Impact of Obesity on Body Image Dissatisfaction and Social Integration Difficulty in Adolescent and Young Adult Burn Injury Survivors

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Burn injury deformities and obesity have been associated with social integration difficulty and body image dissatisfaction. However, the combined effects of obesity and burn injury on social integration difficulty and body image dissatisfaction are unknown. Adolescent and young adult burn injury survivors were categorized as normal weight (n = 47) or overweight and obese (n = 21). Burn-related and anthropometric information were obtained from patients’ medical records, and validated questionnaires were used to assess the main outcomes and possible confounders. Analysis of covariance and multiple linear regressions were performed to evaluate the objectives of this study. Obese and overweight burn injury survivors did not experience increased body image dissatisfaction (12 ± 4.3 vs 13.1 ± 4.4; P = .57) or social integration difficulty (17.5 ± 6.9 vs 15.5 ± 5.7; P = .16) compared with normal weight burn injury survivors. Weight status was not a significant predictor of social integration difficulty or body image dissatisfaction (P = .19 and P = .24, respectively). However, mobility limitations predicted greater social integration difficulty (P = .005) and body image dissatisfaction (P < .001), whereas higher weight status at burn was a borderline significant predictor of body image dissatisfaction (P = .05). Obese and overweight adolescents and young adults, who sustained major burn injury as children, do not experience greater social integration difficulty and body image dissatisfaction compared with normal weight burn injury survivors. Mobility limitations and higher weight status at burn are likely more important factors affecting the long-term social integration difficulty and body image dissatisfaction of these young people. (J Burn Care Res 2013;34:102–108)
Burn injury survivors, especially those with facial burn injuries, report worse quality of life compared with healthy individuals. They also tend to suffer from higher body image dissatisfaction, decreased social integration, and higher perceived stigmatization from their social environment. Specific behaviors encountered from their social environment include avoidance, staring, and unfriendly conduct. Age, time postburn, sex, and injury severity have been associated with body image satisfaction and social integration among burn injury survivors.

Similarly, obese individuals experience social marginalization, inequity, weight discrimination, and prejudice in various public settings because of the prevalent negative assumptions about their attributions and the causes of obesity. Laziness, immorality, lack of personal hygiene and self-control, and low intellect are characteristics frequently misattributed to them. The experienced weight discrimination has been associated with negative psychosocial outcomes, such as low body satisfaction, emotional eating, and other adverse mental health outcomes.

The purpose of this study was to investigate whether overweight/obese adolescent and young adult burn injury survivors experience higher body image dissatisfaction and worse social integration compared with normal weight burn injury survivors. To the best of our knowledge, this is the first study to investigate the relationship of weight status on body image and social integration in burn injury survivors.

METHODS

Sample
The current study was part of two larger cohort studies designed to investigate the long-term psychosocial effect of burn injury. Study sample comprised 68 adolescent and young adult (16–30 years) survivors of pediatric burns, who received acute treatment at a pediatric hospital specializing in burns (Figure 1). This institution serves children and adolescents of low socioeconomic status (SES), free of cost, both from the United States and abroad (mostly Mexico). Approval was obtained from the University of Texas Medical Branch Institutional Review Board. Data were collected in conjunction with the following studies: Burn Model System Five and Ten Year Long-Term Follow-Up of a National Sample of Major Burn Injuries (LTF-NDS; Institutional Review Board# 11–356) and Burn Center Data Bank Study (Institutional Review Board# 11–435). Written consent was obtained from all participants, 18 years and older. For participants younger than 18 years, both written assent and consent from their parents or guardians were obtained. Inclusion criteria included patients admitted with ≥20% TBSA burns, electrical high voltage burns, and individuals younger than 18 years at the time of injury, who were at least 16 years old at follow-up, and for whom follow-up occurred at least 5 years after their burn. Exclusion criteria included being admitted to the hospital for non-burn injury-related reasons, being underweight, not speaking either English or Spanish, and having missing data. Underweight individuals at the time of the interview were excluded from the study sample, as being underweight/cachectic is also a type of disfigurement that is stigmatized and associated with poor health. All questionnaires were self-administered. Validated Spanish versions of the questionnaires were provided for Spanish-speaking participants.

MEASURES

Perceived Burn Specific Health
The brief version of the Burn Specific Health Scale (BSHS-B) was used to evaluate the physical and emotional well-being of participants. This 40-item questionnaire assesses nine domains: simple abilities, heat sensitivity, hand function, treatment regimens, work, body image, affect, interpersonal relationships, and sexuality. In earlier studies, the Cronbach’s α coefficient of reliability for the subscales ranged from 0.75 to 0.93. In our sample, the Cronbach’s α of the body image domain was 0.92. Examples of specific items include, “I would rather be alone than with my family,” “I am not interested doing things with my friends,” or “I have no one to talk about my problems with.” Response options ranged from 0 (“all the time/great difficulty”) to 4 (“never/no difficulty”). Items were summed to obtain subscale scores and a total score.
Well-Being

The Short Form (SF)-12® Health Survey, version 2 was used to evaluate the overall well-being (functional health and mental health) of participants. This abbreviated form of the SF-36® Health Survey includes 12 questions on physical functioning, limitations because of physical problems, pain, general health perception, energy/fatigue, social functioning, and limitations because of social and mental health problems. The SF-12 is a reliable measure of physical and mental health status, yielding results comparable with the original questionnaire. In our sample, the Cronbach’s α for SF-12 was 0.85. Specific questions include, “How does your health now limit you in climbing several flights or stairs,” “How much of the time were you limited in the kind of work or other activities you could do,” “During the past 4 weeks how much did pain interfere with your normal work (outside home and house work),” and “How much of the time during the past 4 weeks have you felt downhearted and depressed.” The total score ranges from 12 to 56, with higher scores indicating greater well-being.

Social Integration

The World Health Organization Disability Assessment Schedule II (WHODAS II) was used to assess participants’ social integration and mobility limitations. Social integration was defined as the existence of the same rights and opportunities for all members of the social group. WHODAS II is a standardized questionnaire used to assess health and disability. It has proven to be valid, sensitive, and reliable across cultures. Previous factor analysis of the WHODAS II form two subscales indicated that domains 4 and 6 of Section 3 can be used to assess difficulty getting along with people and with participating in social activities. The scores from domains 4 and 6 were summed to assess the social integration difficulty of participants, whereas domain 2 was used to evaluate mobility limitations (difficulty getting around). Response options range from 1 (none) to 5 (extreme). Answers are then summed to obtain a total social integration subscale score. In prior research, the Cronbach’s α for those with physical disabilities was 0.97, whereas for domains 4 and 6 it is 0.92 and 0.94, respectively. In our sample, the Cronbach’s α values for domains 3, 4, and 6 were 0.81, 0.82, and 0.84, respectively.

Weight Status

For this study, we assessed participants’ weight status at burn and the time of the interview using anthropometric information obtained from participants’ electronic medical record. Weight status at burn was used as a surrogate marker of preburn weight status. Trained clinical staff members conducted all measurements at admission and at follow-up. Weight was measured with a Scale-Tronix Model 5102 409 (Scale-Tronix White Plains, NY), and height was measured with a stadiometer, PE-WM-BASE (Perspective Enterprises, Portage, MI). Participants with limb amputations were weighed without their prostheses, and their weights adjusted retrospectively for the missing limb. Participants’ body mass index (BMI) was calculated using the following formula: BMI = weight (kg)/height^2 (m^2). World Health Organization criteria were used to classify subjects older than 20 years as underweight (BMI < 18.4), normal weight (BMI, 18.5–24.9), overweight (BMI, 25–29.9), or obese (BMI > 30). Furthermore, the BMI of participants younger than 20 was classified using the age- and gender-specific BMI international cut-off values as established by Cole et al. Participant percentile BMI was calculated according to the age- and sex-specific BMI growth charts developed by the Centers for Disease Control and Prevention.

Other Variables

Clinical information and other burn-related data obtained from the medical record included cause of burn injury, TBSA, specific part of body affected, amputations, age at burn injury, years postburn, and physical disability. TBSA was assessed using the rule of nines method during excisional surgery. Sociodemographic data obtained included age, sex, and ethnicity.

STATISTICAL ANALYSIS

All continuous variables are presented as mean ± SD, and all categorical variables are presented as absolute and relative frequencies. Descriptive statistics, χ² tests of association, and analysis of covariance were performed to evaluate differences in social integration, body image, and well-being across the four weight status categories. We also performed multiple linear regressions to evaluate possible predictors of body image dissatisfaction and social integration. Data analysis was performed using the PASW Statistics 18, Release Version 18.0.0 (SPSS Inc., 2010, Chicago, IL).

RESULTS

The mean age of participants was 18.6 ± 4.2 years. The mean BMI for normal weight participants was
21.7 ± 1.7 and for overweight/obese participants, 29.5 ± 5.7 (P < .001). As shown in Table 1, majority of subjects were male (67.6%) and Hispanic (89.7%). Overall, 69.2% of the sample was normal weight and 30.8% was overweight or obese. Overweight individuals were slightly older than normal weight individuals (19.5 ± 0.5 vs 18.2 ± 3.0 years; P = .04).

Table 2 reflects the burn-related characteristics of the study sample. Fire or flame was the primary cause of burn injury. For about 81% of participants, burn injury affected the head and neck area. Mean TBSA was 56.1 ± 5.7%, whereas 15.4% of participants had an amputation. Mean age at burn was 10.7 ± 4.4 years, whereas the mean time postburn was 7.9 ± 3.9 years. Normal weight children were slightly younger than overweight/obese at time of the burn injury (9.9 ± 4.0 vs 12.3 ± 4.3 years; P = .04).

Participants reported mild body image dissatisfaction (according to BSMS-B) and mild difficulty in participating in society and getting along with others (WHODAS II; Table 3). Overweight/obese participants did not report statistically significant body image dissatisfaction, difficulty getting along with people, difficulty participating in society and social integration difficulty, after adjustment for sex, age at burn, weight status at burn, well-being, amputation, head and neck injury, and mobility limitations. Unadjusted means also showed no statistically significant differences between the two groups.

To examine the predictors of social integration, we conducted a multiple regression controlling for weight status, weight status at burn, head neck injury, well-being, and mobility limitation. As shown in Table 4, social integration difficulty was not associated with currently being overweight/obese after controlling for weight status at burn, head neck injury, well-being, and mobility limitation. However, mobility limitations were associated with greater difficulty in participating in society (P < .001).

A second multiple logistic regression was performed to assess for possible predictors of body

Table 1. Subject characteristics of adolescent and young adult burn injury survivors

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Total (n = 68)</th>
<th>Normal Weight (n = 47)</th>
<th>Overweight/Obese (n = 21)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>18.6 ± 4.2</td>
<td>18.2 ± 3.0</td>
<td>19.5 ± 0.5</td>
<td>.04</td>
</tr>
<tr>
<td>Sex</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>46 (67.6%)</td>
<td>30 (63.8%)</td>
<td>16 (72.6%)</td>
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</tr>
<tr>
<td>Female</td>
<td>22 (32.4%)</td>
<td>17 (36.2%)</td>
<td>5 (23.8%)</td>
<td>.31</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>61 (89.7%)</td>
<td>44 (93.6%)</td>
<td>17 (81.0%)</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>7 (10.3%)</td>
<td>3 (6.4%)</td>
<td>4 (19%)</td>
<td>.35</td>
</tr>
<tr>
<td>BMI</td>
<td>24.0 ± 4.9</td>
<td>21.7 ± 1.7</td>
<td>29.5 ± 5.7</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>BMI percentile</td>
<td>61.4 ± 26.2</td>
<td>49.2 ± 21.4</td>
<td>90.1 ± 6.9</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

BMI, body mass index.

Table 2. Burn-related characteristics of adolescent and young adult burn injury survivors

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Total (n = 68)</th>
<th>Normal Weight (n = 47)</th>
<th>Overweight/Obese (n = 21)</th>
<th>P</th>
</tr>
</thead>
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<tr>
<td>Causes</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flame/fire</td>
<td>52 (76.5%)</td>
<td>34 (72.3%)</td>
<td>18 (85.7%)</td>
<td>.69</td>
</tr>
<tr>
<td>Scald/grease</td>
<td>5 (7.3%)</td>
<td>4 (8.6%)</td>
<td>1 (4.8%)</td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>10 (14.7%)</td>
<td>8 (17%)</td>
<td>2 (9.5%)</td>
<td></td>
</tr>
<tr>
<td>TBSA (%)</td>
<td>56.1 ± 5.7</td>
<td>58.4 ± 8.1</td>
<td>50.9 ± 8.8</td>
<td>.54</td>
</tr>
<tr>
<td>Age at burn (yr)</td>
<td>10.7 ± 4.4</td>
<td>9.9 ± 4.0</td>
<td>12.3 ± 4.3</td>
<td>.04</td>
</tr>
<tr>
<td>Years postburn</td>
<td>7.9 ± 3.9</td>
<td>8.4 ± 0.6</td>
<td>6.8 ± 0.6</td>
<td>.125</td>
</tr>
<tr>
<td>Amputation</td>
<td>10 (15.4%)</td>
<td>8 (17.8%)</td>
<td>2 (10%)</td>
<td>.42</td>
</tr>
<tr>
<td>Burn site</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head/neck</td>
<td>55 (80.9%)</td>
<td>38 (80.9%)</td>
<td>17 (81%)</td>
<td>.78</td>
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<tr>
<td>Trunk</td>
<td>62 (91.2%)</td>
<td>43 (91.5%)</td>
<td>19 (90.5%)</td>
<td>.37</td>
</tr>
<tr>
<td>Perineum</td>
<td>21 (30.9%)</td>
<td>13 (27.7%)</td>
<td>8 (38.1%)</td>
<td>.76</td>
</tr>
<tr>
<td>Arm</td>
<td>64 (94.1%)</td>
<td>43 (91.5%)</td>
<td>21 (100%)</td>
<td>.47</td>
</tr>
<tr>
<td>Hand</td>
<td>54 (79.4%)</td>
<td>36 (76.6%)</td>
<td>18 (85.7%)</td>
<td>.33</td>
</tr>
<tr>
<td>Leg</td>
<td>58 (85.3%)</td>
<td>42 (89.3%)</td>
<td>16 (76.2%)</td>
<td>.24</td>
</tr>
<tr>
<td>Foot</td>
<td>31 (45.5%)</td>
<td>19 (40.4%)</td>
<td>12 (57.1%)</td>
<td>.57</td>
</tr>
</tbody>
</table>
image dissatisfaction. After controlling for the same factors listed above, body image dissatisfaction was also not associated with being overweight or obese (Table 5). However, mobility limitations were associated with body image dissatisfaction (\( P = .005 \)), whereas weight status at burn was an additional predictor of body image dissatisfaction.

### DISCUSSION

Contrary to our initial hypothesis, we found no association between overweight/obesity and social integration and body image in long-term burn injury survivors. However, mobility limitations were associated with higher body image dissatisfaction and social integration difficulty, whereas weight status at burn was associated with greater difficulty with higher body image dissatisfaction.

The current findings are surprising given previous research among nondisfigured individuals, which found obesity associated with greater body image dissatisfaction,\textsuperscript{35} social marginalization, inequity, and prejudice.\textsuperscript{19,20} Instead, we found that obesity/overweight is not associated with body image dissatisfaction and difficulty with social integration in long-term burn injury survivors. Interestingly, higher weight status at burn was associated with greater body image dissatisfaction. This may be because of the fact that individuals facing life-threatening conditions may become more resilient and develop positive coping mechanisms, such as better communication skills, greater self-determination, and a focus on getting the maximal pleasure from daily living.\textsuperscript{36} Alternatively, the limitations and disfigurement of experiencing a traumatic physical injury may outweigh any concerns of the individual about weight. Regardless of the reason, it seems that weight status at the time of burn may no longer be a major determinant of body image for such persons. Participants with high weight status at burn may have preexisting body image dissatisfaction, which persisted after burn injury.

Mobility limitations were associated with greater body image dissatisfaction and social integration difficulty. Previous research conducted in burn survivors, two months postburn\textsuperscript{37} and patients with
amputations, also support the notion that physical function difficulties are associated with body image dissatisfaction. Likewise, improved physical functioning has been previously associated with early social reintegration in adolescent burn injury survivors. Individuals with mobility limitations cannot easily participate in social events and return to their preburn activities.

Several factors may limit the generalizability of our results. First, the small study sample consisted mostly of males and Hispanics. In addition, preburn psychopathology and family environment were not assessed, as data on these factors were not available. Weight status at burn, used as a marker of preburn weight status, may have been skewed by acute fluid shifts related to the burn injury. Although we did not have data on the SES of participants, the vast majority were of low SES. This fact may have also biased our results, as those with low SES may be less prejudiced against obese and overweight individuals. Moreover, the SF-12 used has not been validated for pediatric burn injury survivors. Finally, the body image domain of the BSHS-B, used to assess body image satisfaction, may not have been sensitive enough to discern differences in body image dissatisfaction related to weight status.

However, this study has numerous strengths. To the best of our knowledge, this is the first study to investigate the effect of weight status on body image and social integration in burn injury survivors, or indeed, children with any form of physical disfigurement. In addition, the availability of data on long-term burn injury survivors strengthens the significance of our findings. Finally, all information were collected using validated questionnaires and medical record information, which is a relatively reliable approach.

In conclusion, contrary to our initial hypothesis, we found that overweight and obesity are not associated with negative long-term body image and social integration among pediatric burn injury survivors. However, mobility difficulty was a significant determinant of body image satisfaction and community integration, whereas weight status at burn was a predictor of body image dissatisfaction. Once their medical status is stable, rehabilitation should be a priority for all pediatric burn injury survivors. In addition, body image concerns should be addressed in individuals with high weight status at burn. As a result, an interdisciplinary approach is needed to ensure the optimal long-term psychosocial adjustment of pediatric burn injury survivors. Further research is needed to investigate longitudinally the proposed hypothesis in a larger sample, as burn injury survivors may undergo changes during the adjustment period.

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REFERENCES