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The Perceived Effects of Smoked Cannabis on Patients with Multiple Sclerosis

Key Words
Cannabis
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Neurological disorder
Spasticity
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Depression
USA patients with MS
UK patients with MS

Abstract
Fifty-three UK and 59 USA people with multiple sclerosis (MS) answered anonymously the first questionnaire on cannabis use and MS. From 97 to 30% of the subjects reported cannabis improved (in descending rank order): spasticity, chronic pain of extremities, acute paroxysmal phenomenon, tremor, emotional dysfunction, anorexia/weight loss, fatigue states, double vision, sexual dysfunction, bowel and bladder dysfunctions, vision dimness, dysfunctions of walking and balance, and memory loss. The MS subjects surveyed have specific therapeutic reasons for smoking cannabis. The survey findings will aid in the design of a clinical trial of cannabis or cannabinoid administration to MS patients or to other patients with similar signs or symptoms.

Introduction

The present paper describes the results of the first survey directed at MS patients who smoke cannabis to relieve some of their symptoms. Our objective was to systematically document the claimed benefits of cannabis for MS by MS patients who use cannabis.

Questionnaire, Subjects and Methods

The self-designed questionnaire consisted of 13 pages of 68 questions. Most of these questions were of the close-ended with ordered choices type. An 'odds consistency value' was calculated for subjects' responses on every sign/symptom. Odds were formed by computing the ratio of subjects over two conditions: (a) subjects claiming to have a particular sign/symptom and answering later in the questionnaire that cannabis affects this sign/symptom, and (b) subjects claiming not to have a particular sign/symptom and yet later answering that cannabis affects this sign/symptom. Data returned by subjects in the second of these categories were excluded. The questionnaire was distributed by the Alliance for Cannabis Therapeutics (ACT) in both the United Kingdom and the United States. Patients returned completed questionnaires anonymously by posting them directly to one of the authors. A time limit of 6 months was set for the return of questionnaires. Of 255 questionnaires sent out (120 USA, 135 UK), 25 were returned by the postal services, undelivered. Of the remaining 230 questionnaires, 132 were returned, yielding a response rate of 57%. The final sample was 112, as 14 subjects did not use cannabis, 3 subjects had used cannabis only orally, 1 subject had used only the cannabinoid, nabilone, and 2 questionnaires were incompletely answered. Details of the subjects included in the survey are given in table 1.

Each question and answer was assigned a code which was entered into a database programme (Microsoft Excel 5.0, Microsoft Corporation, Redman, WA). The data were analyzed using the Statistical

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Table 1. The subjects with MS

	USA		UK		All subjects
	males	females	males	females	
Subjects	33	26	24	29	112
Mean (± SD) age of subjects	44.8±6.9	43.4±6.9	44.0±11.7	45.0±9.6	44.4±8.7
Age of subjects, range	30–63	28–55	22–67	24–61	22–67
Mean (± SD) number of years since MS diagnosed	16.7±8.5	12.8±6.3	12.1±8.6	15.3±8.5	14.4±8.2
Number of years since MS diagnosed, range	4–38	3–25	2–36	4–35	2–38
Subjects mostly or completely confined to bed or wheelchair	13	8	11	14	46
Subjects that can walk only with a stick, crutch or brace	6	4	6	8	24
Subjects that can walk without aid for 200 m or more	14	14	7	7	42
Subjects with relapsing-remitting MS	11	12	9	10	42
Subjects with primary-progressive MS	10	10	4	2	26
Subjects with secondary-progressive MS	2	1	6	2	11
Subjects who do not know their type of MS	8	2	5	13	28

The USA and UK subjects did not differ significantly in numbers, gender, age, or duration of MS ($p > 0.05$ each comparison). Similarly, there were no significant differences between the genders or between the countries with respect to walking ability/disability. A comparison of MS types showed that there were no statistical differences between genders or countries, except for the primary-progressive type of MS. For this variable, there were significantly more subjects from the USA than the UK ($p < 0.05$).

Package for Social Sciences (SPSS 5.0.1, SPSS Inc., Chicago, Ill.). Categorical data were analyzed using the χ^2 test with, if necessary, Yates correction for frequencies of five or less [1]. Interval data were analyzed by between-subjects analysis of variance [2]. If the main or interaction effects were significant, post-hoc analyses of mean differences were carried out by the Newman-Keuls multiple comparisons method [2]. Additionally, overall statistical comparisons of cannabis effects on MS symptoms, by country, by gender and by type of MS, were carried out by calculating Pearson product-moment correlation coefficients (r) and then testing for the significance of r [2]. The alpha level was preset at 0.05 (two-tailed).

Results

Table 2 shows reported cannabis consumption patterns and the claimed benefits of taking cannabis. The perceived effects of cannabis use on specific signs and symptoms of MS are listed in table 3. More than 70% of the subjects find cannabis to reduce spasticity (both at rest and during ambulation), chronic pain of extremities (especially leg pain at night), acute paroxysmal phenomena (parasthesias, numbness, and trigeminal neuralgia), tremor, and emotional dysfunction (reactive depression and anxiety). All these signs and symptoms are major disabling features of MS, and tremor, chronic pain, and paroxysmal phenomenon are among the most difficult to treat by conventional means [3, 4]. From 60 to 70% of subjects report cannabis to reduce weight loss (due to decreased appetite), fatigue states (tiredness, leg weakness), double vision, and sexual dysfunction. Of these commonly occurring symptoms, fatigue is a major source of disability, and frequently is not amenable to effective treatment [3, 4]. Less than 60% of subjects report cannabis to reduce most dysfunctions of bladder and bowel, vision dimness, walking disability, impaired balance and memory loss. Bladder and bowel dysfunctions are extremely common in MS, and standard treatments have varying rates of success and there is no pharmacological treatment for the remainder of this final set of signs and symptoms [3, 4]. Most subjects (70.5%) claimed that they had tried to stop taking cannabis one or more times, only to find their MS symptoms return and become worse.

Analyses of cannabis effects on the MS signs and symptoms cross-tabulated by country, gender and type of MS (raw data not shown in tables) yielded the following Pearson's rs: 0.85 for all USA subjects versus all UK subjects; 0.89 for all male subjects versus all female subjects; 0.84, 0.78 and 0.77 for relapse remission versus primary progressive, versus secondary progressive and versus do not know type, respectively; 0.88 and 0.87 for primary progressive versus secondary progressive and versus do not know type, respectively; and, 0.86 for secondary progressive versus do not know type. Each of these correlations was statistically significant ($p < 0.05$). Analyses of cannabis effects on MS signs and symptoms cross-tabulated by

Table 2. Cannabis consumption patterns of subjects with MS

	USA		UK		All subjects
	males	females	males	females	
Mean (± SD) number of years that subjects have smoked cannabis	11.7±7.2	7.2±5.2	2.8±4.2	2.2±3.3	5.9±5.0
Number of years that subjects have smoked cannabis, range	2–28	0.2–18	0.2–18	0.2–16	0.2–28
Mean (± SD) number of times cannabis taken per day	3.9±3.5	2.6±2.1	2.4±3.1	1.7±1.0	2.7±2.8
Mean (± SD) number of days per week that cannabis is taken	6.0±1.8	6.1±1.5	4.9±2.1	5.1±2.4	5.6±2.0
Subjects who usually take cannabis between 6 p.m. and midnight	17	12	20	16	65
Subjects who usually take cannabis whenever it is felt to be necessary	21	15	7	5	48
Subjects who usually take cannabis just before going to bed	11	11	11	9	42
Subjects who usually take cannabis at regular intervals throughout the day	13	9	3	4	29
Subjects who usually take cannabis between 6 a.m. and midday	8	6	5	5	24
Subjects who usually take cannabis between midday and 6 p.m.	7	5	4	6	22
Subjects who take cannabis to relieve certain MS symptoms	30	25	23	25	103
Subjects who take cannabis to aid relaxation	26	17	15	22	80
Subjects who take cannabis to relieve anxiety	18	16	6	10	50
Subjects who take cannabis to relieve depression	17	13	9	8	47
Subjects who take cannabis to reduce the frequency of MS episodes	15	14	7	7	43
Subjects who take cannabis to obtain energy	13	8	2	3	26
Subjects who take cannabis to 'get high'	11	4	4	5	24

Similarities and differences can be discerned between both genders and countries. One important similarity is that cannabis is usually taken in the evening. Another is that cannabis is taken mainly to relieve symptoms of MS and to promote relaxation, only a small percentage of respondents claiming that they take the drug to get 'high'. Major differences were as follows. Male subjects smoked cannabis more years, and smoked cannabis more times per day, than did female subjects ($p < 0.05$, each comparison). Also, USA subjects smoked cannabis more years, smoked cannabis more times per day, and smoked cannabis more days per week, than did UK subjects ($p < 0.05$, each comparison). More USA subjects smoked cannabis as needed, and smoked cannabis at regular intervals, than did UK subjects ($p < 0.05$, each comparison). Lastly, for the anxiety, depression, frequency of MS episodes, and energy items, more USA subjects claimed a beneficial effect than did UK subjects ($p < 0.05$, each comparison).

ranges of ambulatory disability (raw data not shown in tables) indicated that only 3 symptoms were judged to be significantly different across the disabilities. Subjects who are 'mostly or totally confined to a bed or wheelchair' felt cannabis was less effective in relieving depression, weight loss, and spasms when walking than did subjects who 'can walk independently without aid for 200 m' ($p < 0.05$, each comparison).

Discussion

The use of a completely ineffective treatment in patients with MS is associated with improvement in 65–70% of patients because of a high placebo response rate [5]. Accordingly, particular attention should be paid to those signs or symptoms that more than 70% of participants have reported to be improved by cannabis. The present results clearly indicate such a high level of improvement after cannabis for the general categories of pain, spasticity and tremor. These results are consistent with those obtained in five small clinical trials in which cannabis, delta-9-THC or nabilone was given to MS patients and in one clinical trial in which delta-9-THC was given to one patient with spasticity arising from a spinal cord injury. Reviews and critiques of these studies have been published [6, 7]. Our findings also are consistent with the many individual case reports, published for over a century, of patients with spasticity arising from MS or spinal cord injury [8–11].

The present study employed a quantitative internal check of the consistency of subject responses. This feature is important as it can detect respondents who deliberately or inadvertently answer questions incorrectly [12]. The 'mean odds value' was 12:1, indicating that, overall, the odds are 12 to 1 that the subjects who reported that cannabis affected their signs or symptoms actually had these signs or symptoms. The response rate (57%) for the

Table 3. Effects of cannabis on MS signs and symptoms (all subjects)

Sign or symptom	Subjects with listed sign/symptom reporting improvement[1] after cannabis, %	Subjects with listed sign/symptom	Subjects much better, %	Subjects little better, %	Subjects not changed, %	Subjects little worse, %	Subjects much worse, %	Odds[2]
Spasticity at sleep onset	96.5	86	75.6	20.9	3.5	0.0	0.0	17:1
Pain in muscles	95.1	61	73.8	21.3	4.9	0.0	0.0	5:1
Spasticity when awaking in night	93.2	59	71.2	22.0	6.8	0.0	0.0	5:1
Pain in legs at night	92.3	52	75.0	17.3	5.8	1.9	0.0	4:1
Tremor (arms/head)	90.7	43	53.5	37.2	9.3	1.9	1.9	5:1
Depression	90.6	74	62.2	28.4	8.1	1.4	0.0	25:1
Anxiety	89.6	58	60.3	29.3	8.6	1.7	0.0	5:1
Spasticity when awaking in a.m.	89.0	73	63.0	26.0	11.0	0.0	0.0	12:1
Spasticity when walking	87.3	55	61.8	25.5	12.7	0.0	0.0	5:1
Tingling in face/arms/legs/trunk	80.8	78	37.2	43.6	17.9	0.0	1.3	26:1
Numbness of chest/stomach	74.9	32	34.3	40.6	25.0	0.0	0.0	32:1
Pain in face	73.3	15	33.3	40.0	26.7	0.0	0.0	3:1
Weight loss	73.3	30	53.3	20.0	26.7	0.0	0.0	3:1
Weakness in legs	72.9	85	35.3	37.6	23.5	3.5	0.0	28:1
Tiredness	66.3	92	31.5	34.8	26.1	6.5	1.1	18:1
Urinary urgency	64.0	75	29.3	34.7	36.0	0.0	0.0	15:1
Double vision	62.8	43	34.9	27.9	34.9	2.3	0.0	11:1
Sexual dysfunction	62.7	51	39.2	23.5	31.4	5.9	0.0	3:1
Ability to walk	59.4	92	27.7	31.7	36.6	2.9	1.0	10:1
Urinary hesitancy	58.5	53	17.0	41.5	35.8	5.7	0.0	5:1
Vision dimness	58.3	60	30.0	28.3	40.0	1.7	0.0	8:1
Defecation urgency	57.7	26	23.1	34.6	38.5	3.8	0.0	2:1
Balance	56.2	96	18.9	37.3	30.5	10.5	2.9	11:1
Urinary incontinence	54.7	53	24.5	30.2	45.3	0.0	0.0	8:1
Slurred speech	54.3	46	30.4	23.9	39.1	4.3	2.2	46:1
Fecal incontinence	44.4	27	22.2	22.2	55.6	0.0	0.0	3:1
Memory loss	32.0	53	9.4	22.6	54.7	9.4	3.8	7:1
Constipation	30.2	53	5.7	24.5	69.8	0.0	0.0	5:1

[1] Improvement = Much better + little better.
[2] Odds = Number of subjects having the sign/symptom and reporting cannabis affected the sign/symptom, divided by the number of subjects not having the sign/symptom and still reporting that cannabis affected the sign/symptom.

present study was not optimum [12]. This may have been because the questionnaire was rather long or because we were unable to perform a follow-up mailing. It may also reflect the controversial nature of the topic or fear of personal identification or retribution. Although nonresponse bias was undoubtedly present in this study, its impact on our results is unknown. The intended target population of this survey was patients with MS who already smoke cannabis to self-treat their symptoms. However, the degree to which we can generalize our findings to this hypothetical target population is impossible to assess. This is because it is not known whether the sample of patients we contacted through the ACT differs from the total population of MS patients who self-medicate with cannabis. Despite this flaw, it is unlikely that the perceived cannabis-induced reduction in certain MS signs/symptoms was simply a rationalization for cannabis use or arose from a belief that the drug is a panacea. Subject reports of improvement showed a high degree of variation over the total range of signs/symptoms, and some participants reported either no perceived benefits or an actual worsening of their signs or symptoms after smoking cannabis. As it could well be that the subjects who took part in this survey do not represent a typical unskewed sample of MS patients, no predictions can be made from our results about the proportion of all MS patients who might find cannabis beneficial.

It has been well established that MS occurs more frequently in women than in men, the ratio in many clinics

being 2 to 1 [5]. Although our sample contained equal numbers of females and males, data are not available on gender demographics of MS patients who use cannabis. In other respects, subjects of the present study had similar characteristics often observed in the general population of patients with MS. This included age of onset of MS, percentages of patients with specific types of MS, range of disease symptoms, analgesic and antispasticity medications used, medications used to treat acute exacerbations, and the variability of attacks [3–5].

In summary, the present study, taken together with the content of previous reports, strongly suggests that cannabis may significantly relieve certain signs and symptoms of MS, particularly spasticity and pain, in at least some patients. The present study also suggests that these cannabis effects occur equally across nationalities, genders, and diverse clinical presentations of MS. We conclude from these data that there are sufficient grounds for mounting a properly controlled clinical trial that will test the most prevalent claims made about the beneficial effects of cannabis both objectively and conclusively.

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