A pilot study of falls, fear of falling, activity levels and fall prevention actions in older people with polio*

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ABSTRACT. **Background and aims:** Polio survivors are ageing, and reporting new complications including falls. The aims of this study were: 1) to determine the frequency of falls, circumstances surrounding them, and the consequences of falls in older people who have polio; and 2) to investigate the range of fall prevention interventions undertaken to reduce the individual’s risk of falling. **Methods:** A survey was conducted of members of the Eastern Polio Support Group of Victoria. Twenty-eight respondents (70%; 7 male, 21 female) had a mean age of 66 years and an average duration of 57 years since the onset of polio. The survey addressed demographic data, mobility, frequency and description of falls over the last 12 months, their consequences, and community services utilized. The Modified Falls Efficacy Scale (MFES) and Human Activity Profile (HAP) were also completed. Comparative data on the MFES and HAP were obtained from age- and gender-matched healthy community-dwelling older people. **Results:** Fourteen respondents (50%) reported one or more falls over the past 12 months, half reporting multiple falls. Two-thirds of falls occurred while walking. Of those who fell, 67% did not require medical attention. The highest percentage of injuries were bruises or grazes (44%), with one fracture reported. Sixty-one percent reported being fearful of falling, with an average MFES of 7.4 (±2.0), compared with the average of 9.7 (±0.5) for the age- and gender-matched controls (p<0.05). Only 5 of the respondents reported changing their level of activity as the result of a fall. A significant difference was identified on the Adjusted Activity Score (AAS) of the HAP between polio non-fallers (mean 56.3±19.1), polio fallers (mean 40.1±15.6) and age- and gender-matched controls (mean 73.5±10.3) (F2,46=25.5, p=0.000). The median number of fall prevention activities undertaken in the previous 12 months was one, 11 of the 28 respondents undertaking two or more. The most common interventions implemented were vision checks (42%) and review of medications by a doctor (25%). **Conclusions:** A high rate of falling, fear of falling and low activity levels exist in older people with polio. There is a need for further research and clinical programs to reduce falls and injuries in this group.

INTRODUCTION

Polio is a virus which invades and kills the nerve cell bodies of the anterior horn cells, resulting in significant loss of motor units (1). This may result in isolated muscle weakness and unpredictable paralysis. Those motor neurons that persist develop new sprouts, enabling limited recovery of motor function (2). According to the National Health Interview Survey in the United States, polio remains the second most frequent cause of paralysis after stroke (3). Approximately 40000 people in Australia who contracted poliomyelitis in the mid-nineteen hundreds are still alive (4).

It has been estimated that approximately 80% of those with polio will experience new symptoms 30-40 years after the initial onset. This may occur as a result of overuse or premature aging of the enlarged motor units, combined with loss of motor units due to normal aging (2). These new symptoms were first reported over 125 years ago in France (5). Halstead defined PPS as the presence of two or more of the following symptoms: unaccustomed fatigue, muscle and/or joint pain, new weakness, functional loss, intolerance to cold,
Falls have been widely investigated in the older population. At least one-third of all people within the community over the age of 65 years experience one or more falls per year, the rate increasing with age (12-15). Approximately 10% of falls by community-dwelling older people result in serious injury or fracture requiring hospitalization (16). Furthermore, there is increasing evidence that a range of fall prevention activities can be effective in reducing falls among older people (for example, 17-21). Given the increasing age of those who contracted polio during the epidemic of the early 1950s, in combination with the primary weakness associated with polio (10), there has been surprisingly little research investigating falls among older people with polio. A survey of 233 people with polio found that 64% reported falling at least once in the preceding 12 months (22), while Lord et al. (10) found that 68% of a sample of people with polio reported two or more falls in a 12-month period. Recurrent and frequent falls have also been documented as a complaint in other studies of people with polio (7, 23-26). However, none of these studies has specifically investigated the nature of falls, nor investigated in detail the associated consequences, such as reduced activity levels and fear of falling in older people with polio. This information may be useful for clinicians as a framework for targeted fall prevention activities in this clinical group.

The aims of this pilot study were to determine the frequency, circumstances and consequences of falls in persons who have polio, and to investigate the range of fall prevention interventions which had been utilized to reduce the individual’s risk of falling in this sample.

**METHODS**

**Subjects**

Forty surveys were mailed to members of the Eastern Polio Support Group (Melbourne, Victoria) with their monthly newsletter. Twenty-eight (70%) responses were received (7 men and 21 women). Respondents had an average age of 66.2 (±8.6) years, and an average duration since the onset of polio of 57 (±9.5) years. All respondents remained anonymous to the investigators. Age and gender-matched healthy controls were randomly selected from existing data bases as a comparison sample. Healthy controls were independent, community ambulators, with no existing neurological or orthopedic pathology affecting balance or mobility and no reported falls in the previous 12 months. Control subjects underwent a comprehensive screening process for balance- and mobility-related health problems (27).

**Procedures**

A detailed survey was administered which addressed demographic data, mobility, frequency and description of falls in the past 12 months, their consequences, and community services utilized. The respondents also completed two questionnaires:

- the Modified Falls Efficacy Scale (MFES) (28), with which subjects self-rated how confident they are that they will not overbalance while performing each of the 14 listed activities. Each activity was rated on a scale of zero to ten, 0 representing “not confident at all” and 10 being “completely confident”. An average score per item was calculated.

- the Human Activity Profile (HAP) (29), which consists of a list of 94 activities in increasing order of energy expenditure. Subjects were asked to record “still doing”, “have stopped doing” or “never did” for each activity.

Two scores were determined: the Maximal Activity Score (MAS), which is the highest numbered item the subject reported “still doing”, and the Adjusted Activity Score (AAS), which is the MAS less the number of lower numbered activities listed as “have stopped doing”. The AAS is considered more representative of current physical activity levels.

Data from the MFES and HAP were also available for the age- and gender-matched controls.

**Statistical analysis**

The majority of data was categorical, and was analysed using frequency analyses. For the MFES and the HAP, descriptive statistics, including skew, were analysed. For both MFES and HAP, independent t-tests were used to identify differences between subjects with polio and age and gender-matched controls. One-way ANOVA was used to identify differences between respondents reporting falls in the past 12 months, those reporting no falls, and the age- and gender-matched controls, with post-hoc Neuman-Keuls analyses to identify which differences were significant for the MFES and HAP MAS and AAS. Alpha was set a priori at 0.05.

**RESULTS**

Fifty percent of respondents (N=14) reported that both legs were affected by polio, and a further 46% (N=13) reported one leg involvement. Sixty-one percent (N=17) reported their trunk being affected, while only 36% (N=10) reported involvement in one or both arms. Forty percent (N=11) of respondents were able to ambulate indoors independently without gait aids, while 21% (N=6) used single-point sticks, 21% crutches (N=6) and 7% roller frames (N=2). Three others used manual or electric wheelchairs for indoor mobility. For outdoor mobility, 28% (N=8) used no gait aid, 18% (N=5) used single-point sticks, and 7% (N=2) crutches. An additional 15% (N=4) reported using manual wheelchairs. 4% or new atrophy (6). The associated muscle weakness, primarily in plantar flexion and quadriceps muscles, affects dynamic stability in standing and ambulation (7-10).

When combined with fatigue, this weakness may contribute to the occurrence of falls (11).