RESEARCH REPORT

Functional ability and health status of community-dwelling late age elderly people with and without a history of falls

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Abstract *Background:* Obvious functional deterioration is demonstrated in elderly people aged 75 years and older. However, there is only little objective evidence relating to falls in these individuals.

Objective: This cross-sectional study compared functional abilities and health status in the elderly age at least 75 years with no fall, single fall (1 fall), and multiple falls (≥2 falls) during the past 6 months. Furthermore, the study describes fall information of the participants.

Methods: Ninety participants (30 individuals/group) were interviewed for their health status and fall history within the past 6 months. Then they were objectively assessed in terms of their functional ability to conduct daily activities independently.

Results: The findings indicated that the functional abilities of participants with multiple falls were significantly poorer, with the number of those requiring a walking device significantly greater than that in the other groups. These individuals reported loss of balance as a major factor for falls, whereas individuals with a single fall reported an environmental hazard as a common cause of falls.

Conclusion: Although the cross-sectional findings may be unable to clearly confirm the causal relationship of the outcomes, the data support the influence of intrinsic impairments and can be used to promote functional ability and minimise fall risk in these individuals.

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Introduction

Approximately 30% of elderly people experience a fall in a year, and each fall can cause physical and psychological consequences that subsequently reduce quality of life such as fracture and decreased self-confidence and ability to conduct productive activities [1—4]. It is a complex causal event that relates to both intrinsic and extrinsic factors in which a single fall mostly involves extrinsic factors, whereas multiple falls are likely to be related to intrinsic impairments [5—8]. Thus having multiple falls is more clinically important, particularly with advancing age [5—7]. However, these findings were derived from subjective data or some aspects of functional ability in early age elderly. Although advancing age introduces changes in age-related functional decline of many body systems, the obvious functional deterioration is demonstrated in those aged at least 75 years [9]. Therefore, investigation of data relating to falls in these individuals is important to minimise the number of dependent persons, particularly in current times as the number of elderly and their life expectancy have dramatically increased.

Important contributors to an independent lifestyle for the elderly include safe and efficient ambulatory status, good static and dynamic balance, adequate lower extremity muscle strength (LEMS), and good functional endurance [10,11]. These abilities can be quantified using the 10-Meter Walk Test (10MWT), Timed Up and Go Test (TUG), Five Times Sit-to-Stand Test (FTSST), and 6-Minute Walk Test (6MWT) [11,12]. These tests are valid, reliable, and feasible in assessment of the functional ability of the elderly in both clinics and communities [11—14]. In addition, the findings of these tests can be used to direct the process of decision-making to improve the effectiveness of rehabilitation strategies for these individuals [11,12]. Therefore, this study primarily compared functional abilities and health status in the elderly, aged at least 75 years, with a history of having had no fall, a single fall (1 fall), and multiple falls (≥2 falls) during the 6 months prior to taking part in this study. The study also secondarily investigated fall information of individuals who fell.

Materials and methods

Study design and population

The data were cross-sectional, and were collected from several rural communities in Thailand. The sample size was calculated using a formula for data comparison of a major outcome (10MWT) [15,16]. When the power of test was set at 0.8 with an α level at 0.05 and effect size of 0.24 (data from a pilot study using 10 individuals/group), the study required 30 individuals/group or 90 participants in total. The elderly individuals were recruited if they were at least 75 years old with a body mass index (BMI) between 18.5 and 29.9 kg/m^2. In addition, they needed to have intact cognitive functions [Mini-Mental State Examination (Thai version 2002) ≥ 22 points based on education

level [17], good communication, and the ability to understand simple commands for the tests. The exclusion criteria were having (1) pain (at rest and with movement) in the musculoskeletal system of more than 5 out of 10 on a visual analogue scale; (2) sequelae of neuromuscular diseases (e.g., Parkinson's disease and stroke) that affected balance and walking abilities; (3) other signs and symptoms that might influence the tests used in this study such as dizziness, acute illness or injury, unstable heart diseases (e.g., angina) and uncontrolled hypertension. The protocol of the study was approved by the local ethics committee (HE542091), and eligible individuals signed a written informed consent prior to their participation in the study.

Questionnaire development

This study used a questionnaire to interview for baseline data, health status and fall information (please see Appendix 1). It was developed based on consolidation of data from previous studies [5,8,18,19]. Thereafter, it was verified for the content validity through the method of expert panel discussion using four rehabilitation professionals (3 physical therapists and a nurse) who had good clinical experience with the elderly population. Next, it was preliminarily used in 15 elderly people. Then, some items were modified, rearranged, or deleted in order to improve the conciseness, clarity, and completeness of the questionnaire. After all revisions have been made, the questionnaire was divided into three parts: (1) demographic information, (2) health status information, and (3) fall information (Appendix 1). The interview process took approximately 15—20 min/participant.

Study protocols

The eligible individuals were interviewed for their demographics, health status, and their history of falls within the past 6 months using a questionnaire (Appendix 1). The findings were used to classify the participants into three groups including nonfaller, single-faller (1 fall), and multiple-faller (≥2 falls) groups. A fall in this study was defined as any unintentional events that resulted in a person coming to rest on the ground, neither as a result of a major intrinsic event such as stroke or syncope, nor an extrinsic force/overwhelming hazard such as forcefully being pushed down or having a road traffic accident [20].

After sufficient rest, participants were assessed for their level of ability including ambulatory status, static and dynamic balance, LEMS, and functional endurance using four functional tests, including the 10MWT, TUG, FTSST, and 6MWT, in random order. The examiners were blinded to the participants' history of falls, and had sufficient discussion and practice with the methods of measurements to minimise errors of the findings. The procedures used for the tests were as follows.

10MWT
The 10MWT measured ambulatory status in terms of walking speed [11]. This test was performed using a flying start in