Factors affecting adherence to treatment and follow-up of burns in children: A single centre experience

Mustafa Talip Sener, Osman Enver Aydin, Yuksel Anç, Murat Kara, Onder Tan, Ahmet Nezih Kok

ABSTRACT

Aim: Children are prone to burn injury. Burns can be seen as a part of child abuse. The aim of this study was to investigate the factors affecting adherence to the treatment of burn patients, and to emphasize the role of the physician in identifying children’s non-accidental burn injuries.

Materials and Methods: Children who were hospitalized in the burn unit were analyzed retrospectively. Results were assessed for significance using the Chi-square test.

Results: A total of 189 patients were included. Some patients (n = 52; 27.5%) were discharged against medical advice (DAMA) before completion of treatment. Although we could not demonstrate a relationship between non-accidental etiology and DAMA group, it was significant that these patients did not contact the outpatient clinic after discharge. It was evident from records that two of these cases were abused. The reasoning of the parents in the DAMA group for the early discharge was siblings at home, financial and accommodation problems.

Conclusion: Although burns in children commonly occur due to an accident, each burn case should be examined for a non-accidental etiology and findings suggesting abuse should be noted. Physicians should be alert for the detection of signs of burn related child abuse.

Key Words: Accident, burns, child abuse, injury

INTRODUCTION

Burn injuries caused by various physical or chemical agents are considered a preventable trauma that usually occurs as a result of home accidents. The victims, especially the children and the elderly, have high morbidity and mortality.[1-3] The World Health Organization (WHO) reports that each year 300,000 people die due to burns and burn-related causes around the world. What is more, the disability and loss of functions caused by burns affect more individuals.[4] The majority of these burn victims are children and 6% of these patients are hospitalized.[5,6]

The reported incidence of non-accidental injury amongst pediatric burns patients has varied from 6% to 20%.[7,8] Child abuse should be considered in childhood burns. Burns resulting from child abuse have been reported to occur mostly from tap water, and usually in children less than 2 years old. When the extremities are involved, the left side is always included. The suspect is usually a single parent, from a low revenue group.[9] Scald and thermal contact burns are the main etiological factors that may be related to the child abuse or neglect and warrant careful assessment.[10] Children immersed in hot water may struggle and fight to get away from the scalding liquid.

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and so will have splash marks, whereas some young children may jump into a bath with hot water, panic, freeze, and stand still in the water, giving themselves a symmetrical, un-splashed burn distribution. Bilateral burn symmetry (so-called glove or stocking distributions) implies that a child may have been forcibly immersed.\(^{[11]}\)

The aim of this study was to determine the factors affecting adherence to treatment and discuss abuse and negligence in burn cases of DAMA where there was no subsequent contact with an outpatient clinic.

**MATERIALS AND METHODS**

Children who were hospitalized in the burn unit of the plastic and reconstructive surgery department of Ataturk University Faculty of Medicine, between 2011 and 2012, were analyzed retrospectively. Data including the age, gender, place of residence, the place where the burn occurred, the cause of the burn, length of hospitalization, treatment modality, patient compliance with treatment, reason for discharge were documented and recorded. Cases of DAMA were compared with others that were discharged with medical advice (DWMA).

After fluid resuscitation in the early post-burn period, expectant management was the main means of treatment. Intravenous antibiotics, analgesics and appropriate enteral/parenteral nutritional support were given to each patient. Skin grafts, local and distant flaps were all used for reconstruction of the tissue defects where it was necessary. While early tangential excision was considered for moderate and severe burn cases, it was not the choice in mild burn cases.

Patients who demanded referral to an advanced center were not included in the DAMA group of our study. The collection of data regarding whether the discharged patients had applied to out-patient clinics for control, and the physical examination of records, was checked via the hospital patient data recording system.

The Statistical Package for Social Sciences software (Version 20.0, SPSS; Inc., Chicago, IL, USA) was used to analyze the data. Results were assessed for significance using the Chi-square test. Statistical significance was assumed for \(P < 0.05\).

**RESULTS**

A total of 189 children, 89 (47.1%) in 2011 and 100 (52.9%) in 2012 were included in the study. The mean age was 5.9 ± 4.9 (min. 1-max. 18). The burns occurred mostly in the home environment (\(n = 166; 87.8\%\)) including the kitchen (\(n = 131; 78.9\%\)), the living room (\(n = 18; 10.9\%\)) and the bathroom (\(n = 1; 0.6\%\)).

Sixty-nine point three percent (\(n = 131\)) of the cases were due to scald injury, while 20.6\% (\(n = 39\)) were due to flames and 10.1\% (\(n = 19\)) were due to electricity or lightning. Tandir burns (A tandir is a clay oven carved into the ground. It is frequently used for cooking and baking.)\(^{[12]}\) were seen in 9.6\% of the cases (\(n = 16\)). 3.2\% (\(n = 6\)) of the patients died during treatment due to sepsis, hypovolemic shock and multiple organ failure. The median hospitalization duration of patients was 12 (1-133) days. The median hospitalization duration was 13 (1-133) days in the DWMA group and 8 (1-55) days in the DAMA group.

Seventy-seven point eight percent (\(n = 147\)) of the cases were treated with only dressing changes. Skin grafting was the most common intervention during the management period with a 16.4\% (\(n = 31\)) rate. 0.5\% (\(n = 1\)) cases were treated with local and regional flaps. 3.2\% (\(n = 6\)) of the cases needed fasciotomy during the early management period. There was no statistically significant difference between the DAMA and DWMA groups with respect to management method (\(P = 0.8231\)).

Twenty-seven point five percent (\(n = 52\)) of the cases were discharged against medical advice before completion of treatment. The reasoning of the parents for the early discharge were, siblings who needed parental care (44.23%; \(n = 23\)), financial problems (21.15%; \(n = 11\)), accommodation problems (13.46%; \(n = 7\)), seasonal agricultural work (13.46%; \(n = 7\)) and other reasons, such as adherence to remedies, cultural issues and unawareness of the disease (7.69%; \(n = 4\)).

The data from Social Security Institution were examined. According to this data, it was determined that the DAMA group admitted to an outpatient clinic less than the DWMA group. This difference was statistically significant. (\(X^2:104.2222, P < 0.0001\)).

It was evident from the police records that two of these cases were abused by their stepfather, who had injured the children by scalding them.

Scald injury was the most common cause of injuries in the DAMA group. There was no significant difference between the urban or rural housing groups in adherence to outpatient clinic controls.

There was significant difference between the DAMA and DWMA groups in patient age and total burn area. When the DAMA group was compared with the DWMA and it was found that the DAMA patients were younger and had a lower percentage of total burn area than the other group. DAMA group had more facial burns and scalding. What is more, scalding was the most common etiological factor in DAMA group [Table 1].
Table 1: Patient characteristics in the two groups

| Patient characteristics | DWMA % | DAMA % | P value |
|-------------------------|--------|--------|---------|
| Age                     | 6.41 ± 5.33 | 4.44 ± 3.18 | 0.014   |
| Gender                  | 43.1 (59) | 44.2 (23) | 0.885   |
| Female                  | 56.8 (78) | 55.8 (29) |         |
| Male                    | 52.6 (72) | 44.2 (23) | 0.307   |
| Place of origin         | 47.4 (65) | 55.8 (29) |         |
| City                    | 23.4 (32) | 13.5 (7)  | 0.133   |
| Rural                   | 76.6 (105)| 86.5 (45)|         |
| Flame burn              | Yes     | 64.2 (88) | 82.7 (43) | 0.014   |
|                         | No      | 35.8 (49) | 17.3 (9)  |         |
| Scald burn              | Yes     | 12.4 (17) | 3.8 (2)   | 0.080   |
|                         | No      | 87.6 (120)| 96.2 (50)|         |
| Total burn area (%)     | 18.72 ± 14.19 | 12.23 ± 7.99 | 0.033   |
| The location of the burn (%) |         |         |         |
| Scalp                   | 0.16 ± 0.62 | 0.02 ± 0.14 | 0.106   |
| Face and neck           | 1.03 ± 2  | 0.33 ± 0.81 | 0.015   |
| Trunk                   | 5.04 ± 4.52 | 3.04 ± 4.33 | 0.073   |
| Arm                     | 4.07 ± 4.52 | 3.08 ± 4.23 | 0.170   |
| Leg                     | 5.69 ± 6.84 | 5.23 ± 6.37 | 0.673   |
| Genital                 | 0.22 ± 0.415 | 0.17 ± 0.382 | 0.489   |
| Gluteal                 | 0.42 ± 1.2 | 0.37 ± 1.09 | 0.791   |
| Positive cultures       | Yes     | 16.1 (22) | 5.8 (3)   | 0.062   |
|                         | No      | 83.9 (115)| 94.2 (49)|         |
| Applied for control examinations |       |         |         |
| Yes                     | 94.16 (129)| 21.16 (11) | <0.0001 |
| No                      | 5.84 (8) | 78.84 (41)|         |

DWMA: Discharge with medical advice, DAMA: Discharge against medical advice

Our medical records did not include the data for the parental level of education, number of siblings, economical status.

**DISCUSSION**

The World Health Organization (WHO) has defined child abuse as any intentional or unintentional behavior of an adult, community, or country that may adversely affect the child’s health, whether physically, developmentally and/or psycho-socially. Within this broad definition, five subtypes can be distinguished—physical abuse; sexual abuse; neglect and negligent treatment; emotional abuse; and exploitation. Lack of actions taken to provide health care for the child may sometimes be ignored, unless the acts (or lack of acts) lead to severe injuries or even death.

Social and emotional factors are important in the etiology of burns. Many parents have moments of inattention or lack of awareness. What is more, the lack of education and low parenting skills create a high-risk environment for the child. These children are most likely to get burned.

In our study, 27.5% of burn patients were discharged from the hospital at their parents’ request, against medical advice. We suggest that this group of patients should be considered as victims of child abuse, as negligent treatment is also a part of child abuse. However, in our series only 2 of the patients were physically abused by their stepfather. These 2 patients were in the DAMA group. On the other hand, even if these 2 patients were defined as physically abused, it does not imply that the entire DAMA group is also physical abuse victims.

It was noticeable that the DAMA patients did not attend to the outpatient clinic for treatment. Generally, the education level and the financial status of the population in our hinterland are low. Financial and social problems, transportation difficulties, domestic problems and lack of education may explain the rationale for the DAMA group, not attending to the outpatient clinical controls. Moreover, the worst scenario is that the parents may indeed try to keep the victim away from the eyes. Eventually, all these factors should be included in the ‘Child Abuse’ definition made by WHO.

It was observed that, of the abused children who were discharged from the hospital without any legal action being taken, 35-50% were severely injured and 5-10% were killed. In our series, 27.5% rate of DAMA should be regarded as negligent treatment which is a subtype of child abuse, according to WHO definitions. In this DAMA group, 2 cases were identified to be non-accidental burn injury.

Although, there may also be non-accidental etiology in the DWMA group, our data does not provide sufficient evidence for the detection of physical child abuse both in the DWMA or the DAMA groups. Depending on our data and evidence it is not possible to state that there is no non-accidental etiology in the DWMA group.

In our study, we determined that the majority of burns in children were scalds and occurred in the kitchen. These findings are consistent with similar studies. Although accidental burns are common among children. It is recommended that every burn case should be examined for a non-accidental etiology. Although it was reported that child abuse accounts for the 10% of the burn injuries resulting in hospitalization, these rates were not mentioned in similar studies conducted in our country.

Although children are often affected by accidental injuries, trauma inconsistent with the child’s age are less likely to happen spontaneously, and irrational or conflicting explanations of the burn mechanism by the parents during the first admission to the emergency room should alert the medical staff. Some patterns are pathognomonic for child abuse by burning, such as clearly demarcated, deep scald burns of the buttocks, perineum, and feet. Classical examples include deep second- or third-degree burns of the hands or feet in
a glove- or stocking-like distribution. The depth of the burn, having a sharp demarcation, the presence of ecchymosis in addition to the burn, burn being located on the buttocks or genital area, burns on the buttocks and feet with unburned skin creases and toes, burns with a ‘sock’ or ‘glove-like’ appearance on hands or feet and sharply demarcated burns which show the shape of the object that caused the injury, especially on the back, are important indicators of non-accidental (potential child abuse) burns [Figure 1]. Documentation of these features of the wound in medical records and photographs are very important. This information will be decisive for the judicial authorities in differentiating between accidental and non-accidental burn causes. However, we could not document definitive and decisive features of child abuse in our series.

What is more, as we have previously mentioned factors like scald injury, younger age were also related to leaving the treatment against medical advice [Table 1]. However, there is a well-documented relation between the non-accidental etiology, younger patient age and scald burns. Our finding that there is a relation between the DAMA and scald burns and younger patient group may also be consistent with the previous studies.

The literature suggests that we should find more non-accidental etiology in our study. The medical records were not successful in documenting the non-accidental etiology. The main reason for this is the lack of awareness of the medical staff. The family of the burned child directs the healthcare providers to accidental etiology. To overcome this shortcoming the authors crosschecked the medical records with the police records. This emphasizes that the medical records may underestimate the actual rate of child abuse and may not be solely relied on. We may speculate that an educated medical staff would be able to identify more suspicious child abuse.

Majority of the parents in the DAMA group may think that the treatment is no more necessary. Lack of education, confidence in traditional remedies may be the main reasons for this idea. Moreover, some other concerns about the reasoning of the parents which were mentioned above (siblings at home, financial issues, etc.) may convert the parents to think that ‘the treatment is no more necessary’.

The main rationale for leaving the treatment against medical advice, suggested by the parents, was that the siblings of the burn victim who needed parental care at home. Some other socio-economic concerns also affected the treatment status of the patients.

The DAMA may also be associated with a request to be treated in advanced centers. However, in our country, the protocols of patient referral to an advanced center require them to obey the referral order. None of our patients requested referral to another burn care facility.

The median hospitalization duration of all patients was 12 days. The medical advice was expectant wound care in majority of the cases and skin grafting in a minor group. In the DAMA group the parents did not approve further treatment. Our clinic is in the rural part of the country and is the only healthcare facility where the patients can obtain quality burn care, which mandate us to hospitalize the patients for a longer time than other clinics.

Aggressive families may challenge physicians when the possibility of physical abuse is presented. Racial, cultural or economic norms inherited through centuries are confusing factors complicating the evaluation of suspected child abuse.

A request for early discharge gives the physician the responsibility to decide whether the treatment is accomplished or not. If the treatment has not come to an end, the physician may not approve the discharge. On the other hand, physicians do not have the power to prevent discharge without a court order. An understanding of the statutory power that a physician can use, will be beneficial, when the parents want to discharge early against medical advice. If the parents do not give consent for the treatment, which is necessary to improve their child’s health, a physician can apply to Social Services, the Child Protection Agency or the judicial authorities to get a guardianship decision.

**CONCLUSION**

Although burns in children commonly occur due to an accident, every burn case should be examined for a non-accidental cause and attention should be given to signs suggesting child abuse. Photographs of the burn areas should be taken.
Socio-economical support should be provided by the governmental and non-governmental organizations. Facilities for the care of the siblings and accommodation should also be considered. Eventual solution for this problem is the education of the healthcare staff. The concept of ‘child abuse’ should be taught during the undergraduate and graduate education.

The limitation of this study was that, the data were all recorded by the medical staff who were unaware of the concept of ‘child abuse’.

In our study, it was seen that the patients who were discharged before completion of treatment did not contact the outpatient clinic for control after discharge. Discharge before completion of treatment and lack of adherence to periodic control examinations should be perceived as possible child abuse or negligence. Legal action, such as guardianship proceedings, should be taken for the care of the possible child abuse victims. It is not appropriate to make the child abuse issue dependent only on a single medical decision. All related specialized professionals, including legal authorities, should be responsible for the evaluation.\footnote{9}

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Conflicts of interest
There are no conflicts of interest.

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