



## Original Research Article

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## ASSESSMENT OF KNOWLEDGE AND BEHAVIOUR OF PARENTS TOWARD CHILDHOOD ANAPHYLAXIS IN TABUK CITY, KSA

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### ABSTRACT

**BACKGROUND:** Anaphylaxis can be known as one of the most critical issues due to allergic reactions and the most common emergency condition in allergology. It can be fatal if not managed properly and immediately. The incidence rate of anaphylaxis is increasing over time. Still, there is a lack of knowledge about anaphylaxis and its management.

**OBJECTIVES:** Assessment of knowledge and behavior of parents toward childhood anaphylaxis in Tabuk city, KSA.

**METHODS:** In this study, a cross-sectional trial was conducted in Tabuk, KSA. A total of 385 mothers and fathers were included, using an electronic questionnaire to collect the data. Data entry and analysis were performed using Microsoft Excel and SPSS.

**RESULTS:** Of the participants, 80.5% had stated they had heard about anaphylaxis before, and 37.8% stated they had witnessed a case of anaphylaxis before, the vast majority could identify that some foods and drugs can cause anaphylaxis, 94%, 91.1% respectively, about 84.1% knew that animals' or insects' bites could cause anaphylaxis and 81% identify dust and pollen as a cause. However, only 41.1% could identify latex, and 6.3% could identify exercising as a cause. 47.90% know that a previous anaphylaxis attack increases the risk for another, and 44.3% recognize asthma as a risk for anaphylaxis. Only 3.1% identify epinephrine as a treatment for anaphylaxis.

**CONCLUSION AND RECOMMENDATIONS:** We found that parents have somewhat low awareness, especially in some points like some triggers and management, which means we need to spend more effort to improve their awareness.

**Keywords:** Childhood anaphylaxis, Allergic reaction, Parents, Awareness, Epinephrine injection.

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## INTRODUCTION

Anaphylaxis can be considered as a critical allergic reaction that may result in the death of the patient. In the case of infants, the prevalence of anaphylaxis remains underdiagnosed. The sudden release of biologically active mediators from basophils as well as from Mast cells is the prime reason for the occurrence of anaphylaxis [1]. Anaphylaxis presentation may vary, including skin manifestation as urticaria, angioedema, and/or flushing. It may also include respiratory manifestations such as shortness of breath and/or choking, besides abdominal manifestation as abdominal pain, nausea, and vomiting. The most typical manifestations are urticaria and angioedema, followed by shortness of breath [2]. Food, medications, insect sting, and latex are allergens that can trigger immune responses that lead to an anaphylactic reaction, especially food which is considered the most common triggering factor [2]. It is well known that asthma has been proven as a risk factor for severe type anaphylaxis [3]. However, about 20% of the cases are idiopathic anaphylaxis, where there are no identifiable triggers [4]. A systematic review done by Wang et al. [5] in 2019 on several population-based studies reflected that the prevalence of anaphylaxis in children across the globe ranged from 1 to 761 per 100000 person-years, and the incidence rate of anaphylaxis is increasing over time. A cross-sectional study was done by Alkanhal et al. [6] 2018 in KSA on the prevalence of anaphylaxis among pediatrics, estimated to be 5 per 100000. The mortality rate was not more than 1% of all anaphylactic cases, with a higher incidence in children compared to

adults due to relatively underdeveloped immune systems [7]. Anaphylaxis management mostly depends on the case, the effect of the trigger on the patient, and the system it affects [4]. The majority, 80% of anaphylactic cases triggered by food, are mild and recover spontaneously without receiving treatment [4]. There is first-line and second-line management. The first-line treatment is epinephrine injection of 10 microgram/kg IM and repeated every 5 minutes in all patients with severe anaphylaxis with no exception. This drug helps in peripheral vasoconstriction and increases the rate and contractility force of the heart. It acts as a mast cell stabilizer to prevent the inflammatory process in the body, especially in the bronchi and bronchiole, which can cause severe respiratory distress [4]. The second-line is interference, depending on the cause and type of allergy, including removing the trigger like clothes, administering an oxygen mask, IV fluids "0.9% saline "20ml/kg bronchodilator. In some cases, we can give glucocorticoids for protection from the recurrence of anaphylaxis [4]. Discharge the patient with an epinephrine auto-injection device and explain how to use it to avoid the severity of anaphylaxis [4]. Literature review of a systemic review of 59 studies done by et al. [8] published in 2010 showed a lack of knowledge about anaphylaxis and its management on the physician and community level. A cross-sectional study conducted by Tanno & Demoly [9] in France on 2017 applied to the French adult general population and found an urgent need to improve public awareness and health initiatives regarding anaphylaxis.

Yamamoto-Hanada et al. [10] conducted a cross-sectional study in Japan in 2015 and found the experience and perception of food allergy were leaking among caregivers of children with no food allergy. Another cross-sectional study performed by Elhassan et al. [11] in Qatar in 2017 found a lack of knowledge in allergy management. A study aimed to assess knowledge and attitudes regarding food allergy among school teachers in Jazan, Saudi Arabia 2018 by Gohal [12] found that 59.7% of teachers included in the study showed a poor information on food allergy. Another study conducted by Alsuhaibani et al. in Qassim, Saudi Arabia, on 2019 found that most teachers showed little knowledge regarding anaphylaxis, and internet and social media had been rated as the most common source of information for anaphylaxis [13]. Increasing awareness about anaphylaxis will improve its management. However, there is no sufficient study that measured anaphylaxis awareness among caregivers in Saudi Arabia. This population-based study aims to assess caregivers' knowledge and behavior toward childhood anaphylaxis in Tabuk city, KSA.

## METHODS

**Study Design and area:** A cross-section study was conducted in Tabuk city, the capital of Tabuk region located in northwestern Saudi Arabia, with a total population of 551,124 {2019}. One month to collect data by electronic questionnaire in 2020.

**Study population, inclusion, and exclusion criteria:** Include all caregivers who live in Tabuk. Exclusion criteria: Exclude all

physicians who live in Tabuk, Exclude all not caregivers who live in Tabuk.

**Sample size and sampling techniques:** The prevalence was assumed to be 50% with a confidence interval (95% CI of 5%), and a sample size of 385 is representative. Sampling techniques were random.

**Data collection tools:** A Self-administered questionnaire was designed to assess knowledge of anaphylaxis and first aid management of anaphylaxis. The questionnaire was distributed among caregivers through social networking sites, containing both open-ended and close-ended questions, asking about:

- A. Sociodemographic data including age, gender, educational level, and the number of children.
- B. Assessment of Knowledge and behavior toward anaphylaxis by 21 questions, including clinical features of anaphylactic reactions, causes, risk management, action in an emergency, and previous experiences.

**Data analysis:** In the research work, both excel and SPSS version 21 have been used. Data entry has been done in excel, while analysis has been done in SPSS. For descriptive statistics, numbers and the percentage value of categorical variables have been used, and means and standard deviation have been used to give continuous variables. A 21 item-questionnaire was used to evaluate the knowledge of caregivers regarding anaphylaxis. In this questionnaire, the most appropriate answers have already been marked as 1 for correct and 0 for incorrect answers. The scores of each questionnaire were summed up based on the participants' answers. Based on cut-off points

of 60-80%, the participants were classified as below:

0-12 Marks	Low knowledge
13-17 Marks	Moderate knowledge
18-21 Marks	High knowledge

Further, the relationship between the degree of knowledge and the socio-demographic variable was obtained with the help of independent t-tests, ANOVA test, and Kruskal-Wallis tests. Results were considered statistically significant if the P value equals or less than 0.05.

**Ethical consideration:** Ethical approval from the Institutional Review Board of the University of Tabuk was obtained. The privacy of the participants was considered, we explained the concept, and we took their consent before starting the questionnaire. The information obtained was not used for other purposes.

## RESULTS

Table 1 displays the demographical data of the participants. The gender contribution of the participants was 77 (20.1%) males and 307 (79.9%) females. As for the age distribution, the most significant proportion of the participants was between 21-30 years (41.4%), followed by those between 31-40 years (28.6%), and the least responses (1.30%) came from participants aging 51 years and above. 173 (45.1%) had 2-4 kids, and 123 (32%) had 5 kids or more. The majority of participants, 283 (73.7%), had bachelor's & higher education levels. Those having secondary education accounted for 71 (18.50%) a minority of participants were not educated 3 (0.8%).

Demographical Characteristics	N	%
Gender		
Male	77	20.10
Female	307	79.90
Age Group		
20 years or less	31	8.10
21-30 years	159	41.40
31-40 years	110	28.60
41-50 years	79	20.60
51 year and above	5	1.30
Number of Children		
One Child	123	32.00
2-4 kids	173	45.10
5 Kids of More	88	22.90
Educational Level		
Not Educated	3	0.80
Primary or intermediate	27	7.00
Secondary	71	18.50
Bachelor & Higher Education	283	73.70

Table 1: Demographic Profile of The Participants (n =384)

Table 2 shows the pattern of answering the questions related to knowledge about anaphylaxis. A total of 309 (80.5%) of the participants have stated that they had heard about anaphylaxis before, and 145 (37.8%) stated they had witnessed a case of allergic reaction before. The vast majority could identify that some foods and drugs can cause anaphylaxis (94%, 91.1%, respectively), and about 84.1% knew that animal or insect bites could cause anaphylaxis. A total of 81% of respondents identified dust and pollen as a cause. However, about 41.1% could identify latex, and 6.3% could identify exercising as a causative agent for anaphylaxis.

Have you heard about anaphylaxis before?				
Yes	309 (80.5%)	No	75 (19.5%)	
Have you witnessed a case of anaphylaxis before?				
Yes	145 (37.8%)	No	239 (62.2%)	
Some foods can cause anaphylaxis				
Yes*	361 (94%)		4 (1%)	I don't know
Some foods can cause anaphylaxis				19 (4.9%)
Yes*	346 (90.10%)	No	11 (2.9%)	I don't know
Animal or insect's bite can cause anaphylaxis				27 (7%)
Yes*	323 (84.1%)	No	27 (7%)	I don't know
Dust or pollen can cause anaphylaxis				34 (8.9%)
Yes*	311 (81%)	No	22 (5.7%)	I don't know
Exercising can cause anaphylaxis				51 (13.3%)
Yes*	24 (6.3%)	No	264 (68.8%)	I don't know
Latex can cause anaphylaxis				96 (25%)
Yes*	158 (41.1%)		84 (21.9%)	I don't know
Anaphylaxis can lead to death				142 (37%)
Yes*	247 (64.3%)	No	17 (4.4%)	I don't know
Previous anaphylaxis increases the risk for another attack				120 (31.3%)
Yes*	184 (47.9%)	No	42 (10.9%)	I don't know
Having asthma put the person at higher risk for anaphylaxis				158 (41.1%)
Yes*	170 (44.3%)	No	52 (13.5%)	I don't know
Anaphylaxis is				
Self-limited condition			4 (1%)	
Best treated with antihistamine injection			228 (59.4%)	
Best treated with epinephrine injection*			12 (3.1%)	
Best treated with herbal medication			12 (3.1%)	
Best treated with analgesics			14 (3.6%)	
A disease with no treatment			9 (2.3%)	
I don't know			105 (27.3%)	

\*Correct Answer

Table 2: Participants Answers to Knowledge Question (n=384)

Moreover, those who knew that an anaphylaxis attack put you at risk of another were 184 (47.90%). Of those who recognized asthma as a risk factor for anaphylaxis were, 170 (44.3%). When asked about the best treatment for anaphylaxis, only a minority of 12 (3.1%) correctly answered epinephrine injections.

Graph 1 demonstrates the percentage of people identifying the signs of anaphylaxis correctly. The three most correctly identified signs are itching, raised red patches, and

facial/lips swelling with 81.3%, 79.7%, and 73.4 respectively. The three least identified signs are abdominal pain, coma, and seizures with 15.9%, 19.8%, and 21.1 respectively. Graph 2 illustrates the percentages of the information sources for those who knew about anaphylaxis. 64.8% knew about it from the internet and social media, 27.4% from books and magazines, and 7.8% knew about it from the TV or radio. Table 3 shows the participants' average knowledge score and their knowledge level.

Variable		
Knowledge Score (mean, SD)	10.7318	3.95
Knowledge Level (n, %)		
Poor Knowledge	269	70.10
Moderate Knowledge	84	21.90
High Knowledge	31	8.10

Table 3: Knowledge Score & Knowledge Level (n =384)

The mean knowledge score was  $10.73 + 3.95$  (Total = 21). The majority of participants had low knowledge about the condition, 269 (70.1%). At the same time, 84 (21.9%) had moderate knowledge and only 31 (8.1%).

anaphylaxis case before. A significant difference was present between age ( $p = 0.015$ ), educational level ( $p = 0.028$ ) and between who reported knowing anaphylaxis and who did not ( $p = <0.001$ ).

Table 5 shows the answer to the first aid question where we ask the caregivers about the appropriate action if they notice a sign of anaphylaxis on their child. Of them, 62.8% said they would go to the hospital (emergency).

## DISCUSSION

Only a few studies aimed to assess the knowledge and behavior toward childhood anaphylaxis targeting the parents, and our

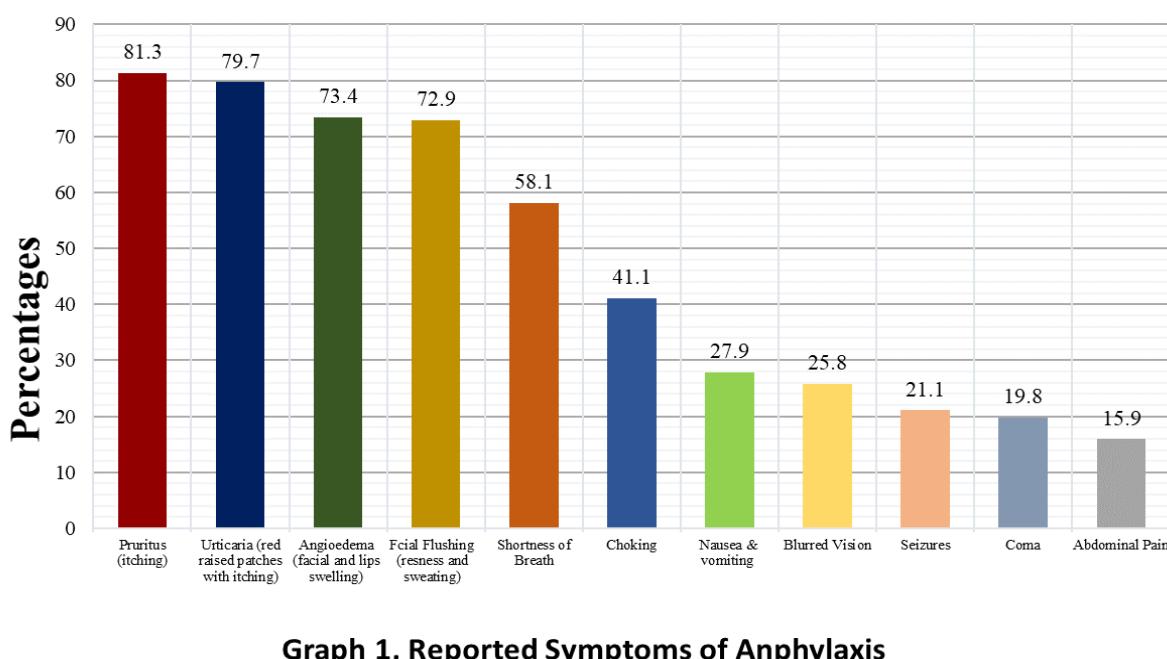


Table 4 compares the knowledge score of anaphylaxes across demographical data, those who reported having prior knowledge and those who reported attending an

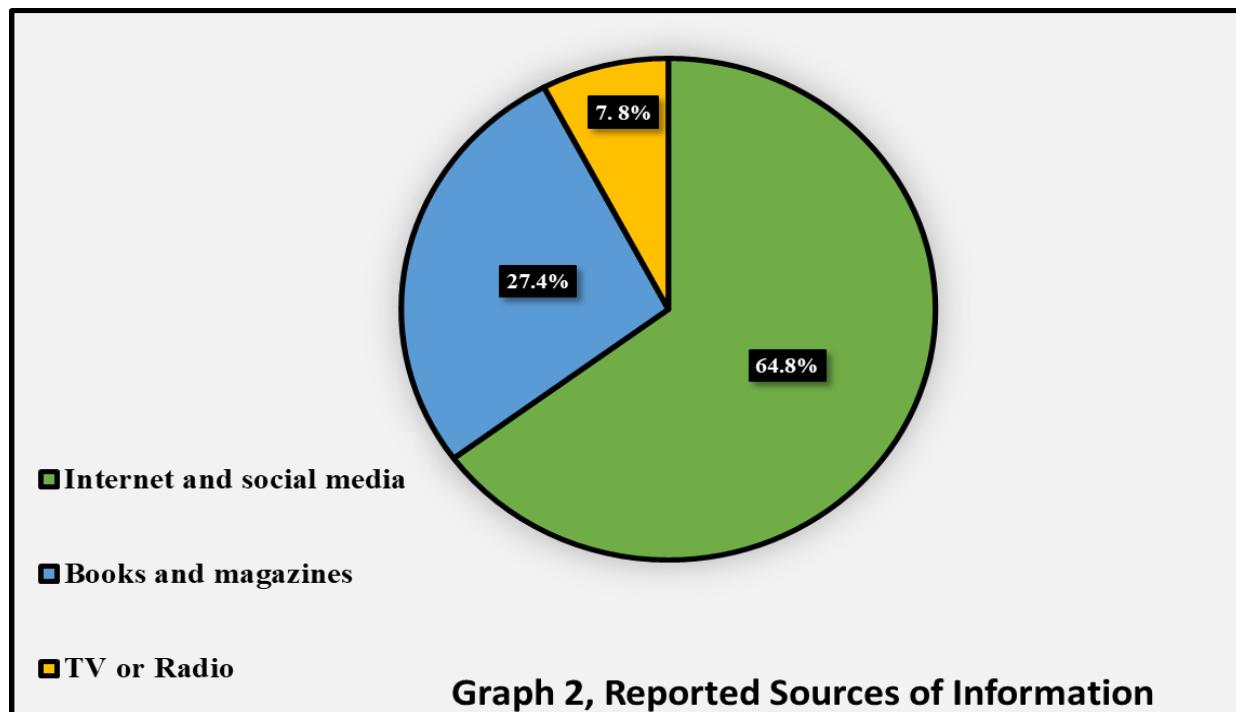
study is the first study in Saudi Arabia. In this study, we found that 309 (80.5%) participants had previously heard about anaphylaxis or had been dealing with anaphylaxis, compared

to 75 (19.5%) of those who had not heard about anaphylaxis. In contrast, only 18% of the asthmatic children's parents in Brazil had received information about anaphylaxis and food allergy [14]. Of the parents, about sixty-four percent, 64.8% used the internet and social media as a source of anaphylaxis information, 27% used books and magazines, and 7.8% used TV or radio. Similar sources were reported by teachers in a Saudi study in Al-Qassim city [13]. Of those who heard about anaphylaxis, about 145 (37.8%) stated they had witnessed a case of anaphylaxis before. A total of 28.6% of teachers in Al-Qassim had witnessed students suffering from anaphylaxis [13]. We asked the parents who participated in our study about the symptoms. The percentage of the three most common correctly identified symptoms are (pruritis) itching, (urticaria) raised red patches, and (angioedema) facial/lips swelling were 81.3%, 79.7%, and 73.4 respectively. Less identifiable symptoms were abdominal pain, coma, and seizures with 15.9%, 19.8%, and 21.1 respectively. Despite this deficiency, a still higher than the percentage of parents answering this question in a study conducted in Brazil on 2018, where only 5.4% knew that dermatitis is a symptom of anaphylaxis and 20.7% knew that wheezing, itching, stomach pain, urticaria, collapse, squeeze throat [14]. This difference may be attributed to geographical differences or increased awareness about anaphylaxis with time. We found that parents have a satisfying background about the most commonly known anaphylaxis triggers. Food was the most common identifiable anaphylaxis trigger, as it was identified by 94% of the parents. Also, participants'

Variable	Knowledge Score (Total Score = 21)		
	Mean	SD	P-Value
Gender			
Male	9.75	4.02	0.015*
Female	10.98	3.90	
Age Group			
20 years or less	11.29	5.41	
21-30 years	10.78	3.74	0.432
31-40 years	10.67	4.14	
41-50 years	10.70	3.49	
51 year and above	7.60	0.89	
Number of Children			
One Child	11.25	4.13	0.204
2-4 kids	10.52	3.80	
5 Kids of More	10.42	3.94	
Educational Level			
Not Educated	7.67	0.58	
Primary or intermediate	9.33	3.32	0.028*
Secondary	10.42	4.15	
Bachelor & Higher Education	10.98	3.94	
Have you heard about anaphylaxis before?			
Yes	11.34	3.55	<0.001*
No	8.21	4.50	
If you heard about anaphylaxis before, from where have you heard about it?			
Internet and social media	11.15	3.56	
TV or Radio	12.25	3.55	0.204
Books and magazines	11.51	3.51	
Have you witnessed a case of anaphylaxis before?			
Yes	11.09	3.34	0.167
No	10.51	4.27	

\* Significant at level  $\leq 0.05$ .

Table 4: Knowledge Scores Comparison Across Demographical Data & Prior Experience/ Knowledge of Anaphylaxis



knowledge that some drugs, animal and insect bites, and dust and pollen can cause anaphylaxis was 91.1%, 84.1%, and 81%, respectively higher, and fewer than 41.10% of our participants knew about latex. Only 6.30% could identify exercise as a triggering factor. Which are compatible with the result of another study aimed to assess the prevalence of triggers associated with anaphylaxis that was conducted in the research setting of a tertiary care facility situated in Saudi Arabia between 2015 and 2017 stated that among the pediatric age group, food is the most common trigger 45.9% followed by insect bites 34.7% then drugs 13.3% and environment triggers 6.1% [6]. Another study conducted at a tertiary hospital in Seoul, South Korea, used medical records between 2003 and 2016 and also showed similar results where food is the most common triggering factor, followed by drugs,

bee venom, and exercise as the least causative factor [15]. Asthma can be considered one of the risk factors in the case of severe anaphylaxis. Moreover, in the study conducted on fatal food and allergic reactions, it was found that people were facing an issue of Asthma [3]. In a study at a tertiary hospital in KSA, 18.4% of the pediatric age group of their sample have a previous history of asthma [6], despite the fact that only 44.30% know that asthma increase risk for recurrent anaphylaxis. Moreover, those who knew that experiencing an attack of anaphylaxis puts the person at risk of another were only 184 (47.90%). It is known that severe, life-threatening reactions that may lead to death do occur and are unpredictable. We think it is important to know the seriousness of the attacks to take it seriously and manage them immediately. So, we ask the parents about this fact, and we

Right action when you notice a sign of anaphylaxis on your child		
	n	%
Call ambulance	7	1.8
Go to the hospital (Emergency)	241	62.8
Go primary health care center or specialist doctor's office/clinic	93	24.2
Give Anti-histamine	14	3.6
Avoid triggers	10	2.6
Don't know	19	4.9

Table 5: First Aid in anaphylaxis (n=384)

found that two-thirds of the study sample, 64.30% know that anaphylaxis can lead to death. When asked about the management of anaphylaxis, most believe that antihistamine injection is the best treatment for anaphylaxis. Only 12 (3.1%) of our participants knew about the treatment and management of anaphylaxis and correctly answered epinephrine injection. In contrast, in Brazil majority of parents, 79.3%, don't know the best treatment for anaphylaxis, about 7.2% answered epinephrine and 7.2% answered oral antihistamine followed by antihistamine injection 4.5% and cortisone 3.6% [14]. In another study in KSA, nearly half of the teachers believe that antihistamine can be considered the most suitable and effective drug that can be used at the initial stage of anaphylaxis, and only 13.3% answered epinephrine [13]. The participants in these studies have insufficient knowledge about the treatment. In addition to that, people in Saudi Arabia have misinformation as they think antihistamine is the best. About

the management in the acute phase, 62.8% of the participants said that they would go to the emergency if they noticed any sign of anaphylaxis in their child, and 24.2% choose to go to a primary health care center or specialist doctor's office/clinic, small proportions prefer call ambulance, give Anti-histamine and avoid triggers, 1.8%, 3.6%, 2.6% respectively, remaining 4.9% don't know what to do. Similar results were found in a study of first food allergic reaction experiences where 51% of the caregivers took their children to an emergency, while the remainder, 35.3%, went to the family physician or specialist doctor's office/clinic. As per the results, about 11% of parents reflected that they are not interested in taking their child to healthcare professionals [16]. We think it is due to the varying severity of the symptoms. In this study, we assess which category of people had more prior experience or knowledge about anaphylaxis. We found that females had more knowledge than males, as a study in the Al-Qassim region was done among teachers and showed the same result [13]. It may be because the study was done in the same country, and females in Saudi Arabia are more looking forward and trying to learn a lot to deal with the critical condition that can happen to their children. Also, we found that people 20 years or less had more knowledge about anaphylaxis than other ages. In contrast, the Al-Qassim study found that those aged 36-45 had more knowledge [13]. It can be explained that younger people are more educated and aware of anaphylaxis than before. We found that the more educated people with bachelor's and higher education degrees are more knowledgeable and aware of anaphylaxis. The Al - Qassim study

showed people with a bachelor's or more knowledge than a diploma [13]. This refers to a higher educational level higher knowledge and awareness about anaphylaxis.

## CONCLUSION

Anaphylaxis is a life-threatening unpredictable reaction that is more common in infants and toddlers. From this point, we are directed to assess the caregiver's knowledge of this important condition. And we found that parents have somewhat low awareness, especially on some points like triggers and management, which means that we need to spend more effort to improve their understanding.

## LIMITATIONS AND RECOMMENDATIONS

Although this study provided significant findings, the inclusion of other groups of caregivers and service providers for children rather than studying the knowledge of only one group of society could provide more effective findings and more reliable and valuable results.

## CONFLICTS OF INTEREST

The author declares that there is no conflict of interest.

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