

# Prevalence of Drug Non Adherence and Associated Factors among Patients with Bipolar Disorder at Outpatient Unit of Amanuel Hospital, Addis Ababa, Ethiopia, 2013

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## Abstract

**Introduction:** Although pharmacotherapy is considered as the main principle of treating a bipolar disorder patient, non adherence is the most common obstacle that limits to gain the optimal effectiveness of medications among bipolar disorder patients. The aim of this study was to assess the prevalence and factors associated with drug non adherence among patients with bipolar disorders.

**Method:** An institution based cross sectional study was conducted on 410 patients with bipolar disorder in May 2013. The sample size was determined using single population proportion formula and participants were selected by using systematic random sampling.

**Result:** Morisky medication adherence scale indicated non adherence amongst 51.20% of participants. Significant predictors of non adherence were no social support [AOR=5.17, 95% CI (2.54, 10.5)], perception of being stigmatized [AOR=2.16, 95%CI (1.24, 3.78)], negative attitude towards treatment [AOR=4.58, 95% CI (2.47, 8.48)], taking medication twice per day [AOR=1.72, 95% CI (1.02, 2.87)], being unemployed [AOR=2.11, 95% CI (1.02, 4.37)] and use of khat [AOR=2.11, 95% CI (1.05, 4.23)].

**Conclusions:** The result this study showed that non adherence among patients with bipolar disorder was found to be high and indicted independent associated factors. And this finding has significant implications to enhance level of adherence by tackling determinant factors (above mentioned in result) and consolidating the intervention program.

**Keywords:** Non adherence; Bipolar disorder; Associated factor; Addis Ababa

## Introduction

### Background and statement of the problem

Bipolar disorder is a mental illness where changes in brain functions transform normal emotions to dramatic mood swing between mania and depression. Severity in mood swing may lead to impair normal functioning at work, at school and in relationships [1]. Bipolar disorder is a category of mood disorders characterized by the presence of one or more episodes of abnormally elevated energy levels, cognition and elevated mood clinically referred as mania with or without depression. Some patients may experience depression and mania simultaneously in mixed episodes [2,3].

Globally, the life-time prevalence of bipolar I disorder (BID) is estimated to be 1% [4]. Pharmacotherapy is considered the main principle of treating a bipolar disorder patient, but non adherence is the most common limit to gain the optimal effectiveness of medications among bipolar patients and adherence to medication is the key in the management of this type of severe mental illnesses [5]. Non adherence is defined by World Health Organization (WHO) as "a case in which a person's behavior in taking medication does not correspond with agreed recommendations from a health care provider". Medication non adherence can include: failing to initially fill or refill a prescription, discontinuing a medication before the course of therapy is complete, taking more or less of a medication than prescribed and taking a dose at the wrong time. The WHO report on adherence concluded that non adherence to long term treatment is a worldwide problem. The report

identifies four interacting determinants of adherence. The relationship with professionals and other service related factors, Condition related factors, patient related factors and treatment characteristics were also highlighted as determining adherence to treatment [6]. Non-adherence with prescribed medication is one of the most difficult things to solve in medicine, and particularly in psychiatry. Although non-adherence with pharmacological treatment has been reported in almost every branch of medicine, the nature of serious psychiatric disorders in which reasoning skills are usually severely damaged may cause higher rates of misbehavior towards prescribed medications. Psychotic and mood disorders may be specially affected by non-adherence mainly as a result of poor insight. The reported consequences of non-adherence in these disorders are multiple relapse, poor psychosocial outcome and increased suicide rates [7].

Patients with psychiatric disorders show a great degree of non adherence to treatment than those with physical disorders. The non

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**Received** April 03, 2015; **Accepted** May 31, 2015; **Published** June 07, 2015

**Citation:** Hibdye G, Dessalegne Y, Debero N, Bekan L, Sintayehu M (2015) Prevalence of Drug Non Adherence and Associated Factors among Patients with Bipolar Disorder at Outpatient Unit of Amanuel Hospital, Addis Ababa, Ethiopia, 2013. J Psychiatry S1: 003 doi: [10.4172/2378-5756.S1-003](https://doi.org/10.4172/2378-5756.S1-003)

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adherence rates ranges from 40-70% to 60-92% in the respective disorders. About 30% of all patients with psychiatric disorders discontinue their medication in the first month [8]. Non-adherence is one of the most effective factors in the course of bipolar disorders and its treatment costs [9] and it is common in patients with BID and is reported to be 20% to 66% with mean of 41% in different studies [10]. Advancement in the treatment of psychiatric disorders is limited by non adherence, which takes power from even beneficial medications [11]. Data regarding the prevalence and associated factors of non adherence among psychiatric patients particularly bipolar disorder patients from developing countries especially Ethiopia is scarce. Therefore, identification of the prevalence of drug non adherence and associated factors will help to develop intervention strategies and programs which minimize this problem in Ethiopian set up. This study attempts to bridge the gap and information in this regard and helps to design effective interventions and therapeutic techniques for enhancing adherence behavior among bipolar patients.

### Significance of the study

Poor adherence to psychiatric medication regimens is a major obstacle to the effective care of persons with chronic mental illnesses. Many people with bipolar disorder stop taking their medications at some point in their treatment. This is a reality that patients, doctors, and family members often struggle with. But it's important to understand some of the possible reasons, and for people with bipolar disorder it is critical to honestly evaluate why they want to stop taking their medication, and thus helps to find new possibilities of prevention and treatment.

Various factors for non adherence with treatment in bipolar disorder have been reported from studies done abroad but such study was not done so far in our country. Therefore, the results of this study may contribute to develop strategies for improving the adherence of patients besides increasing the awareness of health care providers on the matter of adherence. The findings of this study might also help in influencing the development of appropriate plans and intervention programs to reduce drug non adherence in bipolar patients. This in turn, might improve the quality of life for patients who are suffering from bipolar disorder and further benefit family and the country.

### Hypothesis

1. The magnitude of drug non adherence among patients with bipolar disorder is high.
2. Socio demographic factors could affect drug adherence.
3. Other factors such as social support, substance use and feeling of stigmatized have negative impact on drug adherence.

### Objectives

#### General objective

To assess the prevalence of drug non adherence and associated factor among patients with bipolar disorder at outpatient unit of Amanuel mental specialized hospital, Addis Ababa, Ethiopia, 2013.

#### Specific objectives

- To determine the prevalence of drug non adherence among outpatients with bipolar disorder.
- To identify factors associated with drug non adherence among outpatients with bipolar disorder.

### Methods and Materials

An institutional based cross sectional study was conducted at Amanuel mental specialized hospital which is one of the pioneer Ethiopian Hospitals which was established in 1938 by the Italians. During that time, the hospital was supposed to serve as quarantine for people with mental illness. Currently, the hospital has 300 beds and providing specialized psychiatric service with 11 psychiatrists, 14 general practitioners, 29 public health officers, 111 nurses (both psychiatric and clinical nurses), 22 pharmacy professionals and laboratory professionals for patients from all corners of the country. Among the 300 beds of the hospital, 277 are for cold cases and 23 are emergency beds. The clinical service of the hospital is composed of 13 case teams among which the three are mood disorder teams where bipolar patients are served. All case teams have both inpatient and outpatient units. The hospital is also playing its pivotal role as a training institute for psychiatric professionals so as to expand the service throughout the country by introducing psychiatry service to the primary health care system of the country. The hospital teaches psychiatric nurses with level V and in collaboration with other Universities, it trains psychiatry professionals at BSC and MSC levels. The Masters of Science program in integrated clinical and community mental health being provided in collaboration with University of Gondar is among the training services. It also serves as a training center for residents from department of psychiatry Addis Ababa University. This study was conducted in May 2013 and during this period 855 patients with bipolar disorder were attending this Hospital. For hundred twenty (423) three study subjects were selected and participated by systematic random sampling technique with "k" interval of 2. The sample size was calculated by single population proportion formula by assuming the proportion (p) of non adherence to be 50%, margin of error 5% with 95% confidence interval and 10% of non-response rate.

### Inclusion and Exclusion Criteria

#### Inclusion criteria

All bipolar patients who were 18 years and above and are in treatment follow up at outpatient unit of Amanuel mental specialized hospital at the time of the study.

#### Exclusion criteria

Patients who were at their first visit to the hospital.

Patients who were acutely disturbed.

### Operational Definitions

**Drug non adherence:** Persons having bipolar disorder taking mood stabilizer and other medications scoring 3 or more using 8-item Morisky medication adherence screening.

**Positive attitudes towards treatment:** A cut of point greater than or equal to six using DAI screening out of ten items.

**Substance use:** In this study it is defined as ever use of at least one of specific substance during period of treatment (Alcohol, chat, cigarette etc).

**Poor social support:** Scoring of 3-8 using Oslo-3 Social Support Scale (OSS-3).

**Perceived stigma:** If a patient score one or more using the 3-item instrument of screening perceived stigma, if score is less one have no perceived stigma.

## Data Collection Instrument and Procedure

### Data collection instrument

A structured pretested questionnaire was employed to collect socio-demographic characteristics and non adherence related factors. The questionnaire regarding the type of bipolar disorders, the type of drug, frequency and amount of drug taken were adapted from different literature with modification in our cultural context and it was filled from patient record. Drug non adherence was assessed using the 8-item version of self-reporting questionnaire of Morisky Medication Adherence Scale (MMAS), patient attitude towards treatment was assessed by 10 item Drug Attitude Inventory (DAI), social support was measured using the Oslo-3 Social Support Scale with three questions and perceived stigma was measured by 3 item questionnaire. Morisky medication adherence scale (MMAS) is used to assess the level of compliance and widely used in different part of the world for a variety of medical and psychiatric conditions. It is valid and reliable with Cronbach's Alpha 83%; and its sensitivity and specificity are 93% and 53% respectively [12-24]. Morisky medication adherence scale (MMAS-8) consists of eight items that assess the medication-taking behavior with a scoring scheme of "Yes"=0 and "No"=1 for the first seven items and a 5-point Likert response for the last item. The items are summed to give a range of scores from low adherence to high adherence though they are dichotomized in this study by considering scoring greater than or equal to 3 were non adherence. The Oslo 3-items Social Support Scale (OSS-3) is a tool which measures social support by covering different fields of social support such as measuring the number of people the respondent feels close to, the interest and concern shown by others, and the ease of obtaining practical help from others [25]. It is reliable with Cronbach's alpha of 0.60 [26] and widely used in several European countries and score of 3-8 using Oslo-3 social support scale is considered as poor social support. Ten item Drug Attitude inventory (DAI-10) which is self report instrument of false-true statement was used to assess about the nature of patient's experience with taking psychotropic medication, patients feeling about medication and their attitudes and beliefs about medication. The DAI-10 was derived by means of stepwise discriminate analysis from DAI-30 and it was found to be valid and reliable by Awad in 1993.

And in this tool those who score less than six was considered to be having negative attitude towards treatment.

Three items perceived stigma tool was widely used in variety medical condition as an independent variable even in Ethiopia and its reliability was documented.

### Data collectors

Three diploma psychiatric nurses were recruited to collect the data. They were trained for one day on the use of questionnaire and the ethical principles of confidentiality and data management prior to their involvement with data collection and data was collected for one month.

### Data quality control issues

Data quality control issues were insured by conducting the pretest among 5% of samples obtained from patients attending at Amanuel Mental Specialized Hospital prior to data collection. The questionnaire was translated from English to Amharic by experts and back to English to assure same meaning is conveyed. Training was given to the data collectors on the data collection tool and sampling techniques. Supervision was held regularly during data collection period. The collected data was checked on daily basis for completeness and

consistence. Manual and computerized data cleaning was done before data analysis.

### Data processing and analysis

First the data was checked for completeness and consistency. Then it was coded and entered in the computer using EPI.INFO version 3.5.1 software. Then, data was exported to SPSS window version 20 for analysis. Except age, all variables or data's were analyzed in the context of normal distribution. Descriptive summary using frequencies, percentage, graphs, median and range were used to present study results. Bivariate analysis was done for COR and multivariate analysis was employed to calculate AOR for variables which met P-value less than 0.2 during bivariate analysis. P-value of <0.05 was considered as statistically significant on multivariate logistic regression model.

### Ethical Consideration

Ethical clearance was obtained from university of Gondar ethical review board and Amanuel Mental Specialized Hospital ethical committee. Informed consent was obtained from participants and they were informed that participation is on voluntary bases and have full right to withdraw at time of need during the interview process. Moreover, the researcher was motivated to protect and to respect the privacy, secrecy and wellbeing of persons with these conditions. The data that was collected for the purpose of this study didn't contain identifying information, thus ensuring the secrecy of the participants. All the data collected were used for the purpose of the current study only.

### Results

Four hundred twenty three eligible respondents were selected for the study. Among those participants 13 fail to provide complete data and 410 (97% response rate) subjects participated in the study.

### Socio-demographic characteristics and other related factors

**Socio-demographic characteristics:** A total of 206 (50.2%) males and 204 (49.8%) females were participated in this study. The median age of participants was 30 years with range of 45 and almost half 180 (43.9%) are in the age category of 25-34. Among the total participants 174 (42.4%) were Amhara, 233 (56.8%) Orthodox Christian, 283 (69.0%) single, 160 (39.0%) secondary school educational levels. Among the participants, 35.1% were unemployed and 27.6% were employed. Majority of the study participants 280 (68.3%) earn below the average income (Table 1).

**Treatment related factors:** Concerning clinical characteristics of the participants, majority of them 339 (82.7%) were on manic episode, 188 (45.9%) were on mood stabilizer only, 264 (64.4%) were on mono therapy, 269 (65.6%) took their medication twice per day and 330 (80.5%) were on treatment for greater than 12 months duration. As side effect to the medication 184 (44.9%) of the respondents experienced side effect and among the side effects 58 (14.1%) reported weight gain (Table 2).

**Health care and patient related factors:** Regarding substance use, 100 (24.4%) use substance, among users khat accounts 74 (18.0%), alcohol 46 (11.2%) and cigarette 44 (10.7%) (Figure 1).

Regarding health education, 265 (64.6%) of participants were educated about their treatment. Among the respondents 342 (83.4%) had free access to drugs, 131 (32.0%) had perceived stigma, 329 (80.2%)

Variables	Categories	Frequency	Percent
Sex	Male	206	50.2
	Female	204	49.8
Age	18-24	82	20.0
	25-34	180	43.9
	35-44	94	22.9
	>44	54	13.2
Marital status	Single"	283	69.0
	Married	127	31.0
Religion	Orthodox	233	56.8
	Muslim	107	26.1
	Protestant	70	17.0
Ethnicity	Amhara	174	42.4
	Oromo	106	25.9
	Guraghe	96	23.4
	Tigre	34	8.3
Educational status	Illiterate	41	10.0
	Primary education	115	28.0
	Secondary education	160	39.0
	Tertiary and above	94	22.9
Occupational status	Government employed	113	27.6
	Private business	86	21.0
	Daily laborer	22	5.4
	Unemployed	144	35.1
	Student	45	11.0
Monthly income	Below average income	280	68.3
	Above average income	130	31.7

Note: Single" includes separated, divorced and widowed. Treatment related factors

**Table 1:** Distribution of patients with bipolar disorder by socio-demographic factors at Amanuel mental specialized hospital, Ethiopia, 2013 (n=410).

Variables	Categories	Frequency	Percent
Phases of bipolar disorder	Manic episode	339	82.7
	Depressive episode	27	6.6
	Mixed episode	44	10.7
Types of drug	Mood stabilizer	188	45.9
	Combination	146	35.6
	Antipsychotic	76	18.5
Regimen	Mono therapy	264	64.4
	Poly therapy	146	35.6
Frequency of drug	Once per day	141	34.4
	Twice per day	269	65.6
Duration on treatment	<6 months	24	5.8
	6 months-12 months	56	13.7
	>12 months	330	80.5
Experienced side effects	Yes	184	44.9
	No	226	55.1

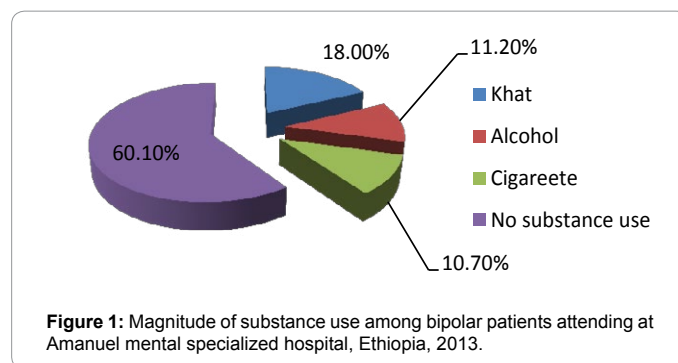
**Table 2:** Distribution of patients with bipolar disorder by treatment related factors attending at Amanuel mental specialized hospital, Ethiopia, 2013(n=410).

had social support and 307 (74.9%) had positive attitude towards their treatment (Table 3).

**Prevalence of drug non adherence:** As measured by MMAS 210 (51.20%) of the respondents scored three and more than three which were the cut point of the scale. Therefore, overall prevalence of drug non adherence in the study population was found to be 51.20%. Respondents reported variety of factors such as forgetfulness (20.2%), running out of drug (5.4%), experiencing side effect (8.5%) and feeling better/ thinking they are cured (11.7%) for their non-adherence (Figure 2).

### Factors associated with drug non adherence

**Bivariate analysis:** The crude analysis was done by including socio-



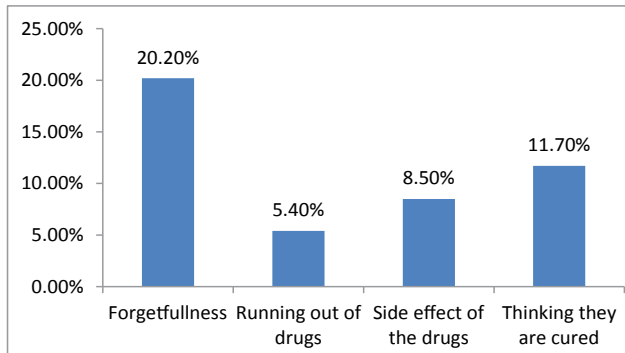
Variables	Categories	Frequency	Percent
Thinking not ill and no need to be treated	Yes	48	11.7
	No	362	88.3
Health education about treatment	Yes	265	64.6
	No	146	35.4
Access to reliable pharmacy	Yes	342	83.4
	No	68	16.6
Perceived stigma	Yes	131	32.0
	No	279	68.0
Social support	Yes	329	80.2
	No	81	19.8
Khat use	Yes	74	18.0
	No	336	82.0
Cigarette use	Yes	44	10.7
	No	336	89.3
Alcohol use	Yes	46	11.2
	No	364	88.8
Attitude towards drug	Positive	307	74.9
	Negative	103	25.1
Knowing consequences of drug non adherence	Yes	328	80.0
	No	82	20.0

**Table 3:** Distribution of patients with bipolar disorder by health care and patient related factors at Amanuel mental specialized hospital, Ethiopia, 2013 (n=410).

demographic, treatment/medication related factors, substance use history, perceived stigma, social support, attitude towards medication and health care related factors like health education and availability of drugs. The variable group expected to be protective against non adherence treated as the reference group. From bivariate analysis of drug non adherence in relation to each explanatory variable age, marital status, religion, occupational status, frequency of drug taking, side effect of the medication, not knowing consequence of non adherence, health education gained during treatment, substance use, perceived stigma, attitude towards medication and social support were variables that full filled the minimum requirement (0.2 level of significance in this study) for further analysis and entered into multivariate logistic regression. On the other hand sex, ethnicity, educational status, phases of bipolar disorder, duration of treatment and type of drug currently taking and drug regimen were not significant at p-value 0.2 were excluded from further analysis.

**Multivariate analysis:** The multivariate logistic regression which controls the effect of confounding variables was carried by taking all independent variables which full filled the minimum criteria, level of significance of <0.2 during bivariate analysis. From those analyzed patients who were unemployed were more likely to be non adherent than with those of employed [AOR=2.11, 95% CI (1.02, 4.37)]. Patients taking medication twice per day were more likely to be non adherent than those taking once per day [AOR=1.72, 95% CI (1.02, 2.87)]. As perception of being stigmatized, patients who felt stigmatized were





**Figure 2:** Reasons for drug non adherence among patients with bipolar disorder attending at Amanuel mental specialized hospital, Ethiopia, 2013.

more likely to be non adherent than with those not felt stigmatized [AOR=2.16, 95% CI (1.24, 3.78)]. Patients who had negative attitude towards treatment were more likely to be non adherent than those with positive attitude towards their treatment [AOR=4.58, 95% CI (2.47, 8.48)]. Patients who use khat were more likely to be non adherent than those who didn't use khat [AOR=2.11, 95% CI (1.05, 4.23)]. Respondents who had no social support were more likely to be non adherent than those who had social support [AOR=5.17, 95% CI (2.54, 10.5)]. Details of the association were shown in Table 4 below.

## Discussion

Drug non adherence with prescribed medication is one of the most difficult to solve issues in medicine, and particularly in patients with Bipolar disorder. The nature of serious psychiatric disorders in which reasoning skills and insight are usually severely damaged may cause higher rates of misbehavior towards prescribed medications [7]. So, this study was aimed to assess the prevalence and factors associated with drug non adherence among bipolar disorder patients. The study showed that the prevalence of drug non adherence was found to be 51.20% by using MMAS and the following factors such as taking medication more than once per day [AOR=1.72, 95% CI (1.02, 2.87)], being unemployed [AOR=2.11, 95% CI (1.02, 4.37)], having perception being stigmatized [AOR=2.16, 95% CI (1.24, 3.78)], having negative attitude towards treatment [AOR=4.58, 95% CI (2.47, 8.48)], use of chat [AOR=2.11, 95% CI (1.05, 4.23)], having no social support [AOR=5.17, 95% CI (2.54, 10.5)] were significantly associated with variable of non adherence and plays a big role to decrease level of adherence/compliance to medication which is in line with our hypothesis or prediction. The overall prevalence of drug non adherence in the this study was found to be higher than study done USA, Germany, China, India and Colombia which were 21.4% [12], 19.3% [13], 37% [14], 13% [15] and 29.8% [17] respectively but it was lower than Brazil and Spain that were 64.72% [17] and 70% [18] respectively. The prevalence of drug non adherence in bipolar disorder reported in published literature ranged from 20% to 66% [10]. The possible reason for the difference in the prevalence may be due to socio cultural differences in the study design used, study population, measurement of medication non adherence and treatment related factors [12,17]. The other possible factors that causes high prevalence of non adherence in the current study area might be lack of sustained health education (35.4%) about the illness and related factors which was crucial in reinforcing adherence [19], high prevalence of substance use 24.4% among them khat was the most available in Ethiopia which leads patient to be non-

adherent [13]. During bivariate analysis socio demographic factors including sex, age, religion, ethnicity, marital status and educational level were not found to be statistically associated with drug non adherence which is contrary to our hypothesis because we previously predicted that those who are male, less educated, aged and singles negatively affect adherence. But still this finding was consistent with many previous studies [13,15,17]. Contrary to this finding, study done in USA on bipolar disorder patients showed that younger, unmarried are more non adherent than elder and married one [12]. The possible explanation for this is might be due to younger are not aware of the

Explanatory variables	Drug non adherence		COR(95%CI)	AOR(95%CI)
	Yes	No		
<b>Age</b>				
18-24	54	28	3.28(1.60, 6.71)	2.31(0.82, 6.48)
25-34	89	91	1.67(0.89, 3.11)	1.21(0.53, 2.78)
35-44	47	47	1.70(0.86, 3.37)	1.33(0.54, 3.26)
>44	20	34	1.00	1.00
<b>Marital status</b>				
Single	160	123	0.48(0.31, 0.74)	0.48(0.27, 0.86)
Married	50	77	1.00	1.00
<b>Occupational status</b>				
Employed	48	65	1.00	1.00
Private business	44	42	1.42(0.81, 2.49)	0.69(0.21, 2.32)
Daily laborer	6	16	0.51(0.18, 1.39)	1.89(0.99, 3.59)
Unemployed	82	62	1.79(1.08, 2.94)	<b>2.11(1.02, 4.37)*</b>
Student	30	15	2.71(1.31, 5.58)	1.85(0.89, 2.13)
<b>Frequency of drug taking</b>				
Once daily	61	80	1.00	1.00
Twice daily	149	120	1.63(1.08, 3.42)	<b>1.72(1.02, 2.87)*</b>
<b>Experience side effects</b>				
Yes	107	77	1.66(1.12, 2.46)	1.08(0.64, 1.85)
No	103	123	1.00	1.00
<b>Health education</b>				
Yes	127	138	1.00	1.00
No	83	62	1.46(0.96, 2.18)	0.80(0.45, 1.41)
<b>Chat use</b>				
Yes	52	22	2.66(1.55, 4.58)	<b>2.11(1.05, 4.23)*</b>
No	178	158	1.00	1.00
<b>Cigarette use</b>				
Yes	29	15	1.97(1.03, 3.81)	0.57(0.21, 1.52)
No	181	185	1.00	
<b>Alcohol use</b>				
Yes	31	15	2.14(1.12, 4.09)	1.30(0.48, 3.52)
No	179	185	1.00	1.00
<b>Perceived stigma</b>				
Yes	89	42	2.77(1.79, 4.28)	<b>2.16(1.24, 3.78)*</b>
No	121	158	1.00	1.00
<b>Social support</b>				
Yes	150	179	1.00	1.00
No	60	21	3.41(1.98, 5.86)	<b>5.17(2.54, 10.5)*</b>
<b>Attitude towards drug</b>				
Positive	134	173	1.00	1.00
Negative	27	78	3.63(2.22, 5.95)	<b>4.58(2.47, 8.48)*</b>

**Note:** Single\* includes separated, divorced and widowed, \*association with P-value <0.05, 1.00: reference group

**Table 4:** Factors associated with drug non adherence among bipolar patients attending at Amanuel mental specialized hospital, Ethiopia 2013 (n=410).

consequence of non adherence and unmarried have less social support than married one. Among occupational status being unemployed was significantly associated with drug non adherence and were about two times more likely to be non adherent than with those of employed. This finding is in line with study done in USA [22]. The possible reason for this may be those who are employed have money to buy medication and they less stigmatized than with those of unemployed. Regarding the drug frequency, participants who were taking their drugs twice daily were about two times more likely to be non adherent than those taking their drug once per day. This study was in line with study done in China in which participants who took complicated regimen were a risk factor for drug non adherence [14]. The possible explanation for this may be 35.6% of participants took combination of two drugs. Using combination of drugs at a time can increase more side effects than using a single drug. This might lead the patient to be non adherent.

Among substance use khat was significantly associated with drug non adherence that were about three times more likely to be non adherent than who didn't use khat. This study coincides with study done in USA [20,21]. Possible reasons might include khat use can have negative impacts on persons internal state, causing increased cognitive problems, unpleasant withdrawal symptoms, increased risk of social withdrawal and ultimately lack of social support. Regarding social support, participants who had no social support were about five times more likely to be more non adherent than those had social support. This is in line with other studies [15,17]. The possible explanation for this might be having social support to give or reminding medication on time or monitoring medications may have influence in adherence behavior. Current study also found out participants who had perceived stigma were about two times more likely to be non adherent than who didn't. The possible reason for this might be participants embarrassed by their mentally illness and avoid going to the hospital on a specific follow up day. Participants who have negative attitude towards treatment were about five times more likely to be non adherent than those who have positive attitude which coincides with study done in Colombia, Germany, Austria and India. The reason might be due to having distrust on medication and believing on traditional medicine [13,15,17,18].

## Limitation of the Study

Cross sectional design of this study didn't allow us to establish a causal relationship between significantly associated variables and drug non adherence, as both variables were measured at the same time and the tools that are used in this study were not validated in our country. In addition, Lack of a "gold standard" method for treatment non adherence measurement because in this study non adherence was measured using self report that may underestimate non adherence as studies suggest.

## Conclusion

Non-adherence is a common, prevalent and important issue in the treatment of bipolar disorder. In this study, about half of study participants were non adherent to their medications which is slightly higher than previous studies in other countries. Forgetfulness and thinking of being cured are the most common reasons for being non adherence and poor social support, having perception of being stigmatized, negative attitude towards treatment, being unemployed, taking medication twice per day and khat use were significantly reduce adherence to medication.

## Recommendation

Based on the results of this study awareness raising strategy that can uplift the attitude of patient towards medication, and designing and implementing continues follow up or care have to be worked by FMOH and psychiatry institutions. In addition, strategies that can promote social support, reduce stigma and substance use is crucial to increase the level of adherence. More ever, the clinician should work better on simplifying the medication regimen; patient education about associated drug side effects, timing and duration of medication; and engaging significant others that helps patients to remember drugs and support them in different aspect.

## Abbreviations

AOR	Adjusted Odds Ratio
BID	Bipolar I Disorder
COR	Crude Odds Ratio
DAI	Drug Attitude Inventory
DSM-IVTR	Diagnostic and Statistical Manual for Mental disorders Fourth Text Revision
FMOH	Federal Ministry of Health
MMAS	Morisky Medication Adherence Scale
SPSS	Statistical Package for Social Sciences
UoG	University of Gondar
WHO	World Health Organization

## Competing Interest

There is no competing interest among authors

## Acknowledgements

We would like to acknowledge University of Gondar and Amanuel Mental Specialized Hospital for their willingness to begin this program and keep it to be continued; and for financial support to carried out this thesis. Then we thanks to the staffs; and plan and program officer of Amanuel Mental Specialized Hospital for their cooperation to provide information so as to determine sample size of the study and for their supporting while the data interviewer did their activity. Ours' thank also go to data collectors and to all respondents bipolar disorder for their patience and permission during data collection.

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