

IMPACT OF BURN SEVERITY, TIME SINCE BURN AND AGE ON THE COGNITIVE FUNCTIONING OF WOMEN WHO HAD BURN INJURIES

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ABSTRACT

Objective: To investigate the impact of burn severity, time since burn and age on the cognitive functioning of women who had burn injuries.

Study Design: Cross sectional study.

Place and Duration of Study: Department of Psychology, University of Gujrat, from Nov 2017 to Jul 2018.

Methodology: The data were collected from females suffering burn injuries. The burn severity, time since burn and age were assessed to see their impact on cognitive functioning of women with burns injured. Further, Montreal Cognitive Assessment scale was used to measure the construct of cognitive functioning.

Results: Among a total of 200 burn victims, 52.5% had the severity level of third degree burns. A total of 75% victims had 6-15 months old burns and 64.5% belonged to age group of 19-34 years. The predictive association among variables based on difference of training and testing relative error (0.61) indicated the significant predictive relationship of burn severity, time since burn and age on the cognitive functioning of burn injured women. Further, relationship of burn severity, time since burn, and age was investigated. The relative importance of burn severity, time since burn and age in predicting cognitive functioning was 0.700, 0.163 and 0.136 respectively.

Conclusion: Burn severity, time since burn and age are the factors affecting the cognitive functioning of female burn victims. Whereas role of burn severity was more prominent than time since burn and age.

Keywords: Burn degree, Burn injuries, Cognitive functioning, Montreal cognitive assessment, Women.

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INTRODUCTION

Burn injury is considered as a stressor which involves many factors for example severity, duration and age that may affect the cognitive functioning. Among others, an important factor is burn severity which is linked with total body surface affected by burn. It is degree of burn from 1st to 4th level that triggers problems in the health outcomes¹. Even after recovering successfully from burn injury the time since burn contributes in predicating cognitive functioning². Further, the age of the victims also plays a significant role in effecting the operative working of the survivors³.

Cognitive dysfunction was considered as the obvious problem associated with burn incidence⁴. Cognitive functioning is important in performing

daily life activities, doing office work and dealing with the social and physical environment⁵. Cognitive functioning may include how people pay attention, use language, work with memory, perceive things, find a solution to the problems, ability to think and create⁶. The cognitive functioning or processes play an important role in producing great intellectual accomplishments among individuals⁷.

Literature has confirmed that trauma produces some instant cognitive responses like inability to concentrate, fear to experience the trauma again, disorientation and memory problems. These patients, in the long run, develop disturbed memory or flashbacks related to the traumatic event. Severe trauma has hazardous effect on the behavior of survivors and they may feel confusion about their decisions. Due to their preoccupation about accident sometimes they adopted avoidance attitude and they generalize their traumatic experience to all related

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situations^{8,9}. Some research further confirmed after studying the burn survivors that the cognitive abilities may be dysfunctional.

In the community the prevalence rate of cognitive problems is as low as 1%-2%. However, this percentage rises with age. In persons with age above 85 years, the prevalence is 14%. The overall prevalence of major neurocognitive disorder at the age of 65 years is about 1%-2% whereas at age 85 years it's 30% showing a great increase. The estimations of the occurrence or prevalence of mild cognitive deficiency at age 65 years is between 2% to 10%. At 85 years the prevalence rate ranges in 5% to 25%.

In this era, there is an important role of women in society for running the spheres of professional, family and everyday deeds. The effects of burn injury may lead to different problems that make these women dependent. The post burn trauma assessment of victims in Pakistan is not fully explored and its importance cannot be negated. A research conducted in Pakistan shows that most of the female burn victims are young (average 32 years) and sustained accidental burn with flame and total body surface area percent is between 8-70%. In our country females are at greater risk of burn injury because of neglected safety measures. The problems may reside in kitchen settings, squatter settlements, female clothing (dupatta) and honor killing of females. After the burn trauma it is of prime importance to pay attention to the psychological and emotional recovery of women with burn injuries¹⁰.

The study focuses on the role of burn severity, time since burn and age on the cognitive functioning. It is imperative to have individuals with ideal cognitive ability to play out the everyday or high order tasks. The cognitive functioning of burn victims is important to explore as the burn injury directly affects the personal and social life of the victim. The objective of our current study is to explore the impact of burn severity, time since burn and age on the cognitive functioning of women who had burn injuries.

METHODOLOGY

The cross-sectional study was conducted from November 2017 to July 2018. The data were collected from a total of 200 women with burns selected from different Non-Governmental Organizations (NGOs), Burn Centers and community of Gujrat, Rawalpindi, Islamabad and Lahore by using purposive sampling. The data were taken from women, aged more than 18 years with unintentional burn injuries and duration of burn injury at least 6 months to 2 years. The patients who had any physical issue or diseases and any psychological syndromes before the burn injury were excluded from the study. Moreover, male, intentional burns and below 18 years women were also not included in the study. These respondents were not available in hospitals and could only be approached in outpatient visits in hospitals or at homes. Their list was not available so it was difficult to finalize a respondent number in advance. The sample was recruited from different Burn Centers of hospitals, community bases and NGO's of Lahore, Rawalpindi, Islamabad and Gujrat and so, maximum respondents were taken which fulfill the criteria. Initially, 326 women with burn injuries were recruited from which 227 confirmed the eligibility criteria. Among the two hundred and twenty seven, 209 completed the questionnaire. Nine questionnaires were discarded because of incomplete or missing information with remaining 200 respondent's information. The Departmental Research Review Committee, Department of Psychology; University of Gujrat, Pakistan had approved the objectives and procedures of research before the data collection.

The burn severity (first degree, second degree and third degree), time since burn (6 to 24 months) and age were asked with other important modifiers of the study. The cognitive functioning was measured by using Montreal cognitive assessment urdu version. It's a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains of executive functions, visuoconstructional skills, naming, attention, language, abstraction,

memory/delayed recall and orientation. Time to administer the MoCA is approximately 10 minutes. The total possible score is 30 points; a score of 26 or above is considered normal. The visuoconstructional / executive skills had 5 score and was based on alternating trial, drawing a cube and clock. In the naming sub-scale, a score of 3 can be obtained after name out the three animals in the picture. Further, in the attention scale the score of 6 can be obtained through digit forward and backward test, vigilance in identify-

Furthermore, the females were briefed about the study with both written and oral consent, then data collected. The data were collected by using face to face interview method with the help of scales. The females were requested to follow the instructions carefully about how to complete the scale and the responses were recorded on scale booklet. The anonymity and confidentiality of the respondents were kept intact. The scale permission was taken from the authors through email.

Table-I: Frequency of burn severity, time since burn and age of women burn victims (n=200).

| Burn Severity | n (%) | Time since Burn (months) | n (%) | Age Group | n (%) |
|---------------|-------------|--------------------------|------------|-----------|-------------|
| First Degree | 16 (8%) | 6-15 | 150 (75%) | 19-34 | 129 (64.5%) |
| Second Degree | 79 (39.5%) | 16-25 | 50 (25%) | 35-50 | 67 (33.5%) |
| Third Degree | 105 (52.5%) | - | - | 51-66 | 4 (2%) |
| Total | 200 (100%) | Total | 200 (100%) | Total | 200 (100%) |

ing a letter and subtraction. The language ability comprised of 3 score with sentence repetition and verbal fluency questions. The abstraction was

Table-II: Predictor association among variables based on training and testing relative error (n=200).

| Relative Error | |
|----------------|---------|
| Training | Testing |
| 0.611 | 0.672 |

Table-III: Relative predictive importance of burn severity, time since burn and age on cognitive functioning (n=200).

| Variables | Importance | Normalized Importance |
|--------------------|------------|-----------------------|
| Burn severity | 0.700 | 100.0% |
| Time since burn | 0.163 | 23.3% |
| Age of the victims | 0.136 | 19.5% |

judged by asking similarities in two things with a score of 2. The memory/delayed recall was measured by asking the words learnt earlier with a score of 5. Finally, the orientation was checked with orientation of a person about date, time and place with the score of 6¹⁶. The women burn injured were recruited by researcher from different burn centers, NGOs and community. The data were collected after taking permission from the authorities of concerned institutions.

The study data was analyzed on Statistical Package for Social Sciences (SPSS) version 22 for windows by using descriptive statistics and neural network analysis. The neural network analysis was run to see the impact or predictive relationship of burn severity, time since burn and age on the cognitive functioning of women burn injured. The analysis provides importance ratios and normalized importance of independent variables towards the dependent. The importance gives an account of the relative importance of each predictive variable in confirming the model whereas normalized importance transfer different data sets inputs of independent variables into equal comparable range.

RESULTS

A total of 200 respondents were studied. The age range of the females were 19 to 65 years with the mean age of 30.95.

Table-I shows the burn severity in patients. The majority of respondents had third degree burn 105 (52.5%) followed by second degree 79 (39.5%) and first degree burn 16 (8%). It also shows time since burn in months and reported that 6-15 months old burn was 3/4, 150 (75%) whereas 1/4 of the patients, burn injury was 16-25 months old 50 (25%). Further, most of the

respondents belong to age group of 19-34 years being, 129 (64.5%) followed by 35-50 year old being 67 (33.5%). There was a very little number of patients to the group of 51-66 being, 4 (2%).

The neural network analysis established the predictive association between variables. The relative error for training and testing was 0.611 and 0.672 respectively as shown in table-II. The less the difference in the relative errors of training and testing, the better the predictive relationship. In case of current research, the difference is very small thus, confirming the association.

Table-III shows the importance and normalized importance of each independent variable towards cognitive functioning. The relative importance ratios of burn severity were 0.700 (normalized importance = 100%). However, time since burn 0.163 (normalized importance = 23.3%) and the age of the victims 0.136 (19.5%) were the 2nd and 3rd important predictors, respectively. The analysis established the fact that burn severity contributed more in effecting the cognitive functioning of female burn victims as compare to time since burn and age.

DISCUSSION

The current study was conducted on female burn victims to assess the impact of burn severity, time since burn and age on the cognitive functioning. The findings of current research comprehensively established the fact that burn severity, time passed after injury and age predict cognitive functioning of women burn injured with a very small difference in training and testing relative error (0.61) which indicates the error was constant across training and testing. It boosted the confidence on the model as it is not over trained¹¹⁻¹⁵. Further, the researchers confirmed that trauma may accompany the problems in the cognitive abilities of victims¹⁶⁻¹⁸. The problems may persist in various cognitive areas. There may be deficit in the executive functioning¹⁹, the inability to concentrate²⁰ lack of memorization, dearth in speed processing²¹ and temporal orientation²².

The effect of burn severity on the cognitive function of women with burns shows the predictive relative importance of burn severity as 0.700 with 100% normalized importance and 52.5% of these females had third degree burns. The findings confirmed the role of burn severity in determining the cognitive functioning of burn injured women with most of the body area affected. Previous literature also revealed and supported that burn severity plays an important role in predicating the cognitive functioning of burn victims². Further, studies in Pakistan confirmed that about 50% of the female burn victims' had 80% body area burnt²³ and 4.43% patients were with more than 90% total body affected by burns²⁴. Previous studies also in line with the current study stating that burn severity effects the cognitive functioning with severe level of burn severity.

The influence of time since burn on the cognitive function of female burn victims indicated the predictive relative importance of 0.163 with 23.3% normalized importance and 75% of these patients were 6-15 months old. It means that time since burn was less important than burn severity in altering the cognitive functioning of women burn injured. Literature had shown that time since burn predicts the cognitive functioning but it is noteworthy that the effected size was small². In the present research the effected size of time since burn was lower than burn severity thus confirming the previous literature.

The impact of age on the cognitive function of women with burns shows the predictive relative importance of 0.136 with 19.5% normalized importance and 64.5% of the patient were young (19-34 years). It was found that age was important in effecting the cognitive functioning but lesser than burn severity and time since burn. Previous studies identified that age also play a role in predicting the cognitive ability of burn victims^{3,25}. Furthermore, age interferes with attention when there is rapid shift from one task to another and it also becomes difficult to keep different information in mind. Person's ability to understand spatial relationships also weakens

with age. A study in Pakistan also showed an average age of burn trauma survivors as 22.81 years belonging to young age group as evident in the current study. Further, another study also reported that most of the burn patient were young at the time of burn incidence. The literature was consistent with the present study which explicates that age of burn victims affects cognitive abilities and this problem was evident in young age group²⁵.

Hence, the results showed that burn severity contributed more comparing to time since burn and age in predicting cognitive functioning of women burn injured.

There were various limitations of the study. According to the set criteria of study the respondents were approached with great difficulty. The study consent and rapport with the victims were acquired with challenge. The completion of cognitive functioning scale took more effort.

These problems related to burn injury incidence must be attended to by the stakeholders so, the supportive assessment and treatment facilities can easily be provided at the right time. The distressing consequences of burn injury make it necessary to develop guidelines and strategies that can prevent or reduce the burn injury problem. In future men and children may also be evaluated on these factors. The thorough understanding of the experience of women burn injured may be investigated by using qualitative study.

CONCLUSION

Burn severity, time since burn and age of the patients are the factors affecting the cognitive functioning of female burn victims. Whereas role of burn severity was more prominent than time since burn and age.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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