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Figure 1: Percentages of 4-MMAS answers and adherence score

Table 1: Description of the study population

Table 2: Description of health status and history of epilepsy

Table 3: Comparison of people with epilepsy with positive and negative attitudes towards medication

Table 4: Final results of regression using the status of attitudes as the dependent variable

Table 5: Final results of regression using the seizure control as the dependent variable

Abstract

Background: Epilepsy is a common worldwide neurological disorder. For people with epilepsy, adherence and attitudes towards medication is a crucial step to improve efficacy of prescribed treatment and to prevent seizures.

Objectives: The first aim of this study was to evaluate attitudes towards antiepileptic medications in Lebanese population. Secondary aims were to assess factors affecting attitudes and associated with epilepsy control.

Material and Methods: A cross-sectional study was conducted in out-patients neurology clinics located in Beirut-Lebanon. Data was collected using a structured questionnaire. Self-report of medication taking behaviors were assessed using the abbreviated (4-items) Morisky Medication Adherence Scale (MMAS-4). Epilepsy was considered as controlled if the patient had no seizures in the last 6 months.

Results: Among 250 people with epilepsy (PWE) recruited in this study, male-to-female ratio was 0.87 (116/134), and 50.8% were married. Mean duration of epilepsy was 13.7 ± 12.8 years. Valproate was the most common antiepileptic drug used followed by levetiracetam and carbamazepine. About 60.8% of the population presented partial epilepsy. Uncontrolled epilepsy was present in more than half of participants (55.2%), with only 32.4% had positive attitudes to their medication. Positive attitudes towards antiepileptic increased in people who found their treatment was efficacious (OR=4.9; 95%CI 1.2-20.0; p=0.03), who had controlled epilepsy (OR=3.4; 95%CI 1.6-7.1; p=0.001), and who were diagnosed as people with epilepsy between the age of 12-20 years (OR=3.1; 95%CI 1.1-8.4; p=0.03). Oppositely, these attitudes decreased in participants who felt their treatment as an economic burden (OR=0.2; 95%CI 0.1-0.4; p<0.001), and in depressive people (OR=0.4; 95%CI 0.2-0.9; p=0.04). Controlled epilepsy was higher in people who contacted a neurologist if seizure occurred, in people with positive attitudes, and after a long duration of disease, but it decreased if patient didn't follow neurologist's instructions in fasting period.

Conclusions: Lebanese PWE were less likely to have positive attitudes towards medication, which may lead to poor epilepsy control. Depression and economic burden were the major factors decreased these attitudes. Identifying factors affecting attitudes to medication and leading to controlled epilepsy may help clinicians to elaborate educational programs to optimize medication adherence.

Keywords: Epilepsy; Attitudes; Behaviors; Antiepileptic drug; Lebanon.

1. INTRODUCTION

Epilepsy is a neurological chronic disorder that affects almost 70 million people of all ages worldwide, of whom 85% live in developing countries [1]. According to the International League Against Epilepsy (ILAE), epilepsy is a brain disease defined by at least two unprovoked (or reflex) seizures occurring more than 24 hours apart [2]. Epilepsy treatment gap is defined as frequency of people with active epilepsy who need treatment but don't receive it [3,4], exceeded 75% in most low-income countries and in rural regions [5,6].

Antiepileptic drugs (AED) are essential to control epilepsy, and are able to reduce seizures frequency in almost 67% of people with epilepsy (PWE) [7]. Despite a large number of AED present to date, low adherence and negative attitudes lead to failure of treatment. Studies showed that non-adherence to antiepileptic medication was associated with poor seizure control [8].

Many studies showed that worse attitudes and non-adherence proportions among PWE were similar to other chronic diseases and ranged between 30% and 50% [9–13]. Lack of adherence to AED might lead to therapeutic failure, poor quality of life, and increase in the risk of seizures recurrence [8,14,15]. Patients' non-adherent having negative attitudes towards drugs present uncontrolled epilepsy, and are at higher risk of status epilepticus (prolonged seizures) [16]. As a result, number of hospital admissions, healthcare costs, rate of morbidity and mortality increase [17–22]. Furthermore, the risk of sudden unexpected death in epilepsy (SUDEP) is higher in non-adherent PWE [23].

Based on these consequences, identifying the barriers to patient's attitudes towards AED is considered essential for clinicians to develop strategies in order to improve attitudes to medication in PWE [11]. Some known factors are unmodifiable by a neurologist in treatment strategy, such as age of disease onset, epilepsy etiology (symptomatic, idiopathic, and cryptogenic), and location of

epileptogenic zone (partial or generalized) [10]. The other modifiable factors are socio-economic factors, health care factors, comorbidities, cultural beliefs about epilepsy, frequency of seizures, treatment management, adverse events of AED, type/ frequency of medication use, cost of treatment and forgetfulness [23,24]. These factors can be controlled, and health care providers should resolve these problems to improve patient's attitudes to treatment.

A literature review showed that multiple factors that influence medication adherence worldwide. But, very few published studies evaluated attitudes to medication among PWE in Arab countries. Two countries (Saudi Arabia and Palestine) have evaluated adherence to AED [10,25]. More studies are necessary to detect these factors among Arabic people who present some specific habits, attitudes and cultures [10].

For this purpose, this study aims firstly to evaluate attitudes towards antiepileptic medications in Lebanese population, and secondary to assess factors affecting attitudes and associated with epilepsy control.

2. MATERIAL AND METHODS

2.1. Study design

A cross-sectional study was conducted in outpatient neurologic clinics of three tertiary care hospitals, two medical centers and ten private neurologic clinics located in Beirut-Lebanon. Beirut is the capital and largest city of Lebanon. Greater Beirut is generally considered as a growth of Beirut city and its peripheral areas (suburbs). These areas are urbanized and considered densely populated

This survey was carried out over a period of 6 months from February 1st, 2018 to July 30th, 2018. The clinics included in this study are visited by PWE from different Lebanese regions. The list of neurologists was obtained from Lebanese Order of Physicians.

The estimated sample size was 217 patients (with a 95% confidence interval (CI), and a 5% precision error [26]) based on a previous published study using Morisky scale and reporting that only 17% of Lebanese patients with chronic diseases were adherent to their treatment [27].

Lebanese outpatients above 18 years of age, diagnosed with epilepsy by a neurologist, and taking at least one AED for at least one month were included in the study.

Participants who had mental retardation or intellectual disability, who were newly diagnosed with epilepsy (adherence of patient who didn't take AED for at least 4 weeks can't be evaluated), presented non-epileptic psychogenic seizures, who were taking AED for neuropathic pain, and pregnant women were not included. Also, participants who didn't give written consent to participate in the study were not included.

2.2. Data collection

Data was collected using a structured questionnaire prepared at first in English, and then presented in Arabic, the local language, to facilitate comprehension for patients.

It was translated into Arabic Language by two independent translators. A back translation to English was done by another bilingual translator, who was not included in developing the initial version. The original Arabic version and the back translated English version were compared to resolve any inconsistency. A pilot study was done with 20 PWE to identify any problem in comprehension. These participants were not included in the final sample of the study.

The questionnaire was divided into six sections. Demographic data, natural history of epilepsy/etiology, and treatment were parts used from standardized questionnaire for investigation of epilepsy in tropical countries [28].

- Socio-demographic characteristics: age, gender, height and weight, region of residence, education level, occupation, marital status, number of workers/family, presence of medical insurance.

- History of epilepsy: duration of epilepsy, age of disease onset, family history, seizures in last 5 years, seizure control, seizure type, and etiology.

- Treatment: type of AED, number of AED, number of pills/day, frequency of administration, reason for discontinuing treatment, appearance of side effects and its type (such as tiredness, nervousness, headache, skin's problem, hair loss, weight gain/loss, blurred vision, upset stomach, difficulty in concentrating, depression, disturbed sleep)[29], and measure serum level of AED.

- Health status: presence of comorbidities (any chronic disease other than epilepsy), and medication history.

- Self-report of medication taking behaviors were assessed using the abbreviated (4-items) Morisky Medication Adherence Scale (MMAS-4).

- General behaviors and attitudes towards medication: in absence/occurrence of seizures, in fasting/busy periods, if side effects appear, if no money/health coverage, if any neighbor's patient advices to stop medication, if participant forget to take medication, frequency of neurology visits, follow healthcare provider instruction, efficacy of treatment approved by participant, and if a treatment was an economic burden. These variables were not considered by MMAS-4.Data collection was done by a bilingual, Arabic native investigator using a face to face interview with PWE. All PWE attending neurology clinics and fulfilling inclusion criteria were included in this

study. The interviewer checked the patient's file to confirm diagnosis and inclusion criteria before taking written informed consent. Data concerning history of epilepsy, medication and health status was extracted from patient's file. The questionnaire was completed for all patients by a unique investigator during a 15 minutes face to face interview, during the patient's visit to the neurologist's clinic. The same questions were asked in the same manner and tone in Arabic to all patients to facilitate direct understanding.

2.3. Definition of dependent variables

In this study, seizure control was defined as studies done in Brazil and UK [30,31]. Epilepsy was arbitrarily classified as controlled if the patient had no seizures in the last 6 months and uncontrolled if he/she had at least one seizure in the last 6 months.

The MMAS-4 is a standardized validated questionnaire, used in this study to evaluate and reflect general health behaviors toward AED therapy. This structured self-report consists of 4 items with four "yes/no" questions [32,33].

Based on previous studies [10,30,34], each item is coded 0 if the answer is "Yes" and 1 if "No". A score can range from 0 to 4. Patients who had a score = 4 were considered adherent having positive attitudes towards AED and who had a score <4 were considered non-adherent having negative attitudes. The adherent state was considered for a patient responding "No" to all 4 questions and this reflects positive attitudes. However, if one response was "Yes", a patient was considered non-adherent with negative attitudes. Cronbach's alpha was measured to evaluate reliability of the translated Arabic scale in this study. It was 0.705, which indicates a high level of internal consistency for a scale in this sample.

2.4. Data analysis

Statistical analysis was done with the Statistical Package for the Social Sciences (SPSS) software, version 20. Descriptive analysis was used to describe qualitative (by frequency and percentage) and quantitative (by mean and standard deviation) variables. Comparative analysis was carried using Pearson's chi-square test or Fisher's exact test to report significant differences for qualitative variables between PWE with positive and negative attitudes. Student's t-test was used to compare the means between positive and negative attitudes groups. Variables having p-value <0.2 were included in the multivariate model. Backward logistic regression was done to determine predictors affecting attitudes to treatment and controlled epilepsy. The variable "Attitudes towards AED" was dichotomized into a dependent variable as "Positive/ Negative", and seizure control into "Controlled/ Uncontrolled". Statistical tests were considered significant with a p-value <0.05 and a confidence interval of 95%.

3. RESULTS

3.1. Socio-demographic and clinical characteristics

Two hundred fifty patients were recruited, with an average age of 40.2 (±14.8) ranging from 18 to 85 years. More than half of PWE (53.6%) were females and lived in Beirut (62.0%). The majority of the participants were unemployed (52.4%). Around quarter of this population (24.8%) have never been to school (Table 1).

Of all the participants, 56.8% had comorbidities, where hypertension and heart problems (cardiac insufficiency/ arrhythmia/ atrial fibrillation) were the most common (24.0%) followed by depression and anxiety (12.8%). Seventy-six patients (30.4%) had a family history of epilepsy. The mean duration of epilepsy was 13.7 years (±12.8). More than half of PWE (55.2%) had an

uncontrolled epilepsy. The majority of population (61.6%) presented partial epilepsy, with symptomatic etiology in 57.6% of cases. Monotherapy was prescribed in 60% of PWE; Valproic acid (50.0%), levetiracetam (26.4%), and carbamazepine (23.6%) were the most common AED prescribed. More than half of participants (58.0%) didn't take their medication daily, due to several reasons, including forgetfulness (37.9%), medication cost (13.1%), unavailability of drugs (13.1%), or absence of seizures (13.1%). Side effects of AED affected 57.2% of PWE (Table 2).

3.2. Attitudes towards antiepileptic drugs

More than half of the patients (56.0%) said they forgot to take their AED. Thereby, within the remaining some patients were classified non-adherent having negative attitudes because they had stopped taking medication if they felt better (30.4%) or worse (20.4%). However, only 32.4% of the study population were considered having positive attitudes to antiepileptic medication based on the sum of MMAS-4 score (Figure 1).

3.3. Comparative analysis between PWE with positive and negative attitudes towards medication

Regarding disease history, uncontrolled epilepsy was found in 44.4% of PWE with positive attitudes to AED compared to 60.4% of PWE with negative attitudes ($p=0.02$). Forgetfulness was the main reason for stopping medication in 32.5% of PWE with negative attitudes compare to no PWE having positive attitudes group. Experience of side effects was higher among PWE having negative attitudes (65.1%) than others (40.7%) ($p<0.001$). Measure of the serum level of AED was done by 76.8% of PWE having positive attitudes compare to. 31.3% of PWE with negative

attitudes ($p<0.001$). Depression was significantly higher ($p=0.04$) among PWE with negative attitudes (27.8%) than in those who had positive attitudes (16%).

As for the patient's behaviors, 17.2% of PWE with negative attitudes forgot to take medicine compare to 7.4% of PWE with positive attitudes in a busy period. A proportion of 38.5% of PWE having negative attitudes could not buy treatment compared to 23.5% of PWE having positive attitudes due to a lack of money or no health coverage. In fasting period, 44.4% of PWE with positive attitudes increased time between 2 doses (>12h) compare to 26% of others Also, increasing dose when seizure occurs ($p=0.02$), stopping medication in seizure-free period or when side effects appear ($p<0.001$), and skipping doses in fasting period ($p=0.003$) were factors which significantly differed between 2 groups of PWE with positive and negative attitudes (Table 3).

3.4. Factors affecting attitudes towards antiepileptic medications

This study showed that seven factors predict patient's attitudes. Efficacy of treatment was an important predictor (OR=4.9; 95%CI 1.2-20.0; $p=0.03$). Controlled epilepsy also increased the odds of having positive attitudes (OR=3.4; 95%CI 1.6-7.1; $p=0.001$). Onset of epilepsy at age between 12-20 years was a factor leading to increased positive attitudes, compared to onset at age <12 years (OR=3.1; 95%CI 1.1-8.4; $p=0.03$).

While, patient's positive attitudes decreased in participants who thought that their treatment was an economic burden (OR=0.2; 95%CI 0.1-0.4; $p<0.001$), depressive PWE (OR=0.4; 95%CI 0.2-0.9; $p=0.04$), who visited their neurologist clinics every year (OR=0.2; 95%CI 0.04-0.5; $p=0.002$) or every few years (only when a seizure occurs) (OR=0.2; 95%CI 0.1-0.7; $p=0.01$), and in older people (OR=0.97; 95%CI 0.94-0.99; $p=0.02$) (Table 4).

3.5. Factors affecting controlled epilepsy

In this study, controlled epilepsy was higher in people who contact a specialist if seizure occurs (OR=2.9; 95%CI 1.3-6.5; p=0.01), in PWE who had positive attitudes towards AED (OR=1.9; 95%CI 1.1-3.4; p=0.03), and after a long duration of disease (OR=1.04; 95%CI 1.02-1.07; p<0.001). However, risk of controlled seizures decreased if patient didn't follow neurologist's instructions in fasting period (OR=0.5; 95%CI 0.3-0.9; p=0.03) (Table 5).

4. DISCUSSION

Only 32.4% of PWE presented positive attitudes to AED, similar to a study from Ethiopia [9], but lower than findings in other countries such as Palestine (36.0%) [25], England (41.0%) [35], Lao (57.6%) [36], and Saudi Arabia (61.7%) [10]. This variation between countries could be due to different habits, behaviors, cultures between populations [10].

Four indirect methods are used to measure medication adherence in the outpatient setting [37]: Self report, electronic medication monitoring, pharmacy refill rates and pill counts.

Electronic medication-measurement systems are expensive and rarely available in the outpatient setting. Pharmacy refill rates is not applicable because drugs (AED included) in Lebanon are delivered without prescription and do not require a renewal of prescription at every purchase. Also, it was difficult to count number of pills and to compare with the total number of pills received by a patient because the patient was seen only once, and did not carry his pills during his neurologist's visit. So we chose MMAS-4, a simple and economical self-reporting method.

A study conducted in essential hypertension established the concurrent and predictive validity of MMAS-4 regarding blood pressure measurements recorded throughout a 3-year follow-up period

[32]. This self-reporting method is used for different chronic diseases, epilepsy included, in several countries and populations [9,10,25,30,35,36].

However, a comparison with studies using other methods to evaluate adherence shows that a low percentage of adherence was more present in studies using subjective methods such as MMAS. In studies using MMAS to estimate adherence in PWE, percentage of adherence ranged between 20% and 55% [30,35,36,38]. However, objective measures such as a medication possession ratio, which definition and estimation differ between studies, show that adherence varied between 50% and 65% [12,17,19,39,40]. In addition, a therapeutic drug concentration monitoring in prospective studies show that adherence to medication was around 60% [41,42].

This study identified three key factors that increase positive attitudes in PWE. These attitudes were present in people who had good perception toward AED, and who were correctly motivated [43]. The PWE who were satisfied and felt that treatment was effective had more positive attitudes in this population.

Controlled epilepsy is a factor leading to increased positive attitudes in this study. When epilepsy is controlled, adherence and positive health behaviors to AED increased. This is in agreement with other studies [15,30].

Attitudes to medication were also associated with age of epilepsy onset. People diagnosed as epileptic at adolescence (12-20 years) had more positive attitudes than those diagnosed during childhood (<12 years). Adolescents were more able to follow instructions of neurologists, and learn more about their disease and treatment. In pediatric patients, parents have a critical role to improve adherence. However, they may tend to be fearful and stressed, this may negatively affect attitudes to AED [44].

290 Oppositely, positive attitudes to medication decreased by four factors. Positive attitudes were
291 lower in PWE who felt that their treatment was an economic burden, similar to another study
292 conducted in Ethiopia [45]. Cost of medications was found to be a big burden due to absence of
293 health coverage for some Lebanese people
294 Depressive PWE were less adherent with negative attitudes to AED. Another study showed also a
295 significant correlation between medication adherence and depressive status [46].
296 PWE who visit neurologist clinic only every year or every few years had less positive attitudes.
297 Patient education about the disease and treatment is essential to resolve patient distress and
298 improve patient's attitudes to medication [15,47].
299 Positive attitudes towards antiepileptic medications decreased in older age. In Ethiopia, older
300 PWE were less adherent with negative attitudes [9], in agreement with another study done in
301 China that reported the same association [8]. Older people present physical difficulties and
302 cognitive problems making it difficult to follow healthcare provider's instructions [48]. However,
303 presence of other comorbidities, complexity of treatment regimen, and multiple daily dosing
304 decreased also adherence [44].
305 The reasons for discontinuation of treatment in this study included forgetfulness, high medication
306 cost, adverse effects, unavailability of drugs, inefficacity of treatment and absence of seizures.
307 Forgetfulness was the main reason for non-adherence and discontinuing treatment in this study.
308 This was reported also in other studies [8,9,49,50], which found that forgetfulness was the key
309 reason for being non-adherent. Most people may forget to take medication when they are busy at
310 work, away from their home or while travelling. High cost of drugs was significantly associated
311 with decreased adherence, similar to a study done in China [8]. PWE who experienced adverse
312 effects of AED had negative attitudes. A common cause for stopping antiepileptic treatment, and

limiting adherence without consulting neurologist was adverse effects [8,51]. PWE who stop taking their medication when the drug is not available had negative attitudes than those who didn't. Thus, the inability to obtain treatment in this population leads to decreased adherence and positive attitudes to medication. The Lebanese government should provide and preserve the required drugs in the public sector at any time in a better manner. Participants who had negative beliefs about their treatment were significantly non-adherent to AED. This negative perception was probably due to treatment failure and recurrence of seizures. These results were similar to another study conducted in UK [12].

Controlled epilepsy was positively associated with adherence and positive attitudes to AED. A reciprocal significant association was found between patient's attitudes and controlled epilepsy, where low medication adherence and negative attitudes showed to be also a cause for uncontrolled epilepsy, similar to results in other studies [14,52,53]. Precisely, PWE who stop treatment are more likely to have uncontrolled epilepsy. This suggests that evaluation of adherence can predict epilepsy outcome.

Duration of epilepsy was a factor affecting controlled epilepsy. PWE who were diagnosed as epileptics since long time were more likely to have controlled epilepsy. Seizures may take longer time to become controlled. Long duration leads to adaptation for this disease, and then improved adherence. In Nigeria, PWE were more likely to have controlled epilepsy when they are in older age [54].

However, controlled epilepsy decreased if patient didn't follow neurologist's instructions in fasting period. Some research was carried out on PWE during the fasting month. During this period, only two meals are consumed per day, separated by a fasting time of 11 to 18 hours

depending on season [55]. A study done in Turkey showed that some of PWE had more seizures during fasting month. This increase was probably due to changes in the way epilepsy medicine were taken, sleep patterns being disturbed, and going for a long time without food [55]. For this, PWE should follow neurologist's instructions in fasting period such as adapting posology and prescribing extended-release drugs taken once a day.

This study was the first to evaluate attitudes to antiepileptic medications in Lebanese PWE, and one among few studies done in the Arab world which has its specific culture and behaviors. However, due to a lack of studies in Arab countries, we didn't have enough data to compare our findings.

With a cross-sectional design, it is impossible to establish causal relationship. Some recall bias may be present due to the fact that self-report was the method used to evaluate behaviors towards medication. Self-report is the most practical method in the outpatient setting, but it tends to overestimate responses compared to the objective methods. In addition to this, the overestimation of acceptable responses may be due to the fact that the questionnaire was completed by the investigator and not privately by the patient. This study evaluated medication problems related to treatment acceptance and patient's attitudes towards medications; all people accepted to take AED but a low level of positive attitudes was found.

Participants were recruited from neurology clinics due to necessity of accurate diagnosis, but selection bias may be present. However, to reduce selection bias, and to be more representative, PWE were recruited from different health structures (private clinics, clinics in hospitals, and clinics in medical centers). Those health structures allow people from all economic stages to access neurologists' consultation. Since PWE were recruited from neurologists' clinics, a high

level of adherence was expected; however, low adherence was found. This approves diversity of PWE recruited and reduces the risk of recruitment bias.

A longitudinal prospective study will be necessary to focused on people who discontinue their medication after a long-time treatment. Persistence of adherence during a follow-up period could be evaluated in future studies.

5. CONCLUSIONS

Lebanese PWE were less likely to have positive attitudes towards antiepileptic medications, which may lead to poor epilepsy control. The positive attitudes of PWE are cornerstone to improve epilepsy treatment, prevent recurrence of seizures, reduce the risk of hospitalization and improve quality of life. Diagnoses followed by pharmacological treatment are not enough in epilepsy management. Thus, evaluation of patient's attitudes is essential in clinical practice, and should be a base in treatment management to predict epilepsy control.

Depression, economic burden and visiting neurologist's clinic every year or every few years predicted negative attitudes towards antiepileptic medications in our study. Non-respect of recommendations to neurologist leads in turn to uncontrolled epilepsy. Depressive people should be managed effectively by a specialist. Prescribing generic drugs with affordable costs and having access to a better social security systems in Lebanon are needed to provide medication to patients with no health insurance and thereby limit the economic burden felt by PWE. Contact neurologist and follow his recommendations in case of seizure occurrence or during fasting periods were necessary to control epilepsy.

Educating PWE and their families about disease and treatment management, adapting simple medication regimens by neurologists (such as monotherapies to reduce number of pills, and

extended-release drugs to reduce frequency of dosing), ensuring a good relationship between PWE and healthcare professionals, and attending regularly to appointments, are important for attaining good adherence to treatment. In fact, using easy reminders to take medications (pill reminder boxes, calendars, alarms, watches with beeper alarms, caregivers reminder) is important to optimize medication adherence and enhance positive attitudes for PWE. Educational programs about the disease and treatment are also necessary for attaining good attitudes towards medications for PWE.

CONFLICT OF INTEREST

There is no conflict of interest.

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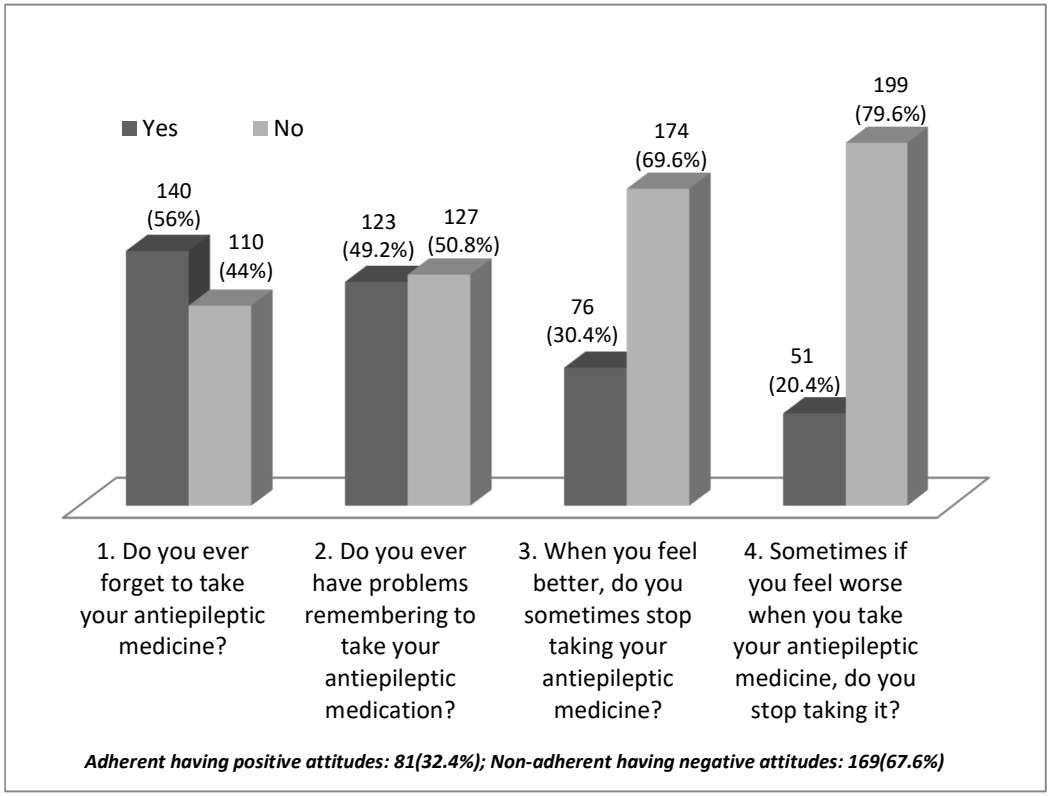

Fig.1. Percentages of 4-MMAS answers and adherence score

Table 1. Description of the study population

Variables		n (%) / Mean ± SD[1]
Sex		
	Females	134 (53.6)
Region of residence		
	Beirut	155 (62.0)
	South	30 (12.0)
	Mount Lebanon	21 (8.4)
	Bekaa	33 (13.2)
	North	7 (2.8)
	Outside Lebanon	4 (1.6)
Body mass index (BMI) [2]		
	Underweight (BMI<18.5 kg/m^2)	7 (2.8)
	Normal weight (BMI≥18.5 kg/m^2)	105 (42.0)
	Overweight (BMI≥25 kg/m^2)	103 (41.2)
	Obese (BMI≥30 kg/m^2)	35 (14.0)
Education level		
	Illiterate	62 (24.8)
	Elementary	60 (24.0)
	Intermediate	41 (16.4)
	Secondary	32 (12.8)
	University	55 (22.0)
Occupation		
	Unemployed	131 (52.4)
	Employed/Self-employed	97 (38.8)
	Shepherd/ Farmer	3 (1.2)
	Student	19 (7.6)
Marital status		
	Single lives alone	11 (4.4)
	Single lives with family	75 (30.0)
	Married	127 (50.8)
	Divorced	22 (8.8)
	Widowed	15 (6.0)
Medical Insurance		138 (55.2)
Age		40.2 ± 14.8
BMI		25.8 ± 6.0
Number of workers/ family		1.4 ± 1.1

[1] SD: Standard deviation; [2] World Health Organization (WHO). Global Database on Body Mass Index

Table 2. Description of health status and history of epilepsy

Variables	Mean ± SD[1] / n (%)
Duration of epilepsy	13.7 ± 12.8
Age of epilepsy onset	26.5 ± 18.8
Family history of epilepsy	76 (30.4)
Presence of seizures in last 5 years	195 (78.0)
Seizure control	
Uncontrolled (at least one seizure in last 6 months)	138 (55.2)
Controlled (no seizure in last 6 months)	112 (44.8)
Presence of comorbidities	142 (56.8)
Type of Comorbidities	
Hypertension / Cardiac problems (cardiac insufficiency/ arrhythmia/ atrial fibrillation)	60 (24.0)
Dyslipidemia	29 (11.6)
Respiratory diseases (Asthma or COPD[2])	9 (3.6)
Angina	7 (2.8)
Kidney disease	4 (1.6)
Gastrointestinal disease	24 (9.6)
Diabetes	21 (8.4)
Thyroid disease	19 (7.6)
Cerebrovascular Accident	11 (4.4)
Depression/ Anxiety	60 (24.0)
Psychosis/ Schizophrenia	32 (12.8)
Migraine	13 (5.2)
Cerebral Tumor	7 (2.8)
Other Comorbidities (Parkinson, osteoporosis, rhumatological disease…)	9 (3.6)
Seizure type	
Simple partial	50 (20.0)
Complex partial	73 (29.2)
Secondary generalized	31 (12.4)
Generalized tonic clonic	80 (32.0)
Generalized myoclonic	11 (4.4)
Generalized atonic	3 (1.2)
Absence	28 (11.2)
Others	1 (0.4)
Epilepsy etiology	
Idiopathic	20 (8.0)
Cryptogenic	86 (34.4)
Symptomatic	144 (57.6)
Type of AE[3] medication	
Benzodiazepines	36 (14.4)
Phenytoin	19 (7.6)
Phenobarbital	11 (4.4)
Carbamazepine	59 (23.6)
Valproate	125 (50.0)
Lamotrigine	27 (10.8)
Levetiracetam	66 (26.4)
Oxcarbazepine	12 (4.8)
Topiramate	22 (8.8)
Lacosamide	12 (4.8)
Perampanel	1 (0.4)
AE therapy	
Monotherapy	150 (60.0)
Bitherapy	67 (26.8)
>2 antiepileptic medications	33 (13.2)
Taking AED daily	105 (42.0)
Main reason for stopping medication	
Forgetfulness	55 (37.9)
High cost	19 (13.1)
Complexity of treatment regimen	11 (7.6)
Experience of side effects	12 (8.3)
Unavailability of drugs	19 (13.1)
Perception of inefficacy	10 (6.9)
Absence of seizures	19 (13.1)
Experiencing of side effects	143 (57.2)

[1] SD: Standard deviation; [2] Chronic Obstructive Pulmonary Disease; [3] Antiepileptic

Table 3. Comparison of people with epilepsy with positive and negative attitudes towards medication

Variables		n (%) Negative attitudes	n (%) Positive attitudes	p-value
Seizure control				
	Controlled	67 (39.6)	45 (55.6)	
	Uncontrolled	102 (60.4)	36 (44.4)	0.02
Age onset disease				
	<12 years	44 (26.0)	16 (19.8)	
	12-20 years	31 (18.3)	27 (33.3)	
	20-40 years	54 (32.0)	15 (18.5)	
	>40 years	40 (23.7)	23 (28.4)	0.02
Measure serum level of AED if specialist prescribe this				
	No	90 (68.7)	13 (23.2)	
	Yes	41 (31.3)	43 (76.8)	< 0.001
When a seizure occurs				
	Double a dose	40 (23.7)	8 (9.9)	
	Continue treatment normally	64 (37.9)	31 (38.3)	
	Contact a specialist	65 (38.5)	42 (51.9)	0.02
In stable status (absence of seizures)				
	Stop medication	49 (29.0)	0	
	Reduce a dose	33 (19.5)	2 (2.5)	
	Continue treatment normally	87 (51.5)	79 (97.5)	< 0.001
In fasting period				
	Not fasting	61 (36.1)	30 (37.0)	
	Skip or reduce a dose to 2 daily doses instead of 3	33 (19.5)	11 (13.6)	
	Increase the time between 2 doses (>12h)	44 (26.0)	36 (44.4)	
	Take all doses together	31 (18.3)	4 (4.9)	0.003
If side effects appear				
	Stop medication	47 (27.8)	4 (4.9)	
	Continue treatment normally	35 (20.7)	13 (16.0)	
	Contact a specialist	69 (40.8)	62 (76.5)	
	Contact a pharmacist	18 (10.7)	2 (2.5)	< 0.001
If a patient is in busy period (at work, away from home, in outdoor dinner/ lunch or in travel), he forget his medication				
	No	140 (82.8)	75 (92.6)	
	Yes	29 (17.2)	6 (7.4)	0.04
If no money/ health coverage, patient buys his medication				
	No	65 (38.5)	19 (23.5)	
	Yes	104 (61.5)	62 (76.5)	0.02
If a neighbor of patient advices him, he stop medication				
	No	146 (86.4)	77 (95.1)	
	Yes	23 (13.6)	4 (4.9)	0.04
Frequency of neurologist clinic visits				
	Every month	24 (14.2)	15 (18.5)	
	Every 3-6 months	42 (24.9)	40 (49.4)	
	Every year	50 (29.6)	14 (17.3)	
	Every few years (when a seizure occur)	53 (31.4)	12 (14.8)	< 0.001
Experience of side effects				
	No	59 (34.9)	48 (59.3)	
	Yes	110 (65.1)	33 (40.7)	< 0.001
Following healthcare provider instructions				
	No	63 (37.3)	8 (9.9)	
	Yes	106 (62.7)	73 (90.1)	< 0.001
Main reason for stopping medication				
	Forgetfulness	55 (42.0)	0	
	High cost	18 (13.7)	1 (7.1)	
	Complexity of treatment regimen	11 (8.4)	0	
	Experience of side effects	12 (9.2)	0	
	Unavailability of drugs	9 (6.9)	10 (71.4)	
	Perception of inefficacy	8 (6.1)	2 (14.3)	
	Absence of seizures	18 (13.7)	1 (7.1)	< 0.001
Participant is satisfied and feels his treatment effective				
	No	70 (41.4)	3 (3.7)	
	Yes	99 (58.6)	78 (96.3)	< 0.001
Participant feels his treatment is an economic burden				
	No	66 (39.1)	67 (82.7)	
	Yes	103 (60.9)	14 (17.3)	< 0.001
Presence of depression/ anxiety				
	No	122 (72.2)	68 (84.0)	
	Yes	47 (27.8)	13 (16.0)	0.04

Non-significant variables:
Gender, Region of residence, Marital Status, Occupation, Education level, Medical insurance, Presence of comorbidities, Family history of epilepsy, Number of AE, Frequency/day, Number of drugs, Number of workers/family, Duration of disease, BMI.

Table 4. Final results of regression using the status of attitudes as the dependent variable

Variables		Adjusted OR	95% CI	p-value
Age		0.97	0.94 - 0.99	**0.02**
Presence of depression/ anxiety		0.4	0.2 - 0.9	**0.04**
Participant is satisfied and find his treatment effective		4.9	1.2 - 20	**0.03**
Participant feels his treatment is an economic burden		0.2	0.1 - 0.4	**<0.001**
Controlled epilepsy (no seizures at least 6 months)		3.4	1.6 - 7.1	**0.001**
Age onset disease	*Reference: <12 years*			
	12-20 years	3.1	1.1 - 8.4	**0.03**
	20-40 years	0.5	0.2 - 1.4	0.2
	>40 years	2.7	0.9 - 8	0.08
Frequency of neurologist clinic visits	*Reference: monthly*			
	Every 3-6 months	0.7	0.3 - 2.1	0.6
	Every year	0.2	0.04 - 0.5	**0.002**
	Every few years (when a seizure occurs)	0.2	0.1 - 0.7	**0.01**

OR:Odds Ratio; CI: Confidence Interval
Dependent variable: "Positive/ Negative" Attitudes.
Hosmer–Lemeshow test p-value=0.7/ Overall predicted percentage = 79.6%.
Variables excluded from the model following this order:
Family history of epilepsy, in busy period (at work, away from home, in outdoor dinner/ lunch or in travel), Following healthcare provider instructions, Gender, Number of pills/ day, if patient forget to take medication, if no money/ health coverage, if a neighbor of participant advices him to stop medication, Experience of side effects, Occurrence seizures in the last 5 years, Attitude in fasting states.

Table 5. Final results of regression using the seizure control as the dependent variable

Variables		Adjusted OR	95% CI	p-value
Attitudes status		1.9	1.1 - 3.4	**0.03**
Duration of disease		1.04	1.02 - 1.07	**<0.001**
Do not follow neurologist's instructions in fasting period		0.5	0.3 - 0.9	**0.03**
Attitude if seizure occurs	*Reference: Double a dose*			
	Continue medication normally	1.2	0.5 - 2.6	0.7
	Contact a neurologist	2.9	1.3 - 6.5	**0.01**

OR:Odds Ratio; CI: Confidence Interval
Dependent variable: "Controlled epilepsy/ Uncontrolled epilepsy".
Hosmer–Lemeshow test p-value=0.6/ Overall predicted percentage = 67.6%.
Variables excluded from the model following this order:
Participant is satisfied and find his treatment effective, Following healthcare provider instructions, Gender, Number of drugs/day, Presence of tumor.