

Quality of Life of Caregiver Spouses of Veterans With Bilateral Lower Extremity Amputations

Ali Moradi¹; Mohammad Hosein Ebrahimzadeh^{2,*}; Mohamad Reza Soroush¹

¹Janbazan Medical and Engineering Research Center, Tehran, IR Iran

²Orthopedic Research Center, Ghaem Hospital, Mashhad University of Medical Sciences, Mashhad, IR Iran

*Corresponding author: Mohammad Hosein Ebrahimzadeh, Orthopedic Research Center, Ghaem Hospital, Mashhad University of Medical Sciences, Ahmad-abad St., P.O. Box: 91766-99199, Mashhad, IR Iran. Tel/Fax: +98-5138417453, E-mail: Ebrahimzadehmh@mums.ac.ir

Received: July 9, 2014; Revised: September 28, 2014; Accepted: October 7, 2014

Background: Providing care for patients with chronic disability affects caregivers' social lives and relationships and can lead to poor health and lower quality of life.

Objectives: In this study, our goal was to assess the quality of life in spouses of war veterans with bilateral lower limb amputations to find factors affecting caregivers' quality of life.

Patients and Methods: In a cross-sectional study, spouses of 244 veterans with war-related bilateral lower limb amputations for at least one year were invited to participate in this study; 189 couples accepted to participate. Information about age, gender, education level, duration of time since amputation, duration of care provided by the spouses and SF-36 questionnaire for both veterans and their spouses were collected.

Results: The average age of spouses was 47 years and duration of care provided by spouses was 25 years. We found lower scores for general health domains in amputees' spouses compared to the general population. Factors correlated with both Physical Component Summary (PCS) and Mental Component Summary (MCS) included the duration of care, duration of marriage, spouses' education level and the veterans' PCS and MCS scores. Veterans' age, spouses' age and the number of children only correlated with PCS. Veterans' education level only correlated with MCS. In multivariable analysis, only spouses' education level correlated with MCS and the veterans' PCS only correlated with that of spouses.

Conclusions: The quality of life of amputees and their spouses were closely correlated; therefore, any improvement in one is likely to improve the other. In addition, lower education level should be considered as a risk factor for poorer quality of life in amputees' spouses.

Keywords: Quality of Life; Amputation; Lower extremity

1. Background

The 8-year Iran-Iraq war (1980-1988) was one of the longest wars of the 20th century and led to enormous casualties. According to a report by the Organization of Veterans and Martyrs Affairs of Iran, the war resulted in a total of 20801 amputees, of which, 12981 were lower extremity amputations (1). Most of these amputees, especially those with bilateral lower extremity amputations, need significant help with activities of daily living, which in turn affects their family members' quality of life (QoL). Bilateral amputees have lower quality of life compared to general population (2, 3). Providing long-term care to disabled patients is exhausting and associated physical, emotional, societal and financial stressors can impact the caregivers' QoL (4-9). Since most victims of war-related lower extremity amputations were young at the time of their injury, they required care since adolescence (10-13). Moreover, lower extremity amputations are often accompanied by other injuries, such as upper extremities amputations, which further increase the victims' need for assistance with performing daily activities (14, 15).

In our country, providing care for patients with disabilities is mostly performed by their family members, especially their wives (7, 16, 17). Therefore, in addition to performing their marital duties, patients' spouses have to act as their caregivers, adding to their workload and stress level (7). To provide care for patients with disabilities, spouses have to make numerous adjustments to their lives (6, 7, 9, 16, 18-22). Providing care for patients with chronic disability affects caregivers' social lives and relationships and can lead to feeling lonely and depression. This ultimately results in poor health and lower QoL for both patients and their caregivers (6, 7, 9, 16, 18-22). Since previous researchers found a positive correlation between QoL of caregivers and quality of provided care (23-25), one can assume that caregivers' higher QoL can in turn result in higher patient satisfaction and improved patient care.

2. Objectives

In this study, our goal was to assess the QoL in spouses of war amputees with bilateral lower limb amputations and

to find factors affecting caregivers' QoL. We compared the QoL of both amputees and their spouses to assess any correlation between them.

3. Patients and Methods

In a cross-sectional study, spouses of 244 veterans with war-related bilateral lower limb amputations, registered in the Organization of Veterans and Martyrs Affairs of Iran, were invited to participate. The study was performed at Mashhad University of Medical Sciences, Mashhad, Iran in 2011. The veterans had to have a primary (amputation occurred in the battlefield) or secondary (amputation occurred for treatment in a hospital secondary to battle injury) bilateral lower extremity amputation resulting from a single battlefield injury during the Iran-Iraq war (1980-1988). The spouses had to have provided care for the veterans for at least one year. Amputees or spouses with coexistence of other disabilities such as chemical injury, medical comorbidity or psychotic disorder that can affect function and QoL were excluded from the study. After explaining the details of study, 189 couples accepted to participate. The Ethics Committee of our institution approved the study and all amputees and their spouses signed the consent form prior to initiation of the study. We gathered data by conducting face-to-face interviews and filling out questionnaires. Information about age, gender, education level, duration of time since amputation, duration of care provided by the spouses and SF-36 questionnaire for both veterans and their spouses were collected.

The SF-36 questionnaire contains both Physical Component Summary (PCS) and Mental Component Summary (MCS) parts determined by adding up the four domains included in each domain. Each domain is directly transformed into a 0-100 scale on the assumption that each question carries equal weight. The eight domains are

vitality (VT), physical functioning (PF), bodily pain (BP), general health perceptions (GH), physical role functioning (PR), emotional role functioning (ER), social role functioning (SF) and mental health (MH). Higher scores indicate better QoL. The validity and reliability of the SF-36 had been tested in Farsi speaking people in Iran before and used for various diseases and disabilities (25). To determine the severity of amputation, we used the number of remaining functional joints (ankles, knees, hips) in both lower limbs from one to six (Table 1) (26).

We used SPSS version 16 (SPSS Inc., Chicago, IL) for statistical analysis. Continuous variables were reported as means and standard deviations and nominal variables were expressed as frequencies and percentages. To find correlation between different variables we used Pearson correlation test for parametric variables and Spearman correlation test for non-parametric ones. Multivariable analyses were performed at the end to find the predictors of QoL. $P < 0.05$ was considered significant. For interpretation of correlation, we assumed coefficients of less than 0.4, 0.4 to 0.7, and more than 0.7 as weak, moderate and strong, respectively.

4. Results

The mean age of spouses' was 47 ± 7 years (24 to 63 years). The mean duration of care provided by spouses was 25 ± 5.8 years (5 to 31 years). Further details are demonstrated in Tables 2 and 3. We compared spouses' QoL with that of general female population and found lower mean scores for body pain and general health domains in amputees' spouses compared to the general population. Emotion score was higher in amputees' spouses compared to that of general population. Other domains were not significantly different in amputees' spouses compared to the general population (Table 4 and Figure 1).

Table 1. Classification of Bilateral Lower Limbs Amputation According to Remaining Functioning Major Joints (Ankles, Knees, Hips)

| Definitions and Subtypes | Type | Examples |
|--|----------|--|
| Without major joint impairment | Type I | Trans metatarsal + lisfranc |
| Only one major joint is impaired | Type II | Syme + trans metatarsal |
| Two major joints are impaired | Type III | Syme + below knee, trans metatarsal + above knee |
| Without ankles | | |
| Without ipsilateral ankle and knee | | |
| Three major joints are impaired | Type VI | Below knee + above knee |
| Without ipsilateral ankle, knee and hip | | |
| Without ankle and knee in one limb and ankle in another | | |
| Four major joints are impaired | Type V | Below knee + hip, above knee + above knee |
| Without ankle, knee and hip in one limb and ankle in another | | |
| Without ankle and knee in both limbs | | |
| Five major joints are impaired | Type VI | Hip + knee |
| All the major joints are impaired | Type VII | Hip + hemipelvic |

Factors that may affect the PCS or MCS of SF-36 questionnaire were analyzed (Table 5). Factors correlated with both PCS and MCS included duration of care, duration of marriage, spouses' education level and the veterans' PCS and MCS scores. Veterans' age, spouses' age and the number of children only correlated with PCS. Veterans' education level only correlated with MCS. In multivariable analysis, only spouses' education level correlated with MCS ($P = 0.002$ and $B = 0.41$) and the veterans' PCS only correlated with that of spouses' ($P = 0.019$, $B = 0.31$). In evaluating each domain of SF-36 questionnaire for veterans and spouses, except for domains related to physical function, physical and emotion roles, all other domains correlated with each other (Table 6 and Figure 2).

Table 2. Demographic Data in Spouses of Amputees With Bilateral Lower Extremity Amputations ^a

| Variable | Value | Minimum | Maximum |
|----------------------------|-----------|---------|---------|
| Age of spouse, y | 47 ± 7.0 | 24 | 63 |
| Age of veteran, y | 50 ± 6.9 | 28 | 76 |
| Marriage duration, y | 27 ± 7.5 | 5 | 57 |
| Duration of care, y | 25 ± 5.8 | 5 | 31 |
| Spouse education, y | 7 ± 4.7 | 0 | 19 |
| Veteran education, y | 12 ± 4.9 | 0 | 24 |
| Number of children | 3.3 ± 1.5 | 0 | 9 |
| Amputation score | 5 ± 0.9 | 3 | 7 |
| Welfare | 5.7 ± 0.7 | 2 | 6 |
| Spouse SF-36 | | | |
| Physical function | 83 ± 22 | 20 | 100 |
| Role physical | 70 ± 41 | 0 | 100 |
| Body pain | 65 ± 35 | 0 | 100 |
| General health | 60 ± 24 | 0 | 100 |
| Vitality | 63 ± 21 | 15 | 100 |
| Social function | 73 ± 28 | 0 | 100 |
| Role emotion | 69 ± 44 | 0 | 100 |
| Mental health | 66 ± 21 | 4 | 100 |
| Physical component summary | 51 ± 25 | 5 | 100 |
| Mental component summary | 64 ± 25 | 9 | 100 |
| Veteran SF-36 | | | |
| Physical function | 50 ± 26 | 0 | 100 |
| Role physical | 40 ± 43 | 0 | 100 |
| Body pain | 66 ± 32 | 0 | 100 |
| General health | 61 ± 24 | 0 | 100 |
| Vitality | 65 ± 20 | 5 | 100 |
| Social function | 80 ± 25 | 0 | 100 |
| Role emotion | 52 ± 48 | 0 | 100 |
| Mental health | 66 ± 21 | 16 | 100 |
| Physical component summary | 69 ± 23 | 11 | 100 |
| Mental component summary | 70 ± 21 | 11 | 99 |

^a Data are presented as mean ± SD.

Table 3. Demographic Information of Spouse of Amputees With Bilateral Lower Extremity ^a

| Variables | Value |
|----------------------------|------------|
| Marital status | |
| First marriage | 172 (91) |
| Widowed | 6 (3) |
| Divorced | 9 (5) |
| Occupation | |
| Employed | 14 (7.5) |
| Unemployed | 174 (92.5) |
| Salary satisfaction | |
| Yes | 36 (19) |
| No | 23 (12) |
| Unemployed | 127 (68) |
| Veteran smoking | |
| Yes | 65 (35) |
| No | 123 (65) |
| Veteran addiction | |
| Yes | 21 (11) |
| No | 167 (89) |

^a Data are presented as NO. (%).

Table 4. Comparison of Different Domains of SF-36 Questionnaire in Spouses of Bilateral Lower Limbs Amputees and Normal Population ^a

| SF-36 Domains | Value | General Population | P Value |
|----------------------------|---------|--------------------|---------|
| Physical function | 83 ± 22 | 83 | 0.83 |
| Role physical | 70 ± 41 | 67 | 0.20 |
| Body pain | 65 ± 35 | 76 | 0.00 |
| General health | 60 ± 24 | 65 | 0.03 |
| Vitality | 63 ± 21 | 63 | 0.22 |
| Social function | 73 ± 28 | 74 | 0.63 |
| Role emotion | 69 ± 44 | 61 | 0.01 |
| Mental health | 66 ± 21 | 65 | 0.52 |
| Physical component summary | 70 ± 25 | 73 | 0.08 |
| Mental component summary | 64 ± 25 | 66 | 0.15 |

^a Data are presented as mean or mean ± SD.

Table 5. Correlation Quality of Bilateral Lower Amputees Spouses With Other Factors

| Spouse SF-36 | Physical Component Summary | | Mental Component Summary | |
|---------------------------------------|----------------------------|-------------|--------------------------|-------------|
| | P Value | Correlation | P Value | Correlation |
| Age of spouse | 0.001 | -0.24 | 0.15 | -0.11 |
| Age of veteran | 0.001 | -0.25 | 0.13 | -0.11 |
| Age difference | 0.91 | -0.008 | 0.94 | -0.006 |
| Marriage duration | 0.005 | -0.21 | 0.009 | -0.2 |
| Duration of care | 0.001 | -0.24 | 0.011 | -0.19 |
| Spouse Education | 0.04 | 0.17 | 0.002 | 0.27 |
| Veteran Education | 0.55 | 0.06 | 0.04 | 0.22 |
| Number of children | 0.02 | -0.18 | 0.24 | -0.9 |
| Amputation score | 0.93 | 0.006 | 0.24 | 0.09 |
| Welfare | 0.27 | 0.12 | 0.79 | 0.03 |
| Physical component summary of veteran | 0.002 | 0.23 | 0.03 | 0.16 |
| Mental component summary of veteran | 0.04 | 0.16 | 0.004 | 0.22 |

Table 6. Correlation of Different Domains of SF-36 Questionnaire Between Bilateral Lower Extremity Amputees and Their Spouses

| SF-36 Domains | P Value | Correlation |
|----------------------------|---------|-------------|
| Physical function | 0.44 | 0.06 |
| Role physical | 0.24 | 0.09 |
| Body pain | 0.08 | 0.13 |
| General health | 0 | 0.38 |
| Vitality | 0.004 | 0.21 |
| Social function | 0.03 | 0.16 |
| Role emotion | 0.81 | 0.02 |
| Mental health | 0 | 0.33 |
| Physical component summary | 0.002 | 0.24 |
| Mental component summary | 0.004 | 0.22 |

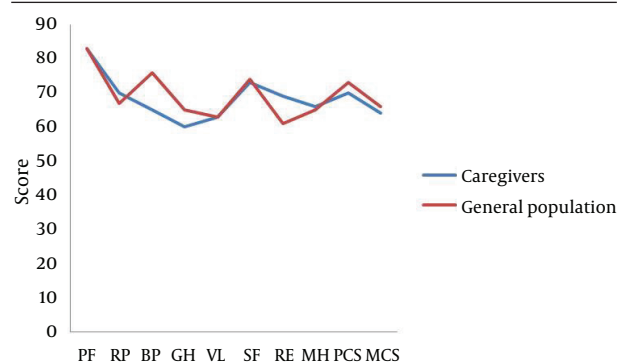


Figure 1. Comparison of Different Domains of SF-36 Questionnaire in Spouses of Bilateral Lower Limbs Amputees and Normal Population; Abbreviations: BP, body pain; GH, general health; MCS, mental component summary; MH, mental health; PCS, physical component summary; PF, physical function; RP, role physical; SF, social function; RE, role emotion; VL, vitality.

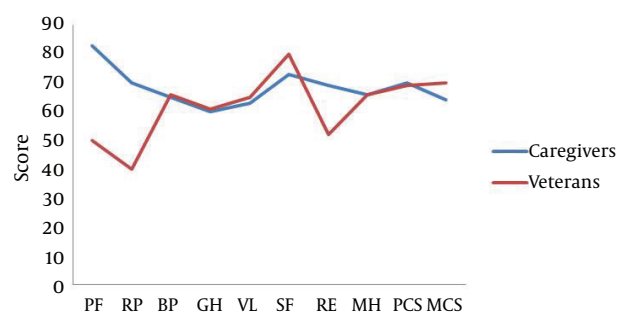


Figure 2. Comparison of Different Domains of SF-36 Questionnaire in Spouses of Bilateral Lower Limbs Amputees and Veterans; BP, body pain; GH, general health; MCS, mental component summary; MH, mental health; PCS, physical component summary; PF, physical function; RP, role physical; SF, social function; RE, role emotion; VL, vitality.

5. Discussion

According to our results, most SF-36 domain scores for the spouses were within the normal range, except for general health and body pain, which were lower, and emotion scores, which were higher compared to those of general population. Duration of care and duration of marriage negatively affected QoL of veterans' spouses, while spouses' educational level and veterans' QoL had a positive impact on spouses' QoL. Although the number of children, and the mean age of spouses and veterans had a negative effect on the PCS, the most important independent predictor for PCS of the spouses was the veterans' PCS score. Spouses' education level was the only significant independent predictor of the spouses' MCS.

In our study, all caregivers were women and it appears that providing care for patients with disability has a

stronger impact on women's QoL compared to that of men (21, 24). The QoL of bilateral lower limb amputee's caregivers is more in normal range compare to other chronic disease caregivers. In a study on patients with war related spinal cord injury, SF-36 domain scores of all caregivers, except for vitality domain, were below the average of general Iranian women (7). Other studies about the QoL of caregivers of patients with chronic diseases support this finding as well (6, 7, 9, 20, 27). Shimoyama et al. found lower scores in mental, general health and vitality domains of QoL in spouses of patients with chronic renal failure (22). Blanes et al. reported lower scores in body pain and vitality domains of QoL among caregivers of patients with spinal cord injuries (6). We found lower scores in health and body pain domains. This might be explained by the amputees' better general health compared to patients with other chronic diseases.

Duration of care and caregivers' age inversely correlated with caregivers' QoL (7, 20, 22, 27, 28). In our study, the duration of care affected both mental and physical components of the SF-36 questionnaire. Hughes et al. and Unalan et al, Hadrys et al. found a negative correlation between duration of care and caregivers' QoL (20, 27, 28). Ebrahimzadeh et al. found a negative correlation between physical function domain in SF-36 questionnaire and the QoL among spouses of patients with war-related spinal cord injuries (7). As the amputees and their caregivers become older, their physical abilities decrease (22). Ebrahimzadeh et al. and Hadrys et al. found an inverse correlation between spouses' age and physical function domain scores in wives of war-related spinal cord injuries (7, 28). In our study, spouses' education level had a positive correlation with their QoL, particularly MCS. Education had a positive correlation with physical function and vitality domains of caregivers of patients with spinal cord injuries (7). Similar to our study, the number of children had a negative correlation with QoL in other studies (7). Based on other studies, it seems that employment status does not affect spouses' QoL (7, 29).

Bilateral lower limb amputees have different types of pain and poor health-related QoL (2, 3). In our study, amputees' QoL closely correlated with that of their spouses. PCS of amputees was the only independent predictor of caregivers' PCS. Moreover, five of eight domains of SF-36 questionnaire correlated with each other. Other studies reported a similar correlation between QoL in caregivers and patients with chronic diseases (23, 24, 30, 31).

There were some limitations in our study. Most importantly, this was a cross-sectional study; therefore, it was not possible to establish a causal association between independent predictors and caregivers' QoL. Moreover, in our study we lost almost 20% of our subjects to follow-up. The QoL of amputees and their spouses are closely correlated; therefore, any improvement in one is likely to improve the other. Using better technology such as better prostheses and providing rehabilitation facilities, which can improve amputees' physical condition,

could improve the QoL of their spouses as well. In addition, as we found a direct correlation between spouses' education level and their QoL, lower education level should be considered as a risk factor for poor QoL in amputees' spouses.

Acknowledgements

We would like to thank to Janbazan Medical and Engineering Research Institute, Dr. Azma, and Dr. Soroush.

Authors' Contributions

Mohammad Hosein Ebrahimzadeh and Mohamad Reza Soroush participated in the design of research, implementation of study protocol and interpretation of data and publication of the manuscript. Ali Moradi participated in analysis and interpretation of data and drafting of the manuscript. All authors read and approved the final manuscript.

References

- Rahimi A, Masoumi M, Soroush M, Mousavi B. [Orthopaedic Complications in Bilateral Lower Limb Amputation]. *Iran J Orthop Surg.* 2009;7(2):58-63.
- Dougherty PJ, McFarland LV, Smith DG, Reiber GE. Bilateral transfemoral/transtibial amputations due to battle injuries: a comparison of Vietnam veterans with Iraq and Afghanistan service-members. *Clin Orthop Relat Res.* 2014;472(10):3010-6.
- Rahimi A, Mousavi B, Soroush M, Masoumi M, Montazeri A. Pain and health-related quality of life in war veterans with bilateral lower limb amputations. *Trauma Mon.* 2012;17(2):282-6.
- Kachooei AR, Ebrahimzadeh MH, Hallaj Moghadam M, Fattahi AS, Razi S, Salehi M, et al. Disabilities and activities of daily living among veterans with old hip disarticulation and transpelvic amputation. *Arch Trauma Res.* 2014;3(1).
- Rouhani A, Mohajerzadeh S. An epidemiological and etiological report on lower extremity amputation in northwest of iran. *Arch Bone Jt Surg.* 2013;1(2):103-6.
- Blanes L, Carmagnani MI, Ferreira LM. Health-related quality of life of primary caregivers of persons with paraplegia. *Spinal Cord.* 2007;45(6):399-403.
- Ebrahimzadeh MH, Shojaei BS, Golhasani-Keshtan F, Soltani-Moghaddas SH, Fattahi AS, Mazloumi SM. Quality of life and the related factors in spouses of veterans with chronic spinal cord injury. *Health Qual Life Outcomes.* 2013;11(8):48.
- Lim JW, Zebrack B. Caring for family members with chronic physical illness: a critical review of caregiver literature. *Health Qual Life Outcomes.* 2004;2(2):50.
- Weitzenkamp DA, Gerhart KA, Charlifue SW, Whiteneck GG, Savic G. Spouses of spinal cord injury survivors: the added impact of caregiving. *Arch Phys Med Rehabil.* 1997;78(8):822-7.
- Rommers GM, Vos LD, Groothoff JW, Schuiling CH, Eisma WH. Epidemiology of lower limb amputees in the north of The Netherlands: aetiology, discharge destination and prosthetic use. *Prosthet Orthot Int.* 1997;21(2):92-9.
- Johannesson A, Larsson GU, Oberg T. From major amputation to prosthetic outcome: a prospective study of 190 patients in a defined population. *Prosthet Orthot Int.* 2004;28(1):9-21.
- Dillingham TR, Pezzin LE, MacKenzie EJ. Limb amputation and limb deficiency: epidemiology and recent trends in the United States. *South Med J.* 2002;95(8):875-83.
- Ebskov LB. Trauma-related major lower limb amputations: an epidemiologic study. *J Trauma.* 1994;36(6):778-83.
- Coupland RM, Korver A. Injuries from antipersonnel mines: the experience of the International Committee of the Red Cross. *BMJ.* 1991;303(6816):1509-12.
- Atesalp AS, Erler K, Gur E, Koseglu E, Kirdemir V, Demiralp B. Bi-

- lateral lower limb amputations as a result of landmine injuries. *Prosthet Orthot Int*. 1999;**23**(1):50-4.
16. Russo J, Vitaliano PP, Brewer DD, Katon W, Becker J. Psychiatric disorders in spouse caregivers of care recipients with Alzheimer's disease and matched controls: a diathesis-stress model of psychopathology. *J Abnorm Psychol*. 1995;**104**(1):197-204.
 17. Zarit SH, Todd PA, Zarit JM. Subjective burden of husbands and wives as caregivers: a longitudinal study. *Gerontologist*. 1986;**26**(3):260-6.
 18. Chan RC. Stress and coping in spouses of persons with spinal cord injuries. *Clin Rehabil*. 2000;**14**(2):137-44.
 19. Harden J, Sanda MG, Wei JT, Yarandi HN, Hembroff L, Hardy J, et al. Survivorship after prostate cancer treatment: spouses' quality of life at 36 months. *Oncol Nurs Forum*. 2013;**40**(6):567-73.
 20. Hughes SL, Giobbie-Hurder A, Weaver FM, Kubal JD, Henderson W. Relationship between caregiver burden and health-related quality of life. *Gerontologist*. 1999;**39**(5):534-45.
 21. Li QP, Mak YW, Loke AY. Spouses' experience of caregiving for cancer patients: a literature review. *Int Nurs Rev*. 2013;**60**(2):178-87.
 22. Shimoyama S, Hirakawa O, Yahiro K, Mizumachi T, Schreiner A, Kakuma T. Health-related quality of life and caregiver burden among peritoneal dialysis patients and their family caregivers in Japan. *Perit Dial Int*. 2003;**23 Suppl 2**(2):S200-5.
 23. Zendjidian X, Richieri R, Adida M, Limousin S, Gaubert N, Parola N, et al. Quality of life among caregivers of individuals with affective disorders. *J Affect Disord*. 2012;**136**(3):660-5.
 24. Wadhwa D, Burman D, Swami N, Rodin G, Lo C, Zimmermann C. Quality of life and mental health in caregivers of outpatients with advanced cancer. *Psychooncology*. 2013;**22**(2):403-10.
 25. 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;**14**(3):875-82.
 26. Ebrahimzadeh MH, Moradi A, Bozorgnia S, Hallaj-Moghaddam M. Evaluation of disabilities and activities of daily living of war-related bilateral lower extremity amputees. *Prosthet Orthot Int*. 2014;**46**(5):363-72.
 27. Unalan H, Gencosmanoglu B, Akgun K, Karamehmetoglu S, Tuna H, Ones K, et al. Quality of life of primary caregivers of spinal cord injury survivors living in the community: controlled study with short form-36 questionnaire. *Spinal Cord*. 2001;**39**(6):318-22.
 28. Hadrys T, Adamowski T, Kiejna A. Mental disorder in Polish families: is diagnosis a predictor of caregiver's burden? *Soc Psychiatry Psychiatr Epidemiol*. 2011;**46**(5):363-72.
 29. Saravi FK, Navidian A, Rigi SN, Montazeri A. Comparing health-related quality of life of employed women and housewives: a cross sectional study from southeast Iran. *BMC Womens Health*. 2012;**12**:41.
 30. Ebrahimzadeh Mohammad H., Golhasani-Keshtan F., Shojaee B. S. Correlation Between Health-Related Quality of Life in Veterans With Chronic Spinal Cord Injury and Their Caregiving Spouses. *Arch Trauma Res*. 2014;**3**(4).
 31. Rajabi-Mashhadi M., Mashhadinejad H., Ebrahimzadeh M., Golhasani-Keshtan F., Ebrahimi H., Zarei Z. The Zarit Caregiver Burden Interview Short Form (ZBI-12) in spouses of Veterans with Chronic Spinal Cord Injury, Validity and Reliability of the Persian Version. *Arch Bone Jt Surg*. 2015;**3**(1).