To Study The Consequences Of Shoulder Pain Intensity On Quality Of Life And Physical Activity In Manual Wheelchair Users - A Correlation Study

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Abstract: Background and Objectives: Numerous persons are dependent on a manual wheelchair for their mobility. They rely largely on the upper extremities for mobility and transfer, which eventually results in shoulder pain. Various studies had shown high prevalence of shoulder pain among wheelchair users. So, the purpose of this study was to see the relationship of shoulder pain intensity on quality of life and physical activity in persons who propel a manual wheelchair. Aim is to correlate the shoulder pain intensity with quality of life and physical activity in manual wheelchair users. Methodology: 35 subjects who met the criteria were included in the study. They were divided into two groups. Subjects of Group 1 (with shoulder pain) - completed a series of questionnaire (Wheelchair User's Shoulder Pain Index , SF-36 Health Survey, Physical Activity Scale for Individuals With Physical Disabilities) administered by an interview process. And subjects of group 2 (without shoulder pain) completed a series of questionnaire (SF-36 Health Survey, Physical Activity Scale for Individuals With Physical Disabilities) administered by an interview process. Results&Conclusion:There was no significant correlation of shoulder pain intensity with quality of life and physical activity in manual wheelchair users. [Patel NNJIRM 2015; 6(5):11-16]

Key Words: Physical Activity, Quality of life, Shoulder pain, Wheelchair

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Introduction:A wheelchair is a chair with wheels to help people move around. It is used by individuals who have impairments that limit their ability to walk.[1] Numerous persons are dependent on a manually propelled wheelchair for their mobility.[3] Individuals who might be likely wheelchair users includes the patients with:

Spinal cord injuries (SCI), SCI results in a complete or partial loss of motor and/or sensory function below the level of injury. It causes extensive functional impairment, compelling many persons to use wheelchair.[2]

Hemiplegia, and other types of paralysis, the muscle spasticity can cause gait patterns to be awkward and jerky. The constant spastic state of the muscle can lead to bone and tendon deformation, further complicating the patient's mobility. Many patients with spastic hemiplegia are subjected to canes, walkers and even wheelchairs.[4]

Multiple sclerosis (MS), approximately 25% of people with MS will eventually need a wheelchair.[5]

Cerebral palsy (CP), Elisabet Rodby-Bousquet studied the Use of manual and powered wheelchair in children with cerebral palsy & conclude that In total population of children with CP, aged 3-18 years, 29% used a wheelchair indoors and 41% outdoors.[6]

Amyotrophic lateral sclerosis (ALS), It is a progressive neurologic disease in which weakness in the lower extremity musculature impairs mobility, results in falls, and restricts activities of daily living (ADLs). And these patients will eventually require a wheelchair for mobility as their disease symptoms progress.[7]

Spine bifida, People with spina bifida higher on the spine (near the head) might have paralyzed legs and use wheelchair.[8]

Arthritis, some people with arthritis find it difficult to move around and need to use a mobility aid, such as a walking stick or a wheelchair.[9]

Lower limb amputees, Walking may not always be possible for someone who has lost a leg. Some people will be able to use a prosthesis(artificial limb) to walk, others may use a wheelchair, crutches or a walker for their mobility.[10]
Wheelchair users rely largely on the upper extremities for mobility and transfers, which eventually results in degenerative structural or physiological joint changes. Researchers have reported that wheelchair users demonstrate

chronic degenerative injuries to soft tissues, including impingement syndromes, rotator cuff tears, sprains, strains and avascular necrosis, as well as evidence of radiological degenerative changes in the shoulder joint.[11]Since the shoulder is optimally designed for reaching and locating the hand in the environment, these weight-bearing loads lead to mechanical trauma and place the shoulder joint at risk for overuse. The sequel of this pattern of use is pain.[12]

Wheelchair propulsion involves 2 separate phases, the propulsive and the recovery phase. The propulsive phase is initiated when the hand comes into contact with the pushrim and continues until the point at which contact is removed at the end of the stroke. The recovery phase involves the motion when the hands disengage from the pushrim until the upper extremities swing back to contact the pushrim once again. As a result of years of wheelchair propulsion, shoulder muscles active during the push phase are believed to become stronger, whereas the muscles that are involved during the recovery phase remain at the same strength. The stabilizing components of the shoulder (rotator cuff, deltoid, and long head of the biceps brachii muscles) may be altered because of the repetitive nature of wheelchair propulsion. The muscles active during wheelchair propulsion (internal rotators, adductors, and flexors) may become stronger as new movement patterns are used, creating an imbalance at the shoulder joint. The movement patterns may then be altered, causing the supraspinatus muscle to be impinged between the humeral head and the acromion, creating pain and inflammation, and possibly leading to rotator cuff tears.[13]

Also, during the propulsion of wheelchair, the shoulder is repetitively forced through an arc of motion against resistance. At a low intensity of wheeling, the contact forces within the shoulder are low, but the muscle forces in the rotator cuff are high and may indicate muscle damage. Wheeling at a low intensity may not cause severe damage to the shoulder joint, but because of its repetitive nature & along with the many other activities of daily living that place higher stresses on the shoulder joint, wheelchair users are reporting high levels of shoulder pain.[14]

It is common for persons with SCI to experience shoulder pain at some point in their lives.[12]

Khamis El Essi et al, in 2012, Surveyed persons with SCI who were experiencing pain and determined that the Shoulder pain which ranged from mild to severe, especially during their usual activities, was prevalent about 62 % who use MWCs, but it was relieved at rest, while 15% of the subjects suffered from mild to moderate shoulder pain.[2]

It interferes with essential daily activities, such as propelling the wheelchair, driving, dressing, and transferring themselves, so that some of them request other people for help.[2] The most common etiology of shoulder pain is reported to be chronic impingement syndrome (Bayley et al., 1987; Sie et al., 1992; Requejo and Mulrouy, 2008).[15]

Severity of pain levels in individuals with SCI has been shown to impact QOL. Lundqvist et al determined that severe bodily pain is related to lowered QOL scores.[12]

Low levels of physical activity in persons with physical disabilities may decrease their aerobic capacity, muscular strength and endurance, and flexibility, all of which have the potential for restricting functional independence and increasing the risk for chronic disease and secondary complications.[16]

Therefore, attaining some level of physical activity is important for individuals with disabilities because it can reduce the risk of secondary health problems that could further limit their functional independence. In addition, physical activity may also maintain or improve this group's physical capacity and, therefore, contribute to an increased quality of life.[17]

Therefore, the purpose of this study was to investigate the relationship of shoulder pain intensity on quality of life and physical activity in persons who propel a manual wheelchair.

Material and Methods: Thirty-five patients who uses manual wheelchair (25 male, 10 female; 33.65% of 104 patients screened) were included in the study. All the participants were signed written

consent after being informed in detail about the study. All participants met the following inclusion criteria: (1) Using Manual wheelchair for minimum 6 months of duration, (2) Age group between 18-65 years, (3) Willing to participate. Individuals with the following criteria were excluded: (1) Hospitalization within the last month for any medical condition. (2) Fracture within the last year in painful arm. (3) Any surgical procedure within the last year in painful arm. (4) Any injury within the last year in painful arm. (5) Diagnosis of adhesive capsulitis within the last year in painful arm. (6) A cortisone injection to the painful shoulder within the last 4 months. (7) Diagnosed with Reflex Sympathetic Dystrophy. (8) Diagnosed with Rheumatoid arthritis. (9) Any serious associated medical conditions.

Outcome measures:

Wheelchair User's Shoulder Pain Index (WUSPI) - (WUSPI) is a 15-item self-report index designed to measure severity of shoulder pain during functional activities like transfers, wheelchair mobility, Self-care and general activities in wheelchair users. An identical VAS anchored at 'no pain' and 'worst pain ever experienced' was used to measure the 15 items addressing the pain dimension during functional activities. Thus, the lowest possible score for each item was zero and the highest possible score was 10. Participants were asked to mark an ''X'' on the line to describe their shoulder pain intensity during that activity. The subject's score on each item was calculated by measuring their response on the VAS in cm. Index scores were calculated for each of the pain and difficulty dimensions and for the total index by adding the component individual item scores. Not all participants performed all the activities listed on the WUSPI. Therefore, the total raw score was divided by the number of activities performed.

SF – 36 Health Questionnaire - SF-36 Health Survey, 36-item instrument for measuring health status and outcomes from the patient's point of view. The SF-36 Health Survey measures eight health concepts, which are relevant across age, disease and treatment groups: physical functioning, role limitations due to physical health problems, bodily pain, general health, vitality (energy/fatigue), social functioning, role limitations due to emotional problems and mental health (psychological distress and psychological well-being).

Physical Activity Scale for Persons with Disabilities - The Physical Activity Scale for Individuals With Physical Disabilities (PASIPD) queries information about the number of days and average hours in a day spent in a variety of activities (13 in total, including leisure, household, and work-related activities) over the last 7 days. The total score is the product of the average hours spent in an activity daily and the metabolic equivalents (MET) summed over each item for questions 2 through 13 (question 1 functions as a practice question).

Procedure

Firstly, the patient's proforma was filled. According to proforma, a subject who was having shoulder pain was included in Group 1(with pain) and a subject who was not having shoulder pain was included in Group 2(without pain). Group 1- with shoulder pain - Participants completed a series of questionnaire (WUSPI, SF-36 Health Survey, PASIPD) administered by an interview process. Group 2 – without shoulder pain - Participants completed a series of questionnaire (SF-36 Health Survey, PASIPD) administered by an interview process. In both groups, these instruments were administered in a consistent order and all questionnaires and were completed during the same visits.

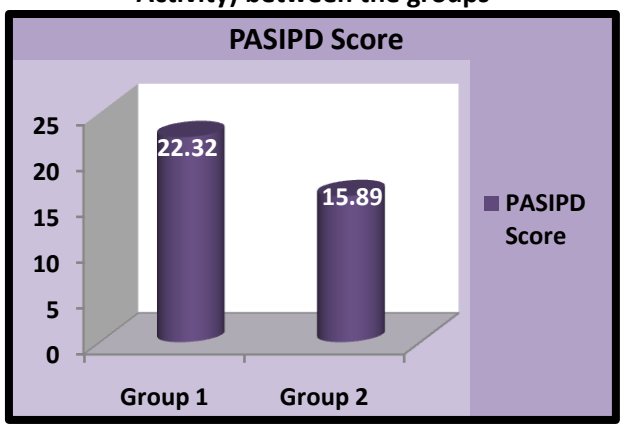
Results: Correlations

Table 1: Correlation of Pain intensity with Quality of life and Physical Activity

Variable 1	Variable 2	Statistical test	R value	P value	Conclusion
Pain	QOL	Pearson	0.32	0.913	NS medium positive correlation
Pain	QOL (physical)	Pearson	-0.042	0.888	NS – small negative correlation
Pain	QOL (mental)	Pearson	0.076	0.795	NS – small positive correlation
Pain	Physical activity	Spearman	0.090	0.759	NS – small positive correlation

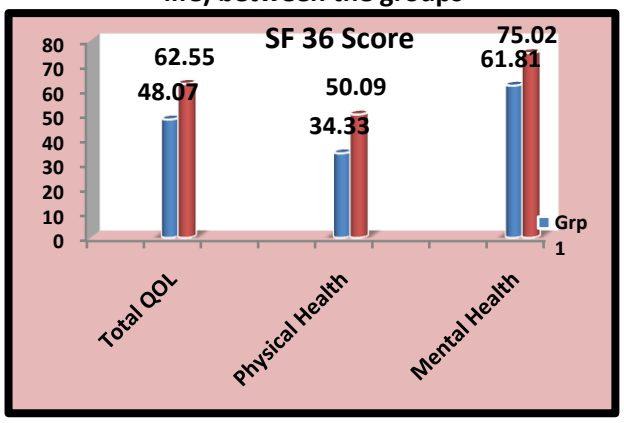
Comparison of PASIPD scores between the groups - Mann-Whitney test was used to compare the PASIPD score between the groups. And P-value was 0.866, which is greater than 0.05 (P > 0.05) so it suggests no significant difference between the groups in physical activity.

Graph 1 – Comparison of PASIPD score (Physical Activity) between the groups



Comparison of SF 36 scores between the groups – Unpaired t- test was used to compare the SF36 scores between the groups. And P-value for total QOL was 0.005, for physical health -0.004 and for mental health-0.030; which is less than 0.05 (P < 0.05) so it suggests significant difference between the groups. By further observing the mean values (graph 2) for both the groups, shows that Group 2 (without pain) is having better QOL than group 1 (with pain).

Graph 2 – Comparison of SF 36 score (Quality of life) between the groups



Discussion: The purpose of this study was to investigate the relationship of shoulder pain intensity with quality of life and physical activity in persons who propel a manual wheelchair. As per result, shoulder pain intensity is not having statistically significant correlation with quality of

life and physical activity in manual wheelchair users which is contradict to the study done by D. Stirane et al. (2012) who stated that shoulder pain intensity is negatively correlating to quality of life and physical activity. Their study had included wheelchair users who used it for more than 50 % of the time and the mean hours of time in wheelchair/day were 11.8 hours whereas the current study had included all the subjects who use the wheelchair manually regardless of the time they use per day. Also the mean hours of wheelchair use/day were only 3.49 hours. So this might be the possible reason behind non-significant result.

PASIPD (Physical Activity Scale for Persons with Physical Disabilities) scale is used to measure physical activity in this study. The limitation of this PASIPD measurement tool used is that it utilizes a standard (average) MET (metabolic equivalent) for each activity that does not distinguish how the activity was actually performed, thereby resulting in similar scores for individuals who might have performed the activity at quite different intensity levels and with different degrees of difficulty.

Though there is no statistically significant correlation between pain intensity & physical activity but from the r value (0.090), it shows small positive correlation. Ideally it is not possible but this result might be because of two reason - First that, the limitation of the PASIPD (Physical Activity Scale for Persons with Physical Disabilities) measurement tool used in this study is that it utilizes a standard (average) MET (metabolic equivalent) for each activity that does not distinguish how the activity was actually performed, thereby resulting in similar scores for individuals who might have performed the activity at quite different intensity levels and with different degrees of difficulty and the second reason is that the mean intensity of pain is 3.87 which can be consider quite less. So person is able to do physical activity even with difficulty.

Also, though there is no statistically significant correlation between pain intensity & quality of life but from the r value (0.32), it shows medium positive correlation. Also when correlating with QOL (physical health) & QOL (mental health) separately, it shows negative correlation of pain with physical health and positive correlation with mental health. So when pain increases, physical QOL decreases because patient feels difficulty in doing physical activity with pain whereas when pain increases, mental health is also increasing – that might because patient is psychologically strong. Also by observing the mean value for physical health (34%) and mental health (60%), we can say that improvement in overall QOL is because of better mental health rather physical health.

Further, though there is no correlation between shoulder pain & quality of life, but when we compared the scores of quality of life between the groups – result shows that there is significant difference in quality of life between the groups that wheelchair users without shoulder pain is having better quality of life compared to wheelchair users with shoulder pain. But there is no significant correlation between shoulder pain & QOL, thus shoulder pain is not the possible reason for poor QOL in group 1 that is wheelchair users with shoulder pain. The reason behind that can be-

- Group 1 is using the wheelchair since longer duration (mean – 81.43 months) compare to group 2 (mean – 45.76 months) and our result says that duration is negatively correlating with QOL.
- Group 1 is using the wheelchair for more hours in a day (mean - 4.25 hours) compare to group 2 (mean - 2.98 hours) and our result says that wheelchair use/day is negatively correlating with QOL.
- An another limitation of our study is that in many instances our subjects experienced pain in other regions of their bodies in addition to their shoulder pain; however, this information was not recorded.

This study had included total 35 patients among which 14 had shoulder pain which shows the 40 % of prevalence rate of shoulder pain among manual wheelchair users. Clinical Implications of this study includes: (1) There is need to implement environmental adaptations for streets and crossing, as well as the entrances of all institutions to be more suitable for persons with disabilities. (2) Find the reason for poor quality of life in manual wheelchair users other than shoulder pain and try to deal with that. It can be - Social barriers, personal barriers, financial barriers, environmental barriers.

Conclusion: According to the results, Null hypothesis is accepted and Experimental hypothesis is rejected. So From present it is concluded that Shoulder pain intensity is not having any significant correlation with quality of life and physical activity in manual wheelchair users.

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Conflict of interest: None

Funding: None

Cite this Article as:Patel N, Patel F, Jadeja T. Consequences Of Shoulder Pain Intensity On Quality Of Life In Manual Wheelchair Users. Natl J Integr Res Med 2015; 6(5): 11-16