Original Article
http://mjiri.iums.ac.ir

Medical Journal of the Islamic Republic of Iran (MJIRI)
Iran University of Medical Sciences

Assessment of the relationship between Quality of Life and Upper Extremity Impairment Due to Occupational Injuries

Mahdie Golchin[1], Mirsaeed Attarchi[2], Elham Mirzamohammadi[3]
Mostafa Ghaffari[4], Saber Mohammadi[5]

Received: 2 June 2013 Accepted: 16 July 2013 Published: 23 Feb 2014

Abstract

Background: Severe upper extremity injuries can affect the quality of life in patients and cause multi-factorial and long-term costs of disease. The aim of this study was to assess quality of life in patients with upper extremity injuries caused by work-related accidents.

Methods: In this study cross-sectional method was used in patients referred to the Occupational medicine Clinic of Rasoul Akram Hospital to determine their impairments. Patient's information including demographic variables, calculation of the impairment rate based on AMA Guide book (in terms of WPI), returning to work, and location of injury, work experience and type of injury. Then the quality of their life was assessed and interpreted using SF36 questionnaire.

Results: 203 patients were evaluated. Different aspects of the patients' life were not associated with age, gender and education of patients based on The SF-36 questionnaire. There was an inverse relationship between the percentage of patients' impairment and different aspects of life quality; there were also a significance correlation between impairment rate and physical performance of patients ($p<0.001$, $r= -0.26$), social performance of patients ($p= 0.001$, $r= -0.24$), pain ($p= 0.005$, $r= -0.2$), emotional health of patients ($p= 0.006$, $r= -0.29$), energy / fatigue in patients ($p<0.001$, $r= -0.29$) and the patient's general health ($p<0.001$, $r= -0.27$).

Conclusion: This study shows that upper extremity impairment due to occupational injuries has an inverse and significant association with various aspects of quality of life.

Keywords: Quality of life, Upper extremity, Occupational injuries, Impairment.

Cite this article as: Golchin M, Attarchi M, Mirzamohammadi E, Ghaffari M, Mohammadi S. Assessment of the relationship between Quality of Life and Upper Extremity Impairment Due to Occupational Injuries. *Med J Islam Repub Iran* 2014 (23 Feb). Vol. 28:15.

Introduction

Work-related injuries in the upper extremities are of the most common work-related disorders which are visited by general practitioners and specialists in occupational medicine (1). In studies conducted in different countries, these injuries account for the most of reported injuries with the occupational settings (2,3).These injuries have a negative impact on the quality of life of these people.

Quality of life is the most important index in the evaluation of therapeutic interventions in the life of these people (4); Most of treatment programs for patients with upper extremity injuries and even im-

1. Occupational Medicine Resident, Occupational Medicine Department, Tehran University of Medical Sciences, Tehran, Iran. mahdie.golchin2000@gmail.com
2. Associate Professor of Occupational Medicine, Occupational Medicine Department, Iran University of Medical Sciences & Brain and Spinal Injury Research Center (BASIR), Imam Khomeini Hospital, Tehran University of Medical Sciences, Tehran, Iran. drmsattarchi@gmail.com
3. Occupational Medicine Specialist, Brain and Spinal Injury Research Center (BASIR), Imam Khomeini Hospital, Tehran University of Medical Sciences, Tehran, Iran. elmirzamo@yahoo.com
4. Assistant Professor of Occupational Medicine, Brain and Spinal Injury Research Center (BASIR), Imam Khomeini Hospital, Tehran University of Medical Sciences, Tehran, Iran. m_ghafaari@yahoo.com
5. (**Corresponding author**) Associate Professor of Occupational Medicine, Occupational Medicine Department, Iran University of Medical Sciences & Brain and Spinal Injury Research Center (BASIR), Imam Khomeini Hospital, Tehran University of Medical Sciences, Tehran, Iran. sabermohammadi@gmail.com

pairment measure the quality of life and rehabilitation based on their individual performance and pay less attention to other aspects of quality of life of these people (5). Upper extremity injuries are responsible for more than one-third of all injuries in the United States and its prevalence is 4.3 percent per 3,000 people. It is also responsible for 30 percent of all injuries and damages resulting to lost workdays (6).

Studies have shown that people who suffer from upper extremity injuries experience emotional and psychological stresses due to various reasons such as pain, difficulty in performing daily activities, dependence on others and getting help from them to do their affairs, uncertainty of outcomes in the future and the appearance of their injured limb. These stresses together with the loss of job and the high cost of treatment may have serious effects on their quality of life (7).

According to the research conducted by the researcher, no study on quality of life after upper extremity injuries resulting from occupational accidents has been done yet in Iran and given the importance of this issue and its economic burden on individuals, families and society and the resulted reduced quality of life, this study evaluates the quality of life after upper extremity injuries resulting from occupational accidents.

The aim of this study was to assess quality of life in patients with upper extremity injuries caused by work-related accidents.

Methods

Rasoul Akram Hospital is one of Tehran's most important centers for doing studies on the work-related diseases and injuries. One of the cases assessed in this center is to determine the level of impairment among employed individuals following traumatic injuries during labor. Given the possibility of examining and interviewing with these patients at this center, people referred to the center for determining their impairment in 2011 were examined and individuals with work-related upper extremity injury included in the study. All patients were examined by a specialist in occupational medicine and the rate of their impairment was assessed based on the American Medical Association book (AMA) and the Whole Person Impairment (WPI) and the results were recorded (8) and those with no upper extremity impairment excluded.

In this cross-sectional study, after selecting patients, their demographic characteristics were recorded through asking questions from patients and studying their hospital records. Then their WPI calculated (assessed) and other information, such as return of work, location of injury, work experience and type of injury were all recorded. Then in order to evaluate the quality of life of patients, SF36 questionnaire (short form of health survey) was used. This questionnaire is a tool to assess health-related quality of life developed in the United States (9) and the psychometric analysis of its translated version was used in various populations (10-16). The mean duration of working shift in participants was ranged from 8-14 hours.

The SF-36 questionnaire is consisted of 36 questions with following 8 scales: physical function with 10 items, functional limitations due to the physical health with 4 items, general health with 5, vitality (VT) with four, social function with 2, role limitation due to the emotional problems with 3 and mental health with 5 (9). Another item that showed health changes for one year was also assessed by SF-36 questionnaire which ultimately examined both physical health (physical performance, physical limitations, physical pain, general health) and mental health (vitality, social performance, emotional problems, and mental health). Scores for each scale varied from 0 to 100 points. 0 reports the worst and 100 reported the best condition in the relevant scale (17). The questionnaire was translated to persian by Montazeri et al. in 2005, and its reliability was also determined (18).

Statistical Analysis

Data were entered into SPSS V.16 soft-

ware. The mean and the standard deviation were used for descriptive data and the Chi-Square used to compare qualitative variables and t-test and ANOVA applied to compare the quantitative variables. Also Correlation test was used to examine the relationship between WPI and the quality of life of patients. Finally, the main variables affecting quality of life were analyzed using multiple logistic Regressions. In this study, the confidence level (α=0.05) and the test power (β= %20) were considered as 95% and 80%, respectively.

Principles of this study were approved by the ethics committee of the Tehran University of Medical Sciences and patients included in the study with the consent and the patients' personal information kept confidential by the researcher.

Results

Patients included in this study were 203 individuals in number with their mean age of 32.16 years (SD=8.78). The level of education of these patients, revealed that 5 patients were illiterate (2.5%), 39 primary school education (19.2%), 78 had completed secondary school education (38.4%), 75 diploma degree (36.9%) and associate's degree (3%). 114 (56.2% of patients) dominant hand injury, and 89 (43.8%) did not have such an injury. Results of the qualitative variables assessment are presented in Table 1. WPI percentage of patients ranged from 1 to 77% and its average was 21.87% (SD=14.84). The mean duration between the incidence of event and being visited by the physician was 8.45 months ranged from less than one to 250 months. Also the patients' work experience ranged from 1 to 480 months and its average was 45.31 months. Results of quantitative variables are presented in Table 2 and the results of assessing the factors affecting quality of life of patients using SF-36 questionnaire are shown in Table 3.

The patients were divided into two groups according to median age on understudy population (30 years) into the age of 30 years or less and above 30 years and the various aspects of quality of life in these two age groups were not tatistically signifi-

Table1. Results of the qualitative variables assessment

		Number (Percent)
Age	≤30	101(49.8%)
	>30	102 (50.2%)
Educational level	Guidance and high school [a]	122 (60.1%)
	High school graduate [b] and higher	81 (39.9%)
Sex	Female	4 (2%)
	Male	199 (98%)
Marital status	Single	54 (26.6%)
	Married	149 (73.4%)
Instrument of injury	Press	71 (35%)
	Plastic injection	13 (6.4%)
	Saw	23 (11.3%)
	Cutting	94 (46.3%)
	Others	2 (1%)
Injury type	Sharp	98 (48.3%)
	Blunt	47 (23.2%)
	Sharp and blunt	54 (26.6%)
	Burning	1 (0.05%)
	Missing	3 (1.5%)
Amputation		20 (9.9%)
Dominant hand	Right	184 (90.6%)
	Left	19 (9.4%)
Location of injury	Right hand	104 (51.2%)
	Left hand	96 (47.3%)
	Both hands	3 (1.5%)
Returned to work		128 (63.1%)

[a] Between 8-12 years of education in school
[b] At least 12 years of education in school

Table 2. The quantitative variables assessment

	Mean	Std. Deviation	Median	Minimum	Maximum
Age(years)	32.16	8.78	31	17	60
Number of children	1.04	1.17	1	0	5
Duration between injury and visit(months)	8.45	22.69	4	0	50

Table 3. The factors affecting quality of life of patients using SF-36 questionnaire

QOL (questions)	Min	Max	Mean	Std. Deviation	Median
Physical Function (3-12)	5	100	63.61	19.27	65
Role limitation due to physical health (13-16)	0	100	20.94	29.20	0
Social function (20,32)	0	100	40.09	24.46	37.5
Role limitation due to emotional problem (17-19)	0	100	23.15	33.42	0
pain (21,22)	0	100	35.54	26.31	32.5
Emotional well being (24-26,28,30)	0	100	46.86	23.32	44
Energy/fatigue (23,27,29,31)	0	100	44.19	23.99	40
General health (1,33-36)	0	100	45.34	22.34	45

cant. The relationship between the level of education and quality of life in ANOVA test was not also statistically significant. The T-test for two groups of high school diploma and lower degree showed, no significant difference in terms of their quality of life. In assessing the location of the injury in upper extremity, no difference observed between injuries of right, left and both hands in terms of quality of life. Also the quality of life of patients with dominant hand injury, based on SF-36 questionnaire, was similar to others with no significant difference. As far as marital status was concerned, no difference was observed between the quality of life in both single and married people after injury. Also, the number of children had no affect on the quality of life. When the quality of life of those who had no children was compared with the quality of life of married ones with children, no significant difference was observed. When the relationship between work experience of patients and their quality of life was assessed, only the patients' social performance score showed a direct and weak correlation with their work experience ($p=0.016$, $r=0.168$). Comparison of quality of life in sharp and blunt injuries showed that social performance in patients with sharp injury was 42.73% (SD=25.63) and 32.98% (SD=24.23) ($p=0.031$) for blunt injury and the observed difference was statistically significant.

The percentage of pain in people with sharp injuries was 37.89% (SD=27.94) and with blunt injury 29.64% (SD=21.66) ($p=0.077$). Also, the emotional health of individuals in people with sharp injuries was 48.20% (SD=22.61) and with blunt injuries 40.13% (SD=24.05) ($p=0.051$). Percentage of patients impairment (WPI) was inversely associated with various aspects of quality of life such as physical performance ($p<0.001$, $r=-0.26$), limitations due to physical health of patients ($p<0.088$, $r=-0.12$), social performance of patients ($p=0.001$, $r=-0.24$), limitations due to the emotional problems of patients ($p= 0.059$, $r=-0.13$), pain ($p=0.005$, $r= -0.2$), the emotional health of patients ($p=0.006$, $r=-0.29$), the amount of energy/fatigue in patients ($p<0.001$, $r = -0.29$) and the patient's general health ($p<0.001$, $r=-0.27$). The total score of SF-36 was significantly and inversely associated with the WPI ($p<0.001$, $r= -0.319$). In regression analysis of factors affecting life, only WPI of patients had significant and adverse correlation in the model (Table 4).

Discussion

Upper extremity injuries can affect a person's quality of life to the extent that the person may even decide to commit suicide, thus investigations on these patients is necessary (19).

In a study it was shown that the physical

Table 4. Regression analysis on variables affecting quality of life

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	55.307	8.168		6.771	<0.001	39.197	71.417
age	-.022	.215	-.012	-.103	.918	-.445	.401
Education	-1.943	2.457	-.059	-.791	.430	-6.790	2.903
marriage	-.917	3.004	-.025	-.305	.760	-6.843	5.008
children	-.817	1.603	-.059	-.510	.611	-3.978	2.344
WPI	-.363	.076	-.331	-4.779	<0.001	-.513	-.213

and mental health of these individuals requires proper rehabilitation to enable them to return to the normal life. Also, the importance of treatment procedures to improve the functional status of these individuals is very important (20). Patients examined in this study were mostly male (98%) with the mean age of 32 years. It shows that their mean age was higher than the mean age in previous studies and in most studies upper lime injuries were mostly found in patients with 24 years old or less (23-21). In studies conducted in other part of the world, given the inexperience of the young people in the early years of working, the rate or possibility of injuries was higher. Given that the average work experience of patients in our study was less than 4 years, the results of our study were consistent with the results obtained by the research conducted in the world. Also in this study, similar to previous studies, the rate of upper extremity injuries were higher in men than women (24). The dominant hand injuries were observed in 56% of patients. Cutting and press machines were the most common tools for causing injuries. Type of damage in 48.3 percents of patients was sharp, in 23.2 blunt and in 25.6 sharp and blunt and 10 percent had amputation. Other studies have confirmed this issue (25). Average percentage of whole person impairment (WPI), was approximately 22% and patients, on average, examined within 9 months after injury. Different aspects of patients' quality of life were assessed using the SF-36 questionnaire. The highest score associated with physical function in these patients was approximately 64%, while the lowest score related to the physical limitations resulted from physical health (21%). Also other indices were less than 50%, except physical performance. SF-36 questionnaire has been used in various studies as an index for assessing the quality of life with regard to the health status of the injured people. In a study conducted by Briem et al., among a population considered as both control and healthy groups, the average score was more than 60 percent and physical and social performance constituted about 90 percent which was much higher than the results of the present study (26). In the study conducted by Chen et al., using the SF-36 questionnaire, mean scores of different indices of quality of life in people with work-related upper extremity injuries were also higher than the present study (27). The lower scores of quality of life index in this study was due to several factors, in which one was the difference in population in different studies.

Also, more consequences of such injuries on the individual's life, due to the fear of job loss and less support, can affect the quality of life of these people. In a study conducted by chen et al., like in our study, most patients were male with the mean age of 35 years. Most patients had non-academic education and demographic variables were somewhat similar to the variables of this study, although in the present study the rate of married participants was higher than the rate of married participant in the study of chen et al (27). In a study conducted by Spreeuwers et al., the quality of life of patients with upper extremity injuries was higher than the quality of life of patients in the present study in most items of SF-36 questionnaire. The mean age of

participants was 42 years and the percentage of female patients was higher (48%). Also, many of the patients had non-academic education.

In the present study, age, gender, education and marital status of patients did not have any effect on the quality of life. The work experience of these people was effective only on their social performance (r=0.168) and those with more work experience had higher social performance scores. As far as sharp injuries are concerned, social performance scores were significantly higher than blunt injuries; also the scores of other quality of life items in patients with sharp injuries were higher, although this difference was not statistically significant due to the greater extent of the affected area and because the blunt injuries were more complex. People, who had a dominant hand injury, had a quality of life similar to others. The reason for that was people with this injury had to use both hands to do their tasks and perform their daily activities, because in most occupations, individuals need to use their both hands even for doing common tasks. Therefore while it is expected that a person with dominant hand injury has a lower quality of life because they are employed and need to use both hands, but it is expected no difference in quality of life based on the dominant or non-dominant hand injuries no difference would be observed in them. Also, in this study, the percentage of whole person impairment (WPI) was inversely correlated with various aspects of quality of life mentioned in the SF-36 questionnaire.

The mean duration between the incidence of event and being visited by the physician was 8.45 months, this variable was relatively shorter than expected which could be due to limitations of insurance companies' laws in Iran.

Eventually it became clear that the quality of life in the present study was lower than other similar studies and quality of life for patients was not significantly correlated with demographic variables and social status of patients. Also, the quality of life of patients was significantly and inversely related to the degree of disability. This study was the first study conducted using the SF-36 questionnaire in Iran to examine the quality of life in patients with upper extremity injuries resulting from work-related accidents. The results could lead to consider ways to improve the quality of life for these patients as far as physical and mental improvements are concerned, because lower quality of life in these patients, not only had negative impact on their rehabilitation process, but also puts a huge burden on other family members and given that most of these people were the only employed person in the family and they were the only one who provide material needs of the family, delay in their proper rehabilitation, could result in serious harms to that individual and his family. Some patients did not fill the questionnaire and this was one of the problems of this study. These individuals were excluded from the study and hence reduced the number of samples. It is suggested that the future research studies the quality of life of patients suffered from work-related injuries in different occupational groups.

Conclusion

The results of this study showed that percentage of WPI was inversely and significantly associated with various aspects of quality of life. In other words, most aspects of quality of life in particular the emotional health and the amount of energy/fatigue in patients were reduced with the increase in the percentage of impairment (WPI). Given that this study was the first study conducted in Iran to examine the quality of life after upper extremity injury resulting from work-related accidents, it is suggested that further studies to be done to mitigate the limitations of this study.

References

1. Spreeuwers D, de Boer AG, Verbeek JH, van Beurden MM, de Wilde NS, Braam I, et al. Work-

related upper extremity disorders: one-year follow-up in an occupational diseases registry. Int Arch Occup Environ Health. 2011; 84(7):789-96.

2. Chen Y, Turner S, Hussey L, Agius R. Physicians' beliefs in the assessment of work attribution when reporting musculoskeletal disorders. Occup Med. 2005; 55(4):298–307.

3. Riihima¨ki H, Kurppa K, Karjalainen A, Palo L, Jolanki R, Keskinen H, et al. Occupational diseases in Finland in 2002. Finnish Institute of Occupational Health, Helsinki. 2004.

4. Gill TM, Feinstein AR. A critical appraisal of the quality of quality-of-life measurements. JAMA. 1994; 272: 619-26.

5. Johnston MV, Miklos CS. Activity-related quality of life in rehabilitation and TBI. Arch Phys Med Rehabil . 2002;83(2):S26–S38.

6. Koch T. Life quality vs the `quality of life': assumptions underlying prospective quality of life instruments in health care planning. Social Science & Medicine. 2000;51: 419-427.

7. Bailey R, Kaskutas V, Fox I, Baum CM, Mackinnon SE. Effect of upper extremity nerve damage on activity participation, pain, depression, and quality of life. J Hand Surg Am. 2009;34(9):1682-8.

8. The American Medical Association's Guides to the Evaluation of Permanent Impairment, Fifth Edition. 2012.

9. Wagner AK, Wyss K, Gandek B, Kilima PM, Lorenz S, Whiting D. A Kiswahili version of the SF-36 Health Survey for use in Tanzania: Translation and test of scaling assumptions. Qual Life Res 1999; 8: 101-110.

10. Taft C, Karlsson J, Sullivan M. Performance of the Swedish SF-36 version 2.0. Qual Life Res 2004; 13: 251-256.

11. Johnston MV, Miklos CS. Activity-related quality of life in rehabilitation and TBI. Arch Phys Med Rehabil 2002; 83(Suppl 2): S26-38.

12. Fuhrer MJ. Postscript and commentary. In: Fuhrer MJ, editor. Assessing medical rehabilitation practices: the promise of outcomes research. Baltimore: PH Brookes; 1997.

13. Patrick D, Erickson P. Health status and health policy: quality of life in health care evaluation and resource allocation. Oxford: Oxford Univ Pr; 1993.

14. Felce D, Emerson E. Observational methods in assessment of quality of life. In: Thompson T, Felce D, Symons F, editors. Behavioral observation: technology and applications in developmental disabilities. Baltimore: PH Brooks, 2000; p 159-74.

15. McColl MA. Measuring community integration and social support. In: Law M, Baum C, Dunn W, editors. Measuring occupational performance: supporting best practice in occupational therapy. Thorofare: Slack. 2001; p 215-28.

16. Dijkers MP. Individualization in quality of life measurement:instruments and approaches. Arch Phys Med Rehabil. 2003; 84(4Suppl 2):S3-14.

17. Dijkers M. Measuring quality of life. Am J Phys Med Rehabil 1999;78:286-300.

18. Montazeri A, Goshtasebi A, Vahdaninia M, Gandek B. The Short Form Health Survey (SF-36): translation and validation study of the Iranian version. Qual Life Res. 2005 Apr; 14(3):875-82.

19. Dubuisson AS, Kline DG. Brachial plexus injury: a survey of 100 consecutive cases from a single service. Neurosurgery. 2002; 51 (3): 673–683.

20. Birch R, Bonney G, Wynn Parry CB. Surgical Disorders of the Peripheral Nerves. Churchill Livingstone, Edinburgh. 1998.

21. Skov O. The incidence of hospital-treated occupational hand injuries. J Hand Surg Br. 1994 Feb; 19(1):118-9.

22. Laflamme L, Blank VL. Age-related accident risks: longitudinal study of Swedish iron ore miners. Am J Ind Med. 1996 Oct; 30(4):479-87.

23. Boyle D, Parker D, Larson C, Pessoa-Brandão L. Nature, incidence, and cause of work-related amputations in Minnesota. Am J Ind Med. 2000 May; 37(5):542-50.

24. Wagner AK, Wyss K, Gandek B, Kilima PM, Lorenz S, Whiting D. A Kiswahili version of the SF-36 Health Survey for use in Tanzania: Translation and test of scaling assumptions. Qual Life Res. 1999; 8: 101-110.

25. Sorock GS, Lombardi DA, Courtney TK, Cotnam JP, Mittleman MA. Epidemiology of occupational acute traumatic hand injuries: a literature review. Safety sci. 2001; 38: 241-56.

26. Briem D, Behechtnejad A, Ouchmaev A, Morfeld M, Schermelleh-Engel K, Amling M, Rueger JM. Pain regulation and health-related quality of life after thoracolumbar fractures of the spine. Eur Spine J. 2007 Nov; 16(11):1925-33.

27. Chen YH, Lin HT, Lin YT, Chao YH, Lin CH, Wei FC, Lien SH. Self- perceived health and return to work following work-related hand injury. Occup Med (Lond). 2012 Jun; 62(4):295-7.