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3 **Post-traumatic stress disorder, cognitive function and adjustment**  
4 **problems in women burn survivors: a multicenter study**

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9  
10 **Abstract**

11 **Objective:** To investigate the relationship of post-traumatic stress disorder,  
12 cognitive function and adjustment problems in women burn survivors.

13 **Methods:** The analytical cross-sectional study was conducted at the Department  
14 of Psychology, University of Gujrat, Pakistan, from November 15, 2017, to July  
15 25, 2018, and comprised women burn survivors at different burn centres of  
16 hospitals, household bases and non-governmental organisations of Lahore,  
17 Gujrat, Rawalpindi and Islamabad, Pakistan. Data was collected using the civilian  
18 version of the standardised Post-Traumatic Stress Disorder Checklist, the  
19 Montreal Cognitive Assessment and the Adjustment Problem Scale for Adults.  
20 Data was analysed using Analysis of a Moment Structures software version 21.

21 **Results:** Of the 200 women, 100(50%) each were living in nuclear and joint  
22 family systems. The maximum number of women 74(37%) were aged 15-25  
23 years; 93(46.5%) were married; and 82(41%) were employed. Post-traumatic  
24 stress disorder affected cognitive issues and adjustment of women burn survivors  
25 (p=0.000).

26 **Conclusion:** Post-traumatic stress disorder significantly affected cognitive issues  
27 and adjustment problems of women burn survivors.

28 **Key Words:** Post-traumatic stress disorder, Cognitive, Women burn survivors,  
29 Burn centres, Cross-sectional study, Multivariate Analysis.

30

### 31 **Introduction**

32 Women were considered to be affectionate, real household asset and the most  
33 important part of every society. Females were key role players in carrying out  
34 family and daily living activities and were at greater risk of a burn injury. Study  
35 of the health-related quality of life (HRQOL) of females indicates a high rate of  
36 injuries compared to males, and females also demonstrated high rates of mental  
37 illness compared to male burn survivors.<sup>1</sup> Burn injury treatment till recovery is  
38 quite a difficult and tiring procedure because burn injury leads to a number of  
39 problems. Women burn injury survivors are at the greatest risk of psychological,  
40 emotional, physical and social hazards, which increases their dependency level.  
41 Literature has confirmed that almost 1/3 of burn injury victims are exposed to  
42 moderate to severe levels of psychological and social issues.<sup>2</sup> Further, it is also  
43 important to note that only a small number of acute burn survivors get psychiatric  
44 help after having the injury.<sup>3</sup>  
45 Mostly they suffer from psychological issues, including acute stress disorder,  
46 depression, suicidal ideation and post-traumatic stress disorder (PTSD).<sup>4</sup>  
47 Thus, it is evident that PTSD is the ultimate effect of burn injury. Further, the  
48 Diagnostic and Statistical Manual of Mental Disorders—V (DSM-V) defines  
49 PTSD as a disorder resulting from a traumatic event. Apart from direct experience  
50 of trauma, even witnessing traumatic events, especially among family and friends  
51 can lead to trauma.<sup>5</sup> A review of studies about the prevalence of PTSD in adult  
52 burn victims Noted PTSD prevalence from 3% to 35% for the first month. In 3-6  
53 months, the prevalence was 2-40%. After 9 months, the prevalence was 45%, and  
54 for more than 2 years, the prevalence ranged 7-25%. Threat to life, acute intrusive  
55 symptoms and pain were the strongest predictors for PTSD.<sup>6</sup>

56 Women burn survivors sometime had problems of cognitive impairment and  
57 adjustment problems due to PTSD. Cognition may be defined as a process in  
58 which individual identify, select, interpret, store and use information to give  
59 meaning to their social and physical environment.<sup>7</sup> The cognitive process or  
60 functioning may include complex attention, executive functioning, learning and  
61 memory, language expression, perceptual-motor function and social cognitions.<sup>5</sup>  
62 Moreover, cognition issues have psychological basis, and literature has confirmed  
63 the notion that PTSD may trigger cognitive dysfunction in survivors.<sup>8</sup> A study  
64 established the fact that trauma can induced problems in cognitions of memory,  
65 especially related to the traumatic event.<sup>9</sup>

66 Moving on, adjustment is a process in which individuals try to adapt, cope and  
67 manage their demands, problems and challenges of daily life activities (DLAs).<sup>10</sup>  
68 DSM-V<sup>5</sup> has specified adjustment as emotional and behavioural changes because  
69 of some stresses in terms of depressed mood, anxiety, combination of anxiety and  
70 depressed mood, disturbance of conduct, combination of disturbance of emotions  
71 and conduct. The sub-domains of adjustment, such as depressive, anxiety and  
72 conduct symptoms, can be foreseen in terms of PTSD. Research confirms that  
73 burn and other trauma survivors report depressive<sup>11</sup> and anxiety symptoms.<sup>12</sup>  
74 Also, conduct disturbances of anger are evident in the trauma population.<sup>13</sup> In  
75 Pakistan, women are approximately half of the total population as per the census  
76 of 2017.<sup>14</sup> The Pakistan National Emergency Department Surveillance (PNEDS)  
77 gathered statistical data of burn victims from November 2010 to March 2011, and  
78 found that 403 patients visited the department. About half of the patients were  
79 aged 10-29 years. of the total, 21 died who were aged 40-49 years, and 308 had  
80 known intention of injury<sup>15</sup>. Statistics have indicated that about 95% of burn  
81 deaths were in low and middle income countries (LMICs) compared to high  
82 income countries (HICs).<sup>16</sup>

83 Females had more burn injuries due to the socio-cultural responsibility of cooking  
84 in the domestic setting.<sup>17</sup> There is a great need for providing proper information

85 about how to regulate temperature of water in baths and unsafe cooking  
86 appliances can be the cause of burn injuries.<sup>18</sup>

87 There are factors that can hinder treatment and rehabilitation of the victims. These  
88 may include lesser family support, as well as medical and living expenses. It has  
89 been suggested that mental health specialists can provide better help in handling  
90 the psychosocial issues of burn victims using the social rehabilitation platform.<sup>19</sup>

91 There are cultures and social traits of overprotecting the disfigured person or to  
92 reject and tease the individual. In both the situations, the attitudes cripple the  
93 victims. Healthcare providers must focus on the cultural factors while dealing  
94 with burn survivors. Pre-injury physical and psychological problems, coping  
95 abilities, psychosocial and economic weaknesses, family care and social support  
96 affect the rehabilitation process, and, additionally, the fear of rejection due to  
97 appearance transformation may lead to depressed feelings with progression  
98 towards suicidal attempts.<sup>20</sup>

99 The current study was planned to explore the role of PTSD in triggering cognitive  
100 and adjustment problems in women burn survivors.

101

## 102 **Subjects and Method**

103 The analytical cross-sectional study was conducted at the Department of  
104 Psychology, University of Gujrat, Pakistan, from November 15, 2017, to July 25,  
105 2018, and comprised women burn survivors at different burn centres of hospitals,  
106 household bases and non-governmental organisations (NGOs) of Lahore, Gujrat,  
107 Rawalpindi and Islamabad, Pakistan. The research proposal was initially  
108 discussed with clinical psychologists and psychiatrists to review the ethical  
109 concerns and study design. After approval from the institutional review  
110 committee, the sample was raised using purposive sampling technique from  
111 among adult female burn victims whose injury duration was 6-24 months and the  
112 burn was accidental. Those with intentional burns or with co-occurrence of any  
113 other health problem or psychiatric disorder were excluded. The subjects included

114 were patients who had been discharged from hospitals after recovery and could  
115 be approached during their follow-up visits in out-patient settings after  
116 permission from hospital and NGO administrations. Based on the inclusion and  
117 exclusion criteria these respondents were not available in hospitals and could only  
118 be approached in outpatient visits in hospitals or at homes. Maximum respondents  
119 were recruited who met the inclusion criteria. After informed consent from the  
120 subjects, data was collected regarding age, marital status, residential type,  
121 education, occupation and family income of patients. Also noted were burn  
122 severity, burn causative agent, first aid, health complaints, parts of body affected,  
123 duration of hospital stay, time since burn injury and satisfaction with treatment.  
124 To avoid biasness, indigenous and translated versions of standard scales with  
125 cultural appropriateness were used. These included the Civilian Version of the  
126 PTSD Checklist in Urdu,<sup>21</sup> Montreal Cognitive Assessment Urdu version<sup>22</sup> and  
127 Adjustment Problem Scale for Adults.<sup>23</sup>  
128 The permission for use and translate the scales in the present research was  
129 obtained from the authors through email.  
130 Data was analysed using Analysis of a Moment Structures (AMOS) version 21  
131 with the analysis technique of Structure Equation Modelling (SEM) which is a  
132 multivariate technique used for structural relationships. It is a merger of multiple  
133 regression and factor analysis.<sup>24</sup> SEM can be significant when used in social  
134 sciences.<sup>25</sup> The analysis was confirmed on model fit indices of chi-square/df  
135 (CMIN/DF) ratio, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index  
136 (AGFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation  
137 (RMSEA).  $P < 0.05$  was considered significant. Further, regression weights and  
138 covariance were also inspected.

139

## 140 **Results**

141 Of the 326 individuals approached, 200(61.34%) women completed the study  
142 (Figure 1). Of them, 100(50%) each were living in nuclear and joint family

143 systems. The maximum number of women 74(37%) were aged 15-25 years;  
144 93(46.5%) were married; and 82(41%) were employed (Table 1). All indices  
145 concluded that the model was appropriate (Table 2).

146 The PTSD regression estimate was -1.8 for cognitive problems ( $p < 0.01$ ) that  
147 PTSD increase by 1 unit led to decreased cognitive ability by 1.8 units. The PTSD  
148 regression estimate was 1.73 ( $p < 0.01$ ) for adjustment problems, indicating 1-unit  
149 increase in PTSD increased adjustment problems by 1.73 units (Figure 2).

150

## 151 **Discussion**

152 Findings confirmed the hypothesis that PTSD had a significant association with  
153 cognitive and adjustment problems of women burn victims. Earlier studies have  
154 indicated that burns were common in females.<sup>26</sup> After burn injury, various issues  
155 may lead to harmful consequences. Psychopathology is one of the hazardous  
156 results of a burn injury, with one study reporting that 38.1% of the burn injured  
157 had PTSD.<sup>27</sup>

158 It was reported that burn victims are at greater risk of developing a cognitive  
159 deficit.<sup>28</sup> Another study also confirmed that burn survivors' cognition was more  
160 impaired compared to other trauma-induced populations.<sup>29</sup> It is confirmed that  
161 PTSD may trigger problem to the executive cognitive functioning.<sup>30</sup> Moreover,  
162 PTSD may cause a problem in paying attention on a task or activities.<sup>31</sup> In older  
163 adults, PTSD impaired cognitive functioning of memory and learning.<sup>32</sup>

164 PTSD is known to cause functional or adjustment impairment in trauma victims.<sup>33</sup>

165 Pakistan is a country where females are at a higher risk of having a burn injury  
166 due to social traditions and ignored safety procedures. The triggering problems  
167 may be linked with kitchen settings, squatter settlements, burns from woman  
168 clothing, like *dupatta*, and murder of females in the name of honour.<sup>34,35,36</sup>

169 In the current study, cognitive and adjustment issues in women burn survivors  
170 were measured. Other psychological factors can also be explored like isolation,  
171 loneliness, self-confidence, motivation, social support and resilience, self-

172 identity or self-concept. Future studies may also explore burn injury impact on  
173 families, friends and significant others along with eyewitness of the burn trauma.  
174 Similar studies may also be replicated on men and children.  
175 The findings of the current study are generalizable owing to its sample size which  
176 though had 200 burn victims, they did have clinical significance which is difficult  
177 to acquire.

178

### 179 **Limitations**

180 The sample size for the study was not calculated as only the possibly available  
181 cases were included due to limited reachable geographical regions.

182

### 183 **Conclusion**

184 PTSD was found to have the potential to lead to problems in cognitive and  
185 adjustment of women burn survivors. Trauma-related stress boosted adjustment  
186 issues related to anxiety, depressive symptoms and conduct disturbances.

187

188 **Disclaimer:** The text is based on a PhD thesis submitted to the Department of  
189 Psychology, University of Gujrat.

190 **Conflict of Interest:** None.

191 **Source of Funding:** None.

192

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314

**Table 1: Demographic, Clinical and Social Information of Patients**

| Variables                | F   | %    |
|--------------------------|-----|------|
| <b>Age</b>               |     |      |
| 15-25                    | 74  | 37   |
| 26-35                    | 71  | 35.5 |
| 36-45                    | 45  | 22.5 |
| 46-55                    | 8   | 4    |
| 56-65                    | 2   | 1.0  |
| <b>Family system</b>     |     |      |
| Nuclear                  | 100 | 50   |
| Joint                    | 100 | 50   |
| <b>Education</b>         |     |      |
| Ill-Literate             | 21  | 10.5 |
| Primary                  | 11  | 5.5  |
| Elementary               | 18  | 9.0  |
| Matric                   | 38  | 19.0 |
| F.A/F.Sc                 | 35  | 17.5 |
| B.A/B.Sc                 | 44  | 22.0 |
| M.A/M.Sc                 | 26  | 13.0 |
| BS(Honors)               | 1   | .5   |
| MPhil                    | 6   | 3.0  |
| <b>Employment status</b> |     |      |
| Employed                 | 82  | 41.0 |
| Unemployed               | 118 | 59.0 |
| <b>Marital Status</b>    |     |      |
| Married                  | 93  | 46.5 |

|                    |     |      |
|--------------------|-----|------|
| Unmarried          | 82  | 41.0 |
| Separation         | 8   | 4.0  |
| Widow              | 17  | 8.5  |
| Children           |     |      |
| 0-3                | 165 | 82.5 |
| 4-7                | 34  | 17   |
| 8-11               | 0   | 0    |
| 12-15              | 1   | .5   |
| Number of Siblings |     |      |
| 0-2                | 42  | 21   |
| 3-5                | 86  | 43   |
| 6-8                | 59  | 12.5 |
| 9-11               | 11  | 5.5  |
| 12-14              | 2   | 1    |
| Birth Order        |     |      |
| 1-3                | 144 | 72   |
| 4-6                | 47  | 23.5 |
| 7-9                | 8   | 4    |
| 10-12              | 1   | .5   |
| Family Income      |     |      |
| less than 15000    | 29  | 14.5 |
| 15000-35000        | 146 | 73.0 |
| above 35000        | 25  | 12.5 |
| Mode of Residence  |     |      |
| Urban              | 132 | 66.0 |
| Rural              | 68  | 34.0 |
| Type of Burn       |     |      |

|                                     |     |      |
|-------------------------------------|-----|------|
| Scald/Hot Fluid                     | 83  | 41.5 |
| Hot Solid Material                  | 22  | 11.0 |
| Flames/Fires                        | 36  | 18.0 |
| Chemical Burn/Strong Acid           | 43  | 21.5 |
| Electric Burn                       | 13  | 6.5  |
| Inhalational Burn                   | 3   | 1.5  |
| Burn Severity                       |     |      |
| First Degree burn                   | 16  | 8.0  |
| Second Degree burn                  | 79  | 39.5 |
| Third Degree burn                   | 105 | 52.5 |
| Part of Body Effected               |     |      |
| 1-3                                 | 178 | 89   |
| 4-6                                 | 22  | 11   |
| First Aid                           |     |      |
| Yes                                 | 163 | 81.5 |
| No                                  | 37  | 18.5 |
| Satisfied with Treatment            |     |      |
| Yes                                 | 166 | 83.0 |
| No                                  | 34  | 17.0 |
| Duration of Burn Incidence (Months) |     |      |
| 6-15                                | 150 | 75   |
| 16-25                               | 50  | 25   |
| Hospital Duration (Hours)           |     |      |
| 0-1000                              | 112 | 88.5 |
| 1001-2000                           | 49  | 8.5  |
| 2001-3000                           | 25  | 1    |
| 3001-4000                           | 14  | .5   |
| Health Problems                     |     |      |
| 0-1                                 | 38  | 19   |
| 2-3                                 | 157 | 78.5 |
| 4-5                                 | 5   | 2.5  |

| Who Bring to Hospital |     |      |
|-----------------------|-----|------|
| Parents               | 118 | 59.0 |
| Siblings              | 32  | 16.0 |
| Friend                | 6   | 3.0  |
| Husband               | 37  | 18.5 |
| Other                 | 7   | 3.5  |

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318 **Table 2: Model fit summary (N=200)**

| P Value | Chi-square/df | GFI   | AGFI  | CFI   | RMSEA |
|---------|---------------|-------|-------|-------|-------|
| 0.000   | 2.208         | 0.926 | 0.884 | 0.931 | 0.078 |

319 GFI: Goodness of Fit Index; AGFI: Adjusted Goodness of Fit Index; CFI: Comparative Fit  
 320 Index; RMSEA: Root Mean Square Error of Approximation.

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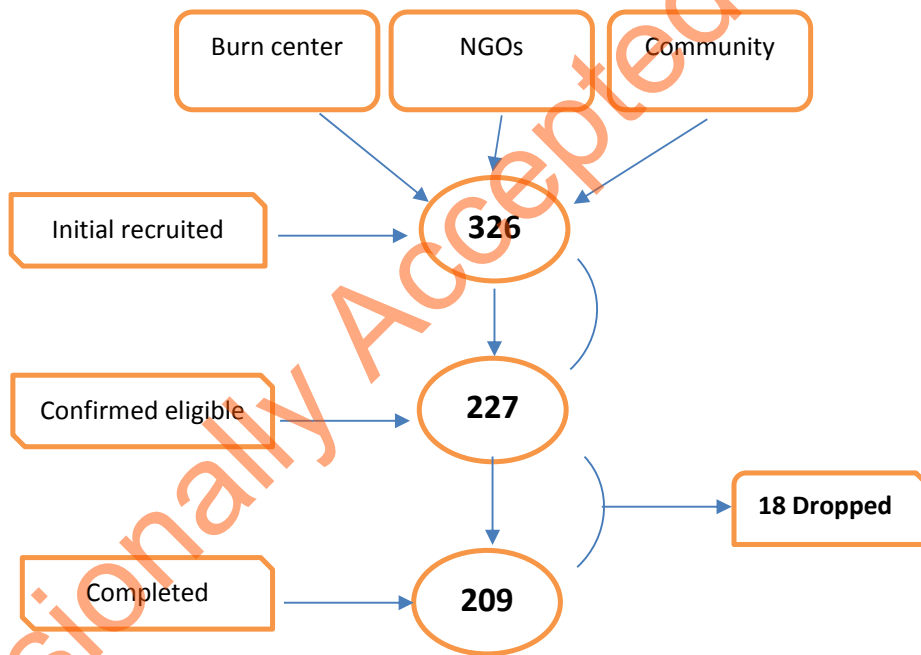
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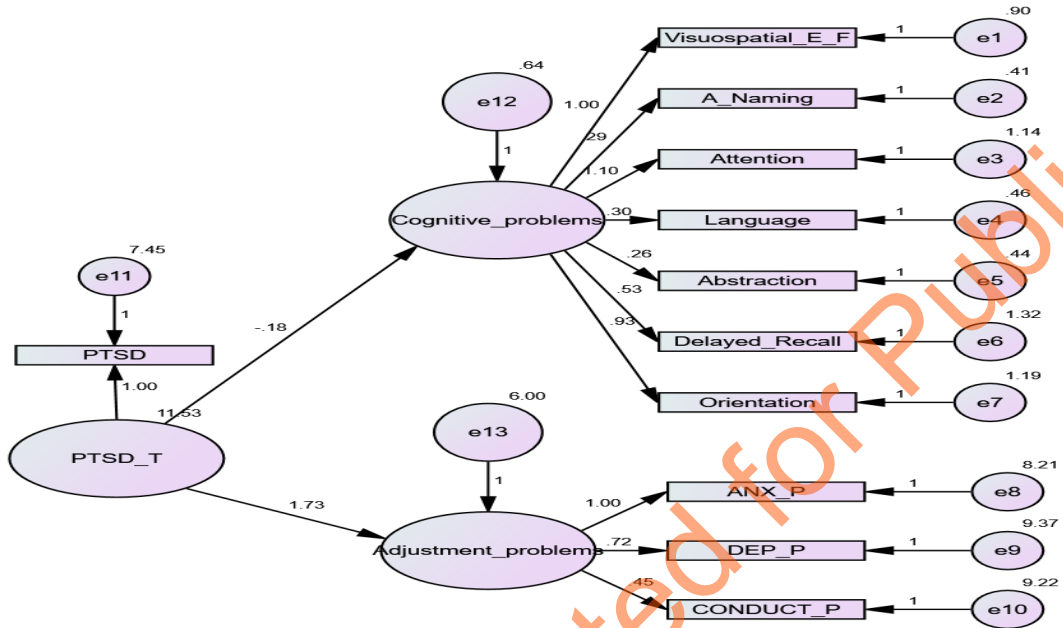
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**Figure 1: Flow diagram. Nine questionnaires were discarded because of incomplete and missing information and finally 200 patients completed the study.**

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341 **Figure 2: Structure equation modelling (path analysis) for PTSD, cognitive and**  
 342 **adjustment problems**



343

344 PTSD: Post-Traumatic Stress Disorder; Visuospatial\_EF: Visuospatial and Executive  
 345 Functioning; A\_Naming: Animal Naming; ANX\_P: Anxiety Problem; DEP\_P: Depression  
 346 Problem; CONDUCT\_P: Conduct Problem.

347

Provisionally Accepted for Publication