

## Comparison of health related quality of life between two groups of veteran and non-veteran spinal cord injured patients

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### Abstract

**Background:** Patients with spinal cord injury (SCI) have a lower health related quality of life (HRQOL) compared to both healthy controls and the normal population. The aim of this study was to compare HRQOL between two groups of veteran and non-veteran SCI patients.

**Methods:** All male paraplegic non-veterans who had sustained complete SCI before 1988 and were residents of Tehran province (Iran), and a similar group of SCI veterans who consecutively participated in a health screening program were enrolled in this study. Patients fewer than 35 and older than 65 years of age were not included in this study. The participants were interviewed based on the Persian version of SF-36 questionnaire by two psychologists. Eight sub-scales and two physical and mental component summaries of the instrument were assessed. We used chi-square, odds ratio, Mann-Whitney U, independent t-test and linear regression for analysis.

**Results:** Overall, 25 veterans and 22 non-veterans were enrolled in the study. The mean age, time since injury and the presence of comorbid illnesses were not significantly different between the two groups ( $P > 0.05$ ). A greater number of veterans were married ( $p = 0.003$ ) and employed ( $p = 0.047$ ). On average, veterans had more years of formal education than non-veterans ( $p = 0.001$ ). The mean (SD) bodily pain sub-scale was 72.73(31.253) for non-veterans and 49.7 (28.287) for veterans ( $p = 0.011$ ). Absence of comorbid illnesses was associated with a better physical component summary ( $p < 0.001$ ). Employment was associated with a better mental component summary ( $p = 0.022$ ).

**Conclusion:** We did not find any differences in HRQOL between the two groups except for the bodily pain sub-scale. Further studies with larger sample sizes are recommended.

**Keywords:** Quality of Life, Spinal Cord Injuries, Veterans, Iran.

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### Introduction

Proposing a comprehensive definition for the quality of life and well-being has been a challenge for the experts of this field in the recent decades (1). Despite its definition,

quality of life is acknowledged as an important component of health. Although medical care improvement has increased longevity, it is supposed to improve quality of life as well.

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Spinal cord injury (SCI) is a problem that affects different aspects of the victim's life, particularly the health-related quality of life (HRQOL) (2-6), and imposes a relatively high burden of the disease (7). Numerous studies have been carried out on the HRQOL in patients with SCI, all indicating a lower quality of life in these patients when compared with the general population (6, 8-11) or healthy controls (12-15).

Over one million people suffer from SCI in the United States (16). In Iran, although many people sustain SCI due to road traffic crashes annually, their precise number is not known. According to a study by Eslami and Rahimi Movaghar (17), 8104 non-veteran spinal cord injury patients receive services from the State Welfare Organization of Iran. In addition, the 1980-1988 Iraq-Iran war has left many casualties in Iran (18, 19), with 400,000 injured people; among whom, 2012 suffer complete SCI (20).

To date, no definite cure has been found for complete SCI. Thus, rehabilitation is currently the most effective means to improve the function of these patients. A comprehensive understanding of different aspects of quality of life in this group of patients is crucial for designing a successful rehabilitation plan (21).

This study was conducted to assess different factors determining the HRQOL in SCI patients and to find out whether there are any differences between veterans and non-veterans with SCI in terms of HRQOL. The perceived difference lies in some suppositions: First, the context in which injury has occurred varies among the two groups. Veterans voluntarily exposed themselves to the risk of injury and sacrificed their health for the sake of their country and defending national boundaries. On the other hand, SCIs in non-veterans typically occur due to accidents that are not foreseen by the sufferers. Moreover, veterans receive a wider range of governmental support covering prolonged disability care and rehabilitation expenses. In this study, we sought to compare the HRQOL of veterans and non-

veterans with complete SCI in order to provide a better insight to physical and mental aspects of quality of life in these patients. The results could be beneficial for designing effective policies to improve the HRQOL in this targeted population.

## Methods

### Participants

All participants were male paraplegic patients with complete SCI occurring before 1988 (before the end of the Iraq-Iran war). Patients fewer than 35 and older than 65 years of age were not included in this study. Non-veterans were approached through an NGO covering all spinal cord injury individuals in Tehran province. All of the twenty three patients who met the inclusion criteria and agreed to take part in the study were enrolled. Similarly, 26 consecutive veterans were approached using the SCI clinic database of Shafa Neuroscience Research Center. In a national level, this center provides regular health screening programs for all Iranian veterans including a one-week in-patient medical surveillance.

The responses of two participants (one veteran and one non-veteran) seemed to be unreliable, so they were excluded from the study.

### Instrument

SF-36 questionnaire: This data collection measure tool consisted of two parts: a general questionnaire for demographic factors and the Short Form 36-items (SF-36) questionnaire for collecting data on HRQOL.

SF-36 is the most common questionnaire utilized worldwide for assessing the HRQOL (22). This questionnaire was translated into Farsi and validated by Montazeri et al. (23). The Persian version which is a psychometrically sound measure has been previously used by a number of researchers to assess quality of life in Iranian spinal cord injury patients (20, 24-28). The questionnaire comprises measures of physical functioning, role limitation due to physical problems (RP), bodily pain (BP), general

health perceptions (GH), vitality (VT), social functioning (SF), role limitation due to emotional problems (RE) and mental health (MH). Scores in each component range from 0 to 100, with a higher global score indicating a more favorable condition and better HRQOL. Scores in the first four components are summated as physical component summary (PCS), and the sum of the scores in the next four components form the mental component summary (MCS).

The questionnaires were completed by two trained psychologists who performed face-to-face interviews with the participants.

### Ethics

This study was approved by the Ethics Committee of Tehran University of Medical Sciences. The aim of this research was discussed with the patients, and informed consent was obtained from all participants.

### Statistical Analysis

We used K.S test to check the normal distribution of the quantity variables. Statistical analysis was conducted using odds ratio, chi square, Mann-Whitney U test and independent t-test to compare the two groups. Type 1 error of less than 0.05 was considered acceptable. Regression models were used to examine the association be-

tween individual characteristics and physical and mental aspects of HRQOL. Separate regression analyses were carried out for the PCS and MCS, which were considered as dependent variables. The distributions of these variables were examined, and their conformity with normal distribution was not ruled out. Independent variables included being veteran or non-veteran, age, marital status, years of formal education, employment status, time since injury, and co-morbid illnesses. Variables were eliminated from the regression model, using the backward elimination procedure with elimination and threshold of  $p > 0.1$ .

### Results

Overall, 25 veterans and 22 non-veterans were enrolled in the study, and information about their age, marital status, years of formal education, employment status, time since injury and comorbid illnesses was obtained (Table 1). The mean age, time since injury and the presence of co-morbid illnesses were not significantly different between the two groups ( $p > 0.05$ ). A greater number of veterans (92%,  $n = 23$ ) than non-veterans (54.5%,  $n = 12$ ) were married ( $p = 0.003$ ) and employed (56% of veterans and 27.3% of non-veterans,  $p = 0.047$ ). On average, veterans had accomplished more years of formal education than non-

Table 1. General characteristics of the participants based on age, years of formal education and time since injury using independent-t test

| Variable                  | Group of Patients         |                       | p     |
|---------------------------|---------------------------|-----------------------|-------|
|                           | Non-veteran<br>(mean± SD) | Veteran<br>(mean± SD) |       |
| Age                       | 52.05 ± 8.454             | 48.92 ± 4.396         | 0.129 |
| Years of formal education | 8.86 ± 5.321              | 13.79 ± 3.243         | 0.001 |
| Time since injury         | 28.36 ± 3.017             | 28.96 ± 2.312         | 0.455 |

Table 2. General characteristics of the participants based on marital status, employment status and comorbid illness using chi-square test

| Variable          |            | Group of Patients   |                 | p     |
|-------------------|------------|---------------------|-----------------|-------|
|                   |            | Non-veteran<br>N(%) | Veteran<br>N(%) |       |
| Marital status    | Single     | 10(45.5%)           | 2(8%)           | 0.003 |
|                   | married    | 12(54.5%)           | 23(92%)         |       |
| Employment status | Unemployed | 16(72.7%)           | 11(44%)         | 0.047 |
|                   | Employed   | 6(27.3%)            | 14(56%)         |       |
| Comorbid illness  | Absent     | 6 (27.3%)           | 5(20%)          | 0.557 |
|                   | Present    | 16 (72.7%)          | 20(80%)         |       |

veterans ( $13.79 \pm 3.243$  compared to  $8.86 \pm 5.321$ , respectively,  $p = 0.001$ ).

The average scores of eight components of SF-36 as well as PCS and MCS for veterans and non-veterans are demonstrated in Table 2. No statistically significant differences were found between the two groups except for the mean bodily pain component score, which was lower in veterans ( $49.7 \pm 28.287$ ) than non-veterans ( $72.73 \pm 31.253$ ) ( $p = 0.011$ ).

To assess the role of each independent variable in predicting PCS and MCS, separate regression analysis models were used for each of these two dependent variables. The absence of comorbid illnesses and being employed were the only statistically significant predictors of a more favorable PCS and MCS in these models, respectively (Table 3).

### Discussion

The aim of this study was to investigate different factors that determine the HRQOL in spinal cord injury patients and to compare the HRQOL between veterans and non-veterans with complete SCI. Our findings showed no differences between the two groups in seven out of eight components of HRQOL as well as PCS and MCS.

Bodily pain was the only component that showed a significant difference, with non-veterans scoring higher, representing a more favorable life quality in this domain. According to our study, the absence of comorbid illnesses and being employed were the only statistically significant predictors of PCS and MCS in SCI patients, respectively.

A similar study by Saadat et al. (20) assessed HRQOL in 39 Iranian male veterans and 63 non-veterans with SCI. In contrast to our results, their findings showed that spinal cord injury veterans had lower HRQOL than non-veterans in PCS, MCS and in all SF-36 subscales except for physical and social functioning. Moreover, they found positive associations between PCS and time since injury and between MCS with both age and years of education. However, differences in the sampling should be taken into account while comparing the results of the two studies. The study of Saadat et al. utilized a larger sample size, but with greater heterogeneity between the two groups of subjects. For instance, veterans were significantly older and had a longer chronicity of the disability ( $23.4 \pm 3.6$  years since injury compared with  $7.0 \pm 4.9$  years in non-veterans). Furthermore,

Table 3. SF -36 scores based on the group of patients

| Variable                                  | Group of Patients      |                    | Test statistics          | p     |
|---|------------------------|--------------------|--------------------------|-------|
|   | Non-veterans (mean±SD) | Veterans (mean±SD) |                          |       |
| Physical functioning                      | 53.41 ± 21.179         | 61.15± 22.724      | Independent-t= -1.203    | 0.235 |
| Role limitation due to physical problems  | 57.95 ± 45.242         | 41.00 ± 43.827     | Z Mann-Whitney U= -1.239 | 0.215 |
| Bodily pain                               | 72.73 ± 31.253         | 49.70± 28.287      | Independent-t= 2.652     | 0.011 |
| General health perceptions                | 52.95 ± 18.623         | 48.80 ±20.63       | Independent-t= 0.721     | 0.475 |
| Vitality                                  | 64.32 ± 20.488         | 62.40± 21.560      | Independent-t= -0.311    | 0.757 |
| Social functioning                        | 83.52 ± 27.109         | 74.00± 31.441      | Z Mann-Whitney U= -0.890 | 0.373 |
| Role limitation due to emotional problems | 69.70 ± 44.732         | 56.00 ± 45.866     | Z Mann-Whitney U= -1.157 | 0.247 |
| Mental health                             | 62.73 ± 20.148         | 68.00± 17.776      | Independent-t= -0.953    | 0.346 |
| Physical component summary                | 237.05 ± 81.309        | 200.65 ± 87.977    | Independent-t= 1.466     | 0.150 |
| Mental component summary                  | 280.27 ± 78.038        | 260.40 ± 92.449    | Independent-t= 0.790     | 0.434 |

Table 4. Regression analysis of physical component summary (PCS) and mental component summary (MCS)

| Variables                | Unstandardized Coefficients |        | Standardized Coefficients |        |       |
|--------------------------|-----------------------------|--------|---------------------------|--------|-------|
|                          | B                           | SE     | Beta                      | t      | p     |
| PCS and comorbid illness | -103.834                    | 25.452 | -0.524-                   | -4.080 | 0<001 |
| MCS and occupation       | 60.614                      | 25.465 | 0.351                     | 2.380  | 0.022 |

\*Variables that failed to represent significant P value ( $P < 0.10$ ) were excluded from the model using a back ward elimination procedure

each group was interviewed by a different set of interviewers, imposing the risk of bias in data collection. In addition, the presence of co-morbid illnesses which is a significant confounding factor was not determined. In other words, the difference in the HRQOL of veterans and non-veterans in the study conducted by Saadat could in fact be the effect of confounding factors which were not controlled between the two groups of patients.

However, it is noteworthy to mention that non-veterans showed a more favorable condition in bodily pain subscale in both studies. In fact, this subscale, which is the only component in our study that differed among veterans and non-veterans, showed the greatest statistically significant difference between the two groups in the study by Saadat et al.

Our study revealed that a greater proportion of veterans were married and employed, and had higher education. This difference can be partly due to governmental supports and privileges for veterans and their family members, providing them with more opportunities to marry, continue their education and find a job.

Different studies have shown contradictory results in terms of association of the age, marital status, education and time since injury with quality of life in SCI patients (8, 29). With respect to age, it is particularly important to consider age at the time of injury, because it is speculated that injury at older age is associated with a lower capacity to cope with the disability. However, while in some studies age was negatively correlated with HRQOL (15, 30), some others found no significant correlation (8). Marriage had a positive impact on the quality of life of the SCI patients in a study by Westgren and Levi (31), but Kreuter et al. did not find any association between marital status and global HRQOL (32).

A longer time since injury can be expected to be associated with a better life quality because of the presumptive adaptation to the different lifestyle over a long period of time. This was evident in a study

by Smith et al. (33). Some investigations (34-36) did not prove this association in concordance with our study. On the other hand, Falvo et al. (37) observed significantly lower PCS scores with an increase in post-deployment time in the U.S. service members who returned from Afghanistan and Iraq.

Higher education is expected to result in a higher rate of employment (38) and working in occupations which are less physically demanding. Because of the interaction between education, employment, financial issues and cultural backgrounds, it is difficult to ascertain the net effect of education on the HRQOL of SCI patients. Clayton and Chubon found that the educational level, employment status, income and social activities were associated with the perceived quality of life (39). In a study by Kreuter et al. who compared two groups of Australian and Swedish patients, higher education was associated with higher HRQOL in Australian SCI patients, but represented no significant correlation in the Swedish group (32). In our study, employment was associated with a higher score in the mental component of the quality of life. It can be argued that having an active social role can improve one's self-image and result in psychological satisfaction and higher perceived quality of life. Employment status was independently associated with the HRQOL in a study by Jain et al. (29). Nevertheless, a study of 21 Iranian female SCI veterans did not show an association between employment and the HRQOL (26). Gender difference and various study designs could explain the inconsistent results.

We found that the physical component of the HRQOL was reversely associated with the presence of comorbid illnesses, which was predictable. It is documented that complicated medical problems associated with SCI adversely affect the HRQOL (8). Der-Martirosian and colleagues also found an association between the HRQOL and comorbidity among older American female veterans (40).

This study had some limitations. The at-



tempt to match the two groups of veterans and non-veterans based on age, time since injury and injury severity (complete SCI) resulted in a relatively small sample size, which could lead to the observed insignificant differences.

### Conclusion

The HRQOL did not differ between veterans and non-veterans in seven out of eight main domains of the quality of life as well as PCS and MCS. Non-veterans scored higher in the bodily pain component, representing a more favorable HRQOL in this aspect. The physical component of the HRQOL had a reverse association with the presence of comorbid illnesses, while the mental component of the quality of life was associated with employment. Further well-designed investigations are required to obtain more reliable results.

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