

The epidemiology of burn injury in children during COVID-19 and correlation with work from home (WFH) policy

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ABSTRACT

Work from home (WFH) mandate is one of the major changes known during this pandemic, aimed as a preventive way to mitigate the spread of the COVID-19 virus. This study aimed to observe the characteristics of pediatric burn injury during COVID-19 pandemic and WFH mandate's impact on pediatric burn injury admission at some Hospital burn centers in Malang. Every patient's age, gender, clinical characteristics, parent's background, and other variables such as the possession of siblings, response time using our burn registry form, and comparative analysis of the incident in WFH housewife mother were assessed. The majority were in the group age of under five years old group age (70%) with a mean of 5.5 years. The most frequent part of the burn injured is extremity 36.7%, and hot liquid dominates as the cause of the injury 73.3% with the total body surface area of burn injury group >10% is the most common 56.7%. The burn injury incident happened more frequently in mothers with children less than two in both groups. This study showed that the increase in increasement of the pediatric burn injury during COVID-19 pandemic between housewife mother and WFH mother has no significant difference also showed that parent especially mother unable to supervise the children during WFH. Strategies to mitigate pediatric burn injuries during WFH should be thoughtfully implemented.

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1. INTRODUCTION

COVID-19 pandemic caused many changes in our society. People's activities are supposed to be done based on specific health protocols to restrict the spreading of the COVID-19 virus. In Indonesia, government mandates to do physical distancing led to the closure of public places such as schools, offices, parks, and shopping centers in almost every province. By this condition, new policies are established; for example, the work-from-home (WFH) and school-from-home policy. Instead of having work-from-home for the whole pandemic period, the Indonesian government still considerate work-from-office (WFO) whenever possible. As a result, WFH to WFO or WFO to WFH policy could change easily during this pandemic [1].

As reported in a previous study in North Carolina's state, there was a 9% increase in pediatric admissions in 2020 compared to 2019 at the local burn center, which school-aged is the most common [2],

[3]. In England, it also reported a 27% increase of burn injuries in 6-10 years old age group [4]. This society's behavioral changes during COVID-19 as the parents' work-from-home and the school's closure forced the children to stay at home caused an increase of pediatric burn cases as reported in several countries [2], [4]–[9]. The cause of this pediatric burn injury incidence increase in every center enforcing lockdown and work from home is still unclear also the impact of this mandate in our city is still unknown. The focus of this study is to describe the epidemiological characteristics of child burn injury during COVID-19 pandemic and Indonesian's work from home mandates that may be used as reference to mitigate this pediatric burn injury increase. Based on our knowledge, this study is the first study in Indonesia assessing the epidemiological characteristics of burn injury in children during COVID-19 pandemic.

2. RESEARCH METHOD

This research was a descriptive-analytic study with purposive sampling at the Emergency Room of Saiful Anwar General Hospital and Type B Private Hospital in Malang. All pediatric patients with burn injuries between February and October 2020 were eligible for inclusion. Data were collected after the participants willingly signed the informed consent and were approved to participate in this study. The burn injuries were diagnosed from physical examination and history taking performed by a general practitioner and Plastic Surgery residents. During history taking, we were using our burns registry form to assess the patient identity, parent's social background, occupation, the work from home or work from office status of the patient parent's occupation, the severity, location, and the cause of burn injuries of the patients. Other variables of interest included possession of household assistant, home remedies applied at home, and numbers of siblings of the patient. Then, we divided into two groups: a group of mothers works from home with a child less than or more than two, the second group were mothers as housewives with a child less than or more than two. We also analyzed the correlation between parents' educational status and home remedies and the response time to take their children to the emergency room. Statistical analysis was performed by SPSS 25 software for descriptive-analytic and chi-square tests to test the relationship between variables. The p-value <0.05 was considered significant.

3. RESULTS AND DISCUSSION

3.1. Result

A total of 30 patients were eligible to be included in this study. The demographic characteristics are presented in Table 1. There were equal in number between males and females, and most of the patients were in the group age of under five years old group age (70%) with a mean of 5.5 years.

Table 1. Demographic characteristics of pediatric patients with burn injury

Demographic characteristics	n	(%)
Number	30	(100)
Gender		
Male	15	(50)
Female	15	(50)
Age (years) Mean +- SD	5.5+-4.462	
Age by years		
≤ 5 years	21	(70)
> 5 years	9	(30)

The clinical characteristics are presented in Table 2. The mean body weight is 16.6 kg, and the mean total body surface area (TBSA) with burn injury is 13.32%, which the group of >10% TBSA is higher (56.7%) than group <10% TBSA (43.4%). The most common thickness of the injury is the mid dermal (40%), followed by the deep dermal (33.3%). The extremity is the most common site in terms of the burn injury location, which was 36.7% for extremity only, 16.7% extremity plus trunks, 10% extremity plus abdomen, 6.7% extremity plus trunks and abdomen, and another 6.7% for extremity plus head.

Table 3 shows parents' backgrounds. It indicated that almost half of them had bachelor's degrees for father 50% and mother 43.3%. The private employee is the most common father's occupation, 36.7%, and housewife was the most common mother's occupation 53.3%. In terms of work policy, 63.3% of fathers do the WFH, 93.3% for mothers, which for mother housewife was considered as WFH.

Table 2. Clinical characteristics of pediatric burn injury

Clinical characteristics	n	(%)
Weight (kg) Mean +- SD	16.66+-10.712	
Weight by percentage		
≤20 kg	23	(76.7)
>20kg	7	(23.3)
TBSA mean +- SD	13.32+-13.373	
TBSA by percentage		
≤10%	13	(43.3)
>10%	17	(56.7)
Injury thickness		
Epidermal	4	(13.3)
Superficial mid dermal	4	(13.3)
Mid dermal	12	(40)
Deep dermal	10	(33.3)
Location of injury		
Trunks	1	(3.3)
Abdomen	1	(3.3)
Extremity	11	(36.7)
Trunks+Abdomen+Extremity	2	(6.7)
Trunks+Extremity	5	(16.7)
Head	1	(3.3)
Head+Trunks	1	(3.3)
Abdomen+ Extremity	3	(10)
Head+Extremity	2	(6.7)
Trunks+Abdomen+Genital	1	(3.3)
Buttock+Genitalia	1	(3.3)
Buttock	1	(3.3)

Table 3. Parents background of pediatric burn injury

Parents background	n	(%)
Educational status of father		
Elementary	2	(6.7)
Junior high	3	(10)
Senior high	9	(30)
Bachelor degree(D3)	6	(20)
Bachelor degree (S1)	9	(30)
Doctoral	1	(3.3)
Educational status of mother		
Elementary	3	(10)
Junior high	6	(20)
Senior high	8	(26.7)
Bachelor degree (D3)	5	(16.7)
Bachelor degree (S1)	8	(26.7)
Occupation of father		
Soldier	1	(3.3)
Farmer	2	(6.7)
Lecturer	1	(3.3)
Merchant	3	(10)
Private employee	11	(36.7)
Government employee	3	(3.3)
Businessman	6	(20)
Others	3	(3.3)
Occupation of mother		
Lecturer	2	(6.7)
Housewife	16	(53.3)
Private employee	4	(13.3)
Government employee	1	(3.3)
Businesswoman	3	(10)
Merchant	3	(10)
Others	1	(3.3)
Work policy of father		
WFH	19	(63.3)
WFO	11	(36.7)
Work policy of mother		
WFH	28	(93.3)
WFO	2	(6.7)

The mean of sibling's possession was 2.30; with siblings less than one was the most common (60%). Most of them did not have a household assistant; only three (10%) had one household assistant. The cause of the injury was commonly caused by hot liquid (73.3%), which response time for managing burn injury for 70% of the patients had less than 24 hours in getting the medical help. Furthermore, in terms of home remedies applied, almost half of them (46.7%) applied no treatment before getting the emergency room treatment, all shown in Table 4.

Table 4. Other's variables of pediatric burn injury

Others	n	(%)
Possession of Siblings Mean +- SD	2.30 +- 0.702	
≤1	18	(60)
>1	12	(40)
Number of household assistant		
0	27	(90)
1	3	(10)
Mode of injury		
Hot liquid	22	(73.3)
Hot surface	3	(10)
Flame	3	(10)
Electrical	2	(6.7)
Response time		
<24 jam mean +- SD	7.00+-3.372	
<24 jam	21	(70)
>24 jam	9	(30)
Home remedies		
Water	4	(13.3)
Ointment	3	(10)
Others	9	(30)
No treatment	14	(46.7)

As shown in Figure 1, the group of mothers as housewives was 16, and the group of WFH mothers who previously work in the office and now do the WFH was 12. The number of burn injury cases in the housewife group with children more than two was seven (43.75%), and for children less than or equal to two is 9 (56.25%). In the WFH mother group, the burn injury case with children more than two is three (25%), and for children less than or equal to two is nine (75%).

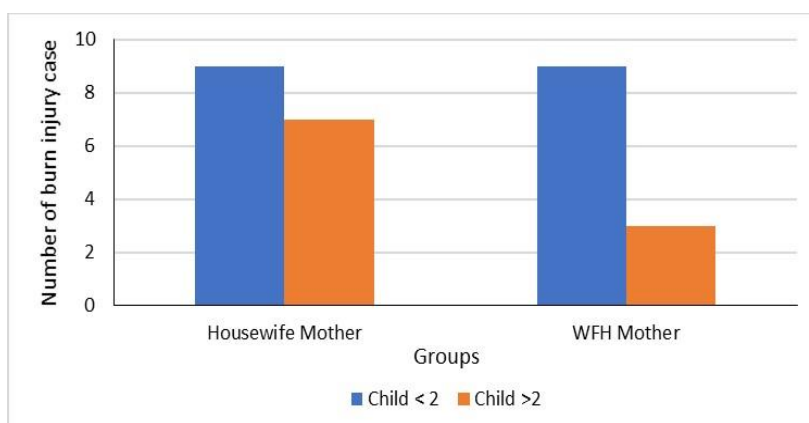


Figure 1. Burn injury incident between housewife mother and WFH mother group

Table 5 shows that the Pearson Chi-Square score is 0.569 (father) and 0.676 (mother), which means there was no correlation between parents' educational status and the application of home remedies. Furthermore, as shown in Table 6, there was a correlation between parent's education father and respond time (0.02), but no correlation was found between parent's education (mother) and responded time (0.116).

Table 5. Impact of parent's education in the application of home remedies

	Father			Mother		
	Value	df	Asymptotic significance (2-sided)	Value	df	Asymptotic significance (2-sided)
Pearson Chi-Square	2.933 ^a	4	0.569	1.526 ^a	3	0.676

Table 6. Impact of parent's education in the response time

	Father			Mother		
	Value	df	Asymptotic significance (2-sided)	Value	df	Asymptotic significance (2-sided)
Pearson Chi-Square	82.300 ^a	48	0.002	46.365 ^a	36	0.116

3.2. Discussion

This study's primary purpose is to investigate the various determinants of pediatric burn injury during this work from home mandate by observing the patients' physical and clinical characteristics, the parental background such as education and working status. Another variable included the possession of siblings, household assistant's possession, the mode of injury, the response time, and the home remedy applied. We suggest mother's working status plays an essential role in this study. It is a widespread thing that mothers take a big responsibility in taking care of the children [10].

There is a 43% increase in pediatric burn injury in 2020 (30 persons) than in 2019 (21 persons). Several studies conducted in other countries during the WFH mandate showed that there were increase in pediatric burn injury in the group age 6-10 years, which is the school-age [2], [4], [5]. They suggested it may cause by the school closure mandates [11]. Our study showed a different result that group age lesser or equal five years old (preschool age) was the most common had to burn injury. This result was similar to a study conducted by Laura *et al.* before the WFH mandate, which shows that pediatric burn injury's most common group age is around 12-36 months [12]. In other words, based on this study, school closure is not one factor responsible for this increase.

From Table 7 we could conclude that almost all studies from different countries showed an increase in pediatric burn injury during COVID-19 pandemic. These findings may indicate that this case has potential to be a global problem if it is not taken care seriously. Every country or burn center can face the same problem when the work from home mandate or lockdown is enforced [2], [4], [7], [8].

Table 7. Comparison of increase child burns injury incidence.

Study	Increase of child burn injury before and during COVID-19 pandemic (%)
This study	43%
Williams <i>et al.</i> [3]	9%
Mann <i>et al.</i> [4]	0.6%
Usha <i>et al.</i> [7]	0.46%
Frederica <i>et al.</i> [8]	1.3%

The clinical characteristics of the burn injury of our data were mostly similar to previous burn injury studies. The TBSA is the only variable that does not similar to other studies. Prior studies showed the pediatric burn injury affected around 7.5% TBSA [12]–[14]. Another study conducted by Alnababtah *et al.* represented the most common TBSA affected in pediatric burn injury was between 1-5% [6]. Our data showed higher TBSA affected with a mean of 13.32%. Mid dermal severity is the most common and consistent with the previous studies when the burn injury in pediatrics has high severity because the children's skin anatomy is thinner than adults [11]. Hot liquid is the most common causative agent, and the injury's location commonly affected the extremity. These may indicate that our pediatric burn injury is more severe than others [4], [12]–[15].

While there is no significant result to be concluded from demographic and clinical characteristics in pediatric burn injury, we suggest the family background plays a vital role in this increase in pediatric burn injuries [2], [14], [16], [17]. This study evaluates the number of mothers as housewives and mothers who previously WFO, which is now WFH, and the possession of children's siblings. The total is 28 because two of them still work in the office, so they were excluded. Our study indicated that whether the mother is a housewife or doing the WFH, the group with the children's sibling more than two has lower pediatrics burn injuries. These findings were consistent with the study conducted by Amador *et al.* that shows the possession of siblings, which is more than three or more, decreases the possibility of acquiring the pediatrics burn injury

[14], [18]. These findings suggest that WFH mandate is not the leading cause causing the increasement of peditrics burn injury during COVID-19 pandemic. Other factors, such as siblings' possession, contribute more to the incident of peditric burn injury, as shown in several previous studies [19], [20]. We evaluated the mother occupational background because in our society, it was expected that children are more attached to their mother than their father [21], [22]. This concludes that WFH mother is not the cause of this phenomenon (the increasement of peditric burn injury during COVID-19 pandemic), but this probably mother is not ready to work at home because she was unable in focusing on work and children at the same time.

At COVID-19 pandemic, siblings' possession more than one had a lower percentage of peditric burn injury incidences, probably because the siblings may take care of one another that helps parents supervise children. Other examples of this inability or unreadiness of parents taking care of their children at home, such as parents do not know how to cook hot water safely, keep burnable materials away from children, or choose kid-friendly household materials.

We also analyze the relationship between parents' educational background and home remedies that applied and the response time. Several studies mentioned that fathers play a significant role in making their children decide to seek medical experts [23]–[25]. While there is no correlation between parents' educational status and home remedies, there is a correlation between father's educational background and response time. The higher their educational background, the faster they seek medical experts' help.

This phenomenon was caused by multiple factors, especially familial background, not only a few particular changes, such as the work status changes. The changes in family conditions before and during the pandemic, such as the psychological aspect, economic aspects, and habitual changes of a family, should be studied comprehensively to understand this phenomenon. Studies with more specific variables focusing on the familial background are mandatory.

In the interpretation of the findings of this study, there are several limitations. Firstly, this study population is limited to patients who came to the general hospital and type B private hospital only, not from all hospitals/burn centers and the sample size is small. Secondly, most subjects have mothers who work as housewives, which were considered working from home. However, we still evaluate by grouping them into housewife mothers and WFH mothers who previously work from the office.

4. CONCLUSION

The demographic and clinical characteristics of peditric burn injury during the COVID-19 pandemic and before COVID-19 pandemic did not differ in contrast. The increasement of the case suggests that parent, especially mother is not ready to do the work at home, unable in focusing on work and children at home at the same time. We suggest a further study of familial background should be conducted to understand this phenomenon. Strategies to mitigate should be thoughtfully implemented.

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