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Original Article
Bangladesh Journal of Infectious Diseases
December 2023, Volume 10, Number 2, Page 85-91
ISSN (Online) 2411-670X
ISSN (Print) 2411-4820
DOI: https://doi.org/10.3329/bjid.v10i2.70553

Prevalence of Hypersensitivity Reaction in Patients attending Selected Diagnostic Centers NOVA/SOMLAB in Benadir Region, Somalia

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Abstract

Background: The immune system plays a crucial role in maintaining health and protecting the human body against microbial invasions. **Objective:** The purpose of the present study was to assess the prevalence of hypersensitivities reaction in allergic patient attending selected diagnostic centers. **Methodology:** This cross- sectional was performed at selected hospitals. The study was carried out from 01st August 2023 to 30th November 2023 at the Immunology department of Nova Diagnostic and Research Institute, Somalia. There 300 samples were included in this study. Questionnaire and investigation (Sample Testing) was used as the main instrument for collecting patient socio-demographic profile and laboratory test were done at Nova diagnostic center. **Results:** A total 300 participants were enrolled in this study. Among the 300 the predominant the prevalence of respondents was high which was 273(91%) cases and most of the participants were Banana allergic which was 215 (71.7%) cases. Maximum cases were from age group of 2-20 years (48%) and followed by 21-39 years (22%), 40-58 years (17.67%) and >58 years (12.33%). There was a statistically significant correlation between allergic status and education (P=0.003), but not between allergic status and age group (P=00.219) or gender (P=0.456). **Conclusion:** The study revealed a significant correlation between allergic status and education, indicating that the majority of participants were allergic to bananas.-[*Bangladesh Journal of Infectious Diseases, December 2023; 10(2):85-91*]

Keywords: Hypersensitivity; allergens; prevalence; allergy; Somalia

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Introduction

The immune system is essential for preserving health and defending the body from microbial invaders. But the same system can also cause heightened inflammatory and immunological responses, which can have negative effects known as hypersensitive reactions. Type I, Type II, Type III, and Type IV reactions are the four conventional categories for hypersensitivity reactions. Known by the name "immediate reaction," type I hypersensitivity is characterized by the production of antibodies against the soluble antigen through the action of immunoglobulin E (IgE). Histamine and other inflammatory mediators are released as a result, along with the degranulation of mast cells. Also referred to as cytotoxic reactions, type II hypersensitivity activates IgG and IgM antibodies, which activates the complement system and causes cell lysis or damage. IgG, IgM, and occasionally IgA antibodies are involved in type III hypersensitivity, commonly referred to as immune complex reactions. Complement system activation from the accumulation of these immune complexes causes polymorph nuclear leukocytes (PMNs) to chemotax and ultimately cause tissue damage. Delay-type hypersensitivity, or type IV 2 hypersensitivity, is characterized by T-cell-mediated responses. Cytokine production triggers the activation of T-cells or macrophages, which results in tissue destruction[1]. Only some people are hypersensitive, and only to certain food additives this means that not all foods containing food additives should be automatically excluded from the diet. For example, monosodium glutamate occurs naturally in sardines or parmesan cheese, and at a much higher concentration than when used as a food additive. Other 'natural chemicals' causing allergies or intolerances include nuts and seafood.

Reactions to food additives are thought to occur less frequently than 1.0% of all food hypersensitivity reactions in adults and up to 2% in children. HFA is reported to affect 0.5% of the general population and atopic individuals somewhat more frequently. that some groups of patients had higher rates of HFA than others, such as 25.0% of those with food allergies, 10.0% to 20.0% of those with IgE-dependent bronchial asthma, 5.0% to 10.0% of those with aspirin intolerance, and 5.0% to 10.0% of those with chronic urticarial. Other evidence indicates that HFA is approximately 0.026%, although the overall population's estimated prevalence of food allergies is 5.0% cases. It should be highlighted that food hypersensitivity (also proven by a provocation test) is 3 far less common than is revealed in medical histories, and that atop is not a known risk factor for HFA. The uncertainty surrounding their precise number is attributable to the difficulties in identifying them[2]Almost a billion individuals worldwide suffer from allergic illnesses. Their prevalence is predicted to climb to 4 billion in the 2050s due to an epidemic that has been on the rise for the past 60 years. Due to the large number of impacted people, the general public is faced with enormous direct and indirect expenditures associated with health care, lost productivity, and patient absenteeism, all of which have a significant impact on macroeconomics. Regretfully, there are still a lot of unmet requirements that need to be addressed because there is a lack of scientific understanding of disease mechanisms, prevention, patient care, and societal determinants[3]. Allergies and allergy disorders are becoming more commonplace worldwide and are no longer "a rare fact" in Africa as previously believed. A systematic review based on data from 11 African countries (Botswana, Democratic Republic of the Congo, Ghana, Kenya, Morocco, Mozambique, Nigeria, South Africa, Tanzania, Tunisia, and Zimbabwe) and the International Study of Asthma and Allergies in Childhood Phase III, which included 16 African countries (Algeria, Cameroon, Congo, Congo (RDC), Ethiopia, Gabon, Ivory Coast, Kenya, Morocco, Nigeria, Reunion Island, South Africa, and Tunisia) both demonstrate that allergies are an emerging disease in Sub-Saharan Africa[4].

In 4 1999, a study realized on suspected allergy cases in Côte d'Ivoire showed that 56.4%, 30.7%, 23.5%, 8.5%, 2.8%, and 1.4% were, respectively, sensitized to mites, cockroaches, molds, pets' dander's (dog and cat), foods (rice, peanut, and soy) and latex allergens[5]. In addition, 52% of cases were polysensitized More than a decade later, studies done in Ghana and Cameroun confirmed the hierarchy of allergens in the sub-Saharan context, with mites (51%), cockroaches (59%), pets' dander's (15%), and foods related allergies (8%) as the main allergens, High sensitization of Africans to mites .and cockroaches, has been reported in many studies. Moreover, it is essential to emphasize that most studies on hypersensitivity to allergens have been carried out in the context of asthma[6]. Food allergies are not as well documented as mites, cockroaches, or even pets' dander allergies. Nevertheless, existing data suggest that the burden of food allergies in Africa should not be neglected or undermined. Food allergies represent 5.0% to almost 50.0% of allergic reactions in Africa. However, in Somalia there is no data published allergic disease[4,7,8]. The study aims to determine the prevalence of hypersensitivities reactions in allergic patients attending a specific diagnostic center.

Methodology

Study Settings and Population: This study was descriptive cross-sectional study design. It was used full quantitative data collection method to find out the prevalence of hypersensitivity reaction allergic patient attending selected diagnostic centers (NOVA/SOMLAB). The study was carried out from 01st August 2023 to 30th November 2023 at the Immunology department of Nova Diagnostic and Research Center, Somalia. The target population for this study was patients attending selected diagnostic centers (NOVA/SOMLAB). Inclusion Criteria: this Study was including all patients attending NOVA/SOMLAB diagnostics centers. Exclusion Criteria: People who are not willing to participate. Non-probability sample technique convenient sample was performed in the present study. Any patient with allergic patient who fulfill the selection criteria was recruited to the stud till the required sample size.

Data Collection: Questionnaire was open-ended questions was administered to every study A participant. Researcher was getting an authority letter from the faculty of Medicine and Health Science of Abrar University, Somalia to make the authorization of carrying out research about ―prevalence of hypersensitivity reaction in allergic patients. Questionnaire and investigation (Sample Testing) was used as the main instrument for collecting patient socio-demographic profile.

Blood Sample Collection and Laboratory Analysis: Gloves, tubes, a maker pen, an allergy machine, a centrifuge, and a paster pipette were utilized in this study. A venous blood sample was taken aseptically and additive-free using serum. A false positive could be caused by centrifugation, the presence of fibrin, or particle debris in the sample. checked each sample for foaming and air bubbles. Before doing the test, remove any air bubbles. samples kept for up to seven days at 2–8 °C before analysis. 100ul of the sample is needed for analysis. In the Benadir Region of Somalia, laboratory analysis was performed at the diagnostic centers NOVA/SOMLAB.

Statistical Analysis: All collected data was analyzed using statistical package for social science software (SPSS version 20). Data analysis began with descriptive analysis. Means with standard deviations was calculated for continuous variables while frequencies and percentages were calculated for categorical variables.

Ethics Approval and Consent to Participate: This study was approved by the Institutional Ethics Review Committee (IERC) of Nova Diagnostic & Research Institute (IERC/NRI001/23), Benadir Region, Somalia. All participants were informed about the study and they gave their written consent before inclusion in the study.

Results

A total number of 300 samples were collected for this study. Among them 52.7% respondents were female, while 47.3% respondents were male. The study found that 48.0% of respondents were aged 2-20, 22.0% were aged 21-39, 17.7% were aged 40-58, and 12.3% were above 58 years. The majority respondents were single, with 45.67% illiterate and 40% having college/university level education. About 61.7% respondents were unemployed, and 91% were allergic. The majority respondents had blood diagnosis and type one hypersensitivity reaction.

Table 1: Demographic Characteristics of Study Subjects (n=300)

Variables	Frequency	Percent
Gender		
• Male	158	47.3
• Female	142	52.7
Age Group		
• 2 to 20 years	144	48
• 21 to 39 years	66	22
• 40 to 58 years	53	17.67
• >58 years	37	12.33
Marital Status		
• Married	127	42.3
• Unmarried	173	57.7
Educational Status		
• Illiterate	137	45.67
• Primary	31	10.33
• Secondary	12	04
• College/University	120	40
Occupational Status		
• Employed	115	38.3
• Unemployed	185	61.7
Allergic Response		
• Allergic	273	91
• Non- allergic	27	09
Diagnosis responds with blood diagnosis		
• Type I hypersensitivity	300	100

Table 2 (a): Food Allergic Respondents

Food	Allergic	Non-Allergic
Banana	215 (71.7%)	85 (28.3%)
Barley	40 (13.3%)	260 (86.7%)
Corns	48 (16%)	252 (84%)
Soya	17 (5.7%)	281 (94.3%)
Dates	100 (40%)	200 (60%)
Peanut	60 (20%)	240 (80%)
Onion	48 (16%)	252 (84%)
Tomato	94 (31.3%)	206 (68.7%)
Codfish	23 (7.7%)	277 (92.3%)
Peach	68 (22.7%)	232 (77.3%)
Eggplant	08 (2.7 %)	292 (97.3%)
Pumpkin	16 (5.3%)	284 (94.7%)
Egg whole	63 (21%)	237 (79%)
Garlic	58 (19.3%)	242 (80.7%)
Wheat	106 (35.3%)	194 (64.7%)
Whole	13 (4.3%)	287 (94.7%)
Soybeans	75 (25%)	225 (75%)
Orange	05 (1.7%)	95 (98.3%)
Chocolate	16 (5.3%)	284 (94.7%)
Sesames	11 (3.7%)	289 (96.3%)
Celery	09 (3%)	291 (97%)
Chilipowder	02 (0.7%)	298 (99.3%)
Spinach	12 (4%)	288 (96%)
Apple	49 (16.3%)	251 (83.7%)
Watermelon	02 (0.7%)	288 (99.3%)
Rice	47 (15.7%)	253 (84.3%)
Chicken	30 (10%)	270 (90%)
Salmon	107 (35.7%)	193 (64.3%)
Milk	167 (55.7%)	133 (44.3%)
Lobster	30 (10%)	270 (90%)
Tea	01 (0.3%)	299 (99.7%)
Mutton	17 (5.7%)	283 (94.3%)
Inhalation	21 (7%)	279 (93%)
Egg	14 (4.7%)	286 (95.3%)
Potato	53 (17.7%)	247 (82.3%)

The study surveyed 273 (91%) of respondents who were allergic to various fruits and vegetables. The majority were banana, with 215 (71.7%) patients being allergic and 85 (28.3%) non-allergic. Other common allergens included dates (40%), corn (16%), barley (13.3%), soya (5.7%), tomatoes (31.3%), peach (22.7%), peanuts (20%), onions (16%), codfish (7.7%), wheat (35.3%), eggs (4.7%), garlic (19.3%), pumpkins (5.3%), eggplants (2.7%), soybeans (25%), chocolates (5.3%), wholes (4.3%), sesames (3.7%), oranges (1.7%), apples (16.3%), spinach (4%), celery (3%), chili powder (0.7%), watermelon (0.7%), milk (55.7%), salmon (35.7%), rice (15.7%), lobster (10%), chicken (10%), potato (17.7%), inhalation (7%), mutton (5.7%), egg (4.7%), and tea (0.3%). The majority of these foods were non-allergic, while a small percentage was allergic. The study also found that a significant percentage of the respondents were allergic to certain foods, such as milk, salmon, rice, lobster, chicken, potato, inhalation, mutton, egg, egg, and tea. The results highlight the importance of understanding and managing allergies in various food items. (Table 2a)

Table 2 (b): Food Allergic Respondents

Food	Allergic	Non-Allergic
Egg white	58 (19.3%)	242 (80.7%)
Been	16 (5.3%)	284 (94.7%)
Pea	04 (1.3%)	296 (98.7%)
Strawberry	11 (3.7%)	289 (95.3%)
Coconut	81 (27%)	219 (73%)
Grape	28 (9.3%)	272 (90.7%)
Egg yolk	12 (4%)	296 (96%)
Fish	06 (2%)	294 (98%)
Mango	09 (3%)	291 (97%)
Olive	01 (0.3%)	299 (99.7%)
Almond	05 (1.7%)	295 (98.3%)
Rye	03 (1%)	297 (99%)
Oyster	30 (10%)	270 (90%)
Scallop	75 (25%)	225 (75%)
Clam	09 (3%)	291 (97%)
Pistachio	10 (3.3%)	290 (96.7%)
Trout	03 (1%)	297 (99%)
Sweet chest	03 (1%)	297 (99%)
Blue mussel	18 (6%)	282 (94%)
Pacific squid	06 (2%)	294 (98%)
Hazelnut	09 (3%)	291 (97%)
Kiwi	08 (2.7%)	292 (97.3%)
Anchovy	06 (2%)	294 (98%)
Plaice	03 (1%)	297 (99%)
Cacao	02 (0.7%)	298 (99.3%)
Walnut	02 (0.7%)	298 (99.3%)
Lamp meet	03 (1%)	297 (99%)
Sunflower	02 (0.7%)	298 (99.3%)
Peanut	05 (1.7%)	295 (98.3%)
Crab	02 (0.7%)	298 (99.3%)
Pork	01 (0.3%)	299 (99.7%)
Tuna	02 (0.7%)	298 (99.3%)
Michelle	03 (1%)	297 (99%)
Mushroom	03 (1%)	297 (99%)
Yeast baker	03 (1%)	297 (99%)
Citrus mix	02 (0.7%)	298 (99.3%)

The study surveyed a total of 219 (73.0%) of respondents, with 81 (27%) being allergic to coconut, 58 (19.3%) being allergic to egg white, and 242 being non-allergic. Other common allergens included pea (1.3%), grape (9.3%), egg

yolk (4%), mango (3%), fish (2%), olive (0.3%), scallop (25%), oyster (10%), clam (3%), almond (1.7%), rye (1%), blue mussel (6%), pistachio (3.3%), pacific squid (2%), trout (1%), sweet chest (1%), hazelnut (3%), kiwi (2.7%), anchovy (2%), plaice (1%), cacao (0.7%), peanut (1.7%), lamb meat (1%), crab (0.7%), walnut (0.7%), sunflower (0.7%), mushroom (1%), Michelle (1%), yeast baker (1%), citrus mix (0.7%), tuna (0.7%) and pork (0.3%). The majority of these foods were non-allergic, with a small percentage being allergic to certain ingredients. The study found that a significant number of these foods were non-allergic, with a significant percentage of allergic patients being non-allergic. The findings highlight the importance of understanding and managing allergens in food production. (Table 2b)

Table 3: Association between Age Group and Allergic Response

Age Group	Allergic Status		Total
	Yes	No	
2 to 20 Years	135(49.5%)	9(33.3%)	144(100%)
21 to 39 Years	56(20.5%)	10(37.0%)	66(100%)
40 to 58 Years	48(17.6%)	5(18.5%)	53(100%)
> 58 Years	34(12.5%)	3(11.1%)	37(100%)

Chi-square test was performed to see the level of significance; p value=0.219

The study showed that 49.5% of respondents aged 2-20 were allergic, while 33.3% were not allergic. Similar patterns were observed in age groups 21-39, 40-58, and 58 years, with no statistically significant difference observed. (Table 3)

Table 4: Association between educational status and Allergic response

Educational Status	Allergic Status		Total
	Yes	No	
Illiterate	133(48.7%)	4(14.8%)	137(100%)
Primary	26(9.5%)	5(18.5%)	31 (100%)
Secondary	9(3.3%)	3(11.1%)	12(11%)
Graduate	105(38.5%)	15(55.6%)	120(100%)

Chi-square test was performed to see the level of significance; p value=0.003

Within the education status of the respondents 133 of illiterate respondents (48.7%) were allergic and 4 of illiterate respondents (14.8%) were no Allergic. The similar patterns were observed 26 of primary respondents (9.5%) were allergic and 5 of primary respondents (18.5%) were no allergic. On the other hand, 3.3% of secondary respondents had allergies, and 3.1% of secondary respondents did not have any allergies. And lastly 105 of university level (38.5%) were allergic and 15 of university level (55.6%) were non allergic to see the differences and did a chi square test. The distribution showed statistically significant between educational status and Allergic response (**P =0.003).** (Table 4)

Table 5: Association between Allergic status of the respondents and Gender of the respondents

Gender	Allergic Status		Total
	Yes	No	
Male	143(52.4%)	15(55.8%)	158(100%)
Female	130(47.6%)	12(44.4%)	142(100%)

Chi-square test was performed to see the level of significance; p value=0.456

Within the Gender status of the respondents 144 of male respondents (52.4%) were allergic and 15 of male respondents (55.8%) were no Allergic. The similar patterns were observed 130 of female respondents (47.6%) were allergic and 12 of female respondents (44.4%) were no allergic. To see the differences, we did a chi square test. The distribution showed statistical no significant (P = 0.456). (Table 5)

Discussion

When a person reacts to environmental elements that are generally safe for them, they develop an allergy. These compounds are present in dust mites, pets, pollen, insects, ticks, molds, foods, and some drugs. They are referred to as allergens[9,10]. Reactions to allergens are frequent. The immunological reaction that results in hay fever is comparable to the immune response that causes an allergic reaction. The majority of allergy reactions occur shortly after coming into touch with an allergen; many of them are moderate, but some can be extremely dangerous. They might only impact a tiny portion of the body or they might impact the whole body. Anaphylaxis, sometimes known as anaphylactic shock, is the most serious kind. A family history of allergies increases the risk of allergic responses[11]. Allergy-related disorders are becoming far more commonplace worldwide, in both developed and developing nations.

According to World Health Organization (WHO) statistics, there is a continuous rise in the prevalence of allergic diseases worldwide, with approximately 30–40% of the global population currently suffering from one or more allergic conditions. Approximately 300 million people worldwide are estimated to have asthma, and

hundreds of millions of people worldwide suffer from rhinitis. These conditions have a significant negative impact on the socioeconomic welfare of society and the quality of life for these individuals and their families. It is predicted that when air pollution and ambient temperature rise, the number of allergic reactions would rise even more. These environmental changes will affect pollen counts, the presence or absence of stinging insects, and the presence or absence of molds associated with allergic diseases[12].

Approximately 32% of adults reported food hypersensitivity, affecting mostly women and subjects less than 61 years old. The foods most often reported to cause adverse reactions were hazelnut (8.9%), apple (8.4%), milk (7.4%) and kiwi (7.3%). Less than one percent (0.9%) reported symptoms from ingestion of meat. Symptoms mostly affected the gastrointestinal tract (15%) and the skin (2.7%). Sixteen per cent were IgE-sensitized to common foods, most often to hazelnut (13.3%), peanut (4.9%) and almond (3.0%), while 5.9% reported symptoms and were IgE-sensitized to the same food, mainly to hazelnut (5.3%)[13,14]. Almost Similar research done by the prevalence of respondents was 273(91%) were allergic patients and 27(9%) were non- allergic patients. 65 Greater population of hypersensitivity reaction in this study was (48%) age 2-20, while (22%) age21-39, also (17.7%) age 40-58, and (12.3%) age above 58. Gender distribution of hypersensitivity reaction (52.7%) was female, while (47.3%) was male, so, most respondents were female. In this study found no statistically significant association of allergic status with age group (P=00.219), gender (P=0.456) but we found statistically significant association between allergic status and Education (P=0.003)[15] and indicating that most participants were banana-allergic.

Conclusion

The study found that most patients at NOVA/SOMLAB diagnostic centers had high prevalence of food allergens. The study found a significant association between allergic status and education.

Acknowledgements
None

Conflict of Interest
No competing interests exist by the authors.

Financial Disclosure
The authors received no specific funding for this work.

Contribution to authors:
Abdullahi Abdulkadir Abdiaziz, Md. Ashiqur Rahman, Md. Biplob Hossain: Conception and design, or design of the research. Abdullahi Abdulkadir Abdiaziz, Md. Ashiqur Rahman, Sadia Islam, Shohanur Rahaman: The acquisition, analysis, or interpretation of data; conceptualized and designed the overall study. Abdullahi Abdulkadir Abdiaziz, Md. Biplob Hossain: Involved in data collection; Manashe Chanda, Afsana Mahbub, Arifa Akram: Drafting the manuscript or revising it critically for important intellectual content. Tapos Biswas, Sadia Islam, Shohanur Rahaman: Involved in data input and data cleaning. Abdullahi Abdulkadir Abdiaziz, Md. Ashiqur Rahman: Conducted data analysis. Md. Ashiqur Rahman, Arifa Akram: Drafted the manuscript. All authors reviewed and approved the final manuscript.

Data Availability
Any questions regarding the availability of the study's supporti ng data should be addressed to the corresponding author, who can provide it upon justifiable request.

Ethics Approval and Consent to Participate
The Institutional Review Board granted the study ethical approval. Since this was a retrospective study and data were collected from the data bases, it was not needed every study participant formal informed consent.

How to cite this article: Abdiaziz AA, Rahman MA, Hossain MB, Islam S, Rahaman S, Chanda M, Mahbub A, Biswas T, Akram A. Prevalence of Hypersensitivity Reaction in Patients attending Selected Diagnostic Centers NOVA/SOMLAB in Benadir Region, Somalia. Bangladesh J Infect Dis 2023;10(2):85-91

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Article Info
Received on: 17 September 2023
Accepted on: 2 November 2023
Published on: 1 December 2023

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