Physical Activity Levels in People with Multiple Sclerosis in Saskatchewan

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A substantial body of literature supports the benefits of physical activity for people with multiple sclerosis (MS). This study examined the types and amounts of physical activity reported by a cross-sectional sample of people with MS in Saskatchewan, Canada. Individuals with MS who were seen in the Saskatoon Multiple Sclerosis Clinic in 2006 were mailed a physical activity survey. Demographic information was collected from a confidentiality-protected clinical database. The response rate was 38.2% (108 of 283). No statistically significant differences in baseline demographics were found between responders and nonresponders. Of the responders, 93.5% engaged in some form of moderate physical activity at least once per week. Of these, 15.7% participated in group classes (mean [SD], 2.35 [1.32] days per week), 63.9% performed a minimum of 15 minutes of self-directed continuous activity (mean [SD], 4.5 [1.8] days per week), and 88.0% accumulated short bouts of moderate physical activity totaling a minimum of 20 minutes daily (mean [SD], 5.4 [1.9] days per week). In addition, 28.7% of responders reported that daily self-care required moderate physical effort. Physical activity decreased with increasing disability. The majority of responders participated in regular physical activity when multiple types of activity are considered. All activity sources should be considered when examining activity levels of individuals with MS. Int J MS Care. 2009;11:114–120.

A substantial body of literature supports the benefits of physical activity for people with multiple sclerosis (MS) with mild-to-moderate disability. Previous research exploring the benefits of exercise in MS has focused primarily on structured physical activity programs. Such studies have found improvements in aerobic threshold, anaerobic threshold, and maximum oxygen consumption with various types of exercise programs. They have also shown improvements in walking speed and endurance, mobility and disability levels, social interaction, and degree of fatigue. Depression and anger subscales on the Profile of Mood States decreased, while positive gains were made in strength, coronary artery disease risk profiles, and health perceptions. In a Cochrane systematic review of exercise therapy for MS, Rietberg et al. concluded that strong evidence supports the benefits of exercise for mobility and physical fitness.

Although the health benefits of nonstructured physical activity in the healthy adult population are receiving increasing attention, little research has focused on the health benefits or the contribution of nonstructured physical activity in the disabled population. In addition to recognized forms of self-managed physical activity, such as walking and bicycling, energy output is required for nonstructured activities of daily living (eg, dressing, bathing, toileting, transferring, eating), as well as for instrumental activities of daily living (eg, housekeeping, shopping, laundry, food preparation, transportation). Nonstructured physical activity through activities of daily living and recreation must be considered when prescribing and evaluating physical activity for individuals with MS. Knowledge about physical activity performed across all disability levels would facilitate the provision of individual counseling and the planning of physical activity community resources for individuals with MS.
Activity Levels of People with MS and Exercise Recommendations

In a survey study, Wadhwnani et al.17 found that 87% of people with MS living in Seattle, Washington, did not meet the Centers for Disease Control and Prevention (CDC) recommendations for physical activity. The CDC recommends strength training 2 days per week and moderate-intensity physical activity for at least 30 minutes on 5 or more days per week, or vigorous physical activity for a minimum of 20 minutes on 3 or more days per week.18 The CDC guidelines were intended for nondisabled individuals with no activity restrictions. These guidelines do not take into account the possibility that both exercise and activities of daily living may require greater energy expenditure for people with MS than for people without a chronic disease. For example, on a treadmill test measuring oxygen consumption, Olgiati et al.19 found a twofold increase in the energy cost of walking for people with MS compared with control subjects. Activities of daily living may require more than minimal levels of physical exertion for people with MS.

The amount of activity recommended to obtain health benefits for people with MS may differ from that for the general population unaffected by chronic disease. In the Wadhwnani et al.17 study, physical activity related to homemaking and self-care was not clearly accounted for, perhaps leading to an underestimation of the total amount of moderate physical activity being routinely performed by people with MS. In contrast to the study by Wadhwnani et al., a survey study by Gulick and Goodman15 found that between 75% and 100% of individuals with MS living in New Jersey engaged in a minimum of 3 hours per week of total physical activity, when nonstructured physical activity was also considered as part of the assessment.

In a meta-analysis of physical activity levels characteristic of individuals with MS, Motl et al.20 found that people with MS are significantly less active than asymptomatic populations but are at least as active as other chronically diseased populations. It may not be appropriate, however, to use standard survey activity measures to directly compare diseased populations with asymptomatic populations. Standard physical activity assessment surveys do not always account for differences in energy expenditure across disability levels in a given disease. In MS, different physical activity assessment tools are needed that account for the unique physical effort required to engage in activities ranging from those of daily living to vigorous exercise. The Cochrane review on exercise therapy for MS concluded that a consensus on valid and reliable outcome measures for the study of exercise in MS is needed, including outcome measures related to activities of daily living.2 Until such disease-specific measurement tools are developed, it seems wise to include all activity in our assessments.

The CDC and the Public Health Agency of Canada do not make recommendations for disabled populations.21,22 Some specific exercise guidelines for the MS population have been proposed.1,12,23 In a comprehensive review of exercise and MS, White and Dresdendorfer1 suggested moderate aerobic exercise for a total of 20 to 30 minutes, alternating with rest periods, two to three times per week. Daily general flexibility exercises were also recommended. More recent recommendations by Howe and Gomperts23 support similarly individualized aerobic programs of moderate intensity three times per week. Training in a group setting to maximize adherence and increase motivation is also suggested. People with MS may require lower exercise frequencies and intensities than nondisabled patient populations, and water-based programs and interval training are recommended for patients with thermosensitivity.12 Overall, the recommendations support individualized programs but do not address the contributions of self-managed, nonstructured activity and the possible role of the increased energy requirements of activities of daily living in the MS population.

Study Objectives and Hypotheses

We conducted a survey-based study of all types of physical activity performed by individuals with MS, including structured programs, nonstructured activity, and activities of daily living. The primary objective of the study was to determine the frequency and types of moderate physical activity (structured and nonstructured) performed by a volunteer sample of people with MS in the province of Saskatchewan, Canada, and to assess the relationship between physical activity (ie, type and frequency) and disability. We hypothesized that higher levels of disability would be associated with less participation in group or self-directed structured physical activity. We also hypothesized that increasing disability would be correlated with less engagement in nonstructured, moderate activity accumulated in short bouts throughout a participant’s day.

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A secondary objective of the study was to explore the relationships of physical activity to gender and place of residence. A tertiary objective was to describe the perception of the relative effort of self-care activities across disability levels.

Methods

This cross-sectional observational study is part of a larger study investigating physical activity, barriers to physical activity, and strategies for overcoming barriers to physical activity in the MS population in Saskatchewan. This article reports findings related to physical activity frequency and type. Participants were mailed a questionnaire along with a postage-paid return envelope in which to return the completed questionnaire. In order to maximize the response rate, participants were encouraged to obtain help from caregivers if needed. Two weeks after the mailing, a follow-up telephone call was made by a member of the MS clinic staff to each participant to encourage return of the completed questionnaire.

Setting

All patients with MS seen by a physician at the Saskatoon Multiple Sclerosis Clinic in 2006 were invited to participate in the study. The MS prevalence rate in Saskatoon was found to be 309.9 in 100,000 on January 1, 2005, when adjusted to the US 2000 population. The average annual incidence rate over 3 decades was 9.5 in 100,000.24 We anticipated that the high incidence and prevalence rates would allow us to capture information on the physical activity of people with both early and advanced disability in Saskatoon and across the province. The study was conducted during the winter months of the year (November through March).

Subjects

Invited participants (N = 283) had definite or probable MS using the Poser criteria25 or the Schumacher criteria.26 One hundred eight individuals responded to the survey. Baseline demographic information was collected from a confidentiality-protected MS clinic database, described elsewhere.24 Data collected included age, gender, age at disease onset, Expanded Disability Status Scale (EDSS) score at the patient’s most recent appointment (2006), and place of residence. These characteristics are reported in Table 1.

Measures

The physical activity survey was designed initially to examine mild, moderate, and high activity levels in the daily lives of the elderly non-diseased population.27 The survey was modified by the research group to target the MS population, making it user-friendly for disabled participants and able to capture performance of short, frequent bouts of physical activity recommended for people with MS.1,12 The modified, large-font survey consisted of a total of one page with a checkbox and one-word fill-in-the-blank format. Participants were asked to record their physical activity in the last week, addressing a) frequency and duration of participation in group physical activity classes; b) number of days on which they engaged in self-directed, continuous physical activity lasting at least 15 minutes; c) number of days on which they engaged in short intervals (3–10 minutes) of moderate activity totaling a minimum of 20 minutes (not including their self-care but including instrumental activities of daily living, such as housekeeping and shopping); and d) whether self-care such as grooming, dressing, and bathing required moderate physical effort, defined as resulting in increased muscle fatigue, increased shortness of breath, or increased heart rate.

Disability was measured using the EDSS,28 the standard clinical measure of neurologic impairment used in

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<th>Table 1. Baseline demographics</th>
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<td>EDSS in 2006</td>
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<td>Disability level as per EDSS, No. (%)</td>
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Abbreviations: EDSS, Expanded Disability Status Scale; SD, standard deviation. *Data missing for 23 nonresponders.
previous major clinical trials. Higher scores are associated with increasing disability, with the highest score of 10 indicating death due to MS. Scores between 0 and 3.5 are consistent with relatively mild disability. Scores in the range of 4 to 6 indicate moderate disability, with preserved ambulatory status with or without unilateral assistance. A score between 6.5 and 9.5 indicates severe disability, ranging from the need for constant bilateral assistance with ambulation to complete dependence for all mobility and self-care. Scores were assigned by an examining physician with experience using the EDSS within the 1-year period before the participant’s completion of the study questionnaire.

Statistical Analysis

Self-reported data regarding physical activity frequency and type were entered into a software program (SPSS Statistics Base for Windows, version 13.0.1; SPSS Inc., Chicago, IL) for analysis along with patient demographic information. Measures of central tendency were used to describe patient demographics and disease characteristics, as well as the frequency of various types of physical activity. Spearman rank correlations were calculated to correlate disability level with the weekly frequency of total physical activity of all types, as well as the weekly frequency of participation in group activity classes, self-directed continuous physical activity lasting at least 15 minutes, and moderate physical activity performed in short intervals totaling a minimum of 20 minutes daily. The independent t test was used to compare the mean frequency of physical activity for MS individuals living in rural and urban settings.

Results

Comparison of Responders and Nonresponders

The survey response rate was 38.2% (108 of 283). The following statistical measures were used to compare the responders with the nonresponders: χ² test for gender, city of residence, EDSS score, and rural versus urban place of residence; independent t test for age and duration since diagnosis; and Mann-Whitney U test for latest (2006) EDSS score. No statistically significant differences were found in baseline demographics between responders and nonresponders (Table 1).

Physical Activity of All Responders, Excluding Self-Care Activity

Some form of moderate physical activity at least once per week was reported by 93.5% of all responders. Of these, 15.7% participated in group classes (mean [SD], 2.35 [1.32] days per week), 63.9% participated in a minimum of 15 minutes of self-directed continuous activity (mean [SD], 4.5 [1.8] days per week), and 88.0% accumulated short bouts of moderate physical activity totaling a minimum of 20 minutes daily (mean [SD], 5.4 [1.9] days per week).

Physical Activity Related to Disability, Excluding Self-Care Activity

Total physical activity (ie, frequency per week) decreased significantly as disability increased (Spearman ρ = −0.37, P < .001). The percentages of responders active at least once per week in a defined type of activity (structured group, self-directed continuous, and/or short cumulative bouts) for the mildly, moderately, and severely disabled responders are shown in Figure 1. For these active responders, the mean numbers of days per week on which they were active in each type of activity in relation to disability level are shown in Figure 2. A moderate inverse relationship was noted between disability level and both the weekly frequency of cumulative bouts of physical activity and self-directed continuous activity combined with group activity (ρ = −0.36, P < .001 and ρ = −0.29, P < .003, respectively). No statistically significant correlation was observed between the frequency of group activity alone and disability level. This observation may be influenced by the fact that, overall, few respondents participated in group activity.

Physical Activity Related to Age, Gender, and Place of Residence

No statistically significant correlation was observed between age and physical activity or between gender and physical activity. Moreover, no statistically significant difference was found in the weekly frequency of total physical activity between those living in rural areas and those living in one of the three larger urban centers.

Self-Care Requiring Moderate Effort

Thirty-one responders (28.7%) reported that daily self-care required moderate physical effort. Of these 31 responders, 10 had mild disability (10 of 66), 6 had moderate disability (6 of 17), and 15 had severe disability (15 of 25). Not surprisingly, the perception that self-care required moderate physical effort was strongest among those severely disabled by MS. However, these perceptions about the increased effort for self-care existed at all disability levels.
Discussion

This study of a Saskatchewan MS clinic population shows that cumulative short bouts of moderate physical activity make an important contribution to total weekly physical activity. The majority of responders accumulated short bouts of moderate physical activity totaling at least 20 minutes daily a minimum of once weekly and a mean of 5.4 days per week. The survey study of Gulick and Goodman\(^{15}\) also identifies the significant contribution of nonstructured cumulative activity to total physical activity across all disability levels. In their study, a convenience sample of individuals with MS completed the Yale Physical Activity Survey (YPAS), which was designed to assess duration and intensity of physical activity in older adults, including physical activity related to housework, yard work, exercise, and recreation.\(^{30}\) A limitation identified by Gulick and Goodman in their study is that much of the nonstructured activity may have occurred at a low intensity level. Our data, however, suggest that for people with MS, nonstructured activity includes moderate-intensity physical activity.

In our study of the Canadian province of Saskatchewan, almost one-third of responders also reported that daily self-care (dressing, bathing, and eating) required moderate physical exertion. The energy requirements for self-care could be substantial in the more severely disabled patient population. It was not anticipated that some responders with only mild disability would report that activity related to self-care required moderate physical effort. A possible limitation of using a self-report measure to estimate self-care effort is that participants may have overestimated their energy exertion. Nevertheless, the potential impact of physical fatigue associated with self-care should be noted. In addition, the surprising report of moderate physical effort required by self-care among the mildly disabled suggests that health-care providers may be underestimating the functional impact of minimal neurologic signs in individuals who are considered mildly disabled (according to the EDSS). Both of these possibilities warrant future consideration if we are to obtain more accurate estimates of physical activity levels in the MS population.

Figure 1. Percentage of respondents active at least once weekly by activity type and disability level

Figure 2. Frequency of physical activity by type and disability level for responders active at least once weekly
Most other research has found at least a moderate correlation between physical activity and level of disability or physical functioning, \(^{15,16}\) and our findings of a moderate correlation between EDSS score and activity level are consistent with those findings. In our study, the frequency of participation in all forms of physical activity combined decreased as level of disability increased. When the various activity types were analyzed separately, this negative correlation did not hold true for structured group activity. We had anticipated that the less disabled would have better access to group classes. Participation in this type of activity, however, was low across all levels of disability, with only 15.7% of all responders participating in structured group activity.

Group classes may be more accessible in a warmer climate and in urban settings. Structured group activity offers the advantage of a controlled dose-response setting for physical activity but may sacrifice the opportunity for individualized physical activity programs, which are recommended for people with MS.\(^{23}\) However, individuals with varying levels of disability may gain psychological and social benefits from participation in group classes. For example, Petajan et al.\(^{5}\) attributed the 97% adherence rate in their study involving a group aerobic training program to social support. Similarly, Howe and Gomperts\(^{23}\) reported that study participants motivated and supported each other during training. The small number of participants in our study involved in group activity raises questions about the accessibility and feasibility of structured group activity outside of the research setting in Saskatchewan for people with MS.

**Practice Points**

- Nonstructured moderate physical activity is a major source of physical activity for people with MS across all disability levels.
- Both exercise and activities of daily living may require greater energy expenditure for people with MS than for people without a chronic disease.
- The role of nonstructured physical activity, including activities of daily living, should be considered when evaluating or prescribing physical activity for individuals with MS.

Participation in some regular, continuous aerobic activity performed outside of a group setting was reported by 63.9% of our responders. This finding confirms that self-directed, continuous aerobic physical activity of at least 15 minutes is being performed by a majority of Saskatchewan residents with MS. Overall, no differences were found in participation in activity of all types between residents living in urban and more rural settings during the winter. Our findings were similar to those of research involving a more temperate climate in that nonstructured physical activity contributed substantially to total physical activity in the MS population across all disability levels.\(^{15}\)

Our study has several limitations related to study design, sampling, and self-report of physical activity. First, the cross-sectional, observational design does not allow us to examine any causal relationships. Second, a clinic-based convenience sample from a single province—Saskatchewan—limits the ability to generalize our findings to a wider MS population. Third, an assumption in the use of a self-report physical activity survey methodology is that a person has the cognitive capacity to complete the survey accurately. Our methodology included the instruction to obtain help from a caregiver if needed. The assistance of a caregiver does not eliminate bias, but it may have reduced bias for responders with possible cognitive impairment who may have struggled with the questions. In future survey studies, pre-identifying those individuals with cognitive dysfunction that may interfere with providing a reliable and valid self-report may be useful.

Future research directed at developing physical activity guidelines and community physical activity resources to promote health benefits for individuals with MS should consider the role of nonstructured physical activity. The energy requirements for many activities are increased for individuals with a disability.\(^{12,31,32}\) Acquiring a better understanding of the energy requirements of specific activities across the MS disease spectrum will facilitate the provision of MS-specific exercise guidelines. In addition, understanding the daily energy expenditures over the course of the disease may help people with MS avoid the known challenges of deconditioning weakness and better manage fatigue.\(^{33-36}\) It is likely that many of the health benefits (psychological well-being, range of motion, mobility) important to individuals with MS may be achieved through lower levels of activity that do not necessarily increase aerobic fitness.
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References