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Factors Associated with Medication Adherence Among Patients with Myasthenia Gravis: a cross-sectional study

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Abstract

Myasthenia gravis (MG) is an autoimmune neurological disorder characterized by damage to transmission at the neuromuscular junction. The prevalence of MG increases every year with severity classes 1-4 where you have to take medication continuously to suppress recurrence and worsening. Non-compliance with taking medication is a problem with various underlying factors. The purpose of this study is to analyze the factors associated with medication adherence in MG sufferers. A descriptive analytic with a cross sectional design involving 122 respondents who underwent treatment at the Neurology Clinic in three type A hospitals in Yogyakarta and Central Java. The results is a significant relationship between age (p = 0.002), education (p = 0.036), belief about medication (p = 0.040) and family support (p = 0.001) on medication adherence in MG sufferers. The factor most related to medication adherence is belief about medication (OR = 3.919). Conclusion Medication adherence in MG is related to age, education, belief about medication and family support. The most related factor is belief about medication. Nurses also need to provide education regarding compliance and procedures for taking medication, increasing belief about medication, knowledge related to disease, involving family members in increasing motivation and support for family members who are sick or undergoing treatment.

Keywords: *Autoimmune; Medication Adherence; Myasthenia Gravis*

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1. Introduction

Myasthenia gravis (MG) is an autoimmune neurological disorder characterized by transmission damage to the neuromuscular junction (Dresser et al., 2021). Behbehani (2023) defined that MG is a condition caused by transmission damage at the neuromuscular junction, which reduces muscles capacity to contract, resulting in fatigue and muscle weakness. The prevalence of MG ranges between 150 jkkmand 200 cases per million people and has steadily increased over the previous 50 years.

This is due to advancements in detection, diagnosis, treatment, and a general increase in life expectancy (Dresser et al., 2021). The disease has two age peaks, namely 40 years of age which mainly affects women, then 60-80 years of age which occurs equally in men and women (Salari et al., 2021). In documenting the number of MG-ers (MG patients) at the Indonesian Myasthenia Gravis Foundation in 2015, it is predicted that the number of patients with MG will exceed 400 people throughout Indonesia, with the biggest population distribution in the Jabodetabek area. This population is growing and is expected to reach 1,635 patients by 2024, according to the Indonesian Myasthenia Gravis Foundation. In other major cities, such as Yogyakarta, the number of patients diagnosed with MG grows every year and reported 140 MG patients in 2023. Data on inpatient visits show that 64.7% of patients with readmissions are patients who experienced a relapse and required hospitalization in hospital.

Follow-up in MG is a treatment to regulate the symptoms of the condition (O'Connor et al., 2020). The most critical recurrence in MG is myasthenic crisis, which is a life-threatening condition with a mortality rate of 2-3% (Nelke et al., 2022). Adherence is a multifaceted phenomena that can be influenced by numerous circumstances, which are categorized into five major dimensions: social and economic factors, therapy-related factors, disease-related factors, patient-related factors, and health care system-related factors (Gast & Mathes, 2019).

There is limited study on drug adherence in MG patients. In the area of health, there are numerous well-known theories. The Health Belief Model (HBM) theory, created by social psychologists in the United States in the 1950s in the context of public health care, is one example (Green et al., 2020).

This model is a conceptual framework for implementing health behavior. This model is also to increase the use of preventive services such as immunizations, medical compilance and general check up. This model identifies and organizes interventions around six main components of why indviduals choose to prevent and detect disease. The six components include perceptions of disease susceptibility (perceived susceptibility), perceptions of the seriousness of a disease (perceived severity), perceived benefits of preventive behavior (perceived benefits), perceived barriers to preventive behavior (perceived barriers), cues in taking preventive action (cues to action) and belief (self efficacy) (Green et al., 2020).

Several components of the Health Belief Model theory are the basis for determining the factors to be studied. The perceived benefit component is a recommended step to reduce risk or severity so as to determine the trust factor in treatment. The perceived barriers component is the potential negative impact of certain health actions that can become a barrier to carrying out recommended behavior, thus determining the duration of treatment and affordability of access to health services. The cues to action component is an individual's readiness to take action to overcome health problems. As a trigger or motivation for someone to take action, act to determine knowledge, motivation. The self-efficiency component is a belief in one's ability to produce changes in desired results. A person's belief perception and behavior determines family support factors, cultural beliefs and spiritual beliefs.

The research included a broader population and examined variables not explored in earlier studies. This is because understanding the factors that may have a negative influence on compliance is very important for several reasons. First, this information can support the identification of patients at high risk of low adherence. Second, it can support the identification of barriers to compliance that might be removed. Third, it could support the development of individually designed adherence - enhancing interventions.

Furthermore, this study applied the HBM theory, which focused on health behaviors to improve illness prevention and severity. So the researcher performed research on “What are the factors linked with adherence to medicine in patients with MG?".

2. Method

This study used cross-sectional. The sample for this study included 122 respondents who conducted therapy at the Neurology Clinic in three type A hospitals in Yogyakarta and Central Java. The Inclusion criteria were MG patients with a decent sense of place, time and space. The exclusion criteria include being unable to hear or see, being unable to read and write, having unstable patient vital signs, and being classified as MG class 5. This study ran for two months, from April 4 to June 5, 2024.

The instruments included Instrument A: respondent characteristics. Instrument B: adherence to taking ARMS medication. Instrument C: belief about medication. Instrument D: knowledge about MG disease. Instrument E: motivation. Instrument F: family support. Instrument G: cultural beliefs. Instrument H: spiritual beliefs. Instrument I: affordability of access to health services.

The eight questionnaires B to I were assessed for validity and reliability with 30 respondents from member of the Indonesian Myasthenia Gravis Foundation who live outside Yogyakarta and Central Java. The results is instrument B: adherence to taking ARMS medication, the question item was declared valid with a correlation value range of 0.378-0.861. Instrument C: belief about medication with a correlation value range of 0.484-0.747. Instrument D: knowledge about MG disease with a correlation value range 0.365-0.440. Instrument E: motivation with a correlation value range 0.367-0.792. Instrument F: family support with a correlation value range 0.443-0.861. Instrument G: cultural beliefs with a correlation value range 0.420-0.668. Instrument H: spiritual beliefs with a correlation value range 0.595-0.886. Instrument I: affordability of access to health services with a correlation value range 0.439-0.776. And then all instrumen have a Cronbach Alpha value more than 0.6.

The data was analyzed descriptively to explain the dependent variable of medication adherence and independent variables, specifically factors related with medication adherence in MG. Univariate tests were performed on each variable based on the kind of data, followed by bivariate tests using the Chi-Square Test, Independent T-Test, and Mann-Whitney to examine the association between the drug compliance variable and each independent factor. Then multivariate test was continued with Logistic Regression test to determine the most associated with medication adherence. Confidence intervals used 95% (CI) and p values <0.05 were considered statistically significant.

This study applied the ethical principle of beneficience. respect for human dignity and the principle of justice. This research has been ethically approved by the Faculty of Nursing, Universitas Indonesia with No. KET-112/UN2.F12.DI.2.1/PPM.00.02/2024 and the Research Ethics Committee of the FKKMK UGM (KE/FK/0613/EC/2024). As well as having obtained a permit from three type A hospitals in Yogyakarta and Central Java. Fist hospital with permit number 893/3.482/2024, dated 4 April 2024, from second hospital with letter number DP.04.01/D.X.2/2495/2024 dated 24 April 2024 and from third hospital with letter number DP.04.03/ D.XI.2/12824/2024 dated 20 May 2024.

3. Results and Discussion

Table 1, shows 122 respondents met the inclusion criteria. Most of the MG patients experienced medication non-adherence, 69 patients (56.5%) while the remaining 53 patients (43.5%) were adhere with taking medication.

Table 1. Description of of medication adherence in patients with MG (n = 122)

Variable	Category	Frequency (f)	Percentage (%)
Medication Adherence	Non-adhere	69	56.5
	Adhere	53	43.5
Total		122	100

According to Table 2, the majority of respondents who did not take medication were female (40.1%), highly educated (24.6%), had an income less than the PMW (Provincial Minimum Wage) (28.8%), had high belief about medication (31.2%), good knowledge (52.5%), and had good affordability of access to health services (51.6%). According to Table 3, the average age of non-adherent respondents was 43.9 years, and their mean cultural belief was 21.2. The average motivation was 75.7, familial support was 18.2, and spiritual belief was 39.

Table 2. Characteristics and result of chi-square test (n = 122)

Variable	Category	Medication Adherence				Total	%	*P*
		Non-adhere	%	Adhere	%			
Gender	Male	20	16.4	17	14.0	37	30.4	0.713
	Female	49	40.1	36	29.5	85	69.6	
Total		69	56.5	53	43.5	122	100	
Education	Primary School	10	8.2	18	14.8	28	22.9	
	Secondary School	29	23.8	19	15.5	48	39.3	0.036*
	Higher Edutaion	30	24.6	16	13.1	46	37.8	
Total		69	56.6	53	43.4	122	100	
Income	< PMW	35	28.8	32	26.2	67	54.9	0.288
	≥ PMW	34	27.8	21	17.2	55	45.1	
Total		69	56.6	53	43.4	122	100	
Belief About Medication	Low	26	21.3	9	7.4	35	28.7	0.040*
	Ambivalent	5	4.1	4	3.3	9	7.4	
	High	38	31.2	40	32.7	78	63.9	
Total		69	56.6	53	43.4	122	100	
Knowledge	Less	1	0.8	0	0	1	0.8	0.372
	Sifficient	4	3.3	1	0.8	5	4.1	
	Good	64	52.5	52	42.6	116	95.1	
Total		69	56.5	53	43.5	122	100	
Affordable Access to Health Services	Less	6	4.9	5	4.1	11	9.0	0.888
	Good	63	51.6	48	39.4	111	91.0	
Total		69	56.5	53	43.5	122	100	

*Significance of *p value* < 0.05

Table 4 shows the results of logistic regression equation can be created as follows: Medication adherence = -4.894 -1.687 education +1.366 belief about medication + 0.287 family support -0.050 cultural belief. According to the results of multivariate analysis, the Odds Ratio (OR) value of the trust variable towards treatment was 3,919. This means that MG patients who do not take their medication are 3.9 times more likely than MG patients who do, after controlling for variables such as education, family support, and cultural beliefs. Belief about medicine was the most powerful predictor of medication adherence, with an OR value of 3.919 (95% CI 1.452-10.573), followed by family support, cultural attitudes, and education.

Table 3. Characteristics and result of independent t-test dan mann-whitney test (n = 122)

Variable		n	Mean	Average	Mean Difference (95% CI)	*P*
Age	Non-adhere	69	47.2	43.97	-7.3686	0.002*
	Adhere	53		51.33		
Cultural Belief	Non-adhere	69	20.7	21.11	0.9461	0.179
	Adhere	53		20.16		
Variable		**n**	**Median**	**Median (minimum-maksimum)**	**Average**	***P***
Motivation	Non-adhere	69	75	75.00 (56.0-95.0)	75.74	0.504
	Adhere	53		76.00 (64.0-94.0)	76.34	
Support Family	Non-adhere	69	21	20.00 (2.0-22.0)	18.26	0.001*
	Adhere	53		22.00 (12.0-22.0)	20.75	
Spiritual Belief	Non-adhere	69	40	40.00 (25.0-50.0)	39.5	0.446
	Adhere	53		40.00 (13.0-50.0)	38.8	
Duration of the Treatment	Non-adhere	69	43.5	48.00 (1.0-336.0)	66.97	
	Adhere	53		36.00 (2.0-420.0)	63.62	0.334

*Significance of *p value* < 0.05

Table 4. Factors affecting medication adherence in patients with MG

Variable	B	OR	95%CI	*P Value*
Education	-1.687	0.185	0.057-0.605	0.005
Belief about medication	1.366	3.919	1.452-10.573	0.007
Family support	0.287	1.333	1.105-1.607	0.003
Cultural belief	-0.050	0.951	0.844-1.072	0.414
Constant	-4.894	0.007		0.061

The average age of respondents was 47 years old or less than 50 years old. Bubuioc et al (2021) explained that MG affects people of all ages, including young women and senior men. . Women under the age of 50 have a higher risk of acquiring MG illness than men due to hormonal variables, specifically the hormone estrogen. Schirò et al (2024), found that women are more likely to have early-onset MG/EOMG before the age of 50, which can lead to hyperplasia of the thymus gland and decreased antibody production (Lefeuvre et al., 2020).

Individuals with MG have difficulty performing daily tasks (Pesa et al., 2024). As explained by Berrih-Aknin et al., (2023) that the severity of MG produces a significant prevalence of weariness. The condition of people with MG is impacted by the severity of the disease and the level of activity that can be tolerated, determining the respondent's ability to complete his education. This may affect patients' access to education. As a result, the majority of responders had received a secondary educationl.

Most responders earn less than the PMW (Provincial Minimum Wage). The patient's job position influences his or her income. The effects of MG, which force patients to limit heavy activities since they are at risk of worsening or relapse, lead to many people choosing not to work and instead doing more activities at home (Guastafierro et al., 2020). Adherents had a higher mean age than non - adherents. Age is one of the complex risk factors for drug nonadherence. Age is one of the variables that cannot be changed. Uchmanowicz et al (2019) explained that adherence to chronic diseases at an advanced age yields better benefits than at a younger age. This is because the elderly age is less busy than the youthful age. This is also supported by Su et al (2024) who found that a long-standing chronic disease will lead to self-efficacy or awareness of the importance of taking medication.

Most of the genders in the compliant and non-compliant were female. Study conducted found that drug compliance in chronic diseases is unaffected by gender. This is because they share a similar understanding of health behaviour. Adherence to medication is a voluntary decision impacted by a variety of variables (Vitturi et al, 2020).

Education in compliant respondents is mostly secondary education while non-compliant respondents are mostly highly educated. Lazaro et al (2019) found that higher education will lead to improved compliance. Perception of the condition will improve, symptoms will be better understood, and disease-related stigma will be reduced (Xu et al., 2022). These disparities in results call for additional research.

The majority of the income falls below the PMW threshold. Government health insurance considerably assists patients with incomes less than

PMW in accessing health care facilities in hospitals (Ruksakulpiwat et al 2020). The role of hospitals as a place to provide facilities and infrastructure, especially medicines, is very necessary.

Knowledge of respondents who are compliant and non-adherent to taking medication both have good knowledge. Shahin et al (2019) stated that health literacy can influence health behaviour in the self-management of chronic diseases. Health literacy can be gained by speaking with health workers, using electronic media, or attending health seminars. The questionnaire used in this study was unable to reflect the complexity of information associated to adherence, hence additional development is required. The mean motivation score for medication adherence and non-adherence ranged from 75.5-76.5. High motivation did not lead to high compliance behaviour. The outcomes of this study are still conflicting because in motivation theory, it is always related with high motivation in a person, causing someone to feel compelled to act in accordance with the rules (Alosaimi et al 2022). This can be further developed to get more in-depth results.

Those who were compliant with taking medication had more family support on average than those who did not. This help is extremely diverse and can take the shape of material or psychological assistance. Yu et al (2024) explained that higher social support indicates higher self-efficacy. Fostering a sense of control and disease control with good adherence (Kvarnström et al., 2021).

This study found no correlation between cultural or spiritual beliefs with medication adherence. This is because the majority of patients agreed to follow the doctor's instructions, rather than for any other reason. Medication adherence is linked to a strong doctor-patient connection and acceptance of the doctor's prescription and medications (Kasahun et al, 2022). Community environment that values religious teachings, a country with high religiosity that makes people feel close to God (Javanmardifard et al, 2020).

There was no significant association between treatment duration and access to healthcare services. Patients who have been diagnosed for a long time or who have recently been diagnosed can be heavily influenced by boredom with their medicine (Khayyat et al., 2019). Good access does not guarantee good medication adherence. As stated by Kvarnström et al (2021) that there is no relationship between distance and compliance. Access that is difficult will be more compliant or vice versa.

Multivariate analysis showed that trust in treatment was the variable most strongly associated with medication adherence in MG. Both adherent and non-adherent respondents held strong medication beliefs. However, individuals who were non-adherent showed lower medication adherence. High medication confidence, achieved by taking medication on a regular basis, can help to avoid the progression of MG. However, side effects from drug use can be painful for patients (Ruksakulpiwat et al 2020).

Health workers can give patients items that support their conviction in the essential treatment. The Health Belief Model theory includes trust in therapy as one of its perceived benefits. According to Myers et al (2020), perception influences actions and belief in the efficiency of a proposed measure to minimize disease risk or severity.

4. Conclusions and Suggestions

The findings showed a significant relationship between age, education, belief about medication, and family support on adherence to taking medication in patients with MG. The most influential factor on medication adherence is belief about medication (OR = 3.919). According to these findings, nurses, as health care providers, have an important role in assessing and identifying patients who are at risk of medication noncompliance so that it can be prevented. The findings of this study can contribute to guiding nurse interventions aimed at improving medication adherence in MG patients.

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