

**Emotional and Behavioural Problems among Children with Allergic Diseases in Sharqia Governorate**  
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### Abstract

**Background:** Emotional and behavioural problems assessment of allergic disease in early childhood are useful for the holistic management and early recognition of possible disorders. **Aim of the study:** This study aimed to assess emotional and behavioural problems among children with allergic diseases. **Subjects and methods: Research design:** Across-sectional research design was carried out in this study. **Setting:** The present study was conducted at allergy and immunology unit outpatient clinics at Zagazig University Hospitals and four schools at Abu Kabir Center, Sharqia Governorate, Egypt. **Subjects:** A matching sample of 87 parents of children with allergic diseases and 87 parents of normal children aged 5-16 years. **Tools of data collection:** Three tools were used for collecting the necessary data. The first tool was a structured interview questionnaire. The second tool was pediatric symptom checklist-35. The third tool was the child behavioural checklist (CBCL). **Results:** The total mean score and standard deviation of emotional and behavioural problems in children with allergic diseases was  $135.62 \pm 26.01$  compared to  $114.81 \pm 23.80$  for children in the control group. The difference was highly statistically significant ( $P < 0.001$ ). The total mean scores and standard deviation of psychosocial problems in children with allergic diseases was  $58.73 \pm 9.37$  compared to  $51.98 \pm 10.41$  in the control group with highly statistically significant difference ( $P < 0.001$ ). **Conclusion:** Children with allergic diseases were more vulnerable to emotional and behavioural problems than non-allergic children. **Recommendations:** Promoting early screening and diagnosis of these issues to provide timely support and intervention program for children. Encouraging collaboration between allergists, pediatricians, psychologists, and mental health professionals to provide comprehensive care plan that include management strategies for both the allergic disease and its psychological impact.

**Keywords:** Allergic diseases, Behavioural problems, Children, Emotional problems.

### Introduction

Children with chronic illnesses are at higher risk for emotional and behavioural problems, including anxiety, depression, social withdrawal, and low self-esteem (Shin and Cho, 2012). Emotional disorders are common in children with severe or chronic illnesses, including allergic diseases (Jarosz et al., 2020).

Allergic diseases are among the most common chronic, non-communicable illnesses affecting children and adolescents. Their prevalence has reached epidemic levels over the past decade (Zainal, Abas and Mohamad, 2021; Noh et al., 2023). These conditions are considered major health issues in childhood (Mazur et al., 2022). They are linked to significant morbidity, impacting quality of life, school attendance, and social functioning (Ghonem, 2022). Common allergic diseases include asthma, allergic rhinitis, atopic dermatitis, and food allergies.

Moreover, multiple allergic diseases may coexist in one individual (Brzozowska et al., 2022). In addition to their physical effects, allergic diseases are also associated with mental health issues (Michaud and Hubbard, 2023). Children with allergies are more likely to experience behavioural and emotional problems, such as hyperactivity or poor mental well-being (Yamaguchi et al., 2021).

Emotional and behavioural problems are the most common mental health problems during childhood and adolescence (Bosakova, Dankulincova and Filakovska, 2024). They cover a wide range of problems, including conduct problems, depression, and anxiety (Dangi and Joseph, 2021). These problems are typically categorized into externalizing problems, which are outer-directed (e.g., acting out, defiant behaviours), and internalizing problems, which are inner-

directed (**Holland, Malmberg and Peacock, 2017**). They are often characterized by a generalized depressed mood, behaviours or feelings considered unsuitable in certain situations, difficulty forming satisfactory interpersonal relationships, and a tendency to develop physical symptoms or fears related to social problems (**Peterle et al., 2022**).

Most emotional and behavioural problems begin in early childhood or adolescence, affecting daily functioning and relationships, and can persist into adulthood (**Chougule et al., 2024**). These problems may accompany chronic illnesses or worsen existing medical conditions (**Osman et al., 2019**). They are a leading cause of disability in young people. If untreated, the emergency of mental health problems in childhood can lead to long-term developmental effects and immediate challenges in school, home, and community life (**Muggli et al., 2021**).

As awareness of children's mental health increases, healthcare professionals, especially pediatric nurses, play a crucial role in addressing both physical and mental health needs (**Gayathri et al., 2023**).

Pediatric nursing plays a crucial role in promoting children's health and well-being. Its scope includes health promotion, disease prevention, diagnosis, treatment, and family-centered care (**Sharun, 2023**). Pediatric nurses are often the first to identify mental health issues in children, assess risk factors, and provide timely interventions (**Gayathri et al., 2023**).

#### **Significance of the study:**

Allergic diseases are highly prevalent among children worldwide (**García-Marcos et al., 2022**). In Egypt, studies from southern Cairo report significant rates, with asthma affecting 46.1% of children, allergic rhinitis 34.5%, and atopic eczema 20.4% (**Al Dhduh, Sabri, and Fouda, 2015**). A more recent study in Egypt also showed high prevalence rates (**Zedan et al., 2023**). These allergic conditions can disrupt daily life and lead to mental health issues and behavioural problems (**Lin et al., 2016**). The chronic nature, prolonged therapy, and recurrent exacerbations negatively impact the quality of life (**Jarosz et al., 2020**). Early identification and intervention are crucial for improving children's emotional and behavioural well-being, with pediatric nurses playing a vital role

in early detection and providing timely support (**Kague, 2023**).

#### **Aim of the study**

The current study aimed to assess emotional and behavioural problems among children with allergic diseases.

#### **Research questions**

1. Are children with allergic diseases subjected to emotional and behavioural problems?
2. Is there a relationship between allergic diseases with emotional and behavioural problems?

#### **Subjects and methods**

##### **Research design:**

Across- sectional research design was used.

##### **Study setting:**

The present study was conducted at allergy and immunology unit outpatient clinics at Zagazig University Hospitals and four schools at Abu Kabir Center, Sharqia Governorate, Egypt.

##### **Study subjects:**

A matching sample of 87 parents of children with allergic diseases and 87 parents of normal children aged 5-16 years.

##### **Tools of data collection:**

Three tools were used to collect the required data:

**Tool I: Structured Interview Questionnaire:** Developed by the researcher with supervisory guidance and based on relevant literature. It includes three parts:

##### **Part I: Characteristics of the Studied Children (Case & Control)**

Collects socio-demographic data of the children, such as age, gender, residence, educational grade, living arrangements, number of siblings, and birth order.

##### **Part II: Characteristics of Parents of the Studied Children (Case & Control)**

Gathers socio-demographic data of parents, including age, education level, occupation, consanguinity, family income, and crowding index.

##### **Part III: Medical History of Children with Allergic Diseases (Cases Only)**

Focuses on the medical history of children with allergic diseases, including types of allergies and family history.

### Tool II: The Pediatric Symptom Checklist (PSC-35)

It was adopted from **Jellinek, Murphy, and Burns (1986)**. This psychosocial screening tool is designed to identify cognitive, emotional, and behavioural problems in children, enabling early intervention. It consists of 35 items rated as Never, Sometimes, or Often, based on parents' impressions of their child's behaviour and development. Parents complete the checklist through a quick and simple fill-in process.

#### Scoring:

A score of 0, 1, and 2 is assigned to Never, Sometimes, and Often, respectively. The total score is the sum of all 35 item scores. For children aged 6 to 16, a score of 28 or higher indicates psychological impairment, while 27 or below suggests no impairment. A score of 28 or above is considered positive, meaning the child requires further assessment.

**Tool III: Child Behaviour Checklist (CBCL) for Ages 6–18 Years:** It was adopted from **Achenbach and Rescorla (2001)**, the Arabic version of this scale was translated and validated by **Seleem et al. (2023)**, who test its validity and reliability on Egyptian children. It is a component of the Achenbach System of Empirically Based Assessment (ASEBA) and is designed to assess emotional, behavioural, and social problems in children aged 6 to 18 years. The questionnaire is completed by parents or caregivers and reflects the child's functioning over the past six months.

The CBCL consists of 120 items rated on a 3-point Likert scale: 0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true. It includes eight syndrome subscales: anxious/depressed (13 items), withdrawn/depressed (8 items), somatic complaints (11 items), social problems (11 items), thought problems (15 items), attention problems (10 items), rule-breaking behaviour (17 items), and aggressive behaviour (18 items). Additionally, 17 items assess other problems not included in any of these subscales.

These eight syndrome subscales are categorized into two broad-band subscales: the internalizing subscale, which measures

emotional problems and includes anxious/depressed, withdrawn/depressed, and somatic complaints, and the externalizing subscale, which assesses behavioural problems and includes rule-breaking and aggressive behaviour. Three other subscales (social problems, thought problems, and attention problems) do not belong to either broad-band subscale. The total problems score is calculated by summing 103 items from the eight syndrome subscales and the 17 additional problem items not included in these subscales.

#### Scoring system:

Scales	T-scores	Percentiles
<b>Emotional/Behavioural problems</b>		
<b>Broad-band scales:</b> (internalizing behavioural problems - externalizing behavioural problems - total behavioural problems).		
Clinic	> 63	> 90
Borderline	60-63	84-90
Non-clinical	< 60	< 84

#### Content validity & reliability

The tools used for data collection were standardized with established validity and reliability. They were translated into Arabic using the translation and back-translation technique to maintain original validity. Content validity of the Arabic version was assessed before the pilot study by a panel of five experts, including professors from Pediatric Nursing, Psychiatric Nursing, Psychiatry Medicine, Allergy and Immunology at Zagazig University, and Pediatric Nursing at Banha University. They reviewed the tools for clarity, relevance, applicability, and ease of implementation, and recommended modifications were applied. For Tool III, the Child Behaviour Checklist (CBCL) for ages 6–18 years, the Arabic version was adapted from **Seleem et al. (2023)**, with its validity and reliability tested and permission obtained for use.

#### Fieldwork

The study was conducted at the Allergy and Immunology Unit outpatient's clinic at Zagazig University Hospitals and four schools in Abu Kabir, Sharqia Governorate, Egypt. After obtaining official approval, a pilot study was conducted and analyzed. The researcher then conducted individual interviews with parents of children with allergic diseases who

met the study criteria and consented to participate. Data collection took 40–45 minutes per child, with the researcher attending the outpatient clinic 3 to 4 days per week from 9:00 A.M. to 2:00 P.M.

For the control group, the researcher selected students from schools who matched the case group (children with allergies) in terms of sex, age, and residence. School directors were informed about the study, and communication with the parents was done through various methods, including parent councils, parents who visited the school, and phone calls. For those contacted by phone, interview appointments were scheduled if they agreed to participate. Parents were given information about the study, assured of confidentiality, and given the option to participate. The researcher interviewed the parents of the control group children individually, 4 days a week (Saturday, Sunday, Monday, and Thursday).

Data collection from parents of children with allergic diseases (case group) took place over approximately two and a half months, from mid-October to the end of December 2023, while data from parents of the selected students (control group) was gathered over one month, from the beginning of January to the beginning of February 2024.

#### **Pilot study**

A pilot study was conducted with 10% of the study subjects (9 parents of children with allergic diseases and 9 parents of normal children). The pilot aimed to test the clarity of the questions, assess the applicability, feasibility, and practicality of the tools, and determine the time required to complete the data collection. Since no changes were made to the tools, the children involved in the pilot study were included in the final sample.

#### **Administrative and ethical considerations**

The study received ethical approval from the Research Ethics Committee of the Faculty of Nursing, Zagazig University (Code: M.DZU.NUR/187/13/6/2023), and the Institutional Review Board at Zagazig University. Official permissions were obtained from the relevant authorities of the allergy and immunology outpatient clinic at Zagazig University Hospitals and the Directorate of Education in Sharkia Governorate, which referred the researcher to the Educational Administration of Abu Kabir for access to

selected schools. The researcher obtained approval from the Educational Administration of Abu Kabir, and oral informed consent was obtained from participants, ensuring confidentiality and voluntary participation.

#### **Statistical analysis**

All data were collected, tabulated and statistically analyzed using SPSS 20.0 for windows. Quantitative data were expressed as the mean  $\pm$  SD and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Percent of categorical variables were compared using Chi-square test or Fisher's exact test when appropriate. The student "t" test was used for comparison of means of two independent groups of quantitative data which were normally distributed.

#### **Results**

**Table (1):** shows that 85.1% of the children were aged between 6 - 12 years, 69.0% were male and 79.3% living in rural areas. Additionally, 54% of children with allergic diseases were first-born, compared to 35.6% in the control group.

**Table (2):** reveals that 93.8% of fathers of children with allergic diseases were aged 30–50 years, compared to 94.1% in the control group. Similarly, 66.7% of mothers of children with allergic diseases were aged 25–35 years, versus 62.1% in the control group. Regarding occupation, 83.9% of mothers of children with allergic diseases were housewives, compared to 74.7% in the control group, while 58% of their fathers worked in freelance jobs, compared to 70.6% in the control group. Positive parental consanguinity was found in 25.3% of children with allergic diseases compared to 17.2% in the control group.

**Figure (1):** reveals that 31% of the studied children had allergic asthma, followed by 20.6% with allergic rhinitis, 19.5% with multiple allergic diseases, 18.3% with allergic conjunctivitis, and the lowest percentage, 10.3%, had skin allergies.

**Table (3):** indicates that 59.8% of children with allergic diseases had a positive family history of allergic diseases. Among those with a positive family history, 59.6% had a family history of allergic asthma, 36.5% of allergic rhinitis, 19.2% of allergic conjunctivitis, and 11.8% of skin allergies.



**Figure (2):** reveals that 83.9% of children with allergic diseases had psychosocial problems, compared to 69.0% in the control group. This difference was statistically significant ( $P=0.031$ ).

**Table (4):** reveals that children with allergic diseases had more emotional and behavioural problems than children in the control group, with a mean score of  $135.62 \pm 26.01$  compared to  $114.81 \pm 23.80$  in the control group. This difference was highly statistically significant ( $P < 0.001$ ). Additionally, children with allergic diseases had more internalizing and externalizing problems than the control group, with a mean score of  $16.59 \pm 8.22$  for internalizing problems, compared to  $10.93 \pm 8.65$  in the control group, and a mean score of  $15.62 \pm 9.92$  for externalizing problems, compared to  $11.17 \pm 8.68$  in the control group. These differences were also highly statistically significant ( $P < 0.001$ ).

**Table (5):** reveals a highly statistically significant relation ( $P = 0.001$ ) between types of allergic diseases and emotional and behavioural problems, particularly in children with multiple allergic diseases, followed by those with allergic asthma.

**Table (6):** reveals that psychosocial problems are highly statistically significant independent positive predictors ( $P = 0.001$ ) of emotional and behavioural problems.

## Discussion

The increasing prevalence of allergic diseases among children and adolescents is a significant medical and social concern, impacting the health economy of many countries of the world (**Khamidovna, 2023**). Allergic diseases are associated with an increased risk of various mental health conditions, including emotional problems, anxiety, depression (**Michaud and Hubbard, 2023**).

The current study found that most of the studied children were aged 6-12 years, with a mean age of  $9.86 \pm 2.23$ , indicating that school-aged children are most affected. Regarding gender, more than three-fifths of the studied children were male, which can be attributed to factors such as sexual hormones, lifestyle differences between genders, microbiota diversity, dietary distinctions, professional options, and

adherence to treatment, among others (**Rosário et al., 2021**).

This finding was supported by a study in Guangzhou, China, by **Yu et al. (2019)**, which reported that boys had a higher risk of asthma, dermatitis, rhinitis, and eczema across all age groups compared to girls. Similarly, a study by **Mohammed et al. (2020)** in Elmaraghah Center, Sohag Governorate, Egypt, found that males had a 1.1 times higher risk of developing asthma than females. Additionally, **Dastoorpoor et al. (2022)** in Khuzestan, Iran, found that the prevalence and severity of asthma, rhinitis, and eczema were higher in boys, with a shift favoring girls aged 13–14 years. The early dominance of asthma in boys may shift to a female predominance due to the impact of female hormones, which enhance immune responses, making girls more susceptible to allergic diseases as they mature, while testosterone suppresses these responses (**Jensen-Jarolim, 2017; Rosário et al., 2021**). Additionally, obesity exacerbates asthma in girls but not in boys of the same age (**Jensen-Jarolim, 2017**).

Regarding residence, over three-quarters of the studied children were from rural areas, which may be attributed to higher exposure to allergenic pollen in rural and semi-rural areas compared to urban areas (**Bosch-Cano et al., 2011**). From the researcher's perspective, the increase in allergic diseases among rural children is attributed to factors such as environmental exposures (e.g., pesticides, pollen, and animal allergens), poor indoor air quality (e.g., wood-burning stoves), socioeconomic challenges (e.g., poverty, limited healthcare access), and lifestyle factors. These contribute to the higher prevalence of allergies in rural areas. In the same line, **Mohammed et al. (2020)** found that children living in rural areas were 1.5 times more likely to develop asthma compared to those in urban areas.

The current study found that approximately three-fifths of children with allergic diseases had a positive family history of allergic diseases. Among them, around three-fifths had a family history of allergic asthma, and slightly more than one-third had a family history of allergic rhinitis. Additionally, one-quarter of children with allergic diseases had parents with a consanguineous

relationship, compared to one-fifth in the control group. This may be attributed to that allergic diseases can be influenced by both genetic and environmental factors (**Wang et al., 2023**). This finding aligns with **Abdelmotaleb et al. (2020)** in the Kom Hamada district, Beheira Governorate, Egypt, who reported that approximately one-quarter of parents had a consanguineous relationship, with highly significant associations found between asthma and a family history of asthma, as well as significant associations with a family history of rhinitis and dermatitis.

The current study found that more than half of children with allergic diseases were first-born, compared to more than one-third in the control group. This supported by the microbiota hypothesis, which suggests that higher early-childhood microbial exposure caused by siblings protects against immunological hypersensitivity (**Luukkonen et al., 2024**). In the same line, **Huang et al. (2023)**, a study in Guangzhou, China, found that first-born children had a higher risk of developing allergic diseases, with several factors like male gender, birth order, and preterm birth increasing the risk. Similarly, **Lisik et al. (2023)**, through a systematic review and meta-analysis of 114 studies from different countries, found that the presence of siblings and being second-born or later may decrease the lifetime risk of atopic dermatitis and food allergies.

The current study found that nearly one-eighth of children with allergic diseases had experienced an allergic condition that later resolved. Among these cases, skin allergies were the most common (about two-thirds), and allergic asthma accounted for one-third. This pattern follows the "atopic march," where allergic diseases typically progress from atopic dermatitis to IgE-mediated food allergies, then allergic asthma, and finally allergic rhinitis, which results in increased sensitization to food and/or environmental allergens as some symptoms become more prominent over time, while others subside (**Tsuge, Ikeda and Matsumoto, 2021**).

The current study found that environmental factors play a significant role in the prevalence of allergic diseases among children. Three-quarters of children with allergic diseases were found to live near dust

sources, approximately two-thirds lived near gardens or agricultural lands, and two-thirds had contact with animals. Additionally, nearly one-third were exposed to chemicals. This is likely due to the agricultural nature of El Sharqia Governorate, where exposure to dust, unpaved roads, and farm animal allergens is common. In contrast, a study by **Al Dhduh, Sabri, and Fouda (2015)** in Al Maadi and Al Maasara, south of Cairo, found that slightly less than two-thirds of students with asthma symptoms lived near coffee shops, a similar proportion were exposed to animals, and slightly more than one-quarter lived near factories. These differences may be attributed to the rural setting of Sharqia compared to the urban environment of Cairo, where the other study was conducted.

The current study found that children with allergic diseases had more psychosocial problems than children in the control group. Over three-quarters of allergic children experienced psychosocial issues, compared to nearly two-thirds of the control group, with a statistically significant difference ( $p = 0.031$ ). This result is consistent with **Wu et al. (2011)** in Taiwan, who found that children with one or more allergic diseases were 1.71 times more likely to have high psychosocial problems compared to those without any allergic diseases, with the impact increasing as the number of allergic conditions increased, and even children with only asthma showed elevated risk. Similarly, **Lee et al. (2012)** in Gwangyang Bay, Korea, reported a relationship between psychosocial stress and allergic symptoms in children and adolescents.

The result of the current study found that children with allergic diseases experience a higher level of emotional and behavioural problems compared to children in the control group, with mean scores of  $135.62 \pm 26.01$  for children with allergic diseases and  $114.81 \pm 23.80$  for children in the control group, showing a statistically significant difference ( $P < 0.001$ ). These findings align with earlier studies, suggesting that children and adolescents with atopic disorders face a higher risk of behavioural difficulties due to social consequences (**Lewis-Jones, 2006**), negative effects on brain development (**Ednick et al., 2009; Kuniyoshi et al., 2018**), or side effects of allergy medications (**Leung**

**et al., 2017).** The causal link between allergic diseases and mental health issues is believed to involve both psychological and biological factors, including the social impact of allergic diseases, such as embarrassment from visible lesions or itching caused by atopic dermatitis, sleep disturbances, and the inflammatory hypothesis, which suggests that disruptions in the immune system and elevated inflammatory cytokines may contribute to mental health issues (**Budu-Aggrey et al., 2021**).

This result is consistent with the study by **Hammer-Helmich et al. (2016)** in Copenhagen, Denmark, which found that children with symptoms of eczema, asthma, or hay fever regardless of gender, age group, or parental socioeconomic position (SEP) were more likely to exhibit emotional, conduct, and hyperactivity problems, and to have abnormal scores in emotional or hyperactivity problems compared to children without atopic diseases. Similarly, **Yamaguchi et al. (2021)**, a study in Japan, revealed an association between allergic clinical manifestations and behavioural problems in children. A history of wheezing and rhinitis in children is associated with an increased risk of behavioural problems, particularly conduct problems.

The present study found that children with allergic diseases had more internalizing and externalizing behavioural problems compared to the control group. The mean scores for internalizing and externalizing problems were significantly higher in the allergic group ( $16.59 \pm 8.22$  and  $15.62 \pm 9.92$ ) compared to the control group ( $10.93 \pm 8.65$  and  $11.17 \pm 8.68$ ), with internalizing problems being more common among children with allergic disease. This difference was statistically significant ( $P < 0.001$ ). A possible explanation for the association between allergic diseases and internalizing behavioural problems is that chronic atopic diseases negatively impact the patient's quality of life, leading to lifestyle restrictions, social and financial challenges, which could contribute to internalizing problems (**Lewis-Jones, 2006**).

In the same line, **Nanda et al. (2016)**, in a study conducted in Cincinnati, Ohio, USA, reported that children with allergic rhinitis and allergic persistent wheezing at age 4 years

were at increased risk for internalizing behaviours problems by age 7 years. Similarly, **Berzosa-Grande et al. (2021)**, in a study in Madrid, Spain, found that children with allergic diseases had a higher risk of both internalizing and externalizing behavioural problems than healthy children, with internalizing problems being more pronounced.

The current study found a highly significant ( $P=0.001$ ) relation between the types of allergic diseases and emotional/behavioural problems. Children with multiple allergic diseases had higher scores, followed by those with allergic asthma. This may be linked to the severity of the diseases, as highlighted by **AbdelHameed et al. (2023)**, who found a significant correlation between disease severity and behavioural/mental health issues.

The findings of the current study align with previous research, showing a significant link between allergies and emotional/behavioural problems in children. In the same line, **Berzosa-Grande et al. (2021)** reported a significant association between allergies and behavioural issues in children aged 6-11 years. Furthermore, **Keller et al. (2021)** revealed an association between atopic disorders and behavioural difficulties in children and adolescents, with different patterns observed by age group. In addition, **Hammer-Helmich et al. (2016)** found that the levels and risks of emotional and behavioural problems were highest for children with symptoms of more than one atopic disease. Similarly, **Nanda et al. (2016)** showed that multiple allergic diseases were linked to higher internalizing scores, with children having a threefold increased likelihood of elevated internalizing scores. The risk was even higher (more than fourfold) in children with allergic rhinitis plus another allergic condition, demonstrating a dose-dependent relationship between the number of allergic diseases and increased internalizing problems like depression and anxiety. Moreover, **Madulara and Andaya (2021)** found that children with allergies, particularly those with severe asthma, are more likely to exhibit ADHD symptoms.

## Conclusion:

Based on the results of the present study, it could be concluded that children with allergic diseases were more vulnerable to emotional and behavioural problems than normal children.

### Recommendations:

The main study results suggest the following recommendations:

- Promote early detection of these issues to ensure timely support and intervention for children.
- Encourage collaboration between allergists, pediatricians, psychologists, and mental health professionals to develop a comprehensive care plan that addresses both the allergic disease and its psychological effects.
- Offer training programs for parents to help them manage their child's allergies and behavioural challenges. Educate them on the emotional impact of allergies and provide effective support strategies.

**Table (1): Characteristics of the studied children (n=174)**

	Study group (n=87)		Control group (n=87)		X <sup>2</sup>	p-value
	No.	%	No.	%		
Age (years)						
6-12	74	85.1	74	85.1	FET	0.99
>12	13	14.9	13	14.9		
Mean± SD	9.86±2.23		9.86±2.23		t=0.001	0.99
Gender						
male	60	69.0	60	69.0	FET	0.99
Female	27	31.0	27	31.0		
Residence						
Rural	69	79.3	69	79.3	FET	0.99
Urban	18	20.7	18	20.7		
Education						
Primary	70	80.5	70	80.5	FET	0.99
Preparatory	17	19.5	17	19.5		
Child live with						
Both parent	78	89.7	84	96.6	FET	0.132
One parent	9	10.3	3	3.4		
Number of siblings						
One	28	32.2	10	11.5	11.026	0.012*
Two	36	41.4	49	56.3		
Three	16	18.4	20	23.0		
Four or more	7	8.0	8	9.2		
Birth order						
The first	47	54.0	31	35.6	6.312	0.097
The Second	21	24.1	27	31.0		
The third	14	16.1	23	26.4		



The Fourth or More	5	5.7	6	6.9
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$\chi^2$ : Chi square test    FET: Fisher exact test, t: student t-test    non-significant ( $p>0.05$ ),  
\*: statistically significant ( $p<0.05$ ).

**Table (2): Characteristics of parents of the studied children (n=174).**

	Study group (n=87)		Control group (n=87)		$\chi^2$	p-value
	No.	%	No.	%		
<b>Father age (years)</b>						
<30	4	4.9	0	0.0	9.059	0.011*
30-50	76	93.8	80	94.1		
>50	1	1.2	5	5.9		
Mean± SD	38.40±6.60		41.29±6.24		t= -2.895	0.059
<b>Father education</b>						
Illiterate	13	16.0	7	8.2	13.121	0.011*
Primary	1	1.2	4	4.7		
Preparatory	2	2.5	3	3.5		
Secondary	46	56.8	32	37.6		
University	19	23.5	39	45.9		
<b>Father job</b>						
Governmental employee	18	22.2	20	23.5	8.043	0.045*
Free	47	58.0	60	70.6		
Not working	3	3.7	2	2.4		
other	13	16.0	3	3.5		
<b>Mother age</b>						
25-35	58	66.7	54	62.1	0.577	0.749
35-45	27	31.0	30	34.5		
>45	2	2.3	3	3.4		
Mean± SD	33.85±5.39		33.98±6.60		t= -0.151	0.880
<b>Mother education</b>						
Illiterate	2	2.3	1	1.1	1.405	0.843
Preparatory	1	1.1	1	1.1		
Primary	1	1.1	56	64.4		
Secondary	56	64.4	29	33.3		
University	27	31.0	1	1.1		
<b>Mother job</b>						
Employee	13	14.9	22	25.3	3.778	0.151
Housewife	73	83.9	65	74.7		
Other	1	1.1	0	0.0		
<b>Family income</b>						
Sufficient	47	54.0	68	78.2	FET	0.001**
Insufficient	40	46.0	19	21.8		
<b>Consanguinity</b>						
No	65	74.7	72	82.8	FET	0.266
Yes	22	25.3	15	17.2		
<b>If answer is yes What is the degree</b>						
The fourth	14	63.6	12	80.0	FET	0.466
The fifth	8	36.4	3	20.0		

Crowding Index						
<2	73	83.9	66	75.9	FET	0.256
>2	14	16.1	21	24.1		

$\chi^2$ : Chi square test    FET: Fisher exact test, t: student t-test    non-significant ( $p>0.05$ ),

\*: statistically significant ( $p<0.05$ ), \*\*: statistically highly significant ( $p<0.001$ ).

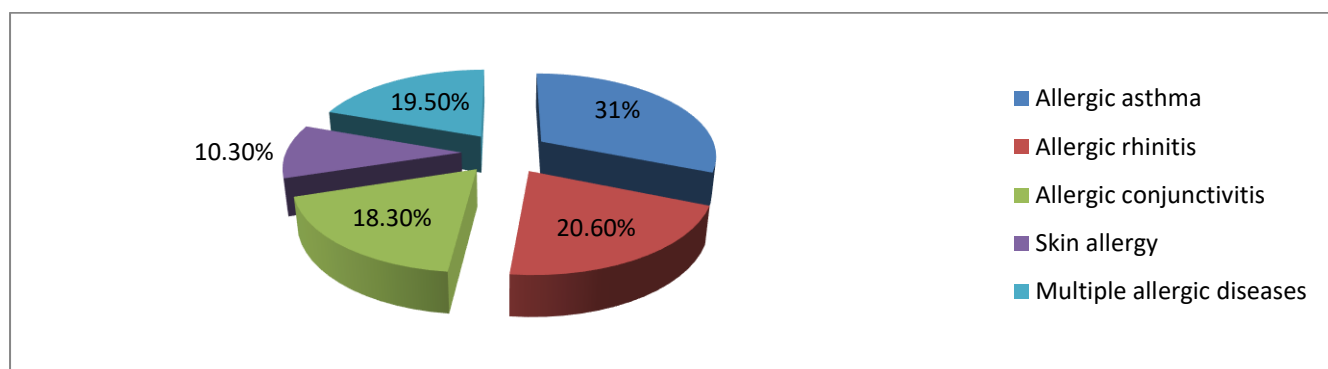
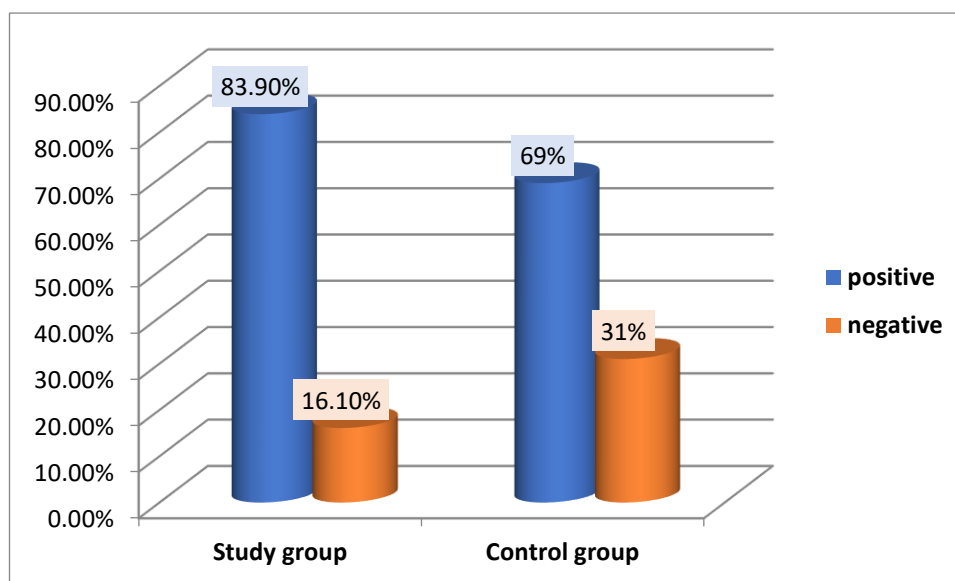


Figure (1): Types of allergic diseases in the studied children (n=87).

Table (3): Family history for allergic disease in the study group (n=87).

Variables	NO.	%
Family history		
Yes	52	59.8
No	35	40.2
Family history for Allergic disease for (n=52) *		
Allergic asthma	31	59.6
Allergic rhinitis	19	36.5
Allergic conjunctivitis	10	19.2
Skin allergy	6	11.8

\*: not mutually exclusive



**Figure (2):** The total score of psychosocial problems in children with allergic diseases compared to control group (n=174).

**Table (4):** The total mean score of emotional and behavioural problems and its internalizing and externalizing domains of the studies children (n=174).

	Study group	Control group	t-test	p-value
Internalizing behavioural problems	16.59±8.22	10.93±8.65	-5.024	<0.001**
Externalizing behavioural problems	15.62±9.922	11.17±8.68	-3.261	<0.001**
Total problem score	135.62±26.01	114.81±23.80^	5.503	<0.001**

MW: Mann-Whitney U, ^: t-test, \*\*: statistically highly significant (p<0.01).

**Table (5):** Relation between types of allergic diseases and emotional and behavioural problems in children with allergic diseases

Types of allergic disease	Emotional and behavioural problem						χ <sup>2</sup> (p-value)
	Clinical =18		borderline =8		Non-clinical=61		
	No.	%	No.	%	No.	%	
Allergic asthma	5	27.8	5	62.5	17	27.9	48.668 (0.001**)
Allergic rhinitis	1	5.6	0	0.0	17	27.9	
Allergic conjunctivitis	0	0.0	0	0.0	16	26.2	
Skin allergy	0	0.0	0	0.0	9	14.8	
combined	12	66.7	3	37.5	2	3.3	

$\chi^2$ : Chi square test \*\*: statistically highly significant (p<0.001).

**Table (6): Step wise multiple linear regression for predicting factors which affect emotional and behavioural problems in children with allergic diseases.**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	31.219	9.718		3.213	.002	12.029	50.410
Psychosocial problems	1.575	.146	.612	10.805	0.001**	1.287	1.863

\*\* : statistically highly significant (p<0.001)

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