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Cannabis use in people with Parkinson's disease and Multiple Sclerosis: A web-based investigation

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ABSTRACT

Objectives: Cannabis has been used for medicinal purpose for thousands of years; however the positive and negative effects of cannabis use in Parkinson's disease (PD) and Multiple Sclerosis (MS) are mostly unknown. Our aim was to assess cannabis use in PD and MS and compare results of self-reported assessments of neurological disability between current cannabis users and non-users.

Methods: An anonymous web-based survey was hosted on the Michael J. Fox Foundation and the National Multiple Sclerosis Society webpages from 15 February to 15 October 2016. The survey collected demographic and cannabis use information, and used standardized questionnaires to assess neurological function, fatigue, balance, and physical activity participation. Analysis of variance and chi-square tests were used for the analysis.

Results: The survey was viewed 801 times, and 595 participants were in the final data set. Seventy-six percent and 24% of the respondents reported PD and MS respectively. Current users reported high efficacy of cannabis, 6.4 (SD 1.8) on a scale from 0 to 7 and 59% reported reducing prescription medication since beginning cannabis use. Current cannabis users were younger and less likely to be classified as obese ($P < 0.035$). Cannabis users reported lower levels of disability, specifically in domains of mood, memory, and fatigue ($P < 0.040$).

Conclusions: Cannabis may have positive impacts on mood, memory, fatigue, and obesity status in people with PD and MS. Further studies using clinically and longitudinally assessed measurements of these domains are needed to establish if these associations are causal and determine the long-term benefits and consequences of cannabis use in people with PD and MS.

1. Introduction

Cannabis sativa has been used for medicinal purposes for several thousand years.[1] Compounds within the cannabis plant interact with what is now known as the endocannabinoid system, which is comprised of a group of receptors and ligands synthesized within the human body. The cannabinoid receptors are found throughout the body, but with higher densities within the central nervous and immune systems. It has been suggested that cannabis may be a natural therapy for combating neuro-inflammatory and neuro-degenerative conditions due to the high density of cannabinoid receptors in the central nervous system.[2] Published reports suggest that people with Parkinson's disease (PD) and multiple sclerosis (MS) may experience relief of some of their symptoms, such as spasticity and pain, when using cannabis.[3–9] Under certain condition cannabis has been shown to have neuroprotective effects.[10] However, negative effects, such as cognitive impairment, are prevalent as well.[11]

Several surveys have looked into cannabis use in Parkinson's disease (PD)[12] and Multiple sclerosis (MS).[13–15] While most studies reported some efficacy of cannabis, none of these studies compared symptoms or disability status between the cannabis users and the non-cannabis users. With the legal status of cannabis use currently in flux, we created an anonymous web based survey to: (1) investigate patterns of cannabis use among people with PD and MS and (2) compare self-reported measures of disability between the cannabis users and non-users.

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2. Materials and methods

2.1. Ethical statement

All procedures and methods were approved by the Colorado State University Institutional Review Board. An acknowledgement of consent was displayed once a prospective participant accessed the survey, and acceptance of this consent was required before an individual could begin the survey.

2.2. Measures

The anonymous survey consisted of the following validated scales: Guy's Neurological Status Scale (GNDS),[16] Nottingham Health Profile (NHP),[17] Fatigue Severity Scale (FSS),[18] Activities of Balance Confidence (ABC),[19] and the International Physical Activities Questionnaire (IPAQ).[20] Demographic (e.g. age, sex, body mass index (BMI)), disease diagnosis, and cannabis use (e.g. past/current use status, times per week, methods of cannabis use) were also assessed. Cannabis use related questions were collapsed into a dichotomous variable (current users vs. non-users). Cannabis efficacy was assessed using an 8 point Likert scale (0: Not helpful − 7: Very Helpful).

Each of the scales were digitized and entered into the on-line survey host Qualtrics. The survey was tested in house by the authors to ensure proper: order, adaptive questioning, and required question enforcement. Adaptive questioning was used to hide questions when previous answers would make subsequent questions irrelevant, e.g. when a participant answered no to current cannabis use no further cannabis use questions were presented. Survey testing was conducted for approximately 3 months, after which an anonymous link was created by the survey host. This link was then posted to the websites of the Michael J. Fox Foundation and the National Multiple Sclerosis Society. These websites are recognized as prominent sources of information about their respective diseases and offer portals to view research opportunities that visitors can partake in. In total, the survey consisted of 185 items, although the length of each survey varied per person depending responses to adaptive questions.

2.3. Sampling

The anonymous online hyperlink to the web-based survey was posted to the research recruitment pages on the websites of the Michael J. Fox Foundation and the National Multiple Sclerosis Society from 15 Feb 2016 until 15 Oct 2016. The survey was also advertised through the participant databases of the investigators and posted to our laboratory webpages. This was a voluntary open survey allowing anyone with access to these websites to participate. There were no incentives offered for participation. Investigator contact information was also made available to prospective participants. Participants were able to contact the investigators via email or through the websites directly if they had questions about the survey. IP address verification was performed to remove duplicate records from individuals who may have filled out the survey multiple times.

2.4. Statistics

Means and standard deviations were calculated for continuous variables. Individual variables are reported and listwise deletion variables were excluded if information was not provided. No statistical corrections for missing data were performed. Demographic comparisons between PD and MS respondents were performed using Students' T-Tests for continuous data (e.g. Age, BMI) and chi-square tests (e.g sex, obesity status) for categorical data. The effect of cannabis use on self-reported scales (GNDS, NHP, ABC, FSS, IPAQ) was examined using a between-subjects two-way (Current Cannabis Use × Disease Diagnosis) analysis of variance (ANOVA). The main effects of disease are only reported in the tables, as it is expected that people with PD and MS will have varying levels of disability due to their differing disease diagnosis and symptoms. Chi-square values were used to test the associations of cannabis use status with categorical variables (e.g. sex and obesity status). Obesity status was defined as having a BMI ≥ 30 and education status was defined as possessing at least a 4 year degree. All analyses were two-sided with significance set to $\alpha < 0.05$ and performed using IBM SPSS Statistics for Windows, version 24 (IBM Corp, Armonk, N.Y., USA).

3. Results

3.1. Sample demographics

The survey was viewed a total of 801 times. The participation/recruitment rate was 96.1%, with 31 records not providing consent. Forty-one records were removed after IP address verification, and 92 records were removed due to lack of self-reported diagnosis. Two records were removed due to lack of demographic information. Forty records were removed due to a diagnosis other than PD or MS, leaving a total sample of 595 records. The completeness rate was 77.3% with 538 records in the final dataset filling out 100% of the survey.

Demographic information is shown in Table 1. The sample was made up of 76.3% PD and 23.7% MS. The average age of the PD group was greater than the MS group (T = 15.948, $P < 0.001$). The MS group had a lower proportion of men ($\chi^2 = 24.606$, $P < 0.01$). Body mass index, obesity status, and education status did not differ between the PD and MS groups (BMI, T = 0.420, $P = 0.675$; Obesity Status, $\chi^2 = 0.084$, $P = 0.772$; Education Status, $\chi^2 = 2.338$, $P = 0.126$).

3.2. Cannabis users and non-user demographics

Demographic comparisons between current cannabis users and non-users are shown in Table 2. Non-users are defined as any individual who is not currently using cannabis, and includes individuals who have tried cannabis in the past. The sex and education status of current cannabis users and non-users was similar (sex, $\chi^2 = 0.034$, $P = 0.854$; education status, $\chi^2 = 1.519$, $P = 0.218$), but the current cannabis users were younger, had lower BMI, and were less likely to be classified as obese (age, F = 4.464, $P = 0.035$; BMI, F = 6.070, $P = 0.014$; obesity status, $\chi^2 = 7.173$, $P = 0.007$).

3.3. Cannabis use characteristics

Cannabis use characteristics are shown in Table 3. Seventy percent of the sample reported having used cannabis at least once within their lifetime, and 44% reported currently using cannabis. Of the current cannabis users, 74% stated their use was for medicinal purposes, but

Table 1
Sample Demographics.

	Total	PD	MS	T-Test/χ^2 results
Age, years [mean(SD)]	57.3(12.4)	61.1 (9.5)	45.1 (12.8)	**
Sex (%)				
Men	52.3	57.9	34.0	**
Women	47.7	42.1	66.0	
BMI [mean(SD)]	26.3 (5.5)	26.4 (5.3)	26.1 (6.1)	ns
Classified as Obese (%)	20.0	20.3	19.1	ns
4-year degree or higher (%)	56.6	58.4	51.1	ns

PD: Parkinson's disease; MS: multiple sclerosis; BMI: body mass index; SD: standard deviation.
*P < 0.05; ** P < 0.01; ns − not significant.