Master Thesis
Department of Plastic and Reconstructive Surgery

Characteristics of Female Burns in In-patients:
An analysis of burn causes, injured areas and duration of treatment

A thesis submitted in part fulfillment for the degree of Master of Medicine

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ABSTRACT

Author: Anna Edwardson

Research title: Characteristics of Female Burns in In-patients: an analysis of burn causes, injured areas and duration of treatment.

Aim: To analyze female burns during the period of 2010-2015 in the Department of Plastic and Reconstructive Surgery at the Hospital of Lithuanian University of Health Sciences.

Objectives:
1. To analyze causes/agents of female burns in in-patients between 2010-2015.
2. To analyze the location and area of the burn injuries, the degree of burns and the size of the injured area.
3. To analyze the duration of treatment in the hospital.
4. To analyze the proportion of female burns and the female to male ratio.
5. To compare the findings with data taken from other countries.

Methodology: This retrospective study analyzed 188 female in-patients, from age 18 and onwards with burn injuries from workplace or non-working sites that were treated between January 1, 2010 and December 31, 2015. The analysis was focused on burn-related characteristics and analyzed descriptively. The material consisted of electronic and handwritten medical records, taken from the Department of Plastic and Reconstructive Surgery at the Hospital of Lithuanian University of Health Sciences. The causes of the burns, the location of the injured area, the depth and size of the burn, and the duration of burn treatment were examined.

Results: The most common burn causes were hot liquid 50.4%, followed by flame burns 43.8%. The most common locations were upper limb 22.9% and lower limb 23.4%, the average total burned body surface area was 12.8% and the most common degree of burn injuries was 2nd degree (65.96%). The average length of in-patient treatment was 24.6 days and the female to male ratio of the burn proportion was 1:2.

Conclusion: Hot liquid and flame were the two causes that together represented the majority of diagnosed burn injuries and the limbs were particularly subjected to burns. Most burn injuries were of less severe 2nd degree compared to 1st and 3rd degree, and covered on average more than a tenth of the body surface area. Males were more burned than females. The only indicators of female burns that differed in comparison to the global literature was the average duration of treatment which was longer in this research and the most common cause of burns was hot liquid and not flames as shown in the other countries.

Key words: Burn injuries, Female burns, Descriptive epidemiology, Lithuania
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CONFLICT OF INTEREST
The author reports no conflict of interest.
CLEARANCE ISSUED BY THE ETHICS COMMITTEE

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tiriami darbo temos: „Characteristics of female burns in-patients: analysis of burn causes,
injured area, duration of treatment“ tiriamojo darbo anotacija, kuri leidžia spręsti, jog
planuojamame tyrove neturėtų būti pažeistos tiriamių teisės, todėl šiam tyrimui pritariau.

Bioetikos centro vadovas

doc. E. Peičius

ABBREVIATIONS
1. INTRODUCTION
Burn injuries are a health problem all over the world and every year approximately 300,000 people die from them [20]. Annually, around 0.4% of burn-injured individuals need medical treatment and it is the 4th most common cause of trauma worldwide. Burns are one of the major injuries; it stands for over 1% of the global burden of all diseases [30]. Even though burn injuries are present all over the world, approximately 90% of all burns are most common in low and middle-income countries. In these countries, it is estimated that half of all fire-related deaths and half of all years lived with disability occurs in a much higher proportion and the majority are females. However, and in contrast, burn injuries and burn related deaths seem to decrease in high-income countries due to better welfare systems and medical care [21]. These types of injuries cause significant morbidity and mortality, both in low and middle-income countries as well as high-income countries. Burn injuries have considerable physical, psychological and financial impact on burn-injured patients as well as on their families and the society itself [18]. Furthermore, from a gender perspective, it is seen that females and males are equally at risk to get burned. Although, what distinguishes them from one another is what kind of burns they have and where they get them. For instance, females tend to get burned mainly at home, especially due to open fire cooking and kitchen stoves. They are also more prone to acid violence and radiation for breast cancer and sun exposure, the latter is however not so common [24].

The statistics in Lithuania show that approximately 7700 people get burns annually but they also demonstrate that burn injuries have decreased because of increased socio-economic status in recent years. During 2001-2010, about 77020 persons were diagnosed with burns and 32809 were females. Hence, it is seen that the proportion of male and female burn injuries is divided into 4:3 [12]. Furthermore, during this period, the burns morbidity of hospitalized in-patients decreased from 58 cases to 40 cases per 100,000 inhabitants. The highest in-patient morbidity was in 2001 and the lowest was in 2009. The most common cause of burns was scald and fire burns and it was mainly due to domestic environments. In 2010, the most common burn cause for females were women between 15 to 64 years old, such as flame injuries, 12%, and scald injuries, 19% [12].

The aim of this research is thus to get in-depth knowledge about female in-patients’ burn injuries by analyzing the most recent statistical data, from 2010 to 2015. The purpose is to assess the epidemiological characteristics, the hospitalization duration, the area and the degree of the burn injuries and lastly, to assess the ratio between female and male burns, and compare this data with other countries.

2. AIM AND OBJECTIVE
2.1 Aim:

The aim of this research is to analyze characteristics of female in-patients burn injuries during the period of 2010-2015 in the Department of Plastic and Reconstructive Surgery at the Hospital of Lithuanian University of Health Sciences.

2.2 Objectives:

1. To analyze causes/agents of female burns between 2010-2015;
2. To analyze the location and area of the burn injury, the degree of the burn and the size of the burn-injured area;
3. To analyze the duration of treatment in the hospital;
4. To analyze the proportion of female burns, and the female to male ratio;
5. To compare the findings with data taken from other countries.

3. LITERATURE REVIEW
3.1 Burn injuries

A burn injury affects several parts of the body system such as neurological, endocrine and immune. The acute phase is known as an intensive and fast change in the tissue damage due to inflammation, which further can lead to a shock, organ dysfunctions or in worst case the death of a burn injured patient [5]. The acute treatment involves intensive care, surgical care, wound care and mobilization, which can cause lots of stress and pain for the patient. The duration of hospitalization depends on the severity of the burn injury and the medical state of the patient. It can be up to a few days and in worse case up to several years.

In recent years, the medical care has improved worldwide and the death rate is thus decreasing. However, patients with severe burn injuries require rehabilitation and the potential risk of complications after burn injuries have thus increased. The rehabilitation takes several years including physical, psychological and social support. Even with all kinds of treatment, burn injuries leave scars on the body and could often be life changing. Post-traumatic stress, depression, physical and psychological strains are very common during and after the treatment of burn injuries and patients with pre-burn psychiatric disorders have a risk for poor recovery [5, 34]. It is also a long process to adapt to the new life quality due to the long treatment and the hospitalization. The burns are associated with a lot of pain, which is also why the treatment of pain is very important for the patient and for the healing process [28]. The goal for burn care is to keep the average length of hospital duration below a ratio of one day per percent burned body surface area [25]. Burns that are around 1-10% of the TBSA (total body surface area) have a lower risk of mortality 0.7%; when the percentage is increasing of the TBSA, the mortality is increasing too [17]. A burn injury is a good model to understand the reaction of a serious trauma in the short and the long prospective. It is a serious health problem where humans are suffering and the mortality is high. Around 5% of the victims will die from burned injuries and many others will suffer from disabilities, disfigurement, and/or scarring [34].

Burns can happen to anyone and it is most common for low and middle-income countries with social disadvantages. In comparison to females, males get more burn-injured in working places due to fire, chemicals and electrical burns. Elderly people get burns mostly in the bathroom and in the kitchen. Other general risk factors that increase the burn risks could be due to low socio-economic statuses, medical problems, alcohol, smoking and drug abuse [24]. It is very common for children under 15 years old to get burned, especially because of their curiosity and unawareness of the consequences of burns that might follow. Furthermore, children and elderly people have thinner skin and are thus more sensitive to burns [2]. Hence,
approximately 95% of burn-injured deaths are related to low socio-economic statuses in low
and middle-income countries. Most of the burns appear in households due to poor house
quality e.g. a household with no separate kitchen, no smoke detectors, heavy drinkers,
smokers, single parents, low educational level and overcrowded households [24].

3.2 Etiology

The etiology of burns can be many, for example thermal burns are exposure to heat,
flame, scalding water, steam and UV. Chemical burns are exposure to acid and alkalis and
electrical burns are exposure to guns or lightning. The most common type of burns for
children is scald injuries (hot liquid) and the most common type for burns for adults are flame
and solids [12,13]. The most common cause is thermal burns, which result from external heat
such as fire, hot liquid and hot gases. Other causes which are not as common is radiation
burns exposure to solar UV and chemical burns exposure to strong acid, alkalis by ingestion
or external body contact and electrical burns that can cause cardiac death. Fire-related deaths
may result from inhalation of carbon monoxide and other toxic products. The most fires
appear in buildings/homes but are also common in motor vehicle accidents and aircraft
accidents [10].

Additionally, scalding burns are due to heat contact with hot liquid or hot vapors, the
severity of the burns are different from flame and hot solid objects. Flame burns the body
surface that is espoused to the fire, the hot liquid follows the gravity from the initial contact
point and can cause burns all along the flow. The degree of the burn depends on the
temperature and the volume of the liquid and the duration of contact with the liquid and how
fast it cools down. Scalding does not ignite fire on clothes as fire does, but it can cause
clothes to trap the heat and prolong the fire so that the flames goes trough the clothes into the
skin. Boiled water in the kitchen or hot water in bathtubs/showers is also one of the most
common burn causes for hospitalization. Most affected patients are children under 4 years
old, elderly and women. Burns give unpleasant scars for women and children in comparison
to men. It can be because of the different genetics women and men have. Burns especially on
the neck and the arms causes more unpleasant scars. However, the mechanism is still
unknown and in order to find out the reason behind it, it is of importance to further examine
the healing process of burn-injured patients [8].

3.3 General background of female burns in the world

In India, around 7 million people get burned every year and approximately 700 000
people of those are hospitalized. According to the National Burns Programme, 91 000 of burn
deaths are women. The highest rate shows that women between 16-35 years old are the majority of the victims. This high level of female burns is mostly due to unsafe kitchens, lack of caution when cooking and loose-fitting clothes (which is more prone to take fire). It is showed that 1/3 of all burns in India are due to clothing that has been lit on fire from open flames. Moreover, intentional burns are very common and occur at high rates in young women, secondly to domestic violence and self-harm [19].

One of the common burn causes is acid attack. In countries such as Bangladesh, Cambodia, Afghanistan, Pakistan and India, women seem to be attacked by acid on a regular basis, especially in the face; mostly to harm one’s beauty. It is a worldwide phenomenon that is not restricted to a particular race, religion or geographical location and the reasons are many but the most common causes are due to the rejection of marriage proposals, cheating or giving birth to a girl instead of a boy. The victims get horrible physical, psychological and social injuries. The short-term effects cause physical pain and the long-term effect cause several implications and consequences. This includes blindness, getting bones dissolved, loss of facial features, the skin gets burned and disfigured due to melted skin tissue, damage of hands causes disability and in worst case severe burns can cause the death of a burn-injured person. Other physical aspect contributes to discomfort such as tightness of the skin as well as severe itching.

The majority of female victims in the context with acid attacks are females between 13-35 years old. Children, men and elderly are also victims to acid violence but not in the same scale as women. The most common acids are hydrochloric, sulfuric, or nitric acid, which quickly burns through flesh and bone and they are also cheap and easy to get. Acid attacks are increasing in India and Cambodia but are decreasing in Bangladesh by 15-20%. In 1999-2015 there were 3712 acid attacks that were reported in Bangladesh, but many more exist that have not yet been reported [10,12]. Another type of burn that is noticeable in Asia is for instance ‘bride burning’, which has been recognized as an important public health problem in both India and Pakistan. The term ‘bride burning’ means that a husband and/or his family murders the bride by drowning her in flammable liquid in order to set her on fire so that she eventually dies. It is estimated that around 2500 deaths every year are caused by ‘bride burning’ in India and around 300 ‘bride burnings’ in Pakistan [14, 15, 16].

Furthermore, for high-income countries, the statistics have shown that burn injuries have decreased throughout the years [3]. In the US for instance, approximately 36 states with 96 hospitals show statistics of 205 033 records of burn injuries. The female to male ratio is 1:2.12 and more than 75% were less burned than 10% of the TBSA, and the most common
cause was fire and flame burns, 43%, and scald burns 34%, which mostly happened at home, 73%. Between year 2006-2015, the average of hospitalization decreased for females from 9.3 days to 7.9 days and the mortality rate decreased from 4.1% to 2.9% [17]. Another high-income country such as Sweden has around 1300 fire accidents per 100 000 inhabitants, and around 1.2% or 20 000 people of those get burned every year [3] and around 5700 people get hospitalized whereas 1500 of those people are adults. This indicates that burn injuries in Sweden are relatively low in comparison to the other countries examined. The low burn causes in Sweden are mostly due to well-developed prevention measures as well as a well-developed healthcare system, but also due to the country’s strong economy [3,8]. The data further shows that the most common causes of burn-injuries in Sweden are scald burns, 48%, and fire burns 52%, and that the majority of burn-injured in-patients are men. However, during 2010, 217 women were hospitalized due to fire burns and the most common burn injuries appeared to be on arms and legs (hot water injuries) and face and chest (fire injuries). The data further showed that the most common causes of burns were at homes, especially in the kitchen, or due to alcohol and cigarette smoking [8]. Around 60% of these people got the TBSA, that is <10%, and the most common burn depth was type 2, which was approximately 50% of the burn-injured people [9].

Additionally, the statistics in Lithuania show that around 7700 people get burned every year but it also shows that the burns have been decreasing recently. During 2001-2010, 32809 females were diagnosed with burns and the female to male burn proportion was 4:3. During these years, the burns morbidity of hospitalized patients had decreased from 58 cases to 40 cases per 100 000 inhabitants and the highest in-patient morbidity was in 2001 and the lowest in 2009. The most common burn causes for women were flame burns 12% and scald burns 19%. One of the reasons why burn injuries are decreasing in Lithuania can be due to that the Lithuanian economics are growing and people are getting better socio-economic statuses. However, the reduction is very small and could be improved further. There were around 2.574 fire deaths and 2.456 fire injuries during the period of 2001-2010. The number of fire related burns have not decreased. 27% of the fires appeared in domestic environment and 73% appeared outside the home environment such as in the forest and at industries [12]. In conclusion, it is seen that burn injuries for women differ depending on which country it is, and what type of economical and well-fare status the country has. Although, despite acid violence and ‘bride burning’, it is shown that the most common cause of female burns in all of the countries, both low and middle-income countries as well as high-income countries, are burn injuries in the kitchen.
3.4 Previous research on female burns in the world

Firdous Khan et al. examined 368 burn-injured females in Pakistan. The results showed that the most common cause was flame burns 79%, chemical burns 8%, steam burns 7%, and scald burns 6%, and the mean TBSA was 37%. The most common degree of burns was 2\textsuperscript{nd} degree 30%, and 3\textsuperscript{rd} degree 10%. The average duration in hospitals was 12 days [19]. There are no records about the location of burns.

In another research made by R.S. Hosseini, 170 burn-injured females in a city called Shiraz in Iran were examined. The results showed that the most common causes of burns were flame burns 98.2%, and scald burns 1.8%, the mean TBSA was 56% and the average duration in hospitals was 13 days [23]. Furthermore, Nader Aghakhani has conducted another similar research whereas she examined another city in Iran known as Urmia. In his research the results showed that 428 people were admitted for burns and that 44.9% were females. The most common cause of female burns was flame 53.2%, the mean TBSA for female burns was 25.2% and the average hospitalization was 6.19 days [30]. Another scholar, Zinat Mohebbi, examined 619 burn-injured females in Iran. The results showed that the most common cause of burns was flame 33.8%, the most common degree was mixed burns 70.59% and 17.6% had 2\textsuperscript{nd} degree of burns and 11.79% had 3\textsuperscript{rd} degree of burns and the mean TBSA was 47.82% [37]. There is no data about the hospital duration in both of these studies including no data about the location and the degree of the burns.

Another scholar known as Nayreen Daruwalla, conducted a research about 33 female burns in New Delhi in India. The results showed that the most common causes were flame burns 17%, and acid burns 10%, and the mean TBSA was 49% [20]. There is no data about the hospital duration and the degree of the burns. Prateek S. Shrivastava examined 103 females in India whereby the results showed that the most common cause of burns were flame 80.6%, and scald 16.5%. The most common location of burns was on the head and the neck 51.4%, the upper limb 65%, the lower limb 54.3% and the TBSA of burns was 36.8% [35]. There is however no data about the degree of the burns and the duration of stay in the hospital. Mallapur M.D. examined 76 patients in India and of those were 52.63% females and the female to male ratio was 0.9:1. The result showed that 97.5% was burned at home and the most common causes for female burns was flame 92.5% and the mean TBSA was 61% [36]. No information was given about the hospital duration, the location and the degree of the burns. Another research conducted by Jayant D. Deshpande included 188 females. The results showed that the female to male ratio was 1.43:1 and that the most common degree of burns was 2\textsuperscript{nd} degree 97%, and the mean TBSA was 59%. The results showed that the most
common causes of burns were thermal burns 91%, whereas 80% of the patients’ injuries appeared when cooking in the kitchen. The location of the burns showed that the most common ones were in the chest and the lower limb [38]. There is no data about the hospital information.

In other countries such as Japan, Yoshioka et al., reported that 27% burn-injured females were admitted for treatment in hospitals and most of the electrical and sun burns happened more in females than in males [42]. Pardo L. reported that 85 burn-injured females were admitted to hospital in Spain. The most common degree of burns was 2nd degree 40% and the mean TBSA was 20%. The most common location of the burns was the upper and the lower extremities. The most common causes of the burns were scald burns 45.88% and fire burns 44.71% and the average hospital duration was 1-2 months [40]. In the Netherlands, Rijn concluded that burn-injured females were more often treated for minor burns and the most common burn causes were scalds burns and contact injuries [41].

Gennadiy Fuzaylov, examined 14 burn-injured patients that were admitted to the burn center in Lviv whereas 28% were females. The most common cause was flame burns and the average of TBSA was 77.5%. There is no information about the degree of the burns as well as the hospital duration [43]. McGwin G. Jr, examined 382 burn-injured females that were admitted to the UAB Burn Center in the US, and the most common cause of the burns were flame burns and scald burns, no other information was given [44].

Another similar study was conducted in Sweden by F. Huss whereas 24 538 Swedish patients were found with burns and 31% of them were females. The results showed that the female to male ratio was 2.23:1 and the average hospital duration was 3 days. It also showed that the mortality rate for men had been improved but that the mortality for women had not changed as much. The improvement was due to a combination of preventive measure, better treatment protocols, and an expanding strategy by which burned patients are treated as outpatients [33]. Another study has been conducted by Nele Brusselaers whereby the research was done on 186 500 patients from 76 different studies from 22 European countries. The results showed that between 4% and 22% of the people were hospitalized and the female to male ratio was 1:1.22. Flames, scalds, and contact burns were the top three causes of all hospitalized burn in-patients, followed by flame and contact burns, 60% to 75%. The flame burns were more prevalent in men, whereas scalds and contact burns were more frequent in women. The mean length of hospitalization (LOS) was 7-33 days and the mean TBSA in patients with severe burn injury was 11% to 24% but had decreased over the past decades. 1:1.22 [32].
4. RESEARCH METHODOLOGY AND METHODS

4.1 Patient selection

In this retrospective study 188 female patients over 18 years old were examined. The females were hospitalized for the treatment of burn injuries between January 1\textsuperscript{st}, 2010 to
December 31, 2015. The data of the in-patients was collected from the Department of Plastic and Reconstructive Surgery at the Hospital of Lithuania University of Health Sciences. The research includes the characteristics of female burns, the cause of the burns, the location of the burns, the degree of the burns and the size of the burns. It also examines the duration of the treatment and the female to male ratio.

The year when the injuries happened, the cause, the location, and the degree of the burns, the size and the duration of treatment are the indicators examined in the context with female in-patients. The female in-patients have also been reviewed and all necessary data for the research have been collected from each patient’s case history.

4.2 Inclusion criteria
1. The patients have been hospitalized in the Department of Plastic and Reconstructive Surgery at the Hospital of Lithuania University of Health Sciences
2. The patients have burn injuries on any part of the body;
3. The patients are females and are over 18 years old.

4.3 Exclusion criteria
1. The patient is male;
2. The patient is under 18 years old;
3. The patients who is treated outside the hospital.

4.4 Statistic analysis
The collected data have been analyzed in Microsoft Excel and IBM SPSS Statistics. The mean and standard deviation was also calculated. The non-parametric Mann-Whitney- U test was used to compare differences for hospital time and burned body percentage between two independent groups (females burned by flame and females burned by liquid), because values of hospital time and burned percentage are not normally distributed. Associations between hospitalization time and burned body percentage were evaluated using Spearman’s correlation coefficient. Pearson’s chi square test was used to analyze associations between two categorical variables. Kruskal Wallis was used to compare hospitalization time between 4 groups of the amount of burned body parts.

5. RESULTS

- Between January 2010 and December 2015, 557 people over 18 years old were admitted with burn injuries to the Department of Plastic and Reconstructive Surgery and of those 188 were females whom were treated for burns (see fig.1).
- The average length of hospitalized days was 26.5 days and the longest hospitalization for a woman was 29 days in 2011 and 2015, and the shortest was 18 days in 2013 (see table 1).
- The total body surface area’s (TBSA) average was 12.8% and the highest TBSA were 16% in 2011 and the lowest 8% in 2013 (see table 2).
- During year 2010-2015 the most common location of burns was on the lower limbs 23.36% and the upper limbs 22.94% (see fig 2).
- The assessment of the degree of the burn was done clinically. The majority of the burn degrees were 2nd degree 65.96% followed by 3rd degree 26.6% and less common was 1st degree of burns 7.1% (see fig 3).
- Most common causes for female burns was hot liquid 50.41% followed by flame burns 43.78% and contact burns 4.24% and last common cause were chemical burns 1.56%, these are however an average percentage of 2010-2015 (see table 3).
- The average ratio for female and male ratio of burn proportion was totally 1:1.94 (see table 4).

[Figure 1]: The total of burn-injured females during 2010-2015.

[Table 1]: Average days spent in hospital during 2010-2015.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AVERAGE DAYS IN HOSPITAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>28</td>
</tr>
<tr>
<td>2011</td>
<td>29</td>
</tr>
</tbody>
</table>
[Table 2]: Average TBSA during 2010-2015.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AVERAGE TBSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>14%</td>
</tr>
<tr>
<td>2011</td>
<td>16%</td>
</tr>
<tr>
<td>2013</td>
<td>8%</td>
</tr>
<tr>
<td>2014</td>
<td>13%</td>
</tr>
<tr>
<td>2015</td>
<td>13%</td>
</tr>
<tr>
<td>Average for all years</td>
<td>12.8%,</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>2.9%</td>
</tr>
</tbody>
</table>

[Figure 2]: Burned body locations during 2010-2015.

[Figure 3]: Degree of burns during year 2010-2015.
**Table 3**: Causes of burns during 2010-2015.

<table>
<thead>
<tr>
<th>Cause</th>
<th>2010</th>
<th>2011</th>
<th>2014</th>
<th>2015</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire</td>
<td>35.71%</td>
<td>31.71%</td>
<td>34.37%</td>
<td>73.33%</td>
<td>43.78%</td>
</tr>
<tr>
<td>Contact burns</td>
<td>10.71%</td>
<td>0%</td>
<td>6.26%</td>
<td>0%</td>
<td>4.24%</td>
</tr>
<tr>
<td>Hot liquids</td>
<td>53.57%</td>
<td>68.29%</td>
<td>53.11%</td>
<td>26.67%</td>
<td>50.41%</td>
</tr>
<tr>
<td>Chemical burns</td>
<td>0%</td>
<td>0%</td>
<td>6.26%</td>
<td>0%</td>
<td>1.56%</td>
</tr>
</tbody>
</table>

**Table 4**: Female to male ratio during 2010-2015.

<table>
<thead>
<tr>
<th>Year</th>
<th>FEMALE (AMOUNT)</th>
<th>FEMALE (%)</th>
<th>MALE (AMOUNT)</th>
<th>MALE (%)</th>
<th>RATIO FEMALE:MALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>47</td>
<td>32%</td>
<td>99</td>
<td>68%</td>
<td>1:2.125</td>
</tr>
<tr>
<td>2011</td>
<td>42</td>
<td>28%</td>
<td>108</td>
<td>72%</td>
<td>1:2.57</td>
</tr>
<tr>
<td>2013</td>
<td>13</td>
<td>38%</td>
<td>21</td>
<td>62%</td>
<td>1:1.63</td>
</tr>
<tr>
<td>2014</td>
<td>39</td>
<td>37%</td>
<td>67</td>
<td>63%</td>
<td>1:1.7</td>
</tr>
<tr>
<td>2015</td>
<td>47</td>
<td>39%</td>
<td>74</td>
<td>61%</td>
<td>1:1.56</td>
</tr>
<tr>
<td>Total</td>
<td>188</td>
<td>33.7%</td>
<td>369</td>
<td>66.3%</td>
<td>Average:1-2</td>
</tr>
</tbody>
</table>

There is a positive moderate statistically significant correlation (see table 5) between hospital time and TBSA (Rsp=0.568, p<0.001). When TBSA increases, hospital time also increases. There is a positive moderate statistically significant correlation between hospital time and TBSA caused by flame (Rsp=0.568, p<0.001). There is a positive moderate
statistically significant correlation between hospital time and TBSA caused by liquid (Rsp=0.571, p<0.001).

**[Table 5]:** Correlation between burned percentage and hospital time.

<table>
<thead>
<tr>
<th></th>
<th>Rsp=0.568</th>
<th>p&lt;0.001</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBSA</td>
<td>For flame</td>
<td>For liquid</td>
</tr>
<tr>
<td>rsp=0.568</td>
<td>rsp=0.57</td>
<td></td>
</tr>
<tr>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

* For all the female patients, the hospital time statistically significantly depended on the results above.

**[Figure 4]:** Hospitalization duration compared by cause of burn (p=0.001).

* There is a statistically significant difference (see Fig.4) in hospital time for burns caused by flames and burns caused by liquid (p=0.001). Females burned by flames spent significantly more days in hospital compared to females burned by liquid.

**[Figure 5]:** TBSA compared with cause of burn (p=0.14).
There is no statistically significant difference (see Fig. 5) in TBSA between females burned by flame and females burned by liquid (p=0.14).

[Table 6]: Burned location compared with cause of burns.

<table>
<thead>
<tr>
<th></th>
<th>Flame</th>
<th></th>
<th>Liquid</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Relative frequency in %</td>
<td>Frequency</td>
<td>Relative frequency in %</td>
<td>p-value</td>
</tr>
<tr>
<td>Burned arms</td>
<td>41</td>
<td>82%</td>
<td>22</td>
<td>45.8%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Burned legs</td>
<td>20</td>
<td>40%</td>
<td>35</td>
<td>72.9%</td>
<td>=0.001</td>
</tr>
<tr>
<td>Burned head</td>
<td>20</td>
<td>40.0%</td>
<td>12</td>
<td>25%</td>
<td>=0.113</td>
</tr>
<tr>
<td>Burned body</td>
<td>32</td>
<td>64.0%</td>
<td>28</td>
<td>58.3%</td>
<td>=0.679</td>
</tr>
</tbody>
</table>

* Burned arms were statistically significantly more likely among females burned by flames (82%) compared to females burned by liquid (45.8%) (p<0.001). Burned legs were statistically significantly more likely among females burned by liquid (72.9%) compared to females burned by flame (40%) (p=0.001). There is no statistically significant association between burned head and cause of burn.
There is no statistically significant association between burned body and cause of burn (p=0.679). (see table 6)

[Figure 6]: Hospital time compared dependent on the amount of burned locations.

* There is a statistically significant difference for hospital time between groups of amount of burned locations (p=0.019) (see table 6). Hospital time is statistically significantly higher for females who have 3 places burned compared to females who have only one place burned (p=0.01). Hospital time is statistically significantly higher for females who have 4 places burned compared to females who have only one place burned (p=0.011).
6. DISCUSSION OF RESULT

6.1 Results

The purpose with this retrospective study was to describe the characteristics of female burns as in-patients and how burns differ from country to country but also to understand why there is a difference and how we can prevent it. The study shows that 188 females fulfilled the criteria for burn injuries, the average days of hospital duration was 24.6 days and the most common cause of burns was scald burns 50.41%, followed by flame burns 43.78%. The mean TBSA was 28.93% and the most common degree of burns was 2nd degree 65.96%. Furthermore, from a gender perspective, it is seen that the female to male ratio in this research was 1:1.94 and in general, it is seen that the male and female burns are quite similar across the world but that men seem to get burned more often than women. This is for instance seen in Europe whereas the female to male ratio is 1:1.22, in Sweden 1:2.23, in the US 1:2.12 and in India 0.9:1 [18,32,7,36]. This may be explained by the fact that burn injuries in adults are often work related [19,29]. Females are more prone to burns in households when cooking in the kitchen and when handling with boiled water, or being in kitchens that are not safe enough and/or wearing improper clothes that easily lit on fire [30].

The results of this research shows that the cause of burns for females are most commonly scald burns 50.41%, followed by flame burns 43.78%. In contrast, the examined studies in Iran shows that the most common causes of burns in females was at first place flame burns 33%-98,2% and at second place scald burns 1,8% [19,23,37]. In another study from Pakistan the most common causes was at first place flame burns 79%, then chemical burns 8%, steam burns 7%, and last scald burns 6% [19]. In some of the studies in India the most common cause of burns was at first place flame burns 80,6%-92.5%, and second scald burns 16,5%, and third acid burns 10% [20,35,36,38]. In Netherlands the most common burn causes were scalds burns and contact injuries [41]. In Japan most of the electrical and sun burns occurred in females [42] and in Spain, scald burns 45.88% and fire burns 44.71% was the most common causes [40]. In Ukraine it was shown that most common cause was flame burns [43]. In the US it was shown that the most common cause of burns was flame burns and scald burns [44].
The risk of these type of burn causes are due to the absence of smoke detectors and by using alcohol while working with flames or hot liquid, smoking in bed or clothing easily lit on fire, kerosene burns, stove blast, pressure cooker, fire and kitchen gas explosions [30,17,38].

The mean TBSA in this research was 28.93% and in some studies from Iran the TBSA was between 25.2%-56% [19,23,37]. In Pakistan the TBSA was 37% [19], and in India the studies showed that the TBSA was between 36.8%-61% [20,35,36,38]. In Ukraine the TBSA was 77.3 % [43] and in Spain the TBSA was 20% [40]. The TBSA is high in this research as in the other countries examined, this is due to that the most common cause of burns was flame burns and scald burns and this type of burns is deeper and associated with more severe destruction of tissue damage than other causes of burns [23]. The average hospital duration in this research showed 24.6 days, in Iran it is seen that the LOS was 6.9-13 days [23,30], in Pakistan the LOS was 12 days [19]. In Spain the average duration of LOS was 1-2 months [40] and in India there is no information about the hospital duration.

Furthermore, the age and the gender of the patient, the cause of the burns, the degree of the burns, if there is an inhalation injury or not, the location of body that is affected and percentage of the TBSA are important factors in determining the duration of hospitalization. Another important factor is the economy since burn care is one of the treatment that cost the most in health care, we can see that it is a long hospital stay, the patient might have multiple surgeries, and expensive equipment requirements (staff, medicine, room) that make it pricey [31,29].

In this research it is seen that the most common degree of burns was 2nd degree, 65.96%. In one of the studies in Iran it is shown that the most common degree of burns was the mixed degree of burns 70.59%, and at second place, 2nd degree of burns 17.6% and 11.79% had 3rd degree of burns [37]. In Pakistan the most common degree of burns was 2nd degree 30%, and 3rd degree 10% [30]. In India one study showed that the most common degree of burns was 2nd degree 97% [38]. In Spain the most common degree of burns was 2nd degree [40]. The degree of burns are the same in most of the countries and it depends on for how long the tissue has been exposed to the heat, i.e. the longer the time the deeper the burn of the tissue [39]. Furthermore, the locations of burn on the body in this research showed that the lower limbs 23.36% and the upper limbs 22.94% are the most common burn injuries. In India the most common locations of burn was the head and the neck 51.4%, the upper limb 65%, and the lower limb 54.3% [35,38]. In Spain the most affected area was upper and lower limbs [40] and there is no information from the other countries.
6. 2 Discussion about burn injured in-patients in other countries

In Sweden the most common causes are fire 52% and hot water burns 48% and in US the most common causes was fire burns 44% as well but also scald burns 33% [7,8]. Furthermore, chemical burns are very rare in Lithuania in comparison to countries such as Bangladesh, Cambodia, Afghanistan, Pakistan and India. In this research chemical burns are only 1% and mostly related to working environments. In Pakistan chemical burns are on second place 8% and are related to the ‘burning bride’ and on first place is fire burns 79% [17]. We can see that in the world the most common causes of burns are similar.

The outcome of burn wounds would depend on the percentage of burns and the degree of burns. It is seen that the majority of the total body surface area was limited between 10-20% of TBSA, and that the <10% of TBSA in Sweden was 60% [9] and in US was 75% [15]. The TBSA are very similar around the world, the most common percentage are under <10% in most of the countries. Furthermore, in Sweden 2nd degree of burns was most common 50% [9]. It is once again seen that this research shows the same results as the rest of the countries examined in this study, i.e. the most common degree of burns are type 2 and what most people are hospitalized for. It is thus reasonable to question why 2nd degree burns are the most common? It is due to the causes of the burns as seen in this research as well as in the other countries examined, such as flame burns and scald burns which seem to cause the 2nd degree of burns [4]. The hospitalization depends on the severity of burns and complications that may appear with the burns, longer duration is due to severe burns and complications. The LOS in US was 9,3 days [15].

Hence, from this research results it is believed that female burns in Lithuania are very similar to the other countries. It is seen that the causes of burns for females are similar around the world and we can see that in Asia, chemical burns are more common compared to the rest of the world because of female acid violence. Due to the causes we can see that the degree of burns are same in the world, the TBSA are also very similar around the world. The only thing that could differ is the duration of the hospital stay from county to country; this depends on the degree of the burns, the location, the complications and the economical status. The consequences of burns include mortality, morbidity, economic and social costs, which are paid by burn victims, their families, health authorities, and the society in general. This is not possible in every country seeing that the treatments of burns are expensive and not everyone can have the possibility to pay the expenses. Hence, in low-income countries, the socio-economical factors do play a greater role and is one of the major reasons why the hospital duration is shorter than in high-income countries. For instance, in Lithuanian the socio-
economical factors do have an impact on the age and the sex of the person who gets burned. Although, the socio-economical factors are becoming stronger in Lithuania seeing that the economy is rising and the people are increasing their living standards, which thus contributes to the decrease of burn injuries. There are, however, other reasons that are causing burns such as the big alcohol problem in the country since the alcohol consumption makes the burn morbidity grow as well.
7. CONCLUSIONS:

- Most common causes for female burns were hot liquid burns 50.41%, followed by flame burns 43.78%;
- The most common location of burns was on the lower limbs 23.36% and the upper limbs 22.94%, the most common degree of burn was 2nd degree 65.96%, the average of the total body surface area (TBSA) was 12.8%.
- The average length of hospitalized days was 24.6 days.
- The average ratio for female and male burn was 1:2.
- The characteristics of female burns in this study were very similar to female burns in other parts of the world. The difference was the hospital duration, which was longer in comparison to the other countries and the most common cause of burn was hot liquid burns followed by flame burns.
8. REFERENCES


6. IDB Sverige 2007 -2009, Socialstyrelsen samt MSB


30. Nader Aghakhani, “Prevalence burn injuries and risk factors in persons older the 15 years in Urmia burn center in Iran” (2011)

APPLICATION
FOR THE PERMIT TO COLLECT DATA OF CASE HISTORIES FROM PROPHET CLINIC OR ARCHIVE
15.12.2016
Kaznas

I ask to allow me carrying out the research under the following topic:

Objective of research is to determine the number of burns in {}

Tasks of research:

I ask to allow me collecting the data of case histories for the purpose of studies and research

The confidentiality of the respondents will be secured in accordance with the provisions of the

Law on Patients' Rights and Reimbursement of Damage caused to Health. The names, surnames, addresses and other personal data of the respondents will not be collected. Only the generalized research results will be published.

Research supervisor

Coordinated with the clinic's manager

Student

Tel. 3704618957, e-mail: ANNALSDEPARTMENT@GMAIL.COM