," *PLoS One*, vol. 10, no. 3, pp. 1–11, 2015.
- [13]. R. L. Cutler, F. Fernandez-Ilimos, M. Frommer, C. Benrimoj, and V. Garcia-cardenas, "Economic impact of medication non- adherence by disease groups : a systematic review," *BMJ*, pp. 1–13, 2018.
- [14]. "Adherence According to Mary Poppins: Strategies to Make the Medicine Go Down," *Perspect.*

- Psychiatr. Care, vol. 46, no. 1, pp. 3–13, 2010.
- [15]. S. C. E. Chapman and R. Horne, “Medication nonadherence and psychiatry,” *Current Opinion in Psychiatry*, vol. 26, no. 5. Wolters Kluwer Health, pp. 446–452, Sep-2013.
- [16]. M. Alsalem, “Psychotropic Medication Non-adherence among Psychiatric Patients at King Abdulaziz Hospital-Makkah,” *Int. Neuropsychiatr. Dis. J.*, vol. 10, no. November, pp. 1–11, 2017.
- [17]. A. Ghaffari-Nejad, A. Mashayekhi, S. Mazhari, and A. Ghayoumi, “Factors Associated With Drug Non-Adherence After Discharge Among Patients With Mood Disorders Hospitalized in Shahid Beheshti Hospital in Kerman: A Prospective Study,” *Zahedan J. Res. Med. Sci.*, vol. 17, no. 4, 2015.
- [18]. K. Tesfay, E. Girma, A. Negash, M. Tesfaye, and S. Dehning, “Medication Non-Adherence among Adult Psychiatric Out-patients in Jimma University Specialized Hospital, Southwest Ethiopia,” *Ethiop. J. Health Sci.*, vol. 23, no. 3, 2013.
- [19]. K. Tesfay, E. Girma, A. Negash, M. Tesfaye, and S. Dehning, “Medication non-adherence among adult psychiatric out patients in Jimma University Specialized Hospital, Southwest Ethiopia.,” *Ethiop. J. Health Sci.*, vol. 23, no. 3, pp. 227–36, Nov. 2013.
- [20]. Sanele Mahaye, “Medication adherence of psychiatric patients in an outpatient setting,” *African J. Pharm. Pharmacol.*, vol. 6, no. 9, pp. 608–612, 2012.
- [21]. M. Tareke, S. Tesfaye, D. Amare, T. Belete, and A. Abate, “Antipsychotic medication non-adherence among schizophrenia patients in Central Ethiopia,” *South African J. Psychiatry*, vol. 24, no. 0, p. 6, Mar. 2018.
- [22]. T. L. Mukattash et al., “Prevalence of non-adherence among psychiatric patients in Jordan, a cross sectional study,” *Int. J. Pharm. Pract.*, vol. 24, no. 3, pp. 217–221, May 2016.
- [23]. Kn. Rao, J. George, C. Sudarshan, and S. Begum, “Treatment compliance and noncompliance in psychoses,” *Indian J. Psychiatry*, vol. 59, no. 1, p. 69, 2017.
- [24]. T. J. Hudson et al., “A pilot study of barriers to medication adherence in schizophrenia,” *J. Clin. Psychiatry*, vol. 65, no. 2, pp. 211–216, Feb. 2004.
- [25]. B. Janssen, W. Gaebel, M. Haerter, F. Komaharadi, B. Lindel, and S. Weinmann, “Evaluation of factors influencing medication compliance in inpatient treatment of psychotic disorders,” *Psychopharmacology (Berl.)*, vol. 187, no. 2, pp. 229–236, Aug. 2006.
- [26]. J. A. Kasper, S. K. Hoge, T. Feucht-Haviar, J. Cortina, and B. Cohen, “Prospective study of patients’ refusal of antipsychotic medication under a physician discretion review procedure,” *Am. J. Psychiatry*, vol. 154, no. 4, pp. 483–489, Apr. 1997.
- [27]. S. K. Hoge et al., “A Prospective, Multicenter Study of Patients’ Refusal of Antipsychotic Medication,” *Arch. Gen. Psychiatry*, vol. 47, no. 10, pp. 949–956, Oct. 1990.
- [28]. C. G. Maan, M. S. Hussain, N. Heramani, and R. K. Lenin, “Factors affecting non-compliance among psychiatric patients in the regional institute of medical sciences, imphal,” *Indian J. Psychiatry*, vol. 57, no. 5, pp. 01–07, 2015.
- [29]. A. Elixhauser, S. A. Eisen, J. C. Romeis, and S. M. Homan, “The Effects of Monitoring and Feedback on Compliance,” *Med. Care*, vol. 28, no. 10, pp. 883–93, Oct. 1990.
- [30]. R. Taj and S. Khan, “A study of reasons of non-compliance to psychiatric treatment,” *J. Ayub Med. Coll. Abbottabad*, vol. 17, no. 2, pp. 26–8.

- [31]. A. Endale Gurm, E. Abdela, B. Allele, E. Cheru, and B. Amogne, "Rate of Nonadherence to Antipsychotic Medications and Factors Leading to Nonadherence among Psychiatric Patients in Gondar University Hospital, Northwest Ethiopia," *Adv. Psychiatry*, vol. 2014, pp. 1–5, 2014.
- [32]. H. Jónsdóttir, S. Friis, R. Horne, K. I. Pettersen, Á. Reikvam, and O. A. Andreassen, "Beliefs about medications: Measurement and relationship to adherence in patients with severe mental disorders," *Acta Psychiatr. Scand.*, vol. 119, no. 1, pp. 78–84, Jan. 2009.