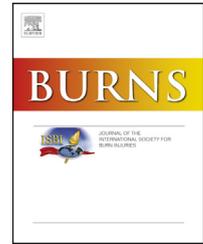


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The influence of age on quality of life after upper body burn

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ARTICLE INFO

Article history:

Accepted 13 September 2018

Keywords:

Burn
Quality of life
The Spanish version of the Burn Specific Health Scale
Age

ABSTRACT

Background: In Spain, the number of aged persons is increasing. By the year 2066, it is expected that 34.6% of the Spanish population will be over 65 years of age. Elderly people present a higher burning risk owing in part to impaired balance and decreased physical strength, lower cognitive abilities, or socioeconomic context.

Objective: Burns to the upper body are common and affect both emotional state and physical function, thus leading to reduced quality of life (QoL). Our objective was to determine the influence of age on the QoL of patients who experienced burns to the upper body, with burns with 2 years.

Methods: This is an observational study with a sample of 58 patients with burns only on the upper body. Patients were divided into two groups: 29 patients of age over 65 years and 29 patients under 65 years; all of them attended the Vall d'Hebron Burn Center, Barcelona, between 2011 and 2014. From the original sample, 45 patients had survived by the time the information was gathered. The QoL of these individuals was evaluated with the Spanish version of the Burn Specific Health Scale. Demographic data (sex, age, total burn surface area [TBSA], burn mechanism, pathological history, length of hospital stay, and rehabilitation duration) were collected. Statistical analysis included parametric and nonparametric tests as appropriate with R3.3.3.

Results: There were no differences between groups regarding the mechanism of burn, TBSA, length of hospital stay, and the domains of QoL test. High blood pressure, diabetes, and other comorbidities were significantly more common in the elderly group than in the younger group. Eleven patients died in the elderly group and two in the younger group ($p=0.012$).

Conclusion: As opposed to what could be expected, in this study, there were no significant differences between surviving patients in both age groups in terms of perceived QoL. Nevertheless, mortality after a burn in the upper side of the body was significantly higher in elderly people than in younger people. The present study results do not support the use of different rehabilitation approaches in elderly patients.

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<https://doi.org/10.1016/j.burns.2018.09.016>

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1. Introduction

According to World Health Organization, the world's population is aging rapidly. Between 2000 and 2050, the percentage of people over 60 years of age will double, thus increasing from 11% to 22% of the world's population [1]. The percentage of Spanish population aged 65 years or older, which currently stands at 18.7%, will reach 25.6% by 2031 and 34.6% by 2066 [2].

Age increases the risk of suffering burns [3] because of the decrease in physical and cognitive capabilities. This risk is high in unfavorable socioeconomic environments.

Elderly people are more vulnerable to changes resulting from burn accidents: their survival rate is lower, wound healing is worse, and both the rehabilitation process and the reintegration to their social environment are more complicated.

We have focused our study on upper body burns, especially those that affect the hands, face, and neck. These types of injuries interfere with everyday activities, social relations, and the perception of self-image [4]; these factors have a particularly important impact on quality of life (QoL).

Specific (Burn Specific Health Scale (BSHS)) and generic (e.g., SF36 or the EQ-5D) questionnaires have been used in many studies on QoL after a burn.

The studies we found have heterogeneous samples owing to the inclusion of patients with different clinical and demographic characteristics such as age, among others [5–7]. Despite the high and growing proportion of elderly people among those burned, there is no conclusive information about the effect of age on the QoL of these patients.

The main aim of the study is to determine the influence of age on the QoL of patients affected by upper body burns to establish better intervention strategies of rehabilitation. This will allow a better administration of treatment according to the needs of each population group, thus leading to the reduction and/or prevention of deterioration of QoL after the burn accident.

2. Methods

An ambispective and observational study was conducted in patients with upper body burns. The study was approved by the Clinical Research Ethics Committee of our center. We included 58 consecutive patients admitted to the Burns Unit of the Vall d'Hebron Hospital in Barcelona, between December 30, 2011, and October 04, 2014. The inclusion criteria were as follows: location of the burn only in the upper part of the body (torso, arms, neck, or face), age over 18 years, burns that occurred before 2 or more years, and agreeing to participate in the study. The exclusion criteria were as follows: presence of burns in lower extremities, significant cognitive impairment, existence of terminal illness, inability to communicate in Spanish language, and difficulty to locate the patient owing to change in place of residence and/or lack of an operative telephone number.

The patient sample was divided into two groups following the Spanish Statistical Office guidelines and according to age. Therefore, 29 patients aged 65 years and younger were

included in one group and 29 patients over 65 years of age in the other one. The final sample consisted of 45 patients because 13 of them had died.

The aim of the study was explained to all the patients by phone, and their participation was requested. After obtaining their consent, they were interviewed by phone to complete the Spanish version of the BSHS [8]. Surveys were conducted by four researchers specifically trained to administer this questionnaire.

This questionnaire was designed to access the functioning level and health-related QoL in adult burn survivors, and it is widely used in research. In our study, we have used the Spanish version of the BSHS, which consists of 71 items divided into four domains, namely, physical health, mental health, social and sexual activity, and general health. The patient rates each item statement between Extremely (score 4) and Not at all (score 0). Mean score is calculated for each domain. The final score reflects an alteration of QoL. A higher mean score indicates a more positive evaluation of function and a higher QoL [8–10].

The following demographic and clinical data were also collected: sex, age, total burned body surface (TBSA, expressed as percent of body surface area), depth of burn, mechanism of burn, pathological history, number of surgical interventions, length of hospital stay, and rehabilitation duration. These data were compared between both groups.

Statistical analysis included parametric and nonparametric tests as appropriate using R software (R version 3.3.3). Comparisons between both groups for the categorical variables were made using the Chi-square test, and if the frequencies in any of the cells in the table were less than 5, Fisher's exact test was used. For the numeric variables, the Mann-Whitney U test was used. All the tests were two tailed. Categorical variables are represented as frequencies, and the quantitative variables are represented as median and interquartile range (IQR). The level of significance was 5% ($p < 0.05$).

3. Results

3.1. Demographic and clinical variables

Of the patients included, 37.9% were men and 62.1% were women, with an average age of 65.5 years. In both groups, the most common burn mechanism was flame, followed by scald, electric, chemical, and contact burn. The majority of the burns were casual accidents, being 86.2% in young patients and 96.6% in elderly patients. In both groups, burns were predominantly deep partial thickness and full thickness (89.65%), of which 81.03% required one or several surgical interventions. There were no differences between groups in terms of TBSA (median value was 7.0% in both groups), and the location of the burns was similar, arms being the most common location in both young (79.3% of patients) and elderly (65.5%) patients: hands were involved in 48.3% and 55.2% of patients as well as head and neck in 55.5% and 58.6%, respectively.

The main demographic and clinical variables are summarized in Table 1.

The presence of comorbidities in our series was higher in elderly patients (86.2%) than in younger patients (34.5%), with

Table 1 – The main demographic and clinical variables in both groups.

	≤65 years	>65 years	Overall p value
Gender:			0.787
Female	17 (58.6%)	19 (65.5%)	
Male	12 (41.4%)	10 (34.5%)	
Age:			
Range	24-65	66-97	
Mean	43.7	76.5	
Burn mechanism	Flame	16 (55.2%)	
n (%)	17 (58.6%)		
	Scald	7 (24.1%)	
	7 (24.1%)		
	Electric	2 (6.90%)	
	2 (6.90%)		
	Chemical	1 (3.45%)	
	0 (0.00%)		
	Contact	3 (10.3%)	
	3 (10.3%)		
Burn causes	Casual	28 (96.6%)	
n (%)	25 (86.2%)		
	Laboral	1 (3.45%)	
	3 (10.3%)		
	Autolysis	0 (0.00%)	
	1 (3.45%)		
Burn depth	Full-thickness	Full-thickness	
n (%)	26 (89.65%)	26 (89.65%)	
	Partial-thickness	Partial-thickness	
	3 (10.34%)	3 (10.34%)	
Total burn surface area	7.00 [2.50-10.0]	7.00 [3.00-12.0]	0.668
Mean (IQR)			
Location of burns	Arms	Arms	
	79.31%	65.51%	
	Hands	Hands	
	48.27%	55.17%	
	Head/neck	Head/neck	
	55.17%	58.62%	
	Thorax	Thorax	
	27.58%	48.27%	
	Back	Back	
	20.61%	20.6%	
	Abdomen	Abdomen	
	0%	0%	
Number of surgical interventions	1.00 [1.00-1.00]	1.00 [1.00-1.00]	0.622
Mean (IQR)			

$p < 0.001$. The most common pathologies in the elderly group were arterial hypertension (HBP), heart disease, and diabetes mellitus (DM). In the younger group, the most common comorbidities were hypertension and anxiety-depressive disorder.

The incidence of comorbidities is summarized in [Table 2](#).

There were no significant differences regarding the length of hospital stay: 13 days (5.00, 23.00) in younger patients and 17 days (4.00, 25.00) in elderly patients ($p = 0.797$).

The duration of rehabilitation treatment during hospital admission, measured in days, was the same in both groups: 6.00 (0.00, 15.00) in younger patients and 6.00 (0.00, 16.0) in elderly patients. The duration of the outpatient rehabilitation treatment, performed in our center or in centers close to the patient's home after hospital discharge, was 0.00 days (0.00, 40.00) in younger patients and 0.00 days (0.00, 0.00) in elderly patients ($p = 0.486$).

Table 2 – Incidence of comorbidities.

	≤65 years n (%)	>65 years n (%)
Comorbidities	34.5%	86.2%
Arterial hypertension	6 (20.69%)	19 (65.51%)
Diabetes mellitus	2 (6.89%)	9 (31.03%)
Musculoskeletal disease	4 (13.79%)	8 (27.58%)
Heart disease	0	13 (44.82%)
Neurological disease	3 (13.34%)	4 (13.79%)
Respiratory disease	3 (13.34%)	2 (6.89%)
Renal disease	1 (3.34%)	3 (13.34%)
Neoplasia	2 (6.89%)	3 (13.34%)
Anxiety-depressive disorder	6 (20.69%)	4 (13.79%)

3.2. Evaluation of mortality and QoL

Mortality after the burn was high, especially in elderly patients, as shown in Table 3. The main causes of death were respiratory complications. Four people died after hospital discharge: two in each group. The causes of these deaths are unknown (Table 3).

There were no differences in the QoL between younger and elderly people after 2 years of suffering the burn in any of the domains evaluated by the BSHS questionnaire: physical domain (52.0 vs. 52.0), mental domain (103 vs. 102), social and sexual domain (55.0 vs. 51.5), and general health domain (43.0 vs. 43.0) (Fig. 1).

4. Discussion

Although it may seem that the prognosis of patients with burns is adversely affected by advanced age, there is insufficient information on the impact of age on QoL in burn injury survivors.

In recent studies on QoL, there is no universally accepted age to define elderly people. According to World Health Organization, people over 60 years of age are considered as elderly [1], but demographic changes take place in developed countries with an increase in life expectancy and a better QoL for elderly people.

Our study shows that patients with upper body burns over 65 years of age are more likely to die during the months following the accident than younger people with burns. However, survivors achieve a similar QoL in the long term. Therefore, our results do not support the need to perform a specific rehabilitation treatment for these patients but a program by objectives regardless of age. Perhaps, age, in itself, is not as important as the state of health before the burn; hence, the enormous diversity of health and functional states that elderly people present is a challenge for health professionals.

Demographic and clinical characteristics were similar in both groups. Several studies analyzed the distribution by gender in burn accidents and found different results according to countries and age groups; in our case, female gender predominated. Globally, more burns are described to occur in women in the domestic environment and in men in the work environment. Although men suffer more burns than women, the trend decreases with age until it reaches the point of reversing, after 75 years, owing to the longer life expectancy of women [11]. Some studies investigated the relationship of gender with mortality but did not reach clear conclusions [12,13], and others such as Goverman et al. associated female gender with a worse QoL [14].

The most common burn mechanisms were flame and scald (Table 1), similar to those reported in studies by Brusselaers et al., who, in a systematic review of severe burns in Europe, reported that the first causes of burn were flame, scald, and contact [15].

The median TBSA was 7.0% in both groups. This was a relatively small area, probably because we included only patients who had burns exclusively in the upper side of the body and because of the decrease in severe burns in recent years [16]. Despite it being a small TBSA percentage, there is unanimity in considering the injury of hands as a determinant of QoL without age discrimination [17]. In our sample, both groups show high and similar proportions of involvement of arms and hands (Table 1). Accordingly, it appears unlikely that our results have been influenced by differences between groups in terms of burn locations.

The length of hospital stay did not vary with age in our sample, unlike that reported in Edgar DW's study, where it increased 1.1 day per decade [6].

Mortality was significantly higher in people over 65 years of age, who had more comorbidities that increase the risk of complications [3]. Mabrouk et al. observed a high mortality (70.9% of deaths) in patients aged 60 years or older with burns and previous health problems [18]. Other factors that may influence postburn mortality, such as TBSA [19,20], smoke inhalation injuries [21], or hemodynamic complications [12], should also be considered.

In general, the time to determine QoL in burned patients is not unanimously established. In some studies, authors measured QoL 2 weeks after the injury [22], whereas others measure during the process of maturation of the scar [23]; there are also authors who analyzed QoL years after the burn [24]. Studies of Rennenberg et al. showed both functional and QoL improvements in the reviews up to 3 years postburn [25]. In our study, we measured the QoL in a precise moment of the injury, i.e., 2 years postburn. This moment was chosen because the biggest changes in the scar have already taken place at this point.

Numerous questionnaires are used to measure the perception of QoL in burned patients (SF36, EQ-5D, and BSHS). Most studies use the BSHS (specific for burned patients), although some authors recommend using it together with a generic QoL scale [26]. Despite their specificity, there is controversy whether these questionnaires cover all the domains defined by the International Classification of Functioning, Disabilities and Health (ICF) [27]. In our study, we used the BSHS because it is specific for burned patients, and it is validated in the Spanish language.

We did not find differences in QoL according to age. No domain of BSHS had a superior result in both age groups. Edgar DW et al. obtained differences in QoL according to age, minimal with the BSHS and greater with the SF-36, especially in physical function, without affecting the overall QoL perceived [6]. In other studies, there are no significant differences in QoL regarding age [23,28].

In our study, we did not find long-term differences in QoL regarding age; however, the results of several studies that analyzed QoL with the BSHS showed that it decreases mainly in the short term, in all ages [14,29,30]. New studies are needed to examine the influence of early and specialized rehabilitation on the improvement of QoL for a short term.

Table 3 – Mortality in both groups.

	≤65 years	>65 years	
Alive	27 (93.1%)	18 (62.1%)	p=0.012
Dead	2 (6.90%)	11 (37.9%)	

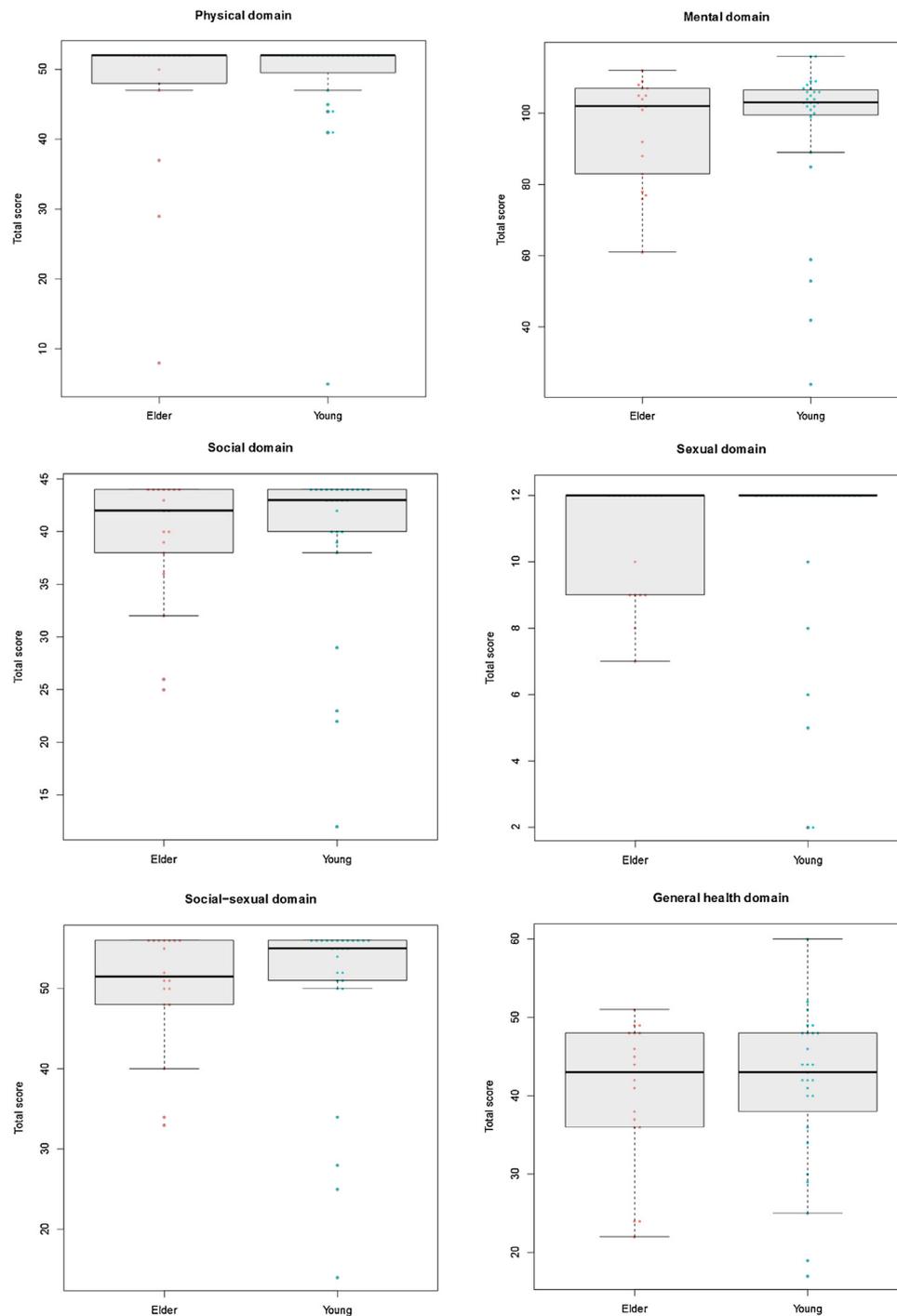


Fig. 1 – Total sum of BSHS scores in different domains in young and elderly patients.

5. Limitations

A limitation of this study is that only upper body burn patients were included, excluding those patients who had burns in both the upper and the lower body, which prevents applying the findings to patients with more extensive burns. However, burns in the upper half of the body have special clinical characteristics and a great impact on QoL. Owing to their impact on QoL, future studies might pay special attention to burns in the hands.

A greater number of deaths in the elderly, which made it impossible to pass the QoL test in these patients, could have caused a selection bias. This limitation will probably affect any prospective study in these groups of patients.

Finally, obtaining the data by phone could have conditioned the test result owing to lack of privacy. Nevertheless, we believe it is unlikely that this circumstance has modified the results of the study because it affects both age groups.

In conclusion, our data suggest that in patients with upper body burns, survival is lower in those over the age of 65 years,

but the QoL of the survivors is not significantly worse in the elderly. These results support the setting of similar long-term rehabilitation goals in both age groups.

Conflict of interest

All authors warrant that no conflicts of interest exist with regard to this study.

Acknowledgment

We are indebted to Statistics and Bioinformatics Unit (UEB) of Vall d'Hebron Research Institute (VHIR) for the statistical analysis.

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