JRM–CC
JOURNAL OF REHABILITATION MEDICINE CLINICAL COMMUNICATIONS
VOL. 3, 2020 ARTICLE 1000023

SHORT COMMUNICATION

IS INTERVENTION TO PREVENT FALLS NECESSARY IN PRIOR POLIO PATIENTS?

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Objective: **To investigate whether intervention to prevent falls is necessary in prior polio patients, by identifying the frequency, circumstances and consequences of falls among patients in Sweden with prior polio.**
Subjects: **Patients with prior polio diagnosis.**
Methods: **A falls history questionnaire was completed by patients with prior polio visiting the outpatient clinic at the Department of Rehabilitation Medicine, Danderyd University Hospital, Stockholm, Sweden, or participating in group activities organized by the patient organization.**
Results: **A total of 80 patients answered the questionnaire; 32 men and 48 women. Eighty-one percent (*n* = 63/77) of respondents walked outdoors, but rarely more than 1 km, or only inside and near the house. Three-quarters of patients had fallen one or more times over the past year and one-quarter of patients had fallen 5 times or more. The falls often occurred during daytime in an environment known to the patient. Sixty-nine percent (*n* = 40/58) of respondents had been injured due to falling during the past year. The most common injuries were minor injuries.**
Conclusion: **Falls are common in patients in Sweden with prior polio. Interventions to prevent falls in people with prior polio are therefore clinically relevant.**

Key words: falls; accidental falls; poliomyelitis.

Accepted Oct 30, 2019; published Feb 27, 2020

JRM-CC 2020; 3: 1000023

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LAY ABSTRACT

Many patients with prior polio have muscle weakness in the lower extremities. The aim of the current study was to investigate if intervention to prevent falls is necessary in patients with prior polio. Therefore, the frequency, circumstances and consequences of falls in Swedish patients with prior polio were determined. The study was performed at the outpatient clinic at the Department of Rehabilitation Medicine, Danderyd University Hospital, Stockholm, Sweden. A total of 80 patients answered a questionnaire about falls history. Three-quarters of patients had fallen one or more times over the past year, and one-quarter of patients had fallen 5 times or more. The falls often occurred during daytime in an environment known to the patient. It is concluded that falls are common among patients in Sweden with prior polio. Interventions to prevent falls in people with prior polio are therefore clinically relevant, as described in earlier studies.

Acute polio is a viral disease that, in some cases, affects the anterior horn cells and causes motor functional impairments of varying degrees (1). According to Post-polio Health International there are 12–20 million individuals who have had polio living in the world today (2). In the Swedish population the number of polio survivors is estimated to be 15,000–20,000 (3).

Decades after the acute polio infection patients may develop post-polio syndrome (PPS). The most common symptoms of PPS are impaired muscle strength, general fatigue and muscle and/or joint pain (1).

Many patients with prior polio have muscle weakness in the lower extremities (1), which limits their movements and has been shown to be directly related to falls (4–6). Patients with prior polio often have a decreased balance and walking speed compared with healthy controls of the same age (7), they are known to have a fear of falling (5, 6, 8– 9) and have been reported to fall often (5, 6, 8–13). It is important to identify the circumstances and consequences of falls in patients with prior polio, in order to prevent falls and fear of falling, and to analyse the necessity of interventions to prevent falling.

 ISSN 2003-0711 doi: 10.2340/20030711-1000023

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The aim of the present study was to investigate whether intervention to prevent falls is necessary in prior polio patients. The research questions were: (*i*) How common are falls and fear of falling in patients in Sweden with prior polio? and (*ii*) What are the circumstances and consequences of falls in this patient group?

METHODS

Information about the study and a questionnaire about falls were sent to patients visiting the outpatient clinic at the Department of Rehabilitation Medicine, Danderyd University Hospital, Stockholm, Sweden, and were also offered to patients participating in group activities organized by the patient organization Swedish Society for Traffic and Polio Disabled (RTP). The study was conducted during 2012–2013. Inclusion criteria were: polio diagnosis and knowledge of the Swedish language. The questionnaire used in the current study had been used previously to identify the circumstances and consequences of falls among polio survivors in the Netherlands (5). The questionnaire was translated from Dutch to Swedish and then back-translated to Dutch, by 2 independent persons with Dutch as their mother tongue and Swedish as their "everyday language". The questionnaire included questions about the patient's medical and physical condition, home environment, mobility, frequency, circumstances and consequences of falls.

The data were anonymized prior to analysis, and were analysed at group level.

The study was approved by the regional ethics committee in Stockholm, Sweden (D: nr 2012/793-31/2).

RESULTS

Descriptive data for the patient group

A total of 80 patients answered the questionnaire; 32 men and 48 women. Ninety-two percent (n=69/76) of respondents were from Europe, of whom 66 were from Sweden. Four patients were from Asia and 2 from Africa. For results regarding age, marital status and accommodation, see **Tables I** and **Table II**, respectively. Seventy percent of the patients were retired (of whom 9% were pre-retired) and 10% had paid work. Seventy-four percent (n=58/78) of respondents had adaptation(s) to their home.

Walking aids and fall frequency

Forty-nine percent (n=36/74) of respondents used walking aids indoors and 80% (n=58/73) used walking aids outdoors. Fifty-four percent (n=41/76) used orthopaedic shoes and 51% (n=36/70) used some form of orthosis on their leg/legs.

Table I. Age and age at onset of polio in Swedish patients with prior polio

Characteristics	Mean (SD)	Min/max
Age, years (n=80)	69 (12)	33/93
Age at onset of polio (n=76)	6 (6)	0.5/27

SD: standard deviation; min: minimum; max: maximum.

Table II. Marital status, accommodation and walking in Swedish patients with prior polio

Characteristics	*n* (%)
Marital status (n=79)	
Married	45 (57)
Cohabiting	5 (6.3)
Divorced	11 (13.9)
Widow/widower	7 (8.9)
Living alone	11 (13.9)
Accommodation (n=78)	
House, several floors	14 (17.9)
House or apartment, ground-floor	14 (17.9)
Apartment, stairs with elevator	43 (55.1)
Apartment, stairs without elevator	6 (7.7)
Retirement home	1 (1.3)
Walking (n=77)	
Walking, almost never	7 (9.1)
Walking, only inside	1 (1.3)
Walking, only inside and near the house	26 (33.8)
Walking, outdoor regularly, but rarely more than 1 km	37 (48.1)
Walking, outdoor regularly more than 1 km	6 (7.8)

The largest proportion 81.9% (n=63) of the patients walked outdoors, but rarely more than 1 km or only inside and near the house (Table II). Three-quarters of patients had fallen one or more times over the past year and one-quarter of patients had fallen 5 times or more (**Table III**). The patients answered the question "How often do you fall on average?" (Table III). Approximately two-thirds (of those who answered the question "How often do you fall on average?") stated that they fall more often today compared with 10, and, respectively, 20 years ago.

Circumstances and consequences of falls

The patients answered a few questions about the last time they fell. Eighty-six percent (n=49/57) of the falls occurred in a known environment. Forty percent (n=29/72) needed help to get up again after the fall. Seventy-three percent (n=41/56) of the falls occurred during the day, 14% in the evening, 7% in the morning and 5% at night (n=56). Sixty-nine percent (n=40/58) had been injured by a fall during the past year. The most common injuries were minor injuries in the form of bruises, scrape wounds, swellings and sprains (n=36/40). Four patients had fractures due to falls (n=4/40).

Table III. Frequency of falls

Characteristics	*n* (%)
Number of falls last year (n=79)	
None	19 (24.1)
1	10 (12.7)
2	12 (15.2)
3	11 (13.9)
4	7 (8.9)
5 or more	20 (25.3)
How often do you fall on average? (n=78)	
Every week	9 (11.5)
Every month	11 (14.1)
More less than 1/month	43 (55.1)
Never	15 (19.2)

Seventy percent (n=46/65) experienced falls as a problem and 77% (n=60/78) were afraid of falling. Forty-four percent (n=34/78) had decreased their walking due to fear of falling.

DISCUSSION

The main question addressed by this study was how common falls and fear of falling are among patients in Sweden with prior polio. The results show that falls are common among patients in Sweden with prior polio, as approximately one-quarter of participating patients fell more often than once a month. Seventy-five percent of the patients reported that they had fallen at least once in the past year, which is similar to the results of previous studies on falls in patients with prior polio (5, 9). Other studies (6, 8, 10–13) have reported a fall rate of 59–69% in the same patient group. Regarding falls during the past year, people with prior polio have more than twice as many falls as the general population, 65 years of age and older (14). Menant & Gandevia (15), describes that patients with prior polio fall up to 4 times as often as age-matched healthy persons.

The second research question in the current study was what are the circumstances and consequences of falls within this patient group. It was found that falls often occurred during daytime in an environment known to the patient, as was found in a previous study (5). The consequences of falls are often minor injuries in the form of bruises, scrapes, etc., as reported in a previous study (5). Ten percent of the patients in the current study sustained a fracture due to falls, more than twice as many as in a sample of the normal population (14, 16). Bickerstaffe et al. (5) reported that 7.1% of polio survivors sustained a fracture as a consequence of falling, and another study reported a fracture frequency of 9.7% among fallers in the same patient group (12). Low bone density and osteoporosis have been found in weaker bone compared with stronger bone in patients with prior polio (17), which could explain the fracture rate after falls. However, the present study cannot determine whether the fracture was in polio-affected bone.

A large proportion of the patients experienced fear of falling, as in previous studies (5, 8, 9) and approximately half of the patients had decreased their walking due to fear of falling. A contributing cause of increased frequency of falls and fear of falling in patients with prior polio may be the increase in slow muscle fibres and a loss of fast muscle fibres (18–20), which can lead to poorer ability to quickly avoid obstacles when walking. Another explanation may be that people with prior polio have weaker knee extension compared with the normal population (21). Muscle strength in knee extension is necessary for knee stability during the standing phase and to prevent the legs from folding. Previous studies (5–7) have observed that muscle weakness in the knee extension muscles, such as the quadriceps, in the weakest leg correlates with the frequency of falls. Nam et al. (12), however, concluded that muscle strength in knee extension did not correlate with the frequency of falls, but difference in leg length did.

Limitations

This study has some limitations. Foreign-born patients visiting the outpatient clinic at the Department of Rehabilitation Medicine, Danderyd University Hospital who do not speak Swedish were excluded as the questionnaire was in Swedish. Although 80 patients answered the questionnaire, many patients did not answer every question.

Conclusion

It can be concluded, however, that interventions to prevent falls in people with prior polio are clinically relevant. Adapted strength training for retained, and if possible increased, leg muscle strength, as well as balance training, can be recommended. If needed, walking aids, orthopaedic shoes and/or orthoses, can be recommended. Muscle strength training should be individually carefully designed and followed up to reduce overstrain of the muscles affected by polio.

ACKNOWLEDGEMENTS

The authors would like to thank the participating patients. Also, the authors thank Ingeborg Van Der Ploeg and John Vreede for translating the questionnaire.

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