Falls, Fear of Falling, Self-Reported Impairments, and Walking Limitations in Persons With Late Effects of Polio

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Objective: To investigate fall frequency during the past year, circumstances relating to falls, fear of falling, self-reported impairments, and walking limitations in persons with mild to moderate late effects of polio.

Design: A cross-sectional postal survey.

Participants: A total of 325 persons with clinically and electrophysiologically verified late effects of polio (175 women and 150 men; mean age 70 years).

Method: Data regarding demographics, fall frequency during the past year, and circumstances relating to falls were obtained through a questionnaire. Fear of falling when performing daily activities was assessed with the Falls Efficacy Scale-International (FES-I), impairments were assessed with the Self-Reported Impairments in Persons with Late Effects of Polio (SIPP), and walking limitations were assessed with the Walking Impact Scale (Walk-12).

Results: Of the 325 respondents, 62% reported at least one fall during the past year. Most of the falls were reported in the afternoon (68%) and when walking outdoors (53%). Persons who fell reported significantly higher ($P < .001$) mean scores than did the persons who did not fall in the FES-I (35.8 points versus 29.2 points), SIPP (28.2 points versus 25.0 points), and Walk-12 (63% versus 43%).

Conclusions: Falls are common in people with mild to moderate late effects of polio, especially later in the day and while walking outdoors. Fear of falling, self-reported impairments, and walking limitations were greater among the persons who fell than in the persons who did not fall. To reduce falls and fear of falling in persons with late effects of polio and to increase their activity level and participation in various life situations, evidence-based interdisciplinary fall management programs are needed.

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INTRODUCTION

Several decades after experiencing an acute poliomyelitis infection, about 15% to 80% of the persons affected experience new impairments or symptoms, referred to as late effects of polio, and some of these persons may also have postpoliomyelitis syndrome [1,2]. Late effects of polio are among the most common neuromuscular conditions that lead to a lifelong disability. The most common impairments reported by persons with late effects of polio are muscle weakness, muscle fatigue, general fatigue, and musculoskeletal pain [3-8], but other impairments such as sleep disturbances and concentration and memory difficulties are also reported and may be directly or indirectly associated with their prior polio infection [1,2,9-11]. These impairments can affect a person's balance and walking ability [12-15] and lead to an increased risk of falling. Falls are common in elderly persons [16,17] and especially in people with various neurologic conditions [18-21], which can increase morbidity and mortality and lead to social and societal consequences.

Despite the known risk for falls in persons with late effects of polio, few studies have investigated the frequency of falls and factors associated with falls in this population. Previously published studies show that 50%-84% of persons with late effects of polio report at least one fall during the past year [22-24]. This percentage is considerably higher than in elderly people in general, whose fall frequency is about 20%-40% depending on their age [17]. Moreover, many persons with late effects of polio have osteopenia or

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osteoporosis, and it is reported that between 35%-40% sustained a fracture as a consequence of their falls [22,25].

An increased risk for falls can also lead to fear of falling. Fear of falling is defined as an ongoing concern about falling that ultimately limits the performance of daily living [26]. Some studies have described that many persons with late effects of polio avoid doing activities in their daily life because of their fear of falling [22,27]. Another study, based on a large sample of 305 persons with late effects of polio, has shown that fear of falling, muscle weakness in the quadriceps muscle in the most affected leg, and reduced balance are predictors for falls [24]. More than 70% of the participants in this study reported falls during ambulation, and one third had reduced the amount of time they walked because of fear of falling [24].

Thus falls and fear of falling seem to be common in persons with late effects of polio, but very few studies have assessed these factors in a sufficiently large sample. Furthermore, no study has been performed to investigate how various self-report impairments and walking limitations are related to falls and fear of falling. An increased knowledge about falls, fear of falling, and factors associated with falls could help clinicians design more individually targeted rehabilitation interventions to reduce falls and fear of falling in persons with late effects of polio.

The aim of this study was to investigate fall frequency during the past year, circumstances relating to the falls, fear of falling, self-reported impairments, and walking limitations in persons with mild to moderate late effects of polio.

METHODS

Participants

A postal survey was conducted among a convenience sample of 356 community-dwelling persons with late effects of polio. They were recruited through a clinical database at a postpolio rehabilitation clinic in a university hospital in the south of Sweden. Inclusion criteria were (1) a verified history of polio; (2) the ability to walk indoors with or without an assistant device; and (3) the ability to understand Swedish. An exclusion criterion was the presence of other diseases (such as stroke, Parkinson disease, and severe osteoarthritis) that could have an impact on the risk of falling.

All participants had a confirmed history of acute poliomyelitis with new symptoms after a period of functional stability of at least 15 years. An electromyogram had been recorded in the upper and lower limbs as part of the initial routine clinical examination and verification of prior polio. All participants had electromyographic findings indicative of prior polio in at least one limb (the upper or lower limb or both) and no other neurologic disorders or medical reasons that could explain their increased or new problems.

Of the 356 persons, 4 declined to participate and 34 did not respond to the postal survey despite being reminded once, and thus a total of 325 participants responded to the questionnaires (a 91% response rate). Data related to their acute polio infection and duration of new symptoms were obtained from the database.

Ethics

All persons gave their written consent to participate. The principles of the Declaration of Helsinki were followed, and the study was approved by the Regional Ethical Review Board in Lund, Sweden (Dnr: 2011/582).

Questionnaires and Rating Scales

The participants were asked to respond to questions about their current medical and physical situation, living situation, vocational situation, resident and home environment, walking distance, and use of mobility aids and orthotic devices. The participants also noted the number of falls they sustained during the past year, circumstances relating to the falls, and injuries related to the falls. Circumstances relating to the falls were described in terms of location, time of day, and activity, whereas injuries sustained during a fall were described in terms of the type of injury and need for hospital care.

Three rating scales were used to assess fear of falling, self-reported impairments, and walking limitations. The Falls Efficacy Scale-International (FES-I) [26,28] was used to explore how concerned the participants are about falling when performing daily activities. The FES-I consists of 16 items and allows persons to denote how concerned they are about falling during activities on a 4-point rating scale, ranging from 0 (not at all concerned) to 3 (very concerned). The items consider the following activities: cleaning the house; getting dressed or undressed; preparing simple meals; taking a bath or shower; going to the shop; getting in or out of a chair; going up or down stairs; walking around in the neighborhood; reaching for something above the head or on the ground; going to answer the telephone before it stops ringing; walking up or down a slope; walking on an uneven or slippery surface; visiting a friend or relative; or going out to a social event. The maximum total score for the FES-I is 64 points. The FES-I is commonly used to assess fear of falling in elderly persons [29] and in persons who have different neurologic diseases [24,30-32], and it has good psychometric properties [29,30,33].

The Self-Reported Impairments in Persons with late effects of Polio (SIPP) was used to assess impairments [11]. The SIPP consists of 13 items and allows persons to rate how much they had been bothered by various postpolio-related impairments during the past 2 weeks on a 4-point rating scale, ranging from 1 (not at all) to 4 (extremely). The maximum score is 52 points. The 13 items consider muscle weakness; muscle fatigue; muscle and/or joint pain during physical activity and at rest; sleep disturbances; concentration difficulties; memory difficulties; and mood swings. The