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Assessment of knowledge, attitude and practices of parent's first aid towards their children injuries in Saudi Arabia

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ABSTRACT

Background: Trauma and violence are the primary causes of mortality among children worldwide, with about 950 000 children and young people under the age of 18 dying each year. Adequate parental involvement can reduce handicap and improve the wounded child's chances of survival, making a big difference in the result. The goal of this study is to determine the baseline level of first-aid knowledge and attitudes among parents of children aged <14 years. *Methodology:* A questionnaire was used to collect data, Between July 2020 and September 2021. The survey is made composed of many validated questionnaires and will be verified in a pilot test. So, because study would include participants from all of Saudi Arabia's regions, a probability stratified sampling approach was used. SPSS version 20.0 was used to enter and analyze the data, and a P-value of less than 0.05 was considered significant. *Results:* 69.8% of the 1042 parents who took participated in our study were women, whereas 30.2 % were fathers. 40.1% of all participants ages between 31- 40 years old while 33.6% ages between 20- 30 years old. 41.4 % of all parents have completed a first-aid course. 78.1% had reported having knowledge on first aid in home injuries. *Conclusion:* Parents have a generally positive attitude and practice when it comes to first aid procedures, according to our research. It is recommended that educational programs on first aid training improve awareness among parents as well as the general community. Parents should be aware of and follow safety precautions at home.

Keyword: Children Injuries, Violence, First Aid.

1. INTRODUCTION

Child injuries are an important public health and development issue that requires urgent attention (Al-Johani and Sabor, 2017). Injury and violence are the leading causes of death among children globally, accounting for nearly 950

000 fatalities among children and young people under the age of 18 each year. In addition, around 39,000 children a day or 14 million children a year need emergency treatment or suffer non-fatal injuries caused by accidents resulting in life long disabilities (Alhajjaj et al., 2021). Children spend a significant amount of time at home, where the majority of the accidents happen (Kamel et al., 2015). Moreover, they are at a higher risk of experiencing injuries, because their bodies are developing, and they have not yet learned to be aware of themselves as well as various environmental hazards (Chowdhury and Chakraborty, 2017a). Therefore, appropriate first-aid knowledge and practice by parents is especially crucial in the treatment of children's injuries, as many dangerous con-sequences of injuries can be avoided if parents know what to do (Eldosoky, 2012).

The American Red Cross Guidelines defined first aid in 2010 as "evaluations and interventions that a bystander or a victim can perform with or without minimum medical equipment"(Chowdhury and Chakraborty, 2017b). Unintentional injuries are the most popular childhood injury mechanism, which can include anything from falls and burns to poisoning and suffocation (Al-Bshri and Jahan, 2021). In 2018, a study in Makkah reported that in Saudi Arabia, injuries are the second leading cause of death. Overall, they found that good knowledge level among their participants was (9.8%). This shows that it demands an intervention to beat the huge knowledge gap and to increase first aid learning, in addition to the joint efforts of the government and the community, practices by mothers will reduce the problem of domestic injuries in children (Nour et al., 2020).

Another study was written in 2020 on Riyadh, Saudi Arabia by a across- sectional survey of parents accompanying children aged ≤ 12years for collecting data, a survey was used, injuries was 24.7% in the past 12 months, the majority of these injuries occurred at home (74.3%), accidental falls (62.9%), burns (22.9%). They claimed that the prevalence of unintentional childhood injuries is high in the data population. Very serious gaps were found between parents reported first aid knowledge and practice. In addition, mothers must focus more in educational programs by force to improve children domestic safety (Alkhamis and Abdulkader, 2020), and in another study about 12 deaths (8.5%) from 1132 child died because of home accident (fall, poisoning, suffocation) (Almuneef et al., 2020).

There is still a lack of information regarding parents' awareness of child first aid as well as their willingness to participate in first aid courses. consequently, our study aims to assess the baseline level of first aid knowledge and overall attitudes regarding first aid among parents having children aged <14 year. The objective of this study is to assess the knowledge and practice of first aid and the associated factors among Saudi parents having children aged <14 year in Saudi Arabia.

2. METHODS

Study design

This study was a descriptive cross-sectional study which is based on a questionnaire. This was completed between July 2020 and September 2021. To assess the knowledge, practice of first aid and the associated factors among Saudi parents having children aged <14 year.

Subjects, Participants, recruitment and sampling procedure

Since the study targets all Saudi parents from all of Saudi Arabia regions, we will assign data collectors from each region to facilitate the data collection process. The questionnaires were given out to Saudi parents from the six geographical regions in Saudi Arabia, which are Eastern, Central, Northern, Northwest, Midwest, and Southwest regions. These regions are 13 provinces that include Riyadh, Makkah, Eastern, Madinah, Albaha, Aljawf, Northern borders, Qassim, Hail, Tabuk, 'Aseer, Jazan, and Najran provinces. We will collect the responses from all of these provinces using the e-questionnaire.

Sample size

A sample size was determined by using Raosoft sample size calculator software by the website http://www.raosoft.com/samplesize.html. At a 95% confidence level, the minimum sample size was calculated, total population size 35,361,026, margin of error ±5%, and an assumed prevalence of 50%. The required minimum sample size was determined to be 385.

Inclusion criteria

All Saudi parents aged 20-60 years old and having children under 14 years old in 2021

Exclusion criteria

Parents who aged 61 years or more, with non-Saudi nationality, who declined to participate in the investigation and have critically sick children or had chronic debilitating illnesses.

Method for data collection and instrument

Ethical approval was taken in the form of written consent from all participants. A pretested-validated self-administered questionnaire was used as a study instrument to assess the knowledge, attitude, and self-efficacy of Saudi Parents toward child first aid; it was divided into different parts: Participants' general characteristics, such as parent's age, education, employment, household size, number of kids, and the occurrence and kind of home injury, if any, in the eight weeks before the research; Knowledge of the parents about the predisposing factors ways of prevention of the selected types of injuries and the immediate measures that should be taken and the source of their knowledge; Parent's attitude in case of exposure to home injuries.

Data management and Statistical analysis

The data collected was input and analyzed via the Statistical Package for the Social Science (SPSS) version 23. Descriptive statistics was performed. Percentages were given for qualitative variables. The determinant factors were determined using the Chi-square test. P-value was considered significant if $P < 0.05$.

Ethical considerations

The research proposal was approved by the Regional Research and Ethics committee of Ministry of Health with Ethical approval number (H-02-J-002). The questionnaire contained a brief introduction explaining the study's objectives and outcomes. We obtained informed written consent from all participants. Data obscurity and discretion were maintained throughout the study.

3. RESULTS

As illustrated in table (1): of all 1042 parents participating in our study, 69.8% of study participants were mothers and 30.2% were fathers. 40.1% of all participants ages between 31- 40 years old while 33.6% ages between 20- 30 years old. 94.4% of parents were married and 4.1% were divorced. 94.2% of participants were Saudi and 26.6% from the western region of the kingdom. 81.2% were highly educated (university or more). 62.1% live in an apartment and 30.9% live in villa. 36.7% had moderate monthly income, 37.4% good income and 12.1% very good income. 24.3% of participants had one child, 28.4% had two, 23.4% had three, 14.1% had four children and 5.9% had five children.

Table 1 Sociodemographic characteristics of participants (n=1042)

Parameter		No.	Percent
Relevance to child	The father	315	30.2%
	The mother	727	69.8%
Age	Less than 20	5	.5%
	20 - 30 years old	350	33.6%
	31 - 40 years old	418	40.1%
	41 – 50 years old	230	22.1%
	51 - 60 years old	39	3.7%
Social status	Married	984	94.4%
	Widower	15	1.4%
	Divorced	43	4.1%
Nationality	Saudi	982	94.2%
	Non-Saudi	60	5.8%
Residency	Southern area	197	18.9%
	Eastern Region	213	20.4%
	The northern area	176	16.9%
	Western Region	277	26.6%
	Central Region	179	17.2%
Education level	uneducated	8	0.8%
	Elementary or middle school	35	3.4%
	secondary	153	14.7%

	university	846	81.2%
Average monthly household income (in Saudi Riyals)	less than 5000	144	13.8%
	From 5000 - 10,000	382	36.7%
	from 10,000-20,000	390	37.4%
	more than 20,000	126	12.1%
Occupation	Student	62	6.0%
	Not employed	368	35.3%
	An employee in the health sector (private or government)	73	7.0%
	Government sector employee	384	36.9%
	Private sector employee	155	14.9%
Accommodation type	Apartment	647	62.1%
	Villa	322	30.9%
	Family house	73	7.0%
Number of children (New-born to 16 years old)	1	253	24.3%
	2	296	28.4%
	3	244	23.4%
	4	147	14.1%
	5	61	5.9%
	6	23	2.2%
	7	8	0.8%
	8	5	0.5%
	10	5	0.5%
Age group of children	0-2	364	34.9%
	3-6	489	46.9%
	7-10	398	38.1%
	11-13	239	22.9%

41.4% of all parents had attended training course on first aid. 78.1% had reported having knowledge on first aid in home injuries. 31.1% of parent reported home injuries of their children two months or more before the study, and 15.1% one month before study (table 2). Most of children suffered from cut with a sharp object 21.2%, followed by burns 15.5%, swallowed a foreign body 8.3%, fall from heights 1.6% and chemical poisoning. Only 5.8% of parents said they would use flour in case of burns, 7.6% would use honey, 43.1% would use tap water, 34.8% medicated ointment, 3.88% would use toothpaste and 43.1% didn't know what to do. In case of electrical shock, 89.8% of parents reported power supply lock, 18.7% paramedic aid request and 10.3% reported airway examination. Regarding chemical poisoning (figure 1), 23.1% of parents would make the child eat milk and egg white, 72.5% would take him to the hospital and 37.5% would help him vomit. The first thing done when a child injured (figure 2), 57.9% couldn't act but someone else did the job, 32.6% gave him the necessary first aid, 7.1% call the ambulance and 3.2% will take him to the hospital. As showed in table (3): 41.5% would go to the hospital when child has a home injury, 94.6% keep children away when using detergents, 96.4% make sure when changing the cylinder, there is no gas leakage, 79.9% would not leave kids alone at home.

Table 2 Knowledge and Practices of Parents First Aid Towards Their Children Injuries (n=1042).

Parameter		No.	Percent
Attended training courses on first aid	Yes	431	41.4%
	No	611	58.6%

Knowledge about first aid to be followed in case of home injuries	Yes	814	78.1%
	No	228	21.9%
The last time one of your children had a domestic injury	more than two months	324	31.1%
	two months	60	5.8%
	Month	157	15.1%
	None	501	48.1%
Type of injury suffered by your child	cut with a sharp object	221	21.2%
	fall from heights	17	1.6%
	Swallow a foreign body	87	8.3%
	burns	162	15.5%
	spasm	3	0.2%
	Chemical poisoning	17	1.6%
	broke down	3	0.2%
	Nose bleeding	1	0.09%
	None	495	47.5%
If the child gets burns first, use	Flour	60	5.8%
	Honey	79	7.6%
	I do not know	51	4.9%
	Moderately cold tap water	449	43.1%
	Medicated ointment	363	34.8%
	Toothpaste	40	3.8%
In the event of an electrical shock, you must:	Power supply lock	936	89.8%
	Paramedic Aid Request	195	18.7%
	Airway examination	108	10.3%
	Remove the broken skin	85	8.2%
	I do not know	83	7.9%
In cases of chemical poisoning (such as chlorine and detergents):	Give the child milk and egg white	240	23.1%
	Take him to the hospital	755	72.5%
	Help him vomit	391	37.5%
	Help him to eat lemon	10	0.95%
	Do gastric lavage	54	5.2%
	I do not know	55	5.3%
Where should detergents and medicines be stored?	In a high shelf or closed cupboard	1014	97.3%
	In a low, easy-to-reach shelf	13	1.2%
	I do not know	15	1.4%
If a child ever had an injury that required first aid	Yes	473	45.4%
	No	569	54.6%
You do first aid for him	Yes	409	86.4%
	No	64	3.6%
What was the first thing done when a child injured	I gave him the necessary first aid	340	32.6%
	Ambulance call	74	7.1%
	Take him to the hospital	25	2.3%
	I couldn't act but someone else did the job	603	57.9%

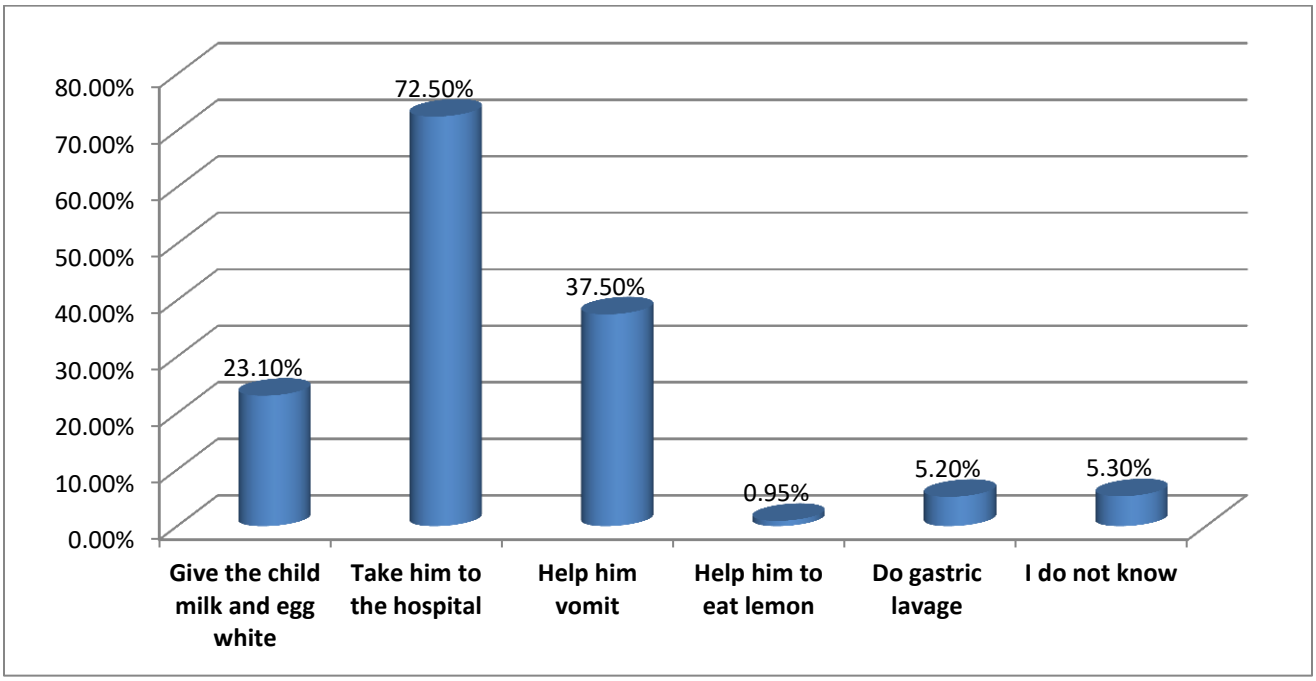

Figure 1 Parent action in cases of chemical poisoning of his (such as chlorine and detergents)

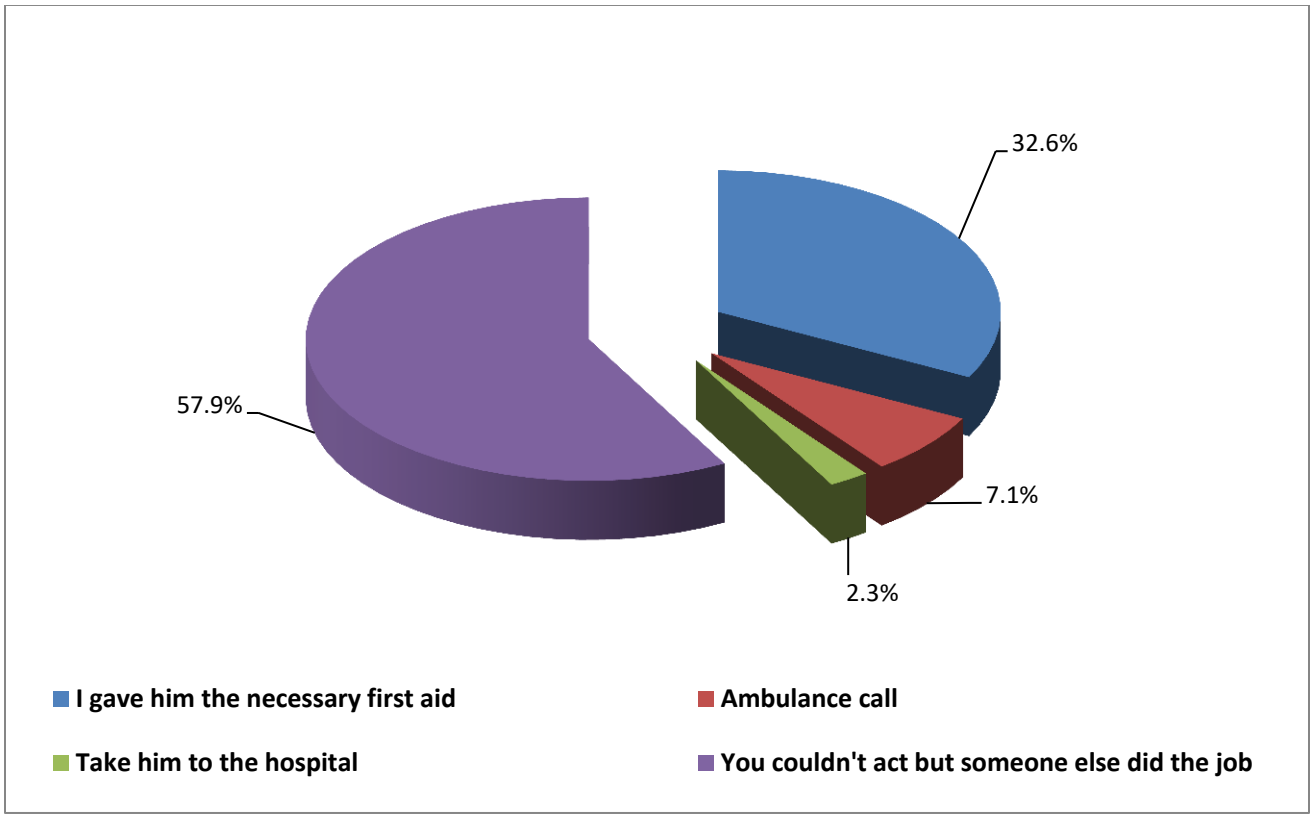

Figure 2 The first thing done when a child injured

Table 3 Parents practice to First Aid towards Their Children Injuries (n=1042)

Parameter		No.	Percent
I go to the hospital when my child has a home injury	Yes	432	41.5%
	No	78	7.5%
	Sometimes	532	51.1%

Keep children away when using detergents	Yes	986	94.6%
	No	21	2.0%
	Sometimes	35	3.4%
Make sure there is no gas leakage when changing the cylinder	Yes	1004	96.4%
	No	14	1.3%
	Sometimes	24	2.3%
Connect multiple devices with one socket	Yes	153	14.7%
	No	686	65.8%
	Sometimes	203	19.5%
Always make sure that the fire extinguisher is working	Yes	583	56.0%
	No	286	27.4%
	Sometimes	173	16.6%
I leave my kids alone at home	Yes	75	7.2%
	No	833	79.9%
	Sometimes	134	12.9%
I am keen to pass on my experience in dealing with domestic injuries to those I know	Yes	767	73.6%
	No	66	6.3%
	Sometimes	209	20.1%

Regarding attitude of parents toward first aid, table (4) shows general good attitude of parents. 97.3% agree that all precautions must be taken to prevent accidents at home, 84.3% agree that home accidents psychologically affect the child, 92.9% agree that it is the responsibility of parents to provide first aid to their children, 92.2% agree that it is important to attend courses to deal with home injuries, 97.3% agree that it is important to have a first aid kit at home but only 52.1% trust their ability to do the right thing in an emergency.

Table (5) shows details of first aid measures taken in home injuries as 53.4% of parents agreed that removing the child's clothes is the first step when hot oil or boiling water falls on a child's chest, 24.9% agreed to put ice packs on the affected part as the first action in burns, 93.9% would test water temperature before giving a baby shower, 95.1% remove small objects from the front of the child and prevent him from putting them in his mouth can prevent suffocation and spitting and 91.3% agreed that the correct behavior in case the child falls and suspects a fracture is not to move the injured part (table 6).

Table 4 Attitude of Parents First Aid towards Their Children Injuries (n=1042)

Parameter	Agree	neutral	Not agree
All precautions must be taken to prevent accidents at home	1014 (97.3%)	27 (2.6%)	1 (.1%)
Home accidents psychologically affect the child	878 (84.3%)	147 (14.1%)	17 (1.6%)
It is the responsibility of parents to provide first aid to their children	968 (92.9%)	63 (6.0%)	11 (1.1%)
There is a failure to spread awareness about how to deal with domestic injuries	784 (75.2%)	175 (16.8%)	83 (8.0%)
It is important to attend courses to deal with home injuries	961 (92.2%)	65 (6.2%)	16 (1.5%)
Do you support giving the basics of first aid and how to avoid accidents as a basic curriculum in schools and universities?	992 (95.2%)	41 (3.9%)	9 (.9%)
It is preferable to use an electric stove over a gas stove	475 (45.6%)	340 (32.6%)	227 (21.8%)
When you contact the Red Crescent, it responds quickly	648 (62.2%)	290 (27.8%)	104 (10.0%)

It is important to have a first aid kit at home	1014 (97.3%)	20 (1.9%)	8 (.8%)
It is important for me to learn first aid	998 (95.8%)	39 (3.7%)	5 (.5%)
I trust my ability to do the right thing in an emergency	543 (52.1%)	333 (32.0%)	166 (15.9%)
The use of traditional methods in treating domestic accidents may be beneficial in treating them	475 (45.6%)	359 (34.5%)	208 (20.0%)

Table 5 Details of first aid measures taken in home injuries (n=1042)

Parameter	Yes	No	Don't know
When hot oil or boiling water falls on a child's chest, is the first step to be removing the child's clothes?	556 (53.4%)	282 (27.1%)	204 (19.0%)
In the event of a burn, is it correct to put ice packs on the affected part as the first action?	259 (24.9%)	600 (57.6%)	183 (17.6%)
Should the water temperature be tested before giving a baby shower?	978 (93.9%)	30 (2.9%)	34 (3.3%)
In all cases, the child should be helped to vomit after consuming chemicals:	537 (51.5%)	294 (28.2%)	211 (20.2%)
If a child is injured, is the first thing to do is apply pressure to the wound to stop the bleeding?	828 (79.5%)	134 (12.9%)	80 (7.7%)
Removing small objects from the front of the child and preventing him from putting them in his mouth can prevent suffocation and spitting:	991 (95.1%)	29 (2.8%)	22 (2.1%)
Should the child be given small amounts of food in his mouth that is appropriate for his age?	1003 (96.3%)	11 (1.1%)	28 (2.7%)
Should the child not laugh while eating?	976 (93.7%)	41 (3.9%)	25 (2.4%)
In your opinion, is the correct behaviour in case the child falls and suspects a fracture is not to move the injured part?	951 (91.3%)	56 (5.4%)	35 (3.4%)
When a child has a nosebleed (nosebleed) he should sit upright with bending forward and pressing the side of the nostrils continuously?	672 (64.5%)	171 (16.4%)	199 (19.1%)
Should I avoid giving the child anything by mouth when he is unconscious (syncope)?	900 (86.4%)	36 (3.5%)	106 (10.2%)

Table 6 Significant correlation between parents' knowledge of first aid and sociodemographic characters of participants (N= 1042)

Parameter		Knowledge on first aid to be followed in case of home injuries		Total (N=1020)	P value
		Yes	No		
Person filling out questionnaire	Father	226	89	315	0.001
		27.8%	39.0%	30.2%	
	Mother	588	139	727	
		72.2%	61.0%	69.8%	
Age	Less than 20	3	2	5	0.091
		0.4%	0.9%	0.5%	
	20 - 30 years old	290	60	350	
		35.6%	26.3%	33.6%	
	31 - 40 years old	317	101	418	
		38.9%	44.3%	40.1%	
	41 – 50 years old	173	57	230	
		21.3%	25.0%	22.1%	
	51 - 60 years old	31	8	39	
		3.8%	3.5%	3.7%	
Nationality	Saudi	767	215	982	0.967
		94.2%	94.3%	94.2%	
	Non-Saudi	47	13	60	
		5.8%	5.7%	5.8%	

4. DISCUSSION

Accidental injuries to infants and young children are often serious, but are largely preventable. Most home accidents involving children can be prevented or reduced if parents know what to do as soon as they occur (WHO, 2005). In our study 31.1% of parent reported home injuries of their children two months or more before the study, and 15.1% one month before study. A study in Egypt study revealed that (34.8%) from the preschool children showed had an injury at home eight weeks before the study (El Seifi et al., 2018); this is quite similar to what was found in two different studies were conducted in Egypt (39.8% & 38.8%) (Eldosoky, 2012; Kamel et al., 2015), in similar to a research done in Turkey (36.5%) (Öztürk et al., 2010), despite the fact that it was greater than that reported in India (23%) (Mahalakshmy et al., 2011).

Most of children suffered from cut with a sharp object 21.2%, followed by burns 15.5%, swallowed a foreign body 8.3%, fall from heights 1.6% and chemical poisoning 1.6%. A research in the Qassim region of Saudi Arabia found that falls (10.7%) cut wounds (15.2%), and burns were the most prevalent home injuries falls (50 percent) (Al-Bshri and Jahan, 2021). In Makkah Al-Mukaramah region KSA, study have reported similar findings as falls comprised 64.4% of injuries, followed by cut wounds (20%) and burns (8.9%) in children up to 12 years old (Saleem Aloufi, 2017). Similarly, among children less than 5 years old, fall (33.6%) was the most common kind of injury followed by cut wound (13.9%) and burn (8.2%) (Mohammed et al., 2019). This was comparable to a study in Egypt reported that most children were exposed to wounds fall/fracture, drug or chemical poisoning, burn and chocking. This might be due to the small size of residences in rural locations, where safety precautions are difficult to implement, as well as the lack of a distinct play space for children (El Seifi et al., 2018).

According to a research was completed in the United States, the most prevalent forms of children's home injuries were falls, burns, poisonings, and choking/suffocation (Mack and Desafey Liller, 2010). In our study, 78.1% of parents reported they have knowledge of first aid in case one of their children had home injury. Another study in KSA reported that most of the parents (97.2%) have heard of first aid (Al-Johani and Sabor, 2017). This figure is higher than those reported from Qassim, KSA as only (58.2%) of moms have a basic understanding of first aid (Al-Bshri and Jahan, 2021). In a study carried out among rural mothers in

Egypt, 26.6% had not heard about the term (Eldosoky, 2012). In India, Nearly two-thirds (65.7%) of women surveyed have never heard of first aid (Sonavane et al., 2016). Differences between these studies can be explained by differences in the demographic characteristics of the population (Al-Johani and Sabor, 2017).

In our study, parents identified many substances in case of burn injury or chemical poisoning as flour, honey and toothpaste for burns and milk and egg white or lemon juice for chemical poisoning. Differences between these studies can be explained by differences in the demographic characteristics of the population, falls, burns, and other injuries Coconut oil has typically been used to treat wounds, cuts, and abrasions. Another famous Indian plant known as Haldi has been utilized as a first aid treatment for wounds, cuts, and abrasions. For example, toothpaste has been used to treat burns, oil massage has been used to heal body injuries from automobile accidents and falls, both animal bites and poisonings were treated with spiritual training (Pathak et al., 2018). Alternative burn treatments have been documented in African nations such as Ghana, South Africa, and Nigeria (Chirongoma et al., 2017; Fadeyibi et al., 2015; Gyedu et al., 2015). vegetable oil, potato flakes, yogurt, and salt have all been found to be utilized as first aid in Ghana, South Africa, and Nigeria, South Africa, Turkey, and the United Kingdom according to previous studies (Alomar et al., 2016; Chirongoma et al., 2017; Eldosoky, 2012; Fadeyibi et al., 2015; Gyedu et al., 2015; Harvey et al., 2011; Karaoz, 2010).

To design appropriate interventions, it is important to assess the practices regarding first aid. Our study shows general good attitude and practice from parents towards first aid measures. A previous study showed that only 55.5% of participants in study followed the appropriate action by cooling the burned area with cold water. Additionally, mothers had best practices for suspected fractures (85.9%) and ingestion of foreign bodies (80%), with burns (55.5%) and asphyxiation (43.2%) having the least association cases (Al-Bshri and Jahan, 2021). These results are consistent with the study of Riyadh, stating that only 41% of care givers treated their burns with cold water, while 32% reported that they treated burns with unscientific means alone or in combination. In another study, 95.1% of respondents possessed a good attitude into first aid in case of suffocation, and 57.1% agreed that immediate assistance is needed in case of suffocation (Alomar et al., 2016). It was noted that only 41% of caregivers treated their burns with cold water, while 32% had treated burns with unscientific means alone or in combination. This is identical to a research performed in Spain, in which over 80 percent of respondents felt that everyone should have a basic understanding of first aid (Abelairas-Gómez et al., 2020).

Our study shows a significant correlation between knowledge of first aid with educational level of parents, monthly income and mothers over fathers. Knowledge levels were much higher for more educated employees, personnel with first aid training or who were already a health care provider, younger staff, and staff in rural locations, according to previous studies (Li et al., 2012). Working mothers who are highly educated in education and health care, mothers of children with domestic trauma, and mothers who have already completed first-aid training are more familiar with first aid procedures in the Qassim area (Al-Bshri and Jahan, 2021). In Egypt, a similar investigation was conducted, (Eldosoky, 2012) Young moms who have completed first aid training and have a higher degree in health-related employment with a high socioeconomic standing scored the best in knowledge. The more educated moms are, the more likely they are to receive knowledge and practical outcomes in first aid for children's injuries, according to a study conducted in Singapore (Thein et al., 2005). In Turkey, Tomruk et al., (2007) mothers who worked in hospitals, had finished university, had attended a first-aid course, or had a first-aid certificate had greater first-aid knowledge, according to the study. A further investigation from Egypt found that parents' total knowledge, attitude, and self-efficacy were significantly influenced by their age, education level, and past home injuries (El Seifi et al., 2018).

5. CONCLUSION AND RECOMMENDATIONS

Our study shows general good attitude and practice from parents towards first aid measures. It is advised that educational programs on first aid training raise the awareness of parents as well as the entire community in order to minimize the morbidity and mortality associated with home injuries. Parents should be aware of and adhere to home safety precautions. Courses offered as extracurricular activities at educational institutions; parent education at PHCC; Encourage personnel in a variety of sectors to acquire basic first aid. It is possible to increase first aid knowledge and practice by using websites and social media to give trustworthy information on first aid to trusted health care providers.

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Authors Contribution

Ahamed Mahah - Principal Investigator, Study design, Manuscript Preparation.

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Ethical approval

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Conflict of Interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are presented in the paper.

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