

ORIGINAL ARTICLE

Prevalence and Factors Associated with Shoulder Complex Function (SCF) Among the Elderly in Private Physiotherapy Clinic in Klang Valley, Malaysia

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ABSTRACT

Introduction: Shoulder problems have been a challenge among the aging population. Although reports surfaced on factors affecting shoulder dysfunction, however, such studies in relation to other factors like neck pain (NP) factor are limited especially among the elderly in the urban population. This study investigated the prevalence and factors associated with shoulder complex dysfunction among the outpatient elderly attending private physiotherapy clinics.

Methods: A total of 75 elderly aged ≥ 60 years old from four private physiotherapy clinics were recruited by simple random sampling method. The elderly were evaluated using the QuickDASH questionnaire to assess shoulder complex dysfunctions and NP scale. **Results:** A total of 92% of participants have shoulder complex dysfunction. A positive correlation of NP to shoulder complex dysfunction ($r(75) = 0.83, p < .001$) with significant associations of sex ($z = -2.549, p = 0.011$), smoking ($z = -2.388, p = 0.017$), lifestyle ($z = -5.780, p = 0.000$), hypertension ($z = -2.808, p = 0.005$), osteoarthritis ($z = -2.966, p = 0.003$), and NP scale ($z = -2.173, p = 0.031$). The predicting factor of shoulder complex dysfunction is sex ($\beta = 0.156, t(74) = 2.240, p = 0.028$) and NP scale ($\beta = 0.704, t(74) = 7.853, p = 0.000$).

Conclusion: There is a high prevalence of shoulder complex dysfunction among the outpatient elderly attending private physiotherapy clinics with a predicting associating factor of sex and NP.

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INTRODUCTION

The challenge among the aging population is the reduction in quality of life (QOL) and functions in active daily living (ADL) activities which leads to reduced function and increased dependence among the elderly causing a rise in healthcare costs and burdening the healthcare system in the country. The trend of shoulder complex dysfunction has been reported in many countries across Western and Asia (1). The gaps between existing studies are demographic and survey areas, however, the aging factor is theoretically relatable to pathophysiological changes of the shoulder complex (2). The shoulder complex range of movement (ROM) has an impact on participation in life roles and activities performed in daily life, such as dressing, eating, and grooming. Tasks

that incorporate reach-to-grasp movements demand the individual to use movement strategies. Aging causes changes in anatomical structures like soft and hard tissue restrictions and degenerations. This directly leads to postural changes and deformities like spinal deformity, spinal disc degeneration, compression, instability, and injury (3). It affects the upper limb function when there is biomechanical involvement especially when the shoulder has been undergoing loading and stress. The elderly with significant shoulder complex dysfunction has an impact on sleep, mood, and mental health (4). The magnitude of the problem could potentially affect the day-to-day burden experience, mentally and physically.

This study is significant as a preventive measure among the elderly as a foundation that creates a possibility of developing a new and effective physiotherapy and rehabilitation treatment framework. The nature of this study is mainly a survey study focused on patient feedback and does not require any physical experiment.

The aim of this study is to determine the prevalence and factors associated with shoulder complex dysfunction among the elderly attending private physiotherapy clinics.

MATERIALS AND METHODS

Samples

An analytical cross-sectional study design was done in four Synapse Physiotherapy clinics located in Bukit Damansara, KL Sentral, Cyberjaya, and Bangsar South. The study population is Synapse Physiotherapy outpatients, and the sample frame is elderly aged ≥ 60 years old. Male and female elderly were selected through a simple random sampling method. Participants who are verbally responsive or have underlying comorbidities (self-reported) like hypertension, diabetes, cardiovascular disease, parkinsonism, cerebrovascular disease, osteoporosis, osteoarthritis, history of vertebral fracture, and other spinal conditions/diseases are included in the study. However, participants with hearing impairment (self-reported and/or facility medical record) or undergone post-surgical intervention (e.g.: cervical, thoracic, or glenohumeral surgical intervention by self-reported and/or facility medical record) were excluded from this study. The sample size estimation was made to represent the descriptive and analytical research objectives calculated from nine independent variables and shows a minimum of 62 samples. By anticipating a 20% non-response rate, the minimum number of samples required is 72 samples. A total of 75 participants were recruited for this study.

Measuring Tools

The operational definition of this study is response through questionnaires. The NP of participants was measured by the Numerical Rating Scale (NRS). Participants are open to options "0 to 10" indicating the pain intensity of NP in 0 represents "no pain at all" whereas the upper limit represents "the worst pain ever possible". It is the most responsive tool and not a time-consuming assessment compared to other pain assessment tools (6). This tool has been evidenced to have good sensitivity and reliability toward pain (7). The shoulder complex dysfunction of the elderly was measured using the QuickDASH outcome measure which is an abbreviated and modified version of the initial DASH (Disabilities of the Arm, Shoulder, and Hand) questionnaire. The QuickDASH outcome measure inspects upper limb physical function in relation to musculoskeletal disorders. It has a sensitivity of 79% and specificity of 75% with a confidence of 90% at the smallest detectable change of 12.75 points (8). QuickDASH consists of 11 questionnaires and uses 5 points Likert scale where participants answer based on their functional capacity to engage in certain upper extremity activities. The activities tested in the QuickDASH outcome measure crucially involves the shoulder complex movements thus this meets the

requirement of a problem-solving solution.

Data Collection

In this research study, data were collected through a process involving multiple components. Firstly, the post-surgical medical records of the participants were thoroughly screened to extract relevant information regarding their surgical procedures and post-operative care. Following that, inclusion and exclusion criteria were applied to ensure the eligibility of the participants for the study. Demographic data, including age and sex, were also gathered. Finally, participants were asked to complete the NP and QuickDASH questionnaire.

Data Analysis

Data collected were analyzed using the IBM SPSS Statistics version 27.0.1 software application. Due to the relatively small sample size obtained ($N < 300$), the normal distribution of the data was determined using the Kolmogorov-Sminov and Shapiro-Wilk tests. Spearman's rho correlation was computed to assess the relationship between NP to shoulder complex dysfunction. A Kruskal-Wallis test was computed to compare all independent variables to QuickDASH scores. A multiple linear regression test was performed to predict factors associated with shoulder complex dysfunction.

Ethical Procedure

This study was approved by the Ethics Committee for Research Involving Human Subjects from Universiti Putra Malaysia (UPM). Permission to conduct the study has been approved by Synapse Physiotherapy, which is a private physiotherapy clinic providing vast physiotherapy and rehabilitation services to the public for ten years now, with four clinics across the Klang Valley. Each elderly was given a soft copy of the information sheet to brief them on the purpose and procedure of the research study. Digital consent and permission from the elderly were verified to ensure the elderly voluntarily participate in this research study and they are still free to withdraw from the study at any time, without giving a reason to respect individual autonomy. A thorough explanation on the assessment form was conducted for the elderly to carefully monitor the samples avoiding any harm either in a physical or psychological manner. The personal information of each participant, e.g., full name and identity number are removed to maintain the participant's anonymity and confidentiality.

RESULTS

Sociodemographic Statistics

It was discovered that the total population of outpatient elderly at Synapse Physiotherapy across four clinics was 178 persons. A total of 75 participants have partaken in the study. The majority are female participants (50.7%). Most participants were non-smokers (61.3%). The majority have hypertension (56%), diabetes (58.7%), osteoarthritis (61.3%), and led an active lifestyle (53.3%) (Table I).

Table I: Frequency table of demographic background data and characteristics of participants

Demographic	Frequency (n = 75)	Percentage (%)	M	SD
Age group				
60-70 years	38	50.7	1.7467	0.83978
75-84 years	18	24		
85 & above	19	25.3		
Sex				
Female	38	50.7	1.4933	0.50332
Male	37	49.3		
Hypertension				
Yes	42	56	0.5600	0.49973
No	33	44		
Diabetes				
Yes	44	58.7	0.5867	0.49575
No	31	41.3		
Osteoarthritis				
Yes	46	61.3	0.6133	0.49027
No	29	38.7		
Smoking				
Yes	29	38.7	0.3867	0.49027
No	46	61.3		
Lifestyle				
Active	40	53.3	0.5333	0.50225
Sedentary	35	46.7		

Prevalence Statistics

There was a high prevalence of shoulder complex dysfunction among the outpatient elderly with a total of 69 out of 75. Two participants had severe shoulder complex dysfunction at the QuickDASH score of 90.91 of 100. There is a strong relationship based on Cohen’s coefficient and a statistically significant association between NP and shoulder complex dysfunction, $r(75) = 0.83, p < .001$ (Table II).

Relationship Between All the Variables with QuickDASH Scores

A non-significant difference was found between the age group of participants ($z = -0.158, p = 0.874$), where we fail to reject the null hypothesis. There is no difference in QuickDASH scores among the different age groups of the participants. The QuickDASH score for participants with diabetes and those without diabetes has no significant difference ($z = -1.326, p = 0.185$). There are significant associations of QuickDASH score with sex ($z = -2.549, p = 0.011$), smoking ($z = -2.388, p = 0.017$), lifestyle ($z = -5.780, p = 0.000$), hypertension ($z = -2.808, p = 0.005$), osteoarthritis ($z = -2.966, p = 0.003$), and NP scale ($z = -2.173, p = 0.031$) (Table III).

Regression Analysis

In determining the relationship between sociodemographic factors to QuickDASH scores, a significant regression equation was found ($F(6,74) = 36.353, p < 0.000$) with an R^2 of 0.76 indicating

Table II: Result of Spearman’s rho correlation between NP and SCF

		NP Scale (NRS)	SCF
Spearman’s rho	NP Scale (NRS)	1.000	.831**
	SCF	-	.000
	NP Scale (NRS)	75	75
	SCF	.831**	1
	NP Scale (NRS)	.000	-
	SCF	75	75

** Correlation is significant at the 0.01 level (2-tailed)

Table III: Comparison of all variables to SCF scores

Demographic		Median	IQR	Mann-Whitney Test	p
Age	Group A	25	15.34-71.58		
	Group B	32	17.61-52.84	-0.158	0.874
	Group C	41	15.91-65.91		
Sex	Male	45	18.18-70.45	-2.549	*0.011
	Female	19	13.64-36.93		
Smoking	Yes	52	20.45-72.72	-2.388	*0.017
	No	27	13.64-42.04		
Lifestyle	Active	16	40.91-75.00	-5.780	*0.000
	Sedentary	66	13.64-26.70		
Hypertension	Yes	44	15.91-71.58	-2.808	*0.005
	No	27	11.36-35.22		
Diabetes	Yes	34	15.91-68.18	-1.326	0.185
	No	20	13.64-65.91		
Osteoarthritis	Yes	41	18.18-68.18	-2.966	*0.003
	No	16	12.50-35.22		
NP score	No pain (0)	14	1.75-15.91		
	Mild (1-3)	16	15.34-25.00	-2.173	*0.031
	Moderate (4-6)	38	27.84-47.16		
	Severe (7-10)	70	65.91-75.00		

*Significant at $p < 0.05$

that the model explained 76% of the variance and the model was a fair significant predictor of shoulder complex dysfunction. Participants’ QuickDASH score is equal to $-20.762 + 8.234$ (Sex) $- 0.612$ (Smoking) $- 6.969$ (Lifestyle) $+ 3.995$ (Hypertension) $+ 0.821$

(Osteoarthritis)+ 17.709 (NP scale). It was seen that sex ($\beta = 0.156$, $t(74) = 2.240$, $p = 0.028$) and NP scale ($\beta = 0.704$, $t(74) = 7.853$, $p = 0.000$) significantly contribute to the QuickDASH scores obtained (Table IV). The variable excluded from the bivariate analysis (diabetes) was a confounding variable in this study

Table IV: Result of multiple linear regression

Variable	B	β	p-value
Constant	-20.762		
Sex	8.234	0.156	*0.028
Smoking	-0.612	-0.110	0.886
Lifestyle	-6.969	-0.132	0.127
Hypertension	3.995	0.075	0.334
Osteoarthritis	0.821	0.015	0.817
NP Scale	17.709	0.704	*0.000

*Significant at $p < 0.05$

*Enter method was used in the model

DISCUSSION

Participants were recruited from the urban areas of Klang Valley, and it can be said that this population is more concerned and educated on health awareness. This portrays the elderly with a better education level practicing a healthier behavior and lifestyle (9). However, it was argued that elderly in the rural area have healthier lifestyles regarding physical activity and diet (10).

Most of the participants in this study were recruited from the Bukit Damansara outpatient elderly population with a prevalence of 31.8%. This study revealed a high prevalence of shoulder complex dysfunction among the outpatient elderly. It can be said that shoulder complex dysfunction among the outpatient elderly is common in urban areas. This common occurrence is influenced by their previous work environment as the elderly have been compensating for their ergonomic posture on top of aging structural changes which leads to the high prevalence of shoulder problems generally in Malaysia (11). This suggests that the epidemic is increasing in the urban areas in Malaysia. Regardless of the setting in rural or urban areas, the elderly in Malaysia generally has poor physical health (12). Moreover, a high percentage of 60.4% of poor physical health awareness was reported in a community-dwelling elderly in Kuala Lumpur (13). Hence, indicating shoulder complex dysfunction among the outpatient elderly is concerning.

There is a significant association between NP in relation to shoulder complex dysfunction among the outpatient elderly due to the musculoskeletal structures that correlate between NP and shoulder complex dysfunction. It is described that shoulder complex dysfunction improves with neck muscle exercises as the neck muscle tone and muscle stiffness reduces (14). As the proposed theory of sarcopenia, the soft tissue changes from aging contribute to functional capability among the elderly (15). The neck-shoulder function reduces when there is a progressive decline in muscle mass

and strength which further justifies these relationships. Furthermore, it was shown that NP increases with age (16). The degenerative change of the neck leads to NP which then affects postural control among the elderly (17). This explains the NP relation to shoulder complex dysfunction as a compensation reaction for comfort to adapt to daily living tasks. Results from the earlier study demonstrate a strong and consistent association of NP to shoulder complex dysfunction through experimental research by executing neck-shoulder exercise training after 6 weeks of rehabilitation (18).

There was a significant difference in QuickDASH scores with sex, smoking, lifestyle, hypertension, osteoarthritis, and NP scale. Sex was found to be an associated factor contributing to shoulder complex dysfunction. A possible explanation for this might be that women undergo hormonal changes like menopause. Menopause causes the estrogen level to drop which leads to joint stiffness and musculoskeletal problems. It is in agreement that other research findings showed a strong correlation between estrogen deficiency with musculoskeletal pain (19). This result corroborates the idea that gender is associated with shoulder pain as female shows a higher prevalence of shoulder pain (24.9%) than men (15.4%) (20). The current study found that smoking was an associated factor with shoulder complex dysfunction among the outpatient elderly. Perhaps, clinically relevant to this result is due to the reduction in blood circulation, which causes soft tissue tightness and joint stiffness (21). It has been conclusively shown that smoking directly affects shoulder function (22). Lifestyle factor was seen associated with shoulder complex dysfunction. It seems possible that this result is due to the loss of muscle mass and strength from inactivity. In addition, weight gain as a result of inactivity increases the pressure and stress on muscles, joints, ligaments, and tendons which subsequently leads to physical problems. It has been suggested that performing aerobic exercises an hour a week reduces the possibility of experiencing shoulder complex dysfunction more than not performing any aerobic exercises (23). Contrary to expectations, this study found a significant association between hypertension with shoulder complex dysfunction, which could only be a referred pain (24). This differs from the findings presented here. This rather contradictory result may be due to an increase in sensitivity to pain or discomfort (25). Another important finding was that osteoarthritis was found to be an associated factor to shoulder complex dysfunction. This result may be explained by the fact that the degeneration of the shoulder articular cartilage causes muscle and joint stiffness. Overall, the factors that have the most effect on shoulder complex dysfunction among outpatient elderly are sex and NP. Collectively, results from this study may suggest that the outpatient elderly may protect themselves from factors associated with shoulder complex dysfunction by modifying the modifiable factors like reducing the occurrence of NP to improve the shoulder complex. Further research is required to shed light on the mechanism underlying

NP to better establish how NP relates to the shoulder complex.

The limitation of this study is the lack of history of occupational physical load and time constraints was possible to perform assessments but not to perform examinations to confirm a clinical diagnosis. Due to unanticipated obstacles that occurred amid the research whereby the body of authority in most private physiotherapy clinics strictly constrained the outpatient elderly's exposure to visitors/outside/researchers due to the Coronavirus (Covid-19) outbreak as these is the high-risk and vulnerable group to the infection. Moving forward, healthcare organizations are recommended to consider the importance of factors associated to shoulder complex dysfunction by providing adequate knowledge and awareness to patients.

CONCLUSION

The outpatient elderly attending Synapse Physiotherapy has a high prevalence of shoulder complex dysfunction. There is a potential for sex, and NP to be associated with shoulder complex dysfunction portraying the significant importance of addressing the problem. Practitioners should consider including rehabilitation treatment of NP in the framework addressing the outpatient elderly with shoulder complex dysfunction. As for future research recommendations to better understand the implications of these results, future studies can be done with a larger sample size.

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