


# Analysis of Medication Adherence Status and Influencing Factors in Adolescents with Major Depressive Episodes

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## Abstract

**Background:** By analyzing the current status and influencing factors of medication adherence in adolescent patients with major depressive episode, this study aimed to provide more evidence on clinical medication treatment of such patients.

**Methods:** This was a retrospective study. A total of 218 adolescents with major depressive disorder (MDD) admitted to the mental health center of the First Affiliated Hospital of Guangxi Medical University from June 2022 to June 2023 were selected as the study subjects. The 8-item Morisky Medication Adherence Questionnaire (MAQ-8) was used to group the patients. All of the patients were collected in accordance with general sociological characteristics and disease characteristics. Conducted  $\chi^2$  test, *t*-test, and binary logistic regression analysis. *p* values less than 0.05 indicated statistically significant differences.

**Results:** A total of 218 adolescents with MDD were included in this study. The average score of MAQ-8 was  $4.44 \pm 2.09$ , of which 139 (63.76%) with a score less than 6 were included in the medication non-adherence group. Six to eight points with 79 cases (36.24%) were included in the medication compliance group. Family economic status (odds ratio (OR) = 6.211, 95% confidence interval (CI) 2.761–13.974), family history (OR = 2.298, 95% CI 1.043–5.062), course of diseases (OR = 2.107, 95% CI 1.002–4.429), Beck Depression Inventory (BDI) score (OR = 2.303, 95% CI 1.043–5.084), drug side effects (OR = 7.139, 95% CI 3.257–15.647), attitude to treatment (OR =

2.583, 95% CI 1.221–5.466), and satisfaction with doctors (OR = 2.338, 95% CI 1.08–5.064) were the effect of medication adherence.

**Conclusion:** Severe depression of adolescent patients with poor medication compliance, as well as influencing factors, including family economic conditions, family history, course of diseases, BDI score, and drug side effects, were clinically investigated to formulate corresponding measures and improve patients' medication adherence.

## Keywords

medication compliance; major depressive episode; teenagers; influencing factors

## Introduction

Depression is a common clinical disorder of the mind, which is characterized by persistent low mood, with high prevalence, recurrence rate, and suicide risk [1]. In particular, patients with severe depression may be accompanied by delusions, auditory hallucinations, self-harm, and suicide. A study has reported that the cumulative incidence rate of adolescent depression in early adolescence has gradually increased from 5% to 20% [2]. Depression has a prevalence of 14%–19% among adolescents aged 15–20 years, and it is considered a major factor influencing adolescent suicides [3]. Early psychological intervention therapy in patients with depression is recommended, but the effect of psychological treatment in some patients with severe depression is not remarkable. Thus, taking appropriate drug treatment is necessary, but the development of the disease is chronic, with relapsing characteristics. Patients often need long-term drug therapy to maintain effectiveness and prevent the recurrence of depression [4]. A research reported

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from China stated that the incidence of non-suicidal self-injury in children and adolescents with depression ranges from 44.0% to 61.2% [5]. In addition, Solmi M *et al.* [6] pointed out that drug compliance in patients with depression is relatively low; 30% of patients completely stop treatment.

One study has shown that the compliance rate of patients with severe mental disorders with standardized management is about 71.78%, among which the rate of patients with schizophrenia who take medication routinely is only 27.49% [7]. Failure to adhere to the medication may lead to the deterioration of the disease, reduced treatment effect, repeated hospitalization, and recurrence of symptoms. Many factors, such as drug side effects and support of family, friends, and health care team is essential for adherence [8–10]. However, the factors affecting medication adherence in adolescent patients with major depressive episodes have not yet been systematically and thoroughly analyzed. Understanding the factors affecting patients' medication adherence as early as possible is important, which can provide a reference for the development of subsequent interventions. Therefore, this study aimed to provide more evidence for the clinical medication treatment of adolescents with severe major depressive disorder by analyzing the current status of medication adherence and its influencing factors. Specifically, we would assess the level of medication adherence among adolescents with severe major depressive disorder and explore the sociodemographic characteristics, disease features, and other potential factors associated with their medication adherence. Through these analyses, we aimed to offer scientific evidence for the development of targeted intervention measures to improve medication adherence among adolescents with severe major depressive disorder, thereby enhancing their treatment outcomes and quality of life.

## Materials and Methods

### General Information

During the period from June 2022 to June 2023, 307 adolescent patients diagnosed with major depressive disorder (MDD) were consecutively enrolled in this study at the First Affiliated Hospital of Guangxi Medical University's Psychiatric Center. All procedures were conducted in accordance with the Declaration of Helsinki.

The inclusion criteria were as follows: (1) adolescents aged 13–18 years; (2) meet the diagnostic criteria of severe depression in the Classification and Diagnostic Criteria of Mental Disorders in China [6]; (3) no other mental disorders; (4) received antidepressant treatment over 3 months;

and (5) no history of drug abuse. The exclusion criteria were as follows: (1) with serious complications or other diseases and (2) incomplete medical records or other data. This study has been approved by the Medical Ethics Committee of The First Affiliated Hospital of Guangxi Medical University. No. 2023(07). Informed consent was obtained from all patients included in this study.

### Methods

The sample size of this study was calculated on the basis of the sample size requirements for regression analysis, which suggests that the sample size should be 5–10 times the number of independent variables. In this study, a total of 22 independent variables were analyzed, indicating that the effective sample size should be between 110 and 220.

Medical history information of adolescent patients from June 2022 to June 2023 were collected through the hospital medical record system, and then medication adherence was investigated through questionnaires. The discharged patients filled out the questionnaires by phone or accompanied with community workers, whereas the inpatients completed the questionnaires with the cooperation of the attending physicians. All adolescents' medication states were investigated 3 months after the medication date. The general sociological characteristics and disease-related characteristics of all patients were collected. The general sociological characteristics included age, gender, education level, place of residence, whether they were the only child, family economic status (family monthly income  $\geq 5000$  yuan, good;  $< 5000$  yuan, poor, the exchange rate is 1 USD = 6.48 CNY), smoking, and drinking; disease-related characteristics included the age of onset, course of disease, family history, and severity of the disease measured by the Beck Depression Inventory (BDI) [11], which contains 21 items. Each item has four statement options; the score range is 0–3, and the total score is 63: 0–13 points, normal; 14–19 points, mild depression; 20–28 points, moderate score. The overall Cronbach's  $\alpha$  coefficient of the scale was 0.873; the  $\alpha$  coefficient values of each dimension were greater than 0.85, and the split-half reliability coefficient was 0.901. Good reliability and validity, current psychotherapy, type of medication, side effects of medication, history of suicide attempt, recognition of current diagnosis, nature of hospitalization, number of previous hospitalizations, attitude towards treatment, change of medication prescription, and satisfaction with doctors were also investigated.

All patients were investigated by using 8-item Morisky Medication Adherence Questionnaire (MAQ-8) [12]. This scale consisted of eight questions, involving con-

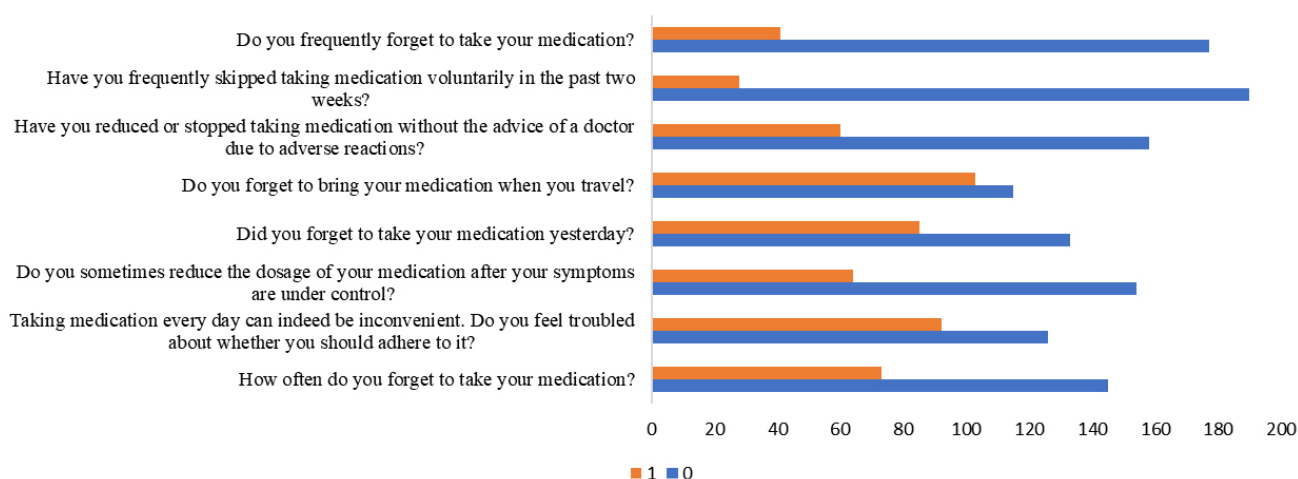


Fig. 1. Scores on the 8-item Morisky Medication Adherence Questionnaire (MAQ-8) scale.

consciousness dimension and behavior dimension. This questionnaire mainly measured patients' medication adherence, with a full score of 8 and a boundary of 6;  $<6$  was divided into non-adherence to medication and included in the medication non-adherence group; 6–8 adhered to medication, and they were included in the medication compliance group. The overall Cronbach's  $\alpha$  coefficient is 0.916; the  $\alpha$  coefficient values of the dimensions were greater than 0.85, and the binary reliability coefficient is 0.864, indicating good reliability and validity. Logistic regression analysis was used to calculate the different items, and the factors affecting the medication adherence of patients were analyzed.

#### Statistical Treatment

SPSS 25.0 statistical software (IBM Corporation, Armonk, NY, USA) was used to analyze the data. Categorical data were expressed as n (%), and the  $\chi^2$  test was used. The measurement data were first assessed using the Shapiro–Wilk test. Data conforming to a normal distribution were expressed as mean  $\pm$  standard and analyzed using the *t*-test. For data not conforming to a normal distribution, [M (P25, P75)] was used, and non-parametric tests were conducted.

Multivariate analysis used binary logistic regression analysis, and *p* values  $< 0.05$  indicates that the difference was statistically significant.

The measurement data were first assessed using the Shapiro–Wilk test. Data conforming to a normal distribution were expressed as mean  $\pm$  standard and analyzed using the *t*-test. For data not conforming to a normal distribution, [M (P25, P75)] was used, and non-parametric tests were conducted.

## Results

### Current Status of Medication Adherence of All Patients

We surveyed a total of 307 adolescents, among whom 89 adolescents were excluded on the basis of the inclusion criteria, resulting in the final inclusion of 218 adolescents with MDD. The average score of MAQ-8 was  $4.44 \pm 2.09$ . A total of 79 cases with a score of 6–8 were included in the medication compliance group, accounting for 36.24%. Each entry score of MAQ-8 is shown in Fig. 1 for details.

### Comparison of Clinical Data of Each Group

Significant differences in family economic status, family history, course of disease, BDI score, drug side effects, attitude towards treatment, and satisfaction with doctors were found between the medication non-compliance group and the medication compliance group ( $p < 0.05$ , Table 1).

### Multiple Factor Analysis of Adolescent Drug Compliance in Patients with Severe Depressive Episode

Family economic status, family history, course of diseases, BDI score, drug side effects, attitude towards treatment, and doctor's degree of satisfaction are the factors influencing severe depressive episode of adolescent patients with medication adherence factor, with odds ratio (OR) value  $> 1$  and  $p < 0.05$  (Tables 2,3).

**Table 1. Comparison of clinical data in each group (n = 218).**

Clinical data		n	Medication non-compliance group (n = 139)	Medication compliance group (n = 79)	$\chi^2$	<i>p</i>
Gender	Male	116	74	42	0.001	0.992
	Female	102	65	37		
Age (years)	<15	96	61	35	0.004	0.952
	≥15	122	78	44		
Place of residence	Cities	117	70	47	1.690	0.194
	Rural areas	101	69	32		
Family economic conditions	Good	95	44	51	22.178	<0.001
	Poverty	123	95	28		
Smoking	Yes	61	36	25	0.825	0.364
	No	157	103	54		
Drinking	Yes	70	41	29	1.202	0.273
	No	148	98	50		
Level of education	Below high school	84	53	31	0.026	0.871
	High school and above	134	86	48		
Only child	Yes	83	57	26	1.400	0.237
	No	135	82	53		
Age of onset (years)	<15	104	65	39	0.137	0.711
	≥15	114	74	40		
Family history of mental illness	Yes	118	86	32	9.260	0.002
	No	100	53	47		
Duration of disease (years)	<2	104	59	45	4.255	0.039
	≥2	114	80	34		
BDI score (score)	30–55	90	48	42	7.214	0.007
	≥55	128	91	37		
Whether the ongoing therapy	Yes	92	57	35	0.224	0.636
	No	126	82	44		
Types of medications taken	Single drug use	97	64	33	0.372	0.542
	Drug combinations	121	75	46		
Drug side effects	Yes	127	102	25	36.080	<0.001
	None	91	37	54		
A history of suicide attempts	Yes	64	38	26	0.754	0.385
	None	154	101	53		
Whether the current diagnosis	Approve	133	82	51	0.656	0.418
	Disapprove	85	57	28		
Nature of hospitalization	Voluntary	115	73	42	0.008	0.927
	Involuntary	103	66	37		
Before admission (time)	<1	125	85	40	2.278	0.131
	≥1	93	54	39		
Attitude to treatment	Positivity	99	51	48	11.771	<0.001
	Negativity	119	88	31		
Change the drug prescription	Yes	47	26	21	1.848	0.174
	No	171	113	58		
Satisfaction with doctors	Satisfied	92	47	45	11.066	0.001
	Dissatisfy	126	92	34		

BDI, Beck Depression Inventory.

**Table 2. Assignment of study variables.**

Variate	Assignment of value
Family economic status	0 = good, 1 = poverty
A family history of depression	0 = negative, 1 = positive
Course of disease	0 = duration <2, 1 = duration ≥2
BDI score	0 = BDI score 30 to 55, 1 = BDI score 55 or more
Drug side effects	0 = no, 1 = yes
Attitude to treatment	0 = positive, 1 = negative
Satisfaction with doctors	0 = satisfied, 1 = dissatisfied

**Table 3. Multivariate analysis of medication adherence in adolescents with major depressive episodes.**

Influencing factors	<i>B</i> value	SE	<i>p</i>	Wald value	OR value	95% CI
Family economic status	1.826	0.414	<0.001	19.489	6.211	2.761–13.974
A family history of depression	0.832	0.403	0.039	4.265	2.298	1.043–5.062
Course of disease	0.745	0.379	0.049	3.863	2.107	1.002–4.429
BDI score	0.834	0.404	0.039	4.259	2.303	1.043–5.084
Drug side effects	1.966	0.4	<0.001	24.1	7.139	3.257–15.647
Attitude to treatment	0.949	0.382	0.013	6.155	2.583	1.221–5.466
Satisfaction with doctors	0.85	0.394	0.031	4.643	2.338	1.08–5.064

OR, odds ratio; CI, confidence interval.

## Discussion

By contrast, 218 patients with adolescent major depressive episodes were included in the present study, of whom only 36.24% were medication adherent. Therefore, good medication adherence is important in reducing relapse and hospitalization. In addition, poor medication adherence can directly increase the likelihood of relapse and increase the economic burden on the family and society [13].

Based on the results of this paper, family financial status as an important factor influencing patients' adherence to medication. Considering the family economic conditions, poor medication compliance is low. Depression is a chronic disease; thus, patients often need medication for a long time, directly increasing the burden of the family. Drug withdrawal behavior reduces the medication compliance. Stable family income can provide patients with economic security and more ways to obtain disease-related knowledge, which can effectively improve their understanding and awareness of drug treatment and provide a prerequisite for active cooperation with medication [14].

This paper found that family history is also a factor affecting patients' adherence to medication. Family members' negative attitude or non-compliance to drug treatment would affect adolescents' drug use behavior. As depression in other family members may increase family stress and tension, adolescents likely become resistant to medication because of fear of judgment when family members hold stig-

matizing views of mental illness. Studies have found that this understanding may be negative, although adolescents with a family history of depression have a comprehensive understanding of the disease [15]. If family members can make drug treatment among teenagers skeptical, then medication adherence decreases [16].

The results of this paper show that the course of disease and BDI score are factors affecting medication adherence in adolescent patients with major depressive episode. With the prolongation of the course of disease, patients easily have negative emotions such as depression, thereby reducing their confidence in treatment, and they select a coping style, thereby reducing medication compliance. In addition, potential mechanisms by which depression affects medication adherence may include memory and cognitive decline, as well as the lack of energy and motivation to continue taking medication [17]. Although medication adherence and disease activity fluctuate over time, the association between patient medication adherence and hospital prognosis may change at different times in the course of the disease [18]. Moreover, patients with a longer course of disease and more severe disease likely have various complications, which increase their psychological and economic pressure, resulting in the idea of giving up treatment. Therefore, the medication compliance of such patients is low.

In this paper, drug side effects become one of the factors affecting patients' adherence to medication. The side effects of most antidepressant medications may cause pa-

tients to experience symptoms such as headache, nausea, insomnia, weight gain, and loss of libido. Youth is in the crucial stage of growth and development, and discomfort or side effects may occur after long-term medication. If the side effects of drugs in patients with severe depression affect their daily life, then they may choose to give up, leading to non-adherence to medication [19]. In addition, patients often think that the side effects of drugs are more unbearable than the disease itself, and some patients even worry that the side effects of drugs will affect their health, which will lead to decreased medication adherence.

In this paper, attitude towards treatment was also found to be a factor affecting patients' adherence to medication. Compared with patients with positive attitude, patients with negative attitude have lower medication compliance because such patients may have insufficient understanding of treatment or medication because of the lack of cognition, and they underestimate the importance of medication, resulting in negative emotions [20]. However, once negative emotions appear, they can directly aggravate the disease. In addition, patients are forced to adopt negative coping styles and are unwilling to control the disease through drug treatment [21].

This study points out that satisfaction with doctors is a factor influencing medication adherence among adolescents with depression. The doctor–patient relationship is the key link between doctors and patients. In a harmonious doctor–patient relationship, patients have a high degree of trust in doctors, and doctors have a high degree of understanding of patients' psychosocial factors. Therefore, patients' wishes should be respected when choosing treatment plans, and professional opinions on medication time and prevention of side effects can effectively improve patients' medication compliance. On the contrary, patients have poor satisfaction with doctors, questioning their professionalism and even resisting to treatment, which can directly reduce medication compliance [22,23].

However, this study still has some limitations. First, the sample size of this paper is small, and only patients who were admitted to our hospital are included, which can lead to a certain bias in the representativeness of the sample. Second, medication adherence is a long-term process, which requires long-term tracking and observation, and given the constraints of time, resources, and other factors, the study may only carry out short-term tracking, which does not allow us to obtain a comprehensive understanding of the long-term changes in medication adherence. Some indicators, such as “family income, attitude toward medication and satisfaction with doctor, and side effects of medication”, were collected and processed in accordance with

dichotomous data, which leads to loss of more information. A limitation was the diversity in medications and dosages received by patients. Adolescents with MDD typically received various types and doses of antidepressant medications based on personalized treatment plans, leading to heterogeneity in medication regimens among the study participants. This variability could have influenced the observed patterns of medication adherence. However, we collected information regarding medication side effects and concurrent medication use, which helped mitigate confounding factors arising from differences in medications and dosages. Finally, the effectiveness of treatment is also an important factor in medication adherence. This study did not use changes in BDI scores over time or other indicators to measure this. Thus, the clinical follow-up can carry out more extensive studies and observe the therapeutic effects of follow-up patients to obtain more objective results.

## Conclusion

Analyzing 218 adolescent patients with MDD, poor medication adherence may be affected by family economic status, family medical history, disease duration, and medication side effects, for which clinical interventions should be developed as early as possible to improve medication adherence.

## Availability of Data and Materials

The original contributions presented in the study are included in the article. Further inquiries can be directed to the corresponding author.

## Author Contributions

JL and NL designed the research study. JL and HS performed the research. JL and HS drafted the manuscript. JL analyzed the data. All authors contributed to important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

## Ethics Approval and Consent to Participate

This study has been approved by the Medical Ethics Committee of The First Affiliated Hospital of Guangxi Medical University. No. 2023(07). Informed consent was obtained from all patients included in this study.

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## Conflict of Interest

The authors declare no conflict of interest.

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