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Research Article

Factors Affecting Shoulder Pain in Paraplegic Wheelchair Users at Community Level in Bangladesh

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Received: November 04, 2019; **Published:** February 10, 2020

Abstract

Background: Independence is main goal in rehabilitation of spinal cord injury paraplegic patient. Wheelchair is an important aid for their mobility and independence. Wheelchair users very often complain shoulder pain. It becomes barrier for their independence.

Objectives: To find out possible factors of shoulder pain and related their pain intensity.

Study Design/Methods: The researcher was choosing cross sectional study design. The sample was selected who were minimum one-year wheelchair user in the community level. Purposive sampling method was selected. Face to face interview took place with 11 close ended questions used for find out the possible factors of shoulder pain and 6 questions were used in different activities for measuring the pain intensity through VAS scale. Chi square test was used to find out the relationship among different pain intensity and significant factors like age, years of wheelchair use, weight of wheelchair, duration of propelling and propelling environment.

Results: The total participant was 100. The male participant was 77% (n = 77) and female was 23% (n = 23). Mean ages were 35.28 ± 7.26 years. Of the participants 79% live in rural and 19% live in urban. The study result revealed that increase pain intensity was highly significant ($P < 0.05$) related to age, years of wheelchair use, duration of propelling time and propelling environment. Researcher identified positive association through chi square value among shoulder pain, duration of wheelchair use, propelling time and wheeling environment. Coefficient variation focuses greater in variation among shoulder pain and duration of wheelchair use (1 - 5 years); wheeling environment (flat surface) and propelling time (below 2 hours) though these variables are significant in chi square analysis.

Conclusion: This study present important information about possible factors of shoulder pain which will help for prevention, patient education, diagnosis and treatment.

Keywords: *Shoulder Pain; Possible Factors; Wheelchair User; Community*

Introduction

Most of the manual wheelchair users is the most common site of upper extremity pain in shoulder joint with the reported incidence of pain ranging from 32% - 78% [1-3]. More than half of manual wheelchair users will develop upper extremity overuse injuries or pain

during their lifetime [4]. Most of the complete paraplegic patient use wheelchair for their rest of life. Wheelchair user depends on their upper limb for their independent mobility. But wheelchair users very often complain of shoulder pain. Shoulder pain has been found to have a high prevalence in the spinal cord-injured population. The prevalence of shoulder pain in paraplegic individuals is high, between 30% and 70% [5]. Many studies have reported the prevalence of upper extremity pain in manual wheelchair users. But not find out the possible factors developing shoulder pain in manual wheelchair users.

Bangladesh is developing country. Most of people's works are at risk. That's why traumatic is main cause of spinal cord injury like fall from height and Road traffic accident, fall of object over head or back. Affecting rural male in their early age and presenting with complete injury of spinal cord is the most likely found in Bangladesh [6]. Centre for the Rehabilitation of the paralyzed (CRP) is the only one centre provide acute care and rehabilitation approximately 390 patients a year [7]. Most of the patients have developed shoulder pain. Shoulder pain in the chronic phases is believed to be partly a result of overuse [8]. Shoulder pain in individuals with paraplegia is multi-factorial. Spinal cord injured person can live an active life. The main aim of this study is to find out possible factors of shoulder pain in paraplegic wheelchair users and predisposing factors of shoulder pain.

Methodology

A cross-sectional descriptive study was performed with structured questionnaires and face to face interviews were conducted with persons having spinal cord injury (SCI).This study design was appropriate to find out possible factors of shoulder pain in wheelchair users like age, duration of wheelchair use, Propelling environment, propelling time, weight of wheelchair which is related to shoulder pain. Eleven (11) close questions used for to identify possible factors of shoulder pain and six (6) questions were used for measuring the pain intensity during different functional activities. Sample was selected from the CRP record file. Purposive sampling was used for sample selection because data was collected from the community level at Savar and Manikgonj area. The sample was selected who had Shoulder pain with Paraplegic patient and at least 1-year wheelchair user in the community. The data was analysis by using SPSS 22. Chi square test was used for find out the relationship among different pain intensity level and various factors like age, years of wheelchair use, weight of wheelchair, propelling time and propelling environment. This study was approved by the Institutional Review Board (IRB) of BHPI, the academic Institute of Centre for the rehabilitation of paralyzed. The study was conducted from June, 2017 to May 2018 and data collection period was September 2017 to December 2017.

Data collection tool

11 closed question used for find out possible factors influencing the development of shoulder pain that is weight of wheelchair, propelling environment, age, year of wheelchair use, propelling time. 6 questions used VAS Scale for measuring pain intensity in different functional activity like in normal time, transferring time, propelling rough surface, put up dress, lifting heavy weight and resting time.

The wheelchair Users shoulder Pain index (WUSPI) is a 15-item self report instrument measuring shoulder pain during transfers, wheelchair mobility, self cure and general activities. But in this research used 6 items for measuring shoulder pain in different functional activities according to Bangladesh situation. The visual analog scale anchored at no pain and severe pain used the measure the 6 items addressing the difficulty dimension during functional activities. Thus, the lowest score for each item is zero and the highest possible score is 10.

Results

Demographic characteristics

The total participants were 100. Majority of the participants (56%, n = 56) were below 40 years of age. More men were affected (approximately 77%, n = 77) than women (about 23%, n = 23). Among the participants location of shoulder pain in right area (62%), pain in the left shoulder (23%) and in both shoulder pain (15%). Most of the participants were married (around 63% n = 63). Most of them

(79%, n = 79) were from the rural area and the most common occupation after injury was shopkeeper (40%, n = 40). 42% (n = 42) of the participants were illiterate.

Clinical characteristics

Propelling environment (flat and Rough) was the most common cause 77% (n = 77), age group (36 - 45 years) 56% (n = 56), Maximum years of wheel chair use approximately 37% (n = 37) of the participants, maximum time of propelling period (4 - 6) hours 32% (n = 32) was the most common cause of shoulder pain. According to American *Spinal Injury* Association (*ASIA*) Impairment Scale 84% (n = 84) of the respondents were Complete -A, while the rest 16% (n = 16) were incomplete.

Demographic	% (n)	Demographic	% (n)	Clinical Causes	% (n)
Age (mean age ± SD) 35.28 ± 7.26		**Educational Status**		**Causes of Shoulder pain**	
< 40 years	56% (56)	Illiterate	42% (42)	Maximum year of Wheel chair use (15 > years)	37% (37)
> 40 years	44% (44)	Primary	30% (15)	Maximum time of Wheel chair propel (4-6) hours	32% (32)
Sex		Secondary	20% (20)	Increase age group (36-45) years	56% (56)
Male	77% (77)	SSC	8% (8)	Propelling environment (flat and Rough)	77% (77)
Female	23% (23)	**Occupation**		**Location of shoulder pain**	
Married	63% (63)	Shop keeper	40% (40)	Right shoulder	62% (62)
Unmarried	26% (26)	Computer tipper	15% (15)	Left shoulder	23% (23)
Divorced	11% (11)	Business	9% (9)	Both Shoulder pain	15% (15)
Residential Area		Housewives	18% (18)	**Type of injury** (According to ASIA)	
Rural	79% (79)	Unemployed	12% (14)	Complete	84% (84)
Urban	19% (19)	Students	6% (6)	Incomplete	16% (16)

Table 1: *Demographic and clinical characteristics.*

Pain intensity according to their age group

Above table showed that 15% participants that age group was 15 - 25 years in their mean pain intensity was 21.60 ± 6.4. 29% participants that age group was 26 - 35 years in their mean pain intensity was 27.13 ± 6.41. And 56% participants that age group were 36 - 45 years in their pain intensity was 32.76 ± 7.31. The table shows that the p value < .005. So, pain intensity in study groups were significantly related to their age.

Age group	Percentage	Mean pain intensity	P value
15 - 25 years	15%	21.60 ± 6.4	
26 - 35 years	29%	27.13 ± 6.41	.000
36 - 45 years	56%	32.76 ± 7.31	

Table 2: *Pain intensity according to their age group.*

Association of shoulder pain intensity and years of wheelchair use

Among the total participants 17% (n = 17) use wheelchair 1 - 5 years and their mean pain intensity was 22.52 ± 6.65. The other 17% who use wheelchair 6 - 10 years and 29% use wheelchair 11 - 15 years their mean pain intensity accordingly was 24.88 ± 5.60 and 30.44 ± 6.95. Another 37% who use wheelchair more than 15 years their mean pain intensity was 33.97 ± 7.16. In the association test using chi-square, the value was 104.85 which indicates among variables was significant because p-was 0.000 ($p < 0.05$). So, shoulder pain intensity was significantly related to years of wheelchair user. In case of coefficient variation showed that though maximum year of wheelchair users more than 15 years shows greater variation in SD, but real thing is that in statistically coefficient variation (CV) proved among 1 - 5 years in wheel chair users are greater in variation.

Year of wheelchair use	Percentage	Mean pain intensity (SD)	Chi square	P value	CV
1 - 5 years	17%	22.52 ± 6.65			29.52
6 - 10 years	17%	24.88 ± 5.60	104.85	.000	22.51
11 - 15 years	29%	30.44 ± 6.95			22.83
15 > years	37%	33.97 ± 7.16			21.07

Table 3: *Pain intensity according to years of wheelchair use.*

Association between shoulder pain intensity and weight of the wheelchair

From the total participants who use heavy weight and middle weight wheelchair their mean pain intensity is 29.30 ± 8.09 and 31.73 ± 6.07. The light weight wheelchair users mean pain intensity is 27.93 ± 9.30. The table shows that chi square value is 49.57 and the p value is 0.009 ($p > .005$). So, there is no significant relation between shoulder pain intensity and weight of wheelchair.

Weight of the wheelchair	Percentage	Mean pain intensity	Chi square	P value
Heavy weight (25 - 35) kg	70%	29.30 ± 8.09		.009
Middle weight (15 - 25) kg	15%	31.73 ± 6.07	49.57	
Light weight (5 - 15) kg	15%	27.93 ± 9.30		

Table 4: *Pain intensity according to their Weight of the wheelchair.*

Shoulder pain intensity according to their wheeling environment

Among the participants seventy seven (n = 77) persons who use both flat and rough surface in rural area and their mean pain intensity was 31.44 ± 7.45 and only twenty three (n = 23) participants only use flat surface in urban area and their mean pain intensity was 22.82 ± 6.12. In the association test using chi-square, the value was 46.46 which indicates among variables was significant because p-was 0.000 ($p < 0.05$). So, shoulder pain intensity was significantly related to wheeling environment that were flat and rough area. Study revealed that coefficient variation in flat and rough surface among the wheelchair users in greater variation in SD, but real thing is that in statistically CV proved that only flat surface shoulder pain among the users were in greater variation.

Wheeling environment	Percentage	Mean pain intensity (SD)	Chi square	P value	CV
Flat+ Rough surface	77%	31.44 ± 7.45	46.46	.000	23.69
Only Flat surface	23%	22.82 ± 6.12			26.82

Table 5: *Pain intensity according their wheeling environment.*

Association between shoulder pain intensity and propelling time

From the total participants 19% (n = 19) were propelling for minimum time and their mean pain intensity was 22.31 ± 6.36 and 49% (n = 49) participants were propelling for moderate time and their mean pain intensity was 29.77 ± 7.70. The other 32% (n = 32) was used wheelchair maximum time and their pain intensity was 33.21 ± 6.62. Above table shows that the p-value is .000 (p < .005). So, there is significant relationship between shoulder pain intensity and propelling time. But in case of coefficient variation (CV) showed that though maximum wheelchair propelling time was 2-4 hours shows greater variation in SD, but real thing is that in statistically CV proved below two hours duration of wheel chair propelling users were greater in variation.

Wheelchair propelling time	Percentage	Mean pain intensity (SD)	Chi square	P value	C.V
Minimum time (below 2 hours)	19%	22.31 ± 6.36			28.50
Moderate time (2 - 4 hours)	49%	29.77 ± 7.70	68.987	.000	25.86
Maximum time (4 - 6 hours)	32%	33.21 ± 6.62			19.93

Table 6: *Association between shoulder Pain intensity and wheel chair propelling time.*

Discussion

This study found that increasing age group is significantly related to their pain intensity. Alm, Saraste, and Norrbrink [9] found his research age was associated with ongoing shoulder pain. Many study reported that age is one of the factor for increasing pain. The researcher initiated that there is a high significant relationship of pain intensity and duration of wheelchair use. Boninger., *et al.* [1] reported that the risk factor of shoulder pain are the duration of injury, age and wheelchair propulsion style.

This study discovered that who use flat and rough surface their pain intensity is more than who use only flat surface. Samuelsson, tropp, and Gerdle [5] stated that the wheelchair user with paraplegia due to SCI puts an intense load upon the muscles and joints of the upper extremities during wheelchair propulsion such as driving. Alm., *et al.* [9] found that the highest median intensities of shoulder pain according to the WUSPI were reported for daily activities such as pushing the wheelchair up ramps or inclines outdoors. The increasing pain intensity is significantly related to the propelling time. Shoulder pain is common overuse problem in wheelchair users [10].

This study found that weight of wheelchair is not significantly related to pain intensity. In Bangladesh most of the wheelchair user live in rural area. Their propelling environment is not flat. So, after rehabilitation CRP provide wheelchair which is heavy weight. It is suitable for prevention of fall from wheelchair. For propelling this chair need more resistance and overuse of the shoulder. Veeger, Rozendaal and Van der Helm [11] reported that during propulsion of a wheelchair, the shoulder is repetitively forced through the motion against resistance.

Limitation of the Study

This number may not be representing the overall population of wheelchair users. This study only investigated the association pain intensity between weight of wheelchair, age, wheeling environment, propelling time but not check the sitting posture and propelling style. Whereas the shoulder function and ability to perform activity and participate in society did not correlate in this study. Further research is needed to understand the exact etiopathological factors, their clinical relevance and plan for appropriate intervention.

Conclusion

This study present important information with regards to prevent the shoulder pain who are using wheelchair in the community level. The study needs to be replicated on a wider scale to determine its generalisability to a wider population. It can also help to provide knowledge for the health service provider and help to deal with shoulder pain and prevent them. This study has given us useful information for everyday practice with the rehabilitation of clients with SCI.

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Volume 11 Issue 3 March 2020