

Knowledge, Attitude and Practices of General Practitioners regarding food allergy and anaphylaxis in India

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Abstract

Food allergies are more common among infants, children and adolescents. Genetics and other lifestyle issues may play key role in food allergy pathogenesis. The management of food allergy sometimes needs medical attention and emergency preparedness. Thus knowledge, attitude and practices of general practitioners is a matter of priority to deal with food allergy patients.

A total of 115 general practitioners were recruited within 3 months period. All participants had at least 15 to 20 h allergy teaching in the curriculum of their medical school studies. The validated questionnaires included questions on the demographic characteristics of the participants and their knowledge and attitudes regarding the diagnosis, symptoms, severity, triggers, risk factors and treatment of food allergies. Participants were divided into three groups based on their years in practice (<10 years, 10-20 years, >20 years) and comparisons were made.

Participants scored 62.5% in knowledge based items correctly, ranging from 23% to 87% correct. Regarding questions on attitude and approach of participants to food allergies, 70.5% responded that they commonly refer such patients to allergy specialists. 43.6% believed they were knowledgeable enough regarding the management of patients with food allergies, while 96.5% extended their request for future periodic educational meetings on allergic disorders. The significant number of physicians with the highest clinical experience does not consider skin

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prick test or RAST as sufficient tool to diagnose food allergy ($p=0.024$).

Due to lack of awareness and diagnostic tools used by the general practitioners, there continues to be a paucity of information regarding the food allergy/food hypersensitivities in Hyderabad. Periodic educational programmes should be aimed at improving the standard of practice among general practitioners regarding food allergies.

The last 2 to 3 decades have witnessed a sharp increase in the prevalence of food allergies^{8,32} with increased worldwide concern to what is now considered an important public health problem.^{9,33,43} In the United States, food allergy affects up to 4% of the adult population and 6–8% of children.^{13,19} In India the prevalence of probable food allergy is 1.2%, mainly accounted for allergy to cow's milk (0.5%) and apple (0.5%).³⁰ The management of food allergies continues to consist of educating patients on how to avoid relevant allergens, to recognize early symptoms of an allergic reaction in case of an accidental ingestion, and to initiate the appropriate emergency therapy. A limited number of foods are responsible for the vast majority of food-induced allergic reactions like milk, egg, peanuts, fish, tree nuts in both children and adults²⁶. Food-induced allergic reactions are responsible for a variety of symptoms involving the skin, gastrointestinal tract, and respiratory tract and may be caused by IgE-mediated and non-Ig E-mediated mechanisms.³⁷

Food allergy is gaining substantial focus by both the health professionals and general population. It is usually over diagnosed by the public and misdiagnosed by physicians. Several approaches have been used for food allergy diagnosis, including obtaining medical history, trials of diet elimination, food/symptom

diary, skin testing etc. Appropriately designed Double blind placebo controlled food challenge (DBPCFC) remains the gold standard, although it has a few limitations.⁴ Biochemical, genomics and proteomics approaches are being looked into to discover novel biomarkers.

Histamine, which is stored mainly in mast cells and basophils, is a prominent contributor to allergic disease. Elevations in plasma or tissue histamine levels have been noted during anaphylaxis and experimental allergic responses of the skin, nose and airways. Of the four cardinal signs of asthma (bronchospasm, edema, inflammation, and mucus secretion), histamine is capable of mediating the first two through its H₁ receptor and mucus secretion through its H₂ receptor. Of the five cardinal signs of allergic rhinitis (pruritus, mucosal edema, sneezing, mucus secretion, and late-phase inflammatory reactions), histamine is capable of mediating the first three through its H₁ receptor. In the nasal cavity, mucus secretion can be reflexively mediated by H₁ and possibly also by H₂ receptors. In the skin, the cardinal features of urticaria (vasodilation, vascular permeability, and pruritus) can be mediated by stimulation of the H₁ receptor. In anaphylaxis, histamine H₁-receptor stimulation can mediate vascular permeability, smooth muscle contraction, and

tachycardia, whereas H₂-receptor stimulation can mediate mucus secretion. Stimulation of both receptors can mediate vasodilation and reduce peripheral vascular resistance. Thus although histamine is only one of many mediators of allergic disease, it plays a primary role in allergic rhinitis, urticaria, anaphylaxis and to a lesser degree, asthma.⁴⁵

Currently, management of food allergies consists of educating the patient to avoid ingesting the responsible allergen and initiating therapy if ingestion occurs. However, numerous strategies for definitive treatment are being studied, including sublingual/oral immunotherapy, injection of anti-IgE antibodies, cytokine/anticytokine therapies, herbal therapies and novel immunotherapies utilizing engineered proteins and strategic immunomodulators. The 'oral allergy syndrome' is more common than anaphylactic reactions to food. Although treatment is through recognition and avoidance of the responsible foods, patients with anaphylactic reactions need emergent epinephrine and instruction in self-administration in the event of inadvertent exposure. Antihistamines can be used for more minor reactions.⁴⁶

In India, food allergy is rapidly growing due to exposure to multiple triggers, change in life style, lack of awareness and with the shift of dietary practices from home cooked food to packed food items.³⁹ Previous studies states that appreciable allergy knowledge gaps exist regarding food allergy among the general public *i.e* the patients and the parents of the allergic children.¹⁷, who most often consult the general physicians as a front line in the treatment of this common and life-threatening

condition.² In spite of large number of allergic disorders patients being treated by general physicians, there are very few well-documented studies/case reports to evaluate effectiveness of the system in such cases.^{12,17,23} Very limited published data is available in Indian population regarding knowledge attitude and practices of physicians in food allergy, hence, it is imperative to find out the status of the tools and techniques used to diagnose and treat the problem of food allergy, to ensure patient safety. Thus food allergy has been shown to lower general health perception and limit family activities.^{9,33} Therefore it is essential to highlight the knowledge attitude and practices of general practitioners regarding the management of food allergies. The aim of this study was to determine the knowledge, attitude and practices of general practitioners with regard to management of food allergies based on their clinical practice, so that programmes can be organized/planned to improve the missing aspects of their knowledge and attitude towards the problem of food allergy.

Population study :

The present study is one of its own kind and a new attempt. The study population consisted of general practitioners practicing in Hyderabad, the capital of Telangana. A total of 115 were recruited within 3 months *i.e* from January -March 2014. Although there might be small differences between the medical schools, all participants had at least 15—20 h allergy teaching in the curriculum of their medical school studies. Prior approval was taken from the Institutional Ethics Committee to conduct the study and informed consent was obtained from the participants.

Study design :

All the practitioners involved in the study were asked to fill out questionnaires which were distributed on the morning and collected on the same day by the end of each day. Participating physicians did not have prior knowledge on the objectives of the study. The survey consisted of questions that were mainly based on the validated questionnaire prepared.^{18,29} The distributed questionnaires included questions on the demographic characteristics of the participants and their knowledge and attitudes regarding the diagnosis, symptoms, severity, triggers, risk factors and treatment of food allergies. It also included questions related to treatment of perceived food allergy and anaphylaxis. Participants were divided into three groups based on their years in practice (<10 years, 10-20 years, >20 years) and comparisons were made.

Statistical analysis :

Descriptive statistics were provided for demographic characteristics and responses to each question on the questionnaire. Each participant was awarded a score based on the number of correct responses. Comparisons were made in groups based on years in practice of participants regarding their knowledge on the subject matter. Categorical variables and continuous variables were compared with Chi-square test and Man Whitney U test respectively. A *p*-value of ≤ 0.05 was considered indicative of statistical significance. SPSS-21 statistical software package was used for the analyses.

Demographic characteristics of participants:

A total of 107/115 participants, who were practicing general practitioners, returned completed questionnaires suitable for evaluation, 55.6% of whom were males while rest were females. We found that more number of the participants were in private practice (58%) as compared to hospital based (42%) practice. 60% of the participants had 10-20 years of practice. 75% participants reported that the patients suffering from food allergy comprised only <5.0% of their out /s and most of them (57%) were in the age group of 5-50 years. (Table-1)

Knowledge of the participants :

The rates of correct responses for each question are summarized in Table-2. Participants scored 62.5% in knowledge based items correctly, ranging from 23% to 87% correct. Majority of participants (76.3%, 80.8%, and 82.9%) responded correctly to questions on asthma as a risk factor for anaphylaxis, no cure for allergy and protein as an allergic food component respectively. It was found that 74.1% and 76.3% of the participants knew that food allergens passes from maternal diet into breast milk and cow's milk allergy related mortality respectively but 48.2% of them knew that children with milk allergies cannot eat yoghurts/cheese with milk. 48.1% of the participants did not agree to the question that it is acceptable for children with egg allergies to eat egg yolks and 32.1% had knowledge regarding influenza vaccines are unsafe for children with egg allergy More than half of the participants (60.9%) were aware that teenagers are at higher risk than younger children and 68.5% answered that provision

of daily antihistamines cannot prevent food allergy. Half of the participants (50.9%) did not consider chronic nasal problems as a symptom of food allergy but 76.2% of them holds correct knowledge about the relationship between moderate—severe AD and food allergy. 48.1% of the participants gave correct answer that children less than 5 years of age are most likely to have food allergies. Besides this although 80.8% of them reveal that epinephrine autoinjector should be prescribed for a child who had anaphylaxis, only 60.54% of them prescribed the former treatment during their practice. Only 44.2% of them prefer IM route for epinephrine injection and 62.7% have no contraindication to prescribe self injectable epinephrine. About 65% of the participants highlighted that most of the time timely administration of epinephrine prevents fatal anaphylaxis, 54.1% and 60.5% had knowledge of lateral thigh as epinephrine injection location and 0.3mg epinephrine dose for a 27kg child respectively.

Attitude and practices of the participants:

Regarding questions on attitude and approach of participants to food allergies, 70.5% responded that they commonly refer such patients to allergy specialists, while only 29.5% responded that they rarely refer such patients for further evaluation. To the question on the best approach to help patients with food allergies, 72.5% of participants cited campaigns aimed at raising awareness, 14.7% cited the identification of the causes of food allergy and 12.3% cited development of new treatment strategies to cure food allergies as the most suitable approach. Less than half of participants (43.6%) believed they were knowledgeable enough regarding the management of patients

with food allergies, while 96.5% extended their request for future periodic educational meetings on allergic disorders (Table-3).

Comparison of subgroups :

Comparisons with regards to correct responses to each question were made in groups of three based on years in practice of participants regarding their knowledge on the subject matter. Participants were divided into three groups according to the duration of their experience: (1) lower than 10 years; (2) between 10 and 20 years; and (3) higher than 20 years. There was no significant difference between these groups according to their total scores ($p: 0.193$)

According to the present survey done on medical practitioners the response given by the physicians with the increase in clinical experience reported significant number of deaths may occur due to milk allergy ($p=0.007$), influenza vaccine usage is unsafe in egg allergic patients ($p=0.001$), teenagers are supposed to be at higher risk for anaphylaxis ($p=0.011$). Also participants with more years in practice significantly scored higher particularly for the questions on the treatment of anaphylaxis, such as daily histamine intake ($p=0.03$), lateral thigh as epinephrine injection location ($p=0.049$), correct dose of epinephrine ($p=0.023$) and no contraindication to prescribing self injectable epinephrine ($p=0.031$). The significant number of physicians with the highest clinical experience does not consider skin prick test or RAST as sufficient tool to diagnose food allergy ($p=0.024$).

To the best of our knowledge, this

study gives the first comprehensive information regarding food allergy in providing knowledge as well as perceptions in general practitioners in India. On an average, all the participants with respect to their knowledge on anaphylaxis and food allergies fared good. On the contrary less than half responded that children with cow's milk allergy could consume cheese and yoghurt, although most participants correctly identified cow's milk allergy potentially fatal. Most participants had prior knowledge regarding the fact that food allergens can be transferred to infants through breast milk and also considered that moderate to severe atopic dermatitis can be a symptom of food allergy. Most of the practitioners had correct opinion regarding the dosage and route of epinephrine administration but were not confident with respect to the site of the application. It was identified that food allergy was commonly identified during first five years of infancy as per the reports of 48% of practitioners whereas 43.4% participating practitioners knew that there is no cure for the food allergy till date. 55.1% of practicing practitioners believed that the usage of antihistamines in managing food allergy patients. According to our study the mean score of all participating practitioners was 62.5%, a value which is higher to that observed in a similar study conducted on primary care physicians in Turkey.¹⁴ The difference in the scores might be because of differences/variances in educational background of physicians representing different populations.

In recent years it was reported that anaphylactic shock due to cow's milk resulted in fatal outcome.¹⁵ Infact babies survive on cow milk, few become hypersensitive and leading to allergic reactions such as rashes, naso-respiratory symptoms and also may lead

to anaphylactic shock. According to a study it was found patients allergic to protein present in milk are supposed to avoid all dairy products in their diet.⁴⁴ In the case of breast feeding infants mother should eliminate dairy products from her diet till ceasing breast feeding.¹¹ As per our study results the practitioners reported that milk protein induces allergy in significant number of patients.

Sicherer⁴¹ reported that parents of food allergic children and teenagers have no readily available medication. Another study¹⁶ reported that adolescents spend their time away from their residences and their inappropriate food habits may place them at the risk of allergic ailments. It was reported in a study³⁴ that emergency kits with epinephrine auto injectors were unavailable at schools sufficiently. So we assume that physician and patient knowledge is mandatory to make use of medication to save lives.

According to a recent study¹ childhood immunization is one of the greatest public health successes of the last century and will play a vital and technical role in upcoming years. Influenza vaccine is egg derived and has been contraindicated in people with egg allergy.⁴⁰ However, no study has shown that residual ovalbumin content can cause adverse events (including anaphylaxis related morbidity or mortality) in egg allergic recipients, or that vaccination is riskier for these recipients than for the general population. But according to our study 32% of practitioners showed that these influenza vaccine is not safe for infants with egg allergy.

In Indian scenario food allergy

prevalence primarily considers milk³⁰, shellfish²⁵, eggplant³⁵, peanut³¹ and different fruits.²¹ Participants' responses to in our study what they believed were the most frequently encountered food allergens were eggs, milk curd and citrus fruits in decreasing order.

A study³ reported that H₁ receptors and their clinical efficacy is not completely explored with regard to their contribution of anti-allergic effects. There is no data available suggesting superior allergic properties of H₁ histamine compared to those are not extensively investigated. In our study participants fared good score and shown that daily intake of histamines cannot prevent food allergy.

A review of a national database demonstrated that 57% of anaphylactic episodes are not recognized in the emergency department,³⁶ while another study reports that anaphylaxis is under recognized in both emergency departments and urgent care centers⁷ Overall, this lack of recognition and management of anaphylaxis means that patients often do not receive first-line epinephrine treatment.

More than half of the physicians do not consider positive skin prick test or RAST as a sufficient tool to diagnose and confirm food allergy. But there is no advantage of RAST alone or in combination with prick skin testing over prick skin testing alone in the evaluation of food hypersensitivity in children. Skin testing should be considered a good test for excluding immediate food hypersensitivity but only a suggestivity positive indicator of hypersensitivity due to high rate of clinically insignificant positive skin tests.⁷ In India

various community and hospital based studies^{5,12,20,22,24,27,28,42} are conducted or in process to know the prevalence of food allergy and list those food items as allergens. To ensure the diagnosis of food allergy, serum IgE and IgG should be performed to confirm food allergy and food intolerance resp. This may encourage the discussion and will increase more scope for diagnosis and treatment of other associated diseases, which is currently not always done. A previous study done by Gupta *et al.*,¹⁷ in 2008 reported that KAP about food allergy of the physicians and general public was inadequate and needed further improvement. Subsequently in a span of 8 years, this study has shown some improvement in their KAP. The probable reason for such improvement could be due to the reasons that due to increase in prevalence of food allergy, much of focus is there on the problem. To overcome this problem various databases are prepared, allergy clinics are set, not only this several continuing medical education (CME) are organized, symposia, and group discussions with the prescribers, which probably has reinforced the concept of different diagnostic tools. Apart from this, announcements are made for different meetings and are encouraged to attend International Conferences on food allergy to know the prevalence of allergy worldwide. In this study, it was found that with the increase in the years of practice of physicians, there was increase in the total knowledge score as well as the increase in score for individual questions regarding food allergy. The participants with more than 20 years in practice responded better to questions on risk factors of food allergies and anaphylaxis as well as correctly identifying adrenalin as the drug of choice for the treatment of

anaphylaxis. Thus it can be interpreted having more and more experience leads to gain more knowledge and influence the physicians to seek for the disease and improve their knowledge about the subject which presumably results in better management of the disease. Based on the total scores this study reveals the fact that with the increase in clinical experience there is increase in knowledge of physicians regarding food allergy, but significant difference was found only with respect to issues like child mortality due to milk allergy, influenza vaccines are unsafe for children with egg allergy, teenagers are at higher risk for fatal food allergy versus younger children, daily antihistamine prevents food allergy reaction, lateral thigh as epinephrine location, epinephrine dosage

and skin prick test or RAST as sufficient diagnostic tool for food allergy. Earlier Data suggest that disparities exist in the clinical diagnosis of disease.¹⁹ Appreciable food allergy knowledge gaps exist, especially among physicians and the general public. The quality of life for children with food allergy and their families is significantly affected. Acquisition of biomedical knowledge, practical experience, and integration of theoretical and experiential knowledge resulting in knowledge encapsulation.⁶ On the contrary physicians with more experience may paradoxically be at risk for providing lower-quality care. The extent, magnitude, and nature of these results must be clarified, and added attention should be given

Table-1: Demographic characteristics of General Practitioners (N=107)

Variables	Sample Population n (%)
Gender	
• Male	59(55.6)
• Female	48(44.4)
Practice type	
• Hospital based	45 (42)
• Private practice	62 (58)
Years in practice	
• <10	16(14.8)
• 10-20	63(59.3)
• >20	28(25.9)
Food allergic patients seen/month	
• <5%	75(70.2)
• 5-10%	22(20.5)
• >10%	10(9.3)
Age group of food allergic patients seen	
• <5 years	29 (27.4)
• 5-15 years	32 (30.2)
• 15-50 years	30 (27.6)
• >50 years	16 (14.8)

Table-2: Correct knowledge of participants (%) and comparisons based on years in practice

Questions	Overall	Years in practice			
		<10	10-20	>20	p-value
Asthma is an important risk factor for severe anaphylaxis (T)	76.3	3.7	14.9	81.4	0.111
There is a cure for food allergy (F)	80.8	5.7	14.3	80.0	0.199
Food component that causes allergic reaction (protein)	82.9	8.0	9.1	85.7	0.078
Food allergens are passed from maternal diet into breast milk(T)	74.1	2.0	13.7	84.3	0.075
Child can die from milk allergy reaction (T)	76.3	2.1	12.8	85.1	0.007*
Children with IgE-mediated milk allergies can eat yoghourts/cheese with milk (F)	88.2	3.1	14.0	82.9	0.466
Okay for children with egg allergies to eat egg yolks (F)	68.1	3.2	13.2	83.6	0.273
Vaccines are unsafe for children with egg allergy (influenza)	32.1	1.5	17.5	81.0	0.001*
Chronic nasal problems are symptom of food allergy (F)	50.9	4.1	13.0	82.9	0.718
Moderate/severe atopic dermatitis is associated with food allergy (25%–50%)	76.2	5.8	12.2	82.0	0.167
Age group most likely to have food allergies (0–5 y)	48.1	4.9	10.8	84.3	0.197
Teenagers are at higher risk for fatal food allergy vs. younger children (T)	60.9	6.0	14.6	79.5	0.011*
Daily antihistamine prevents food allergy reaction (F)	68.5	2.8	32.4	34.3	0.003*
I would prescribe epinephrine autoinjector for a child who had anaphylaxis (T)	60.5	5.2	11.6	83.2	0.171
The first treatment of choice is epinephrine in case of anaphylaxis(T)	80.8	26.6	34.6	38.8	0.863
The rate of preference of IM route for epinephrine injection(T)	54.1	31.3	32.7	36.0	0.275
No contraindication to prescribing self-injectable epinephrine (T)	62.7	18.2	34.9	46.9	0.031*
Timely administration of epinephrine prevents fatal anaphylaxis (most of the time)	64.7	12.9	24.4	28.1	0.316
Epinephrine injection location (lateral thigh)	44.2	10.1	40.1	49.8	0.049*
Dose of epinephrine, 27kg child (EpiPen/Twinject, 0.3 mg epinephrine)	60.5	2.3	14.3	83.4	0.023*
Positive skin prick test or RAST is sufficient food allergy diagnosis (F)	65.3	4.9	9.2	85.9	0.024*
Total Score	62.5	7.8	18.7	70.4	0.193

T: true; F:false; IgE:Immunoglobulin E; IM: intramuscular; RAST: radioallergosorbent test

*p≤0.05

Table-3: Attitude and Practices of participants (%) and comparisons based on years in practice

Questions	Overall	Years of clinical practice/ experience			
		<10	10-20	>20	p-value
How often do you refer your patients with suspected food allergy to a subspecialist (allergist)					
• Mostly	70.5	28.9	30.6	34.5	0.666
• Rarely	29.5	35.5	31.7	32.8	
Which age group is most likely to have food allergies?					
• 0—5 years	74.0	38.5	42.0	19.5	0.923
• 5—15 years	14.7	22.0	33.6	44.4	
• >15 years	12.3	29.6	33.5	36.9	
I am confident of my ability to care for patients with food allergy	43.6	14.6	37.2	48.2	0.616
Which of the following do you think is the most important to help people with food allergies?					
• Promote public awareness campaigns about food allergy	72.5	29.2	32.3	38.5	0.184
• Identify the cause of food allergy	15.8	33.4	31.6	35.0	
• Develop a cure for food allergy	11.7	67.8	76.8	55.4	
Would you like periodic training sessions for allergic diseases? (Yes)	96.5	36.2	31.2	32.6	0.795

to this subgroup of physicians who may need quality improvement interventions.⁹ Although more than 100 participants completed the survey, the limitation of this study was inability to enroll physicians from all the corners of the city due to the small sample size. Even though we tried to involve all the physicians but only the volunteers came into the programme.

The above study revealed that due to lack of awareness in the community and practicing specialists and diagnostic tools used, there continues to be a paucity of information regarding the prevalence and incidence of food allergy and other food hypersensitivities in

India. Thus, the study results emphasize the importance of understanding and assessing the interplay between food allergy and nutrition in order to protect and identify appropriate sources of foods for sensitized sub-populations especially in economically disadvantaged countries and communities like India. Provision of periodic educational programmes should aim at improving the standard of practice among primary care physicians regarding allergic disorders in general, and food allergies in particular. Any improvement sustained regarding this matter would increase the quality of health care and the quality of life of affected individuals.

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