Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.47750/jptcp.2023.30.05.042

Predictors to Health Promoting Behaviors among Patients with Myasthenia Gravis: Health Belief Model Approach

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Submitted: 19 January 2023; Accepted: 04 February 2023; Published: 03 March 2023

ABSTRACT

Myasthenia Gravis is a rare, chronic, acquired autoimmune neuromuscular disorder causing weakness in skeletal muscles. Patients with Myasthenia Gravis face many bio-psychosocial consequences that may require dramatic changes in their lives. The aim of this study was to determine predictors to health promoting behaviors among patients with Myasthenia Gravis using Health Belief Model. A predictive correlational research design was utilized to fulfill the aim of the study. Consecutive sample of convenience consisting of 57 adult male and female patients admitted for 21 months at one of Cairo University Hospitals, Egypt constituted the study sample. Data was collected using the following tools:(a) Demographic and Medical Background Data Form, (b) Glasgow Coma Scale to determine the conscious level of the potential participants, (c) The Adapted Health-Promoting Lifestyle Profile II tool to assess the health-promoting behaviors among the study participants and (d) the Health Belief Model Scale to assess the disease variables that were supposedly act as the predictors to health promoting behaviors among the study participants. Results showed that the majority of participants were female (78.90%), married (66.70%), educated (96.50%) and not working (91.20%), with a mean age of 33.96 ±9.81. Most of the participants have no family history of the disease (96.50%), have generalized Myasthenia Gravis (68.40%), their age at disease onset is between 20 to 40 years old (71.90%) and initial signs and symptoms are ptosis, limbs weakness and dysphagia (49.10 %, 40.40 % and 35.10% respectively). Additionally, more than one third of the study participants achieved low level of total health promoting behaviors. Accordingly, only two health belief model constructs, i.e., self-efficacy and cues to action shown to be predictors to health promoting behaviors. The study recommends that a self-management program should be designed to provide the patients with the necessary tools to improve self-efficacy and enhance management skills.

Keywords: *Myasthenia Gravis, Health-Promoting Behaviors, Health Belief Model*

INTRODUCTION

Myasthenia Gravis, a chronic disorder of the neuromuscular transmission, is increasingly acknowledged as a syndrome more than as a single disease and resulting from binding of autoantibodies to components of the neuromuscular junction, most commonly the acetylcholine receptor (AChR) and lead to weakness and fatigue of skeletal muscle (Narayanaswami et al., 2021). This can be generalized or localized to certain muscle groups; however, involvement of the bulbar and respiratory muscles can be life threatening. The incidence rate of Myasthenia Gravis varies with age, gender, and ethnic groups, estimates of incidence range from 7 to 23/million while prevalence is 70 to 320/million worldwide (Misra, Kalita, Singh & Kumar, 2020). Myasthenia Gravis affects males and females equally after the age of 50 and mostly females before the age of 40 years (Chen et al., 2020).

Patients with Myasthenia gravis face many physical, psychological and social consequences after being diagnosed. Indeed, in many conditions, severe physical impairments and debilitating symptoms force patients to change drastically occupational and social lives to account for the physical disability (Tong, Delfiner & Herskovitz, 2018). Psychologically, patients may experience depression and anxiety, with the physical diagnosis either exacerbating an underlying predisposition for these psychological symptoms or bringing about psychological distress due to the stress and transition that accompanies the chronic illness (Zhu et al., 2022). In addition, patients may struggle to rely on others for help, both physically and emotionally; asking for help can be in stark contrast to their previous ways of relating to the world and tend to blame themselves for the illness, which has been proven to relate to negative outcomes, both physically and emotionally (Muzaffar & Rohail, 2021).

To date, there is no known cure for Myasthenia Gravis, however; anticholinesterase drugs and corticosteroids have been shown to alleviate the disease's signs and symptoms. Intravenous immunoglobulin, plasma exchange, as well as thymectomy, can be considered also as effective treatments for Myasthenia Gravis (Misra et al., 2020). Hence, engagement of patients with Myasthenia Gravis in health-promoting behaviors is a key factor in promoting physical, social and psychological wellbeing and preventing additional health problems as the majority of patients do not return to pre-morbid levels of functioning and find it difficult to maintain the daily activities (Kim et al., 2021). Health promoting behaviors were selected as dependent variables in the current study due to the direct impact on quality of life (Suppiah, Marshall, Lee & Looi, 2022).

Major goals for health promotion include finding ways to encourage patients to engage in healthy behaviors and improve overall well-being and life quality (Algahtani et al., 2021). Presently, little is known about factors that may influence and predict the health-promoting behaviors among patients with Myasthenia Gravis. For that reason, in order to investigate the predictors to the health promoting behaviors among patients with Myasthenia Gravis, it is essential to use model that could explain and predict person's health related behaviors concerning the uptake of health services to provide better understanding, and clearer picture of what is being studied, hence, the use of health belief model.

Such data are essential prerequisite for the alleviation of psychosocial morbidity and consequently could improve the quality of survival associated with Myasthenia Gravis. In addition, there were few studies on Myasthenia Gravis in Egypt at present, and the researcher was unaware of any study in Egypt or elsewhere that looked at the predictors of health-promoting behaviors in patients with Myasthenia Gravis based on health belief model approach. Further, the researcher expect that the knowledge generated from the current predictive study would help nurses to gain new perspectives about patients with Myasthenia Gravis or validate a proper course of action. Last, though not least, it is hoped that the study would draw attention and motivation, especially among nurses, for further research into this topic and disease.

The current study had two-fold purposes: (a) to determine the predictors to the health promoting behaviors among patients with Myasthenia

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Gravis using Health Belief Model constructs and (b) to examine the strength and magnitude of the relationships and interrelationships among the study variables, i.e., the dependent variables which are health-promoting behaviors, and the Health Belief Model constructs as the independent variables.

To fulfill the aim of the current study the following null hypotheses were formulated:

$H_0$1. There will be no predictive relationship between perceived benefits of compliance to therapeutic medical regimen and total health promoting behaviors among patients with Myasthenia Gravis.

$H_0$2. There will be no predictive relationship between perceived barriers to compliance to therapeutic medical regimen and total health promoting behaviors among patients with Myasthenia Gravis.

$H_0$3. There will be no predictive relationship between perceived severity of crises and total health promoting behaviors among patients with Myasthenia Gravis.

$H_0$4. There will be no predictive relationship between perceived susceptibility to crises and total health promoting behaviors among patients with Myasthenia Gravis.

$H_0$5. There will be no predictive relationship between perceived self-efficacy and total health promoting behaviors among patients with Myasthenia Gravis.

$H_0$6. There will be no predictive relationship between cues to action and total health promoting behaviors among patients with Myasthenia Gravis.

MATERIALS AND METHODS

Research Design

A predictive correlational research design was utilized to fulfill the aim of the study. The study variables are classified as independent (predictor) and dependent (outcome), however, these variables are not manipulated, but occur naturally (Grove, Gray& Faan, 2019; Blouin & Gyurcsik, 2019). This design was appropriate for this study due to the use of several quantitative variables in the prediction of the relationship and to explain the changes in dependent variable (Health promoting behaviors) based on one or more independent variables (Health Belief Model constructs, i.e., perceived susceptibility to crises, perceived severity of crises, perceived benefits of compliance to medical regimen, perceived barriers to compliance to medical regimen, cues to action and self-efficacy)

Setting

The current study was conducted at a Neurology Unit in a university hospital in Cairo, Egypt. The unit is customized to receive patients with different diagnoses of neurological disorders such as multiple sclerosis, stroke, transverse myelitis … etc.

Sample

Consecutive sample of convenience consisted of adult male and female patients admitted for 21 months from March 2020 to December 2021 in the above-mentioned unit constituted the study sample. Requirements for potential participants were that they had a confirmed diagnosis of Myasthenia Gravis, fully conscious, i.e., scoring 15 out of 15 on Glasgow Coma Scale and free from other autoimmune diseases as Systemic Lupus Erythematosus, Rheumatoid Arthritis… etc. and known psychological disorders.

Tools for Data Collection

Data was collected using the following four tools: (a) Demographic and Medical Background Data Form, (b) Glasgow Coma Scale (Teasdale & Jennett, 1974; Tasker, 2019), (c) The Adapted Health-Promoting Lifestyle Profile II tool (A-HPLP II) (Walker, Sechrist, Pender, 1987) and (d) the Health Belief Model Scale (Champion, 1999; Dewi, 2018; Wu, Feng & Sun, 2020; Phan, Beck, Wang & Butler III, 2020).

First tool

Demographic and Medical Background Data Form consisted of two sections, the first section included demographic data such as age, gender, marital status, level of education …etc. While the second section included medical data such as onset of disease, type of therapy, family history … etc.

Second tool

Adopted Glasgow Coma scale (GCS) to assess the conscious level of the potential participants. According to the scoring system of GCS, the patient was considered fully conscious if the total score is 15 out of 15. Glasgow Coma scale is valid and reliable tool for assessing the conscious level (kappa values = ≥0.7) (Teasdale & Jennett, 1974; Tasker, 2019).

Third tool

The Adapted Health-Promoting Lifestyle Profile II tool: based on the health-Promoting Lifestyle Profile II tool (Walker et al., 1987), adaptation was carried out in areas of scoring to make the tool more pliable for study participants. The adapted tool consisted of 52 questions covering the six health promoting behaviors, the respondents were asked to indicate how often they adopt specific health-promoting behaviors on a 3-point scale - instead of 4-points scale - ranging from 1 to 3, where 1 = never, 2 =sometimes, 3 = routinely. A composite of the total scale as well as individual subscale scores were obtained from the adapted tool. The adapted HPLP II is a valid and reliable for assessing health-promoting behaviors (alpha reliability coefficient is ≥ 0.7).

Fourth tool

The Health Belief Model Scale: The scale was formulated based on literature review (Champion, 1999; Dewi, 2018; Wu, Feng & Sun, 2020; Phan, Beck, Wang & Butler III, 2020) to suit the Myasthenia Gravis disease variables that were supposedly act as the predictors to health promoting behaviors among patients with Myasthenia Gravis. The Scale consisted of 35 questions covering the six Health Belief Model constructs. Each question was scored on a 3-point Likert scale, disagree, neutral, agree, and scored as 1, 2, and 3 respectively. Higher scores indicate stronger feelings about the construct. This scale is a valid and reliable for assessing the Myasthenia Gravis disease variables based on health belief model (alpha reliability coefficient is ≥ 0.7).

Procedure

Once official permission was granted to proceed with the proposed study, the researcher identified potential participants who met the criteria for possible inclusion in the study daily from the head nurse of the selected unit. Then, the level of consciousness of potential participants was assessed using GCS; participants who scored 15 out of 15 on GCS proceeded to the next step. At that time, the purpose and the nature of the study was explained to each potential participant individually.

Through structured interview Demographic and Medical Background Data Form was completed by the researcher then data of the study including the Adapted Health-Promoting Lifestyle Profile II tool and the Health Belief Model Scale were collected as well. Each tool was completed once per participant. The three tools used for data collection took approximately between 90 to 120 minutes to be completed for each participant. If the patient became tired during the data collection time, the information was gathered in a longer time to allow the patient to regain the power.

Ethical Consideration

Formal approval was obtained from the Research Ethics Committee of Faculty of Nursing, Cairo University. In addition, an official permission was obtained from hospital/unit administrators to conduct the study. Each potential participant was informed about the purpose of the study and its significance. Potential participants were informed also that participation in the study is completely voluntary, as well as they have the right to withdraw from the study at any point without any penalty. Additionally, all participants were assured that their anonymity

and confidentiality will be guaranteed through coding the data. Moreover, participants were informed that the data will not be reused for any other research purpose without their permission. Participants who choose to take part in the study were asked to sign the consent form.

Data analysis

Data were analyzed using SPSSx (version 25). Descriptive statistics were used to describe demographic and medical variables and the level of health-promoting behaviors. Whilst, hierarchical multiple regression analysis was performed to determine the predictive variables on overall health-promoting behaviors. Based on logical and theoretical considerations, the researcher figures out the order of the variables to be entered in the regression model. In model 1, pertinent demographic variables were entered, whereas, in model 2, medical variables including family history, type of Myasthenia Gravis, thymectomy surgery, occurrence of crises and age at the onset of the disease were entered. At last, the six constructs of health belief model were entered in model 3. Normality assumption was verified using histogram, Q-Q plot, and Kolmogorov–Smirnov, while the multicollinearity among variables was evaluated by all variance inflation factors for the variables in the model (b3), thus multicollinearity was not problematic. All hypotheses were accepted or rejected at 0.05 level of significance.

RESULTS

Concerning demographic data, table 1 showed that the mean age for study participants was 33.96 ± 9.81 years, and the commonest age group was between 20-40 years with a percentage of (73.70%). In addition, most of the participants were females (78.90%), educated (96.50%), married (66.70%), had insufficient income (75.40%) and are not currently working (91.20%). Table 2 displaying medical data revealed that the majority of the participants had no family history of the disease (96.50%); almost two thirds of the participants had Generalized Myasthenia Gravis (68.40%) and the common initial signs and symptoms were ptosis, limb weakness and dysphagia (49.10%, 40.40% and 35.10% respectively). On the other hand, the participants' age at the onset of the disease was between 20 to 40 years old (71.90%) and eighty-four percent of the participants experienced disease crises. As regards the medical management, cholinesterase inhibitors, immuno-modulating agents and plasma exchange were the most common medications /interventions (94.70%, 77.20% and 43.85% respectively).

In reference to Health promoting behaviors, table 3 displayed the levels of total health promoting behaviors among patients with Myasthenia Gravis; it is apparent from the table that almost 58 % of the study participants achieved moderate level of health promoting behaviors, while 40% achieved low level of health promoting behaviors and only one participant achieved high level. Additionally, and as can be seen from table 4 that the highest mean score recorded on health promoting behaviors subscales was on interpersonal relations (Mean 2.30 ± .360) while the lowest was on physical activity (Mean 1.33 ± .388). As regard, correlation between participants' total health-promoting behaviors and health belief model constructs, table 5 displayed that with the exception to perceived barriers, all health belief model constructs were correlated with total health promoting behaviors, however, in different magnitude and strength. Nevertheless, self-efficacy and cues to action were highly correlated to total health promoting behaviors (p 0.000 and 0.000 respectively).

In relation to predictors to health promoting behaviors, table 6 showed the results of hierarchical multiple regression analysis. As can be seen in model 1, demographic variables accounted for 35.90% of the variance of total health-promoting behaviors, but with the inclusion of medical variables in model 2 the explained variance of health-promoting behaviors increased by 4.50%. Whereas, in model 3, where perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and cues to action were added to the model the explained variance of health-promoting behaviors reached to19.40%. It is obvious from the table that the total variance of health promoting behaviors were significantly predicted by self-efficacy and cues to action since $P < 0.05$.

Based on the former presented results, it is clear that there was a predictive relationship between perceived self-efficacy, cues to action and total health promoting behaviors so, hypotheses 5 and 6 were rejected as null hypotheses, whereas, the study hypotheses 1, 2, 3 and 4 were accepted as null hypotheses.

DISCUSSION

The current study findings showed that the mean age for the study participants was around thirty-four years old and more than three quarters of the participants were females. The study results were consistent with studies conducted by Al-Ahmer and Elshony (2021) and Dong et al. (2020) which revealed that the mean age of their study participants was thirty-five years old and almost three quarters of the study population were females. The fact that females experience hormonal change along their lives; with estrogen being potent stimulator of autoimmune diseases, could explain partially the increased number of females in the study sample, in addition, using contraceptive pills, which in turn affect the hormonal level that may be considered as risk factors of Myasthenia Gravis (Desai & Brinton, 2019). Another factual explanation is that Myasthenia Gravis affects mostly females before the age of forty years (Thomsen, Vinge, Harbo & Andersen, 2021) and as noted in the results section table 2 that the participants' age at the onset of the disease was between 20 to 40 years old.

On the other hand, the results of the current study were inconsistent with studies done by Mazzoli et al. (2018); Alsop, Williams and Gomersall (2020) and Suppiah et al. (2022) which concurred that the mean age was around forty-eight to fifty-five years old respectively and males constituted more than half of their study participants. This discrepancy could be explained in the light of different sampling techniques used as well as different samples that were drawn from variable geographical areas and different countries.

Despite the fact that positive family history of MG is well documented by many research studies around the world which concluded that the familial rate of Myasthenia Gravis was high and suggested a genetic contribution to the pathogenesis of Myasthenia Gravis along with individual risks of Myasthenia Gravis and other autoimmune diseases among the relatives of patients with Myasthenia Gravis (Liu, Kuo, See, Tsai & Yu ,2017 ; Green et al. ,2020 ; Ahmed, Al Salmi, Al Rahbi, Al Farsi & Hannawi ,2021). Surprisingly, the current study results showed that almost all participants had no family history of the disease. This Paradoxical finding can be explained in the light of the fact that there is no familial awareness about genetic/familial diseases that occurs within the same family, in addition to, the absence of formal registration system in most hospitals in Egypt about genetic/familial autoimmune disease.

In reference to the type of Myasthenia Gravis, the study findings revealed that; more than two thirds of the participants had generalized Myasthenia Gravis; the initial signs and symptoms were ptosis and limb weakness and the participants' age at the onset of disease was between 20 to 40 years old. In the same direction of the study results, a study conducted by Algahtani et al. (2021) entitled "Clinical Presentation, Management and Outcome in Patients with Myasthenia Gravis" displayed that the patients initially developed ptosis, diplopia, and/or blurred vision and limb weakness and all were eventually diagnosed with Generalized Myasthenia Gravis, nevertheless, the onset of symptoms was seen to be maximum in the third decade.

In reference to the occurrence of MG crises, the majority of the participants suffered from disease crises, and more than half of the participants admitted to hospital after the occurrence of crises. These findings were congruent with a study conducted by Gummi, Kukulka, Deroche and Govindarajan (2019) entitled "Factors Associated with Acute Exacerbations of Myasthenia Gravis" which showed up that more than half of their study participants experienced crises and required hospital admission.

As regards, medical management, cholinesterase inhibitors and immune-modulating agents were the most common treatment modalities between the study participants. This finding is in the same line with a study by Sanders, Wolfe, Narayanaswami and MGFA Task Force on MG

Treatment Guidance (2018) entitled "Developing Treatment Guidelines for Myasthenia Gravis". However, it is worth mentioning that two participants did not receive any medical treatment which was consistent with a study by Andersen, Gilhus and Sanders (2016) entitled "Factors Affecting Outcome in Myasthenia Gravis" which disclosed that four participants received no treatment and experienced spontaneous remission.

With regard to health promoting behaviors, it was noted that more than one third of the participants achieved low level on total health promoting behaviors while only one participant achieved high level, in addition, the health promoting behaviors subscales showed low level on physical activity and moderate levels on the other five subscales. So far, there are no studies that addressed health-promoting behaviors among patients with Myasthenia Gravis, but in the light of adopted frame of reference and the stated hypotheses, the study findings can be harmonized with a study conducted by Lehnerer et al. (2021) entitled "Burden of Disease In Myasthenia Gravis "which showed that the mental and physical health-related quality of life in patients with Myasthenia Gravis is remarkably lower in comparison to the general population.

Along the same line, a study by Law, Flaherty and Bandyopadhyay (2020) entitled "A Review of Psychiatric Comorbidity in Myasthenia Gravis" displayed that patients with MG experience higher levels of psychological disorders and indicated that the paradigm of clinical practice has yet to adequately address the management of psychological impacts for the disease as the somatic complains.

The results of these studies combined imply low level of health promoting behaviors among patients with Myasthenia Gravis. Furthermore, the low level of health promoting behaviors among the studied sample can be explained in the light of the fact that Myasthenia Gravis (MG) affects overall quality of life, as most of the patients with Myasthenia Gravis have limitations in their physical functioning; many experience changes in psychological states and often have anxiety and depression which may lead to variation in adhering to health promoting behaviors (Jeong, 2018).

As regards health belief model constructs, the participants had moderate levels of perceived susceptibility, perceived severity, and perceived barriers which indicated that most of the participants were aware of their current health status, perceives themselves vulnerable to occurrence of disease complications, are well aware that the complications of the disease especially crises , may be serious and negative; and realizes the difficulties, barriers and cost of commitment to therapeutic medical regimen behavior to be quite low. On the other hand, the participants had high levels of self-efficacy, perceived benefits, and cues to action which imply that participants had realistic judgments of their capabilities to execute therapeutic medical regimen, recognizes that compliance to that regimen has positive impacts on reducing the consequences of disease complications and considered advising received from physicians, family and other patients supporting and accelerating forces toward living with the disease.

Except for the perceived barriers, all health belief model constructs were correlated with total health promoting behaviors. This finding is consistent with studies conducted by Rahimi, Jalili and Farmanbar (2017); Azadi et al., (2021); Al-Metwali, Al-Jumaili, Al-Alag and Sorofman, (2021) which revealed that health belief model constructs were significantly associated with healthy behaviors. The study finding related to perceived barrier could be explained in light of the fact that Myasthenia Gravis is a rare autoimmune chronic disease that has recently started to be recognized in Egyptian society that require appropriately skilled health care team, funds and resources . Another plausible explanation is different sampling methods, different population and different geographical areas utilized in these research studies.

In relation to predictors to health promoting behaviors; the results of the study demonstrated the existence of a predictive relationship between perceived self-efficacy, cues to action and total health promoting behaviors, accordingly, hypotheses 5 and 6 were rejected as null

hypotheses, whereas, the study hypotheses 1, 2, 3 and 4 were accepted as null hypotheses. The current study results is consistent with a Chinese study carried out by Fan, Xing, Yang, Wang and Feng (2020) entitled "fatigue, self-efficacy and psychiatric symptoms influence the quality of life in patients with Myasthenia Gravis" which revealed that patients with higher self-efficacy levels are more likely to start or maintain a specific task even in the face of existing barriers. The study further signify the association between self-efficacy factors and improvement of the results of conventional MG treatment and consequently health-related quality of life. Other supporting studies conducted by Habibi, Sedighi, Jahani, Hasani and Iranpour (2021) in Iran; Wong et al. (2021) in Hong Kong and Shmueli (2021) in Palestine signaled that cues to action variable is a main predictor of self-care practices and a significant driving force of uptake of a healthy behavior and interventions.

On the other hand, a study by Sulat, Prabandari, Sanusi, Hapsari and Santoso (2018) titled "The validity of health belief model variables in predicting behavioral change: A scoping review" prevailed that perceived barriers and perceived benefits were the strongest predictors of behavioral changes. The perceptions of seriousness of illness, barriers and benefits of the preventive behavior were consistently predictive of increasing the likelihood of performing health-promoting behaviors. Another study by Al-Sabbagh et al., (2021) revealed that the perceptions of seriousness of illness, barriers and benefits of the preventive behavior were consistently predictive of increasing likelihood of performing health-promoting behaviors.

Several factors may have relevance to the observed discrepancies between the study findings and the previously mentioned research studies. One possible factor is different samples used, ethnic background, nationalities and geographical locations. Another possible explanation that might partially account for these differences is the quarantine periods that imposed nationally during the era of COVID-19 where patients with all auto immune diseases including Myasthenia Gravis were alerted and given clear instructions on the necessity and importance of not leaving homes except for emergency for fear of infection related to immunotherapy and possible respiratory and bulbar muscular weakness.

CONCLUSION

Based on the results of the current study, it can be concluded that the health promoting behaviors were significantly predicted by self-efficacy and cues to action. Thus, patients with Myasthenia Gravis were more likely to engage in a health-promoting lifestyle if they had higher self-efficacy and cues to action. The current study, moreover, provides new insight into the predictors of the health promoting behaviors among patients with Myasthenia Gravis, by understanding these predictors, health care providers may be equipped to ascertain and address factors that may facilitate and contribute to better outcomes among those group of patients.

IMPLICATIONS

Our study has important implications for patients, health care providers and policy makers. Among patients, these findings may ease more understanding of health promoting behaviors and its predictors. Further, the predictors found in this study may help health care providers to anticipate adverse outcomes that may otherwise go undetected.

Health care providers including nurses need to be engaged in a more personalized discussion of potential risks, susceptibility and anticipatory guidance may be tailored to the patient unique circumstances. Moreover, nursing care should focus on evaluating individualized lifestyles and social support systems and providing adequate patient education to enhance health promoting behaviors.

As for policy makers, support groups, couples therapy, or one-on-one counseling should be encouraged to promote disease outcomes.

One of the important implications of this study is the importance and necessity of developing and designing a self-management program specifically designed for patients with Myasthenia Gravis to supply the necessary

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stimulus to improve patients' belief in their capacity to act in a way that necessary to reach specific goals and increase their acceptance of recommended health actions.

RECOMMENDATIONS

Replication of the study on a larger probability sample selected from different geographical areas in Egypt.

A phenomenological study should be designed to examine in depth the individual experience of patients with Myasthenia Gravis to understand the lived experience from the vantage point of the patient.

Replication of the study with additional tools that measure personality characteristics of the subjects, subjects' perception of the disease, and role of family in motivation process following diagnosis.

A longitudinal study would be deigned to determine the stability of the study findings over a longer period of time.

TABLE 1: Frequency and percentage distribution of demographic Characteristics among study participants (N=57).

Variable	Category	N	%
Age	Less than 20	3	5.30
	20-40	42	73.70
	41-60	11	19.20
	More than 60	1	1.80
	Mean ±SD	33.96± 9.81	
Gender	Male	12	21.10
	Female	45	78.90
Educational status	Educated	55	96.50
	Not Educated	2	3.50
Marital Status	Single	13	22.80
	Married	38	66.70
	Divorced	5	8.70
	Widow	1	1.80
Income	Sufficient	14	24.60
	Insufficient	43	75.40
Current Working status	Working	5	8.80
	Not working	52	91.20

TABLE 2: Frequency and percentage distribution of medical data variables among study participants (N=57).

Variable	Category	N	%
Family history	Yes	2	3.50
	No	55	96.50
Type of MG	Ocular	18	31.60
	Generalized	39	68.40
Initial signs and symptoms**	Vision problems (blurred, double vision)	11	19.30
	Ptosis	28	49.10
	Dysphagia	20	35.10

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Variable	Category	N	%
	Dysarthria	12	21.05
	Limb weakness	23	40.40
	Dyspnea	7	12.30
	Voice change	3	5.20
Age at disease onset	Less than 20	12	21.10
	20-40	41	71.90
	41-60	3	5.20
	More than 60	1	1.80
Occurrence of Crises	Yes	48	84.20
	No	9	15.80
Medical Management**	No	2	3.50
	Cholinesterase Inhibitors	54	94.70
	Immuno-modulating agents	44	77.20
	Plasma Exchange	25	43.85
	IV Ig	8	14

** Total is different as more than one response was given by each participant.

TABLE 3: frequency and percentage distribution of the total health-promoting behaviors levels among study participants (N=57).

Categories	N	%
Low	23	40.40
Moderate	33	57.90
High	1	1.70

TABLE 4: means and standard deviations of the health-promoting behaviors subscales among study participants (N=57).

Health-promoting behaviors subscales		Mean	SD	Level
Nutrition		2.01	.337	Moderate
Physical Activity		1.33	.388	Low
Health Responsibility		2.01	.441	Moderate
Interpersonal Relations		2.30	.360	Moderate
Self-Actualization		2.23	.463	Moderate
Stress Management		1.90	.364	Moderate

TABLE 5: Correlation between Participants' scores on Health belief model constructs and total health-promoting behaviors (N = 57).

Health belief model constructs	Mean	SD	Level	Total Health Promoting Behaviors	
				r	P
Perceived Susceptibility	2.2140	.54754	Moderate	.311	.009**
Perceived Severity	2.2682	.53661	Moderate	.296	.013*
Perceived Benefits	2.3649	.47528	High	.233	.041*
Perceived Barriers	2.1368	.36676	Moderate	.106	.217
Self-Efficacy	2.5564	.45069	High	.584	.000***
Cues To Action	2.4035	.33026	High	.567	.000***

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*P < 0.05 ** P < 0.01 *** P < 0.001

TABLE 6: Hierarchical multiple regression of Health-Promoting Lifestyle Profile Scores Regressed on the Health Belief Model Variables (N = 57).

Predictors (Health Belief Model Variables)		Model 1		Model 2		Model 3	
		Beta	t	Beta	T	Beta	t
			6.311***		5.411***		2.760**
Demographic Variables	Age	.065	.422	-.140	-.630	-.173	-.817
	Gender	.463	3.134**	.492	3.209**	.288	1.970
	Marital Status	-.011	-.085	.015	.114	.008	.062
	Educational status	.121	1.025	.112	.913	-.023	-.181
	Working status	.021	.174	.000	.000	-.078	-.666
	Income	.264	2.139*	.267	2.083*	.066	.522
	Medical Insurance	.022	.189	.056	.438	.145	1.159
Medical variables	Family history			.057	.463	.024	.213
	Type of MG			-.058	-.472	-.001	-.005
	Thymectomy surgery			-.014	-.110	-.102	-.876
	Occurrence of Crises			-.115	-.894	-.087	-.722

Beta: standardized regression coefficient; * P < 0.05 ** P < 0.01 *** P < 0.001

Cont. **TABLE 6.** Hierarchical multiple regression of Health-Promoting Lifestyle Profile Scores Regressed on the Health Belief Model Variables (N = 57)

Predictors		Model 1		Model 2		Model 3	
		Beta	t	Beta	t	Beta	t
	Age at disease onset			.237	1.253	.100	.570
Health belief model constructs	Perceived Susceptibility					-.073	-.550
	Perceived Severity					-.179	-1.157
	Perceived Benefits					.021	.180
	Perceived Barriers					-.031	-.224
	Self-Efficacy					.298	2.027*
	Cues To Action					.320	2.067*
R2		0.359 (35.90%)		0.404 (40.40%)		0.598(59.80%)	
R2 change		0.359		0.045 (4.50%)		0.194 (19.40%)	
F		3.927		2.490		3.145	
P		<.01		<.05		<.01	

Hierarchical multiple regression of health-promoting behavior among CAD patients (N = 20

Beta: standardized regression coefficient; * P < 0.05 ** P < 0.01 *** P < 0.001

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