Poststroke Shoulder Pain and Its Association With Upper Extremity Sensorimotor Function, Daily Hand Activities, Perceived Participation, and Life Satisfaction

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Objective: To assess the differences in upper extremity sensorimotor function, daily hand activities, and perceived participation and life satisfaction between individuals with and without poststroke shoulder pain (PSSP), and to determine how PSSP is associated with these variables.

Design: A cross-sectional study of a convenience sample.

Participants: Forty-nine community-dwelling individuals (mean ± standard deviation [SD] age, 64 ± 9 years), 24 with PSSP and 25 without (non-PSSP) were assessed, in mean ± SD 15 ± 8 months after stroke.

Methods: Upper extremity sensorimotor function was assessed, and daily hand activities, perceived participation, and life satisfaction were reported. Demographics were described, and shoulder pain characteristics were recorded in the PSSP group. Between-group differences and regression analyses were conducted.

Results: The PSSP group had significantly decreased passive shoulder abduction ($P = .001$) and upper extremity motor function ($P = .03$) in comparison with the non-PSSP group, but there were no significant differences between the groups in daily hand activities, perceived participation, or life satisfaction. In the multivariate analyses, PSSP (odds ratio [OR] 4.42 [95% confidence interval (CI), 1.21-16.24]; $P = .03$) and proprioception (OR 10.28 [95% CI, 1.1-96.01]; $P = .04$) were associated with upper extremity motor function, whereas perceived participation was associated with life satisfaction (OR 1.08 [95% CI, 1.03-1.13]; $P = .002$). Passive shoulder abduction, resistance to passive movements, and proprioception explained 45% of variance of daily hand activities, whereas daily hand activities, vocational situation, and gender explained 40% of variance of perceived participation.

Conclusions: This cross-sectional study indicated that there is an association between PSSP and upper extremity motor function, whereas the association between PSSP, daily hand activities, perceived participation, and life satisfaction is less clear. PSSP is commonly described as a severely disabling condition, but our results imply that, in individuals with mild-to-moderate upper extremity paresis, it may not have a great impact on their life situation.

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INTRODUCTION

Stroke is one of the most common causes of life-long disability in the adult population. In the acute phase after stroke, reduced arm and hand function are seen in a majority of the patients and in approximately 40% in the chronic phase [1,2]. Poststroke shoulder pain (PSSP) is a common type of pain after stroke [3,4], especially in those with reduced arm and hand function [5]. PSSP is associated with decreased motor function [5,6], somatosensory function [6,7], limited range of motion (ROM) [8,9], and spasticity [10]. Results of several studies showed that PSSP could be a long-lasting problem [5,7] and is associated with depression [6] and longer hospital stay [11,12].

Even if PSSP is common after stroke, it is unclear how it impacts the individual's life situation. The International Classification of Functioning, Disability, and Health [13] can be

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used to describe the consequences of a disease in the context of impairments (ie, body functions), activities (ie, the execution of a task), and perceived participation (ie, involvement in life situations).

Few studies have investigated how PSSP is associated with the ability to perform activities, perceived participation, and life satisfaction, and the results differ, depending on the study designs and the outcome measurements used. Two studies reported that patients with PSSP in the subacute phase have more activity limitations, according to Barthel Index, than patients without shoulder pain (non-PSSP) [5,11]. Other studies [6,14-16] were not able to confirm this finding. One study reported an association between PSSP and decreased participation [14], whereas another study did not find such a relationship [15]. Chae et al [16] found that PSSP was associated with reduced quality of life, but the results are difficult to interpret because they did not include a control group. Thus, further studies are needed to understand how PSSP affects different domains according to the International Classification of Functioning, Disability, and Health. Such knowledge would assist clinicians in the selection of appropriate rehabilitation interventions. The purpose of this study was to assess the differences in upper extremity sensorimotor function, daily hand activities, perceived participation, and life satisfaction between individuals with and those without PSSP, and to determine how PSSP is associated with these variables.

METHODS

Participants

A total of 49 community-dwelling individuals with stroke, 24 with and 25 without PSSP, were included. The participants were recruited from Lund Stroke Register, the Department of Neurology, and the Department of Rehabilitation at Skåne University Hospital by screening medical records. Inclusion criteria were (i) stroke onset at least 5 months before study enrollment, and (ii) decreased sensorimotor function in the affected arm but the ability to use the arm to some extent in daily activities. Exclusion criteria were (i) difficulty to communicate or to understand test instructions, (ii) other conditions that caused pain (eg, fibromyalgia, arthritis), and (iii) severe depression or other psychiatric symptoms. For participants with PSSP, the inclusion criteria were daily or almost daily pain in the affected shoulder for at least 4 months after stroke onset. At the time of data collection for this study, the participants also were included in another study regarding somatosensory functions assessed by Quantitative Sensory Testing [17].

Procedures

A flow chart of the recruitment of participants is presented in Figure 1. Medical records for approximately 1350 potential participants with stroke onset between May 2009 and December 2011 were reviewed. Of a total of 167 potential participants, 98 persons were contacted by mail with information about the study and 1-2 weeks later by telephone for an interview. The interview consisted of questions about independency in activities of daily living (including hand activities), walking ability, somatosensory functions, shoulder pain, general health, other diseases or conditions, and current medication. After the interview, 45 persons were excluded because they did not meet the inclusion criteria (22 persons), declined to participate (21 persons), or were unable to be contacted (2 persons). Fifty-three persons were assessed, but another 4 did not meet the inclusion criteria. Finally, 49 persons were included and gave their informed consent to participate. The study was approved by the regional ethical review board in Lund, Sweden (Dnr 2011/471).

Demographics and Characteristics

Before the assessments, age, gender, living situation, vocational situation, and stroke-specific characteristics (side of lesion, type of stroke, stroke onset, and length of rehabilitation) were recorded. Participants were asked about the occurrence of shoulder pain before and after their stroke onset. Pain in other parts of the body than in the paretic shoulder was registered (ie, pain in the lower extremities; the upper extremity; the back, neck, or head), and prescribed pain medication also was recorded.

Assessments and Outcome Measurements

All assessments were performed by a trained physical therapist (I.L.), with long experience of stroke rehabilitation. The assessments for this study lasted approximately 30-45 minutes and were performed before the Quantitative Sensory Testing assessments. During the day of assessments, all the participants were instructed to use their daily medication as prescribed.

Shoulder Pain. For the participants with PSSP (n = 24), the following data were recorded before the assessments: duration of shoulder pain; pain intensity; pain when eating, dressing, and raising the arm above the horizontal plane. Pain intensity was assessed by a 0-100−mm visual analog scale for pain (VAS-P). A VAS-P more than 40 mm was considered as moderate-to-severe pain [18].

Upper Extremity Sensorimotor Functions. Upper extremity sensorimotor functions were assessed by (i) passive ROM in abduction and external rotation of the upper arm, (ii) motor function, (iii) resistance to passive movements in the elbow, (iv) light touch, and (v) proprioception. Passive ROM was measured with a goniometer [9], which has been shown to be a reliable method [19]. Motor function in the upper arm and hand as well as advanced hand activities were assessed by using the Modified Motor Assessment Scale,