



Medication non-adherence in essential tremor

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ABSTRACT

Background: There are numerous studies of medication adherence in a variety of chronic diseases including Parkinson's disease; however, there are no such studies in patients with essential tremor (ET). This study aimed to (1) present self-report data on medication adherence in ET cases, (2) examine the demographic and clinical factors that might be associated with lower medication adherence.

Methods: 151 ET cases were enrolled in a clinical-epidemiological study at Columbia University. An 11-item medication adherence questionnaire, modeled after the Morisky medication adherence questionnaire, was administered.

Results: Seventy-three (48.3%) of 151 cases were taking daily medication for ET. One-third (24/73; 32.9%) of cases reported that they sometimes forgot to take their medication, and 1 in 5 (15/73; 20.5%) reported missed doses within the past week. Most striking was that nearly 1 in 4 (17/73; 23.3%) reported that there were whole days in the past two weeks in which they had not taken their medication. A factor analysis revealed four factors that captured different aspects of non-adherence. Higher non-adherence was associated with more depressive symptoms, younger age, and less severe tremor but was not associated with type or number of ET medications.

Conclusions: Approximately one in four ET patients reported whole days in the past two weeks in which they had not taken their medication. It is possible that this relatively high rate of non-adherence could be a function of the poor therapeutic efficacy of the medications currently available to treat ET.

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1. Introduction

There are numerous studies of medication adherence across a broad range of chronic diseases including Parkinson's disease (PD), epilepsy, rheumatoid arthritis, and asthma; however, there are no such studies in patients with essential tremor (ET) [1–5]. This is surprising, since ET is one of the most commonly encountered chronic neurological disorders [6–8]. Gauging medical adherence and understanding the factors that contribute to non-compliance is an important endeavor, which can enhance current treatment as well as direct future efforts in developing improved treatments. Medication compliance is a complex issue, and is related to a variety of factors, including the perceived efficacy of the medication [9,10]. The current set of medications used for the treatment of ET

certainly have limited efficacy [11,12]. The presence of side effects may also decrease medication adherence [5], and unwanted side effects are a common occurrence among treated ET patients [13]. The two aims of the current study were to (1) present self-report data on medication adherence in ET cases, (2) examine the demographic and clinical factors that might be associated with lower medication adherence among patients with ET. It is hoped that these data will be of use to treating physicians as well as those interested in developing new therapies.

2. Methods

2.1. Participants

ET cases were enrolled in a study of environmental risk factors for ET at Columbia University Medical Center (CUMC) [14]. Upon enrollment, a trained tester obtained written informed consent, approved by the CUMC Institutional Review Board, from all participants. ET cases were identified from two primary sources: a computerized billing database of all ET patients who were seen at least once at the Center for Parkinson's Disease and Other Movement Disorders at CUMC over the past 5 years as well as the International Essential Tremor Foundation (IETF) [14]. IETF members lived in the New York metropolitan area and were mailed advertisements

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[14,15]. All enrollees had received a diagnosis of ET from their treating neurologist and lived within a 2-h driving distance of CUMC [14,15]. After enrollment, all diagnoses were confirmed using published diagnostic criteria, as outlined below [14,15].

Baseline recruitment began in 2000 and ended in 2009. In April 2009, a follow-up phase began, with the goal of enrolling at least 120–130 ET cases. During the follow-up phase, the oldest cases were targeted first (i.e. those with the highest likelihood of loss to follow-up due to mortality). During recruitment for the follow-up phase, 41 ET cases (24 women, 17 men; age 75.4 ± 13.0 years) refused to participate. At follow-up, 151 ET enrollees underwent the same in-person evaluation as at baseline (see below) [16].

2.2. Clinical evaluation

Each case underwent an in-person evaluation consisting of a series of demographic and clinical questionnaires in which a variety of demographic and clinical factors that have been linked to medication non-adherence in other chronic diseases were assessed [1,5]. An 11-item self-report medication adherence questionnaire was modeled after the Morisky medication adherence questionnaire, which is a simple, eight-question, self-reported tool [17]; however, three additional questions (questions 2, 4 and 7, Table 1) were added to try to capture additional non-adherence behaviors. In total, there were eleven items, 10 of which were scored as no (0) vs. yes (1) and one (question 11) that was scored with additional gradations (0, 1, 2, 3). The total score ranged from 0 to 13 (maximal non-adherence) (Table 1).

The Center for Epidemiological Studies Depression Scale (CESD-10), a self-report, 10-item screening questionnaire, was used to assess depressive symptoms (range 0–30 [greater depressive symptoms]) [18]. The Folstein Mini-Mental Status test score (0 [most impaired] – 30) was used as a brief assessment of cognition [19].

Each case underwent a 20-min videotaped neurological examination, which included an assessment of postural tremor, five tests of kinetic tremor, as well as assessments of head (neck), voice and jaw tremors [14]. Each videotaped examination was reviewed by E.D.L., who rated the severity of postural and kinetic arm tremors (range = 0–3) using a reliable and valid clinical rating scale, assigning a total tremor score (range 0–36) [14]. Diagnoses of ET were re-confirmed by E.D.L. using the videotaped neurological examination as well as published diagnostic criteria (moderate or greater amplitude kinetic tremor [tremor rating ≥ 2] during three or more tests or a head tremor, in the absence of PD, dystonia or another cause) [14].

2.3. Statistical analyses

Data were analyzed in SPSS (Version 21). A factor analysis was performed, entering the 11 items in the medication adherence questionnaire. This analysis was performed using the principal component method, with orthogonal (varimax)

rotation. This method was chosen to identify separable and independent clusters. Eigenvalues greater than 1.0 were used to select the factors, as is common practice [20]. The analysis identified four factors, and was used to create four non-adherence (NA) subscores and a total NA score. To do so, the responses to questions 7 and 8, had to be inverted. None of the NA subscores or the NA total score were normally distributed (Kolmogorov–Smirnov tests with all p values < 0.001); hence, nonparametric tests were used in assessing these scores. Associations between a range of demographic and clinical variables (age, gender, race, years of education, total tremor score, duration of tremor, mini-mental status test score, CESD-10 score, number of ET medications, taking vs. not taking particular ET medications) and each of the four NA subscores and total NA score were assessed using Spearman's correlation coefficients and Mann–Whitney tests.

3. Results

There were 151 enrollees (age = 71.7 ± 13.1 years, 78 [51.7%] female, education = 16.1 ± 2.6 years, total tremor score = 20.3 ± 6.1 , tremor duration = 31.9 ± 18.8 years). The total number of prescription medications currently taken for any medical condition ranged from 1 to 15 (mean = 5.8 ± 3.2). Of these 151, 73 (48.3%) were taking daily medication for ET; the characteristics of these 73 (Table 2) were similar to those of the larger sample of 151.

Fifty (68.5%) of 73 were taking a beta-blocker (of whom 39 were taking propranolol), 31 (42.5%) were taking primidone, 9 (12.3%) were taking topiramate, 5 (6.8%) were taking gabapentin, and a small number were taking other medications. In addition, 17 (23.3%) were taking a benzodiazepine. Forty-seven (64.4%) of 73 were taking one ET medication, 23 (31.5%) were taking two, two (2.7%) were taking three, and one (1.4%) was taking four ET medications.

One-third of cases reported that they sometimes forgot to take their medication, and 1 in 5 reported missed doses within the past week (Table 1). Nearly 1 in 4 reported that there were whole days in which they had not taken their medication in the past two weeks (Table 1).

A factor analysis revealed four factors: Factor I (Questions 1, 2, 5, 6, Eigenvalue = 3.28, explaining 29.8% of the variance), Factor II (Questions 3, 10, 11, Eigenvalue = 1.93, explaining 17.5% of the variance), Factor III (Questions 7, 8, Eigenvalue = 1.43, explaining 13.0% of the variance), Factor IV (Questions 4, 9, Eigenvalue = 1.06, explaining 9.6% of the variance), which explained 69.9% of the variance. Each factor seemed to capture a different aspect of non-adherence. Factor II questions related to the nuisance of having to follow a routine medication schedule, factor IV questions captured behaviors such as the active self-management and even stopping of medications, factor I questions related to the occasional forgetting of a dose, and factor III questions related to recall of recent adherence.

Based on the four identified factors, four NA subscores and a total NA score were constructed. The NA subscores and total NA scores are shown (Table 3).

Table 1
Medication adherence questionnaire in 73 ET cases who took daily medication for ET.

Question	Response data
1 Do you sometimes forget to take your ET medication?	24 (32.9)
2 Over the last week, did you miss any doses of your ET medication?	15 (20.5)
3 Over the past two weeks, were there any days when you did not take your ET medication?	17 (23.3)
4 In the past 2 weeks, have you sometimes stopped a dose of medication if you were feeling ok?	6 (8.2)
5 Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?	6 (8.2)
6 When you travel or leave home, do you sometimes forget to bring your medications?	7 (9.6)
7 Did you take you last regularly scheduled dose of ET medication?	65 (89.0)
8 Did you take your ET medication yesterday?	66 (90.4)
9 When you feel like your tremor is under control, do you sometimes stop taking your medicine?	5 (6.8)
10 Do you ever feel hassled about sticking to your ET treatment plan?	7 (9.6)
11 How often do you difficulty remembering to take all your medication?	
No difficulty	54 (74.0)
A little difficulty	17 (23.3)
Somewhat difficult	1 (1.4)
Quite difficult	1 (1.4)

Values are numbers (percentages).

Table 2
Demographic and clinical characteristics of 73 ET cases who took daily medication for ET.

Characteristic	Data
Age in years	73.0 ± 13.5
Female gender	39 (53.4)
White race	70 (95.9)
Years of education	16.2 ± 2.7
Total tremor score	21.9 ± 4.9
Duration of tremor in years	34.2 ± 18.3
CESD-10 score	7.4 ± 5.3
Mini-mental status test score	28.7 ± 1.7

Values are means $\pm$ standard deviations or numbers (percentages). CESD-10 = Center for Epidemiological Studies Depression Scale.

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