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RESEARCH ARTICLE

Giftedness and allergy: A comparative study of the risk factors in gifted and typical children

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ABSTRACT

Aim: To compare the various parameters associated with giftedness and allergy in gifted children within their group and with typical children of average intelligence.

Methods: The case-control questionnaire study was conducted in Adıyaman, Türkiye, in April-May 2023. The study included 75 gifted and 190 typical children aged 6-14. The face-to-face survey consisted of 37 questions, 16 of which were added to the 21 questions of the International Study of Asthma and Allergies in Childhood (ISAAC) Phase 3.

Results: The prevalence of recurrent ear infections in gifted children (33.3%) was found to be significantly higher than in typical students (20.5%) (P= 0.028). The rate of asthma in gifted students with recurrent ear infections (40%) was found to be significantly higher than the rate in gifted students without recurrent ear infections (16%) (P=0.022). The rate of allergic rhinitis in gifted students with food allergies (38.5%) was found to be significantly higher than the rate of those without food allergies (11.3%) (P=0.029). The high food selectivity (21.3%) of gifted students was found to be significantly higher than that of typical students (8.4%) (P=0.002). Among the gifted students, 50% of those who were very selective about food had asthma (P=0.014), and 37.5% had allergic rhinitis (P=0.029).

Conclusions: The study has shown the association between giftedness and various allergic conditions, suggesting that certain factors like recurrent otitis and food selectivity behavior may contribute to the higher prevalence of these conditions in gifted children.

Keywords: Gifted, talented, allergy, asthma, allergic rhinitis

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INTRODUCTION

There is no consensus among the terms "gifted", "talented", "highly talented", "gifted and talented", and "special talented" when defining individuals with higher intelligence and talent than the average population. These terms can be used interchangeably depending on the time, country, and geographic region (1).

Although there are various approaches, children who score two standard deviations above the mean on Intelligence Quotient (IQ) tests can be considered gifted (2). When a threshold value of IQ ≥ 130 is used, approximately 2.14% of the population falls into the gifted category. It is also possible to view giftedness as an above-average cognitive ability that interacts with other individual and environmental variables rather than relying solely on IQ. In such cases, a threshold value of IQ ≥ 120 is used, and the gifted population ranges from 5-8% (2,3). However, the definition of giftedness may differ from country to country (4). Gifted children exhibit superior cognitive abilities in maths, arts, and languages compared to moderately gifted peers and show marked differences in the physical, mental, and emotional domains (5).

Two-thirds of gifted children reported having various types of allergies (6). In a study conducted by Karpinski et al. (7), a comparison between gifted individuals and the average population revealed higher rates of asthma (15.4%, 7.4%), food allergy (9.6%, 3.7%), environmental allergy (33.2%, 10.6%), autism spectrum disorder (ASD) (1.2%, 1.0%), autoimmune disease (14.7%, 8.0%), depression (26.8%, 9.5%), and anxiety (20.0%, 10.9%). They attributed these findings to a psychoneuroimmunological mechanism, suggesting that gifted individuals experience physical and mental overexcitability. Their heightened awareness keeps them in a constant state of vigilance, leading to persistent activation of the sympathetic nervous system, which can negatively impact the immune system. Consequently, this heightened immune response may contribute to the development of autoimmune diseases and allergies (7).

Science and Arts Centers (SAC) in Türkiye are educational institutions affiliated with the Ministry of National Education. They cater to gifted students in pre-school, primary, secondary, and high school, offering specialized education in areas such as painting, music, or general mental abilities based on their selection through examinations. These institutions provide group education to children on weekdays and weekends, ensuring their formal education in traditional institutions is maintained (8).

This study aimed to compare allergic disorders, including asthma, allergic rhinitis, eczema, and food allergy, in gifted children at primary and secondary school age in Adıyaman, a southeastern province of Turkey, with typical children of average intelligence.

Additionally, the study was designed to compare various individual and environmental parameters associated with giftedness and allergy and socio-demographic characteristics with typical children of average intelligence. Moreover, the study aimed to compare these parameters, specifically among gifted students.

MATERIALS AND METHODS

Study design and population

This case-control questionnaire study was conducted in Adıyaman between April and May 2023. The case group consisted of gifted primary and secondary school students who studied at SAC alongside their traditional educational institutions. On the other hand, the control group included typical primary and secondary school students with average intelligence who attended solely traditional educational institutions. The study participants were children between the ages of 6 and 14. Those with any acute illness, individuals taking medication, individuals with epilepsy, Down syndrome, kidney failure, and similar chronic conditions were excluded from the study.

Data collection tools

ISAAC, an international study, introduced a three-phase questionnaire in 1995 by Asher et al. (9) to assess the prevalence and severity of asthma, rhinitis, and eczema in children. Phase 1 utilizes baseline questionnaires to evaluate the prevalence and severity of asthma and allergic diseases in specific populations.

Phase 2 investigates potential causal factors based on the findings from Phase 1. Phase 3 replicates Phase 1 to monitor prevalence trends. Phase 3 involves a questionnaire consisting of 8 questions for asthma, six for rhinitis, and seven for eczema (9). The Turkish translation of the ISAAC questionnaire was conducted by Oneş et al. (10) in 1997 to determine the prevalence of asthma in Istanbul.

In the present study, an additional 16 questions were incorporated into the existing 21 questions from ISAAC Phase 3. These additional questions included ten related to socio-demographic characteristics, four related to allergies, and two related to giftedness. The complete questionnaire consisted of 37 questions, and it was administered through face-to-face interviews. In the case group, 75 out of 100 children (75%) agreed to participate in the study, while in the control group, 190 out of 200 children (95%) volunteered to participate.

Ethics statement

The study was approved by multiple authorities. Specifically, the approval was obtained from the Adıyaman Provincial Health Directorate with the decision number E-13389845-051.08-206611150, dated January 9, 2023. Additionally, the Adıyaman Provincial Directorate of National Education granted approval with the decision number E-36700636-605.01-68004132, dated January 10, 2023. The study also received approval from the Adıyaman University Non-Interventional Research Ethics Committee with decision number 2023/1-3, dated January 24, 2023.

Since all participants in the study were under the age of 18, written consent was obtained from their families, indicating their agreement to participate. Moreover, all procedures were conducted following the principles outlined in the Declaration of Helsinki and by relevant local laws and regulations.

Statistical analysis

The analysis was conducted using the SPSS software package (SPSS Inc., Chicago, IL), version 22. Descriptive statistics were used to present categorical data as n and % values and continuous data as mean ± standard deviation (Mean ± SD) values. Chi-square analysis (Pearson Chi-square) was employed to compare categorical variables between groups. The Kolmogorov-Smirnov test was used to assess the normal distribution of continuous variables, and the Mann-Whitney U test was utilized to compare paired groups. The statistical significance level for the analysis was set at $p<0.05$.

RESULTS

A total of 265 children participated in the study, 75 in the case group and 190 in the control group. In the case group, 56% were girls and 44% were boys, whereas, in the control group, 51.1% were girls and 48.9% were boys. There was no significant difference in gender between the two groups (p=0.468).

The mean age of the participants was 11.7 ± 2.2 years in the case group and 11.9 ± 1.6 years in the control group. There was no significant difference in age between the groups (p=0.271).

The number of siblings was significantly lower in the case group than in the control group (p<0.001). The income level of individuals in the case group was significantly higher than those in the control group (p=0.014). The rate of snoring, especially during respiratory tract infections, was significantly higher in the case group (32%) compared to the control group (16.8%) (p=0.025). The prevalence of recurrent ear infections was significantly higher in the case group (33.3%) than in the control group (20.5%) (p=0.028).

Regarding food selectivity, 22.7% of the individuals in the case group were not selective, 56% were selective, and 21.3% were highly selective. In the control group, 40% were not selective, 51.6% were selective, and 8.4% were highly selective. There was a significant difference in selectivity between the groups (p=0.002). The prevalence of food allergy in the case group (17.3%) was significantly higher than that in the control group (8.4%) (p=0.036). No significant differences were found between the groups in terms of other parameters (p>0.05) (Table 1, Table 2).

The prevalence of wheezing/whistling in the chest in the case group (32%) was significantly higher than the rate in the control group (18.4%) (p=0.017).

Table 1. Comparison of sociodemographic characteristics of the groups				
		Case (n=75)	**Control (n=190)**	**p**
Age, Mean ± SD		11.7±2.2	11.9±1.6	0.271 **
Maternal age, Mean ± SD		39.9±4.1	39.7±4.8	0.633 **
Father age, Mean ± SD		43.1±4.8	43.8±5.2	0.349 **
Total family income, Mean ± SD		53786.7±158125.1	27233.2±27279.3	**0.014 ** **
Number of siblings, Mean ± SD		1.9±.7	2.8±1.2	**<0.001 ** **
Gender	Female	42 (56%)	97 (51.1%)	0.468*
	Male	33 (44%)	93 (48.9%)	
School	Primary school	20 (26.7%)	61 (32.1%)	0.387 *
	Middle school	55 (73.3%)	129 (67.9%)	
Mother education status	Middle school and below	8 (10.7%)	34 (17.9%)	0,147 *
	High school and above	67 (89.3%)	156 (82.1%)	
Father education status	Middle school and below	4 (5.3%)	25 (13.2%)	0,066 *
	High school and above	71 (94.7%)	165 (86.8%)	

* Chi-square analysis, ** Mann Whitney U test was applied.

Table 2. Comparison of various characteristics of groups				
		Case (n=75)	**Control (n=190)**	**p**
Living place	Rural	2 (2.7%)	13 (6.8%)	0.246*
	Urban	73 (97.3%)	177 (93.2%)	
Tobacco smoke at home	Yes	22 (29.3%)	76 (40.0%)	0.105*
	No	53 (70.7%)	114 (60.0%)	
Presence of pets at home	Yes	14 (18.7%)	31 (16.3%)	0.646 *
	No	61 (81.3%)	159 (83.7%)	
Night snoring	Never	50 (66.7%)	153 (80.5%)	**0.025 ***
	Always	1 (1.3%)	5 (2.6%)	
	Only in the presence of respiratory infection	24 (32%)	32 (16.8%)	
Recurrent ear infection	Yes	25 (33.3%)	39 (20.5%)	**0.028 ***
	No	50 (66.7%)	151 (79.5%)	
Food selectivity behavior	I never select any food	17 (22.7%)	76 (40.0%)	**0.002 ***
	I am selective	42 (56%)	98 (51.6%)	
	I am very selective	16 (21.3%)	16 (8.4%)	
Food allergy	Yes	13 (17.3%)	16 (8.4%)	**0.036 ***
	No	62 (82.7)	174 (91.6%)	
Handedness	Right	68 (90.7%)	174 (91.6%)	0.812 *
	Left	7 (9.3%)	16 (8.4%)	

* Chi-square analysis, ** Mann Whitney U test was applied.

Similarly, the prevalence of wheezing/whistling in the chest during the past 12 months in the case group (26.7%) was significantly higher than the rate in the control group (10%) (p=0.001). The prevalence of physician-diagnosed asthma in the case group (24%) was significantly higher than the rate in the control group (13.2%) (p=0.031). Additionally, the prevalence of wheezing/whistling in the chest during the past 12 months in the case group (20%) was found to be significantly higher than the rate in the control group (10%) during the same period (p=0.028) (Table 3).

The prevalence of sneezing or a runny or blocked nose in the case group in the absence of cold/flu was significantly higher (60%) compared to the control group (41.6%) (p=0.007). Similarly, the prevalence of sneezing, or a runny or blocked nose in the absence of cold/flu in the last 12 months was significantly higher in the case group (36%) than the rate in the control group (23.2%) (p=0.033). The rate of accompanying itchy-watery eyes with these symptoms in the last 12 months was significantly higher in the case group (21.3%) than in the control group (11.6%) (p=0.041). Additionally, the rate of physician-diagnosed allergic

Table 3. Comparison of asthma questions according to groups

		Case	Control	p*
		Number (%)	Number (%)	
Have you ever had wheezing or whistling in the chest at any time in the past?	Yes	24 (32%)	35 (18.4%)	**0.017**
	No	51 (68.0%)	155 (81.6%)	
Have you had wheezing or whistling in the chest in the last 12 months?	Yes	20 (26.7%)	19 (10.0%)	**0.001**
	None	55 (73.3%)	171 (90.0%)	
How many attacks of wheezing/whistling have you had in the last 12 months?	None	2 (10.0%)	4 (21.1%)	0.083
	1-3	8 (40.0%)	12 (63.2%)	
	4-12	5 (25.0%)	3 (15.8%)	
	>12	5 (25.0%)	0	
In the last 12 months, how often, on average, has your sleep been disturbed due to wheezing?	Never	5 (25.0%)	7 (36.8%)	0.243
	Less than one night per week	8 (40.0%)	10 (52.6%)	
	One or more nights per week	7 (35.0%)	2 (10.5%)	
In the last 12 months, has wheezing ever been severe enough to limit your speech to only one or two words at a time between breaths?	Yes	11 (55.0%)	7 (36.8%)	0.256
	No	9 (45.0%)	12 (63.2%)	
Have you ever had physician-diagnosed asthma?	Yes	18 (24.0%)	25 (13.2%)	**0.031**
	No	57 (76.0%)	165 (86.8%)	
In the last 12 months, has your chest sounded wheezy during or after exercise?	Yes	15 (20.0%)	19 (10.0%)	**0.028**
	No	60 (80.0%)	171 (90.0)	
In the last 12 months, have you had a dry cough at night, apart from a cough associated with a cold or a chest infection?	Yes	37 (49.3%)	72 (37.9%)	0.088
	No	38 (50.7%)	118 (62.1%)	

* Chi-square analysis was applied.

rhinitis was significantly higher in the case group (16%) than in the control group (6.3%) (p=0.013) (Table 4).

The rate of physician-diagnosed eczema in the case group was 18.7%, while it was 13.2% in the control group, and no significant difference was found between the two groups (p=0.254) (Table 5).

Among gifted students, the prevalence of allergic rhinitis in rural areas (100%) was significantly higher than the rate of allergic rhinitis in urban areas (13.7%) (p=0.024). The prevalence of asthma in students who were exposed to tobacco smoke at home (40.9%) was significantly higher than the rate of asthma (17%) in students who were not exposed to tobacco smoke at

Table 4. Comparison of allergic rhinitis questions according to groups

		Case	Control	p *
		Number (%)	Number (%)	
Have you ever had a problem with sneezing, or a runny, or a blocked nose when you did not have a cold or the flu?	Yes	45 (60.0%	79 (41.6%)	**0.007**
	No	30 (40.0%)	111 (58.4%)	
In the past 12 months, have you had a problem with sneezing, or a runny, or a blocked nose when you did not have a cold or the flu?	Yes	27 (36.0%)	44 (23.2%)	**0.033**
	No	48 (64.0%)	146 (76.8%)	
In the past 12 months, has this nose problem been accompanied by itchy-watery eyes?	Yes	16 (21.3%)	22 (11.6%)	**0.041**
	No	59 (78.7%)	168 (88.4%)	
In which of the past 12 months did this nose problem occur?	January	14 (51.9%)	22 (50.00%)	0.880
	February	13 (48.1%)	21 (47.7%)	0.973
	March	11 (40.7%)	20 (45.5%)	0.697
	April	9 (33.3%)	10 (22.7%)	0.327
	May	4 (14.8%)	6 (13.6%)	1.000
	June	3 (11.1%)	4 (9.1%)	1.000
	July	2 (7.4%)	2 (4.5%)	0.632
	August	1 (3.7%)	1 (2.3%)	1.000
	September	2 (7.4%)	3 (6.8%)	1.000
	October	3 (11.1%)	4 (9.1%)	1.000
	November	5 (18.5%)	7 (15.9%)	0.757
	December	8 (29.6%)	13 (29.5%)	1.000
In the past 12 months, how much did this nose problem interfere with your Daily activities?	Not at all	4 (14.8%)	7 (15.9%)	0.215
	A little	9 (33.3%)	24 (54.5%)	
	A moderate amount	10 (37.0%)	11 (25.0%)	
	A lot	4 (14.8%)	2 (4.5%)	
Have you ever had hay fever?	Yes	12 (16.0%)	12 (6.3%)	**0.013**
	No	63 (84.0%)	178 (93.7%)	

* Chi-square analysis was applied.

Table 5. Comparison of eczema questions according to groups

		Case	Control	p *
		Number (%)	Number (%)	
Have you ever had an itchy rash coming and going for at least six months?	Yes	7(9.3%)	7 (3.7%)	0.074
	No	68 (90.7%)	183 (96.3%)	
Have you had this itchy rash at any time in the last 12 months?	Yes	3 (42.9%)	2 (28.6%)	1.000
	No	4 (57.1%)	5 (71.4%)	
Has this itchy rash at any time affected any of the following places: the folds of the elbows, behind the knees, in front of the ankles, under the buttocks, or around the neck, ears, or eyes?	Yes	3 (42.9%)	2 (28.6%)	1.000
	No	4 (57.1%)	5 (71.4%)	
At what age did this itchy rash first occur?	Under two years	3 (42.9%)	2(28.6%)	1.000
	Age 2-4	2 (28.6%)	3 (42.9%)	
	Age 5 or more	2 (28.6%)	2 (28.6%)	
Has this rash cleared completely at any time during the last 12 months?	Yes	4 (57.1%)	2 (28.6%)	0.592
	No	3 (42.9%)	5 (71.4%)	
In the last 12 months, how often, on average, have you been kept awake at night by this itchy rash?	Never	66 (88.0%)	153 (80.5%)	0.240
	Less than one night per week	7 (9.3%)	33 (17.4%)	
	One or more nights per week	2 (2.7%)	4 (2.1%)	
Have you ever had physician-diagnosed eczema?	Yes	14 (18.7%)	25 (13.2%)	0.254
	No	61 (81.3%)	165 (86.8%)	

* Chi-square analysis was applied.

home (p=0.027). The prevalence of asthma in students with recurrent ear infections (40%) was significantly higher than the rate of asthma (16%) in students without recurrent ear infections (p=0.022). There was a significant difference in asthma among students based on their level of food selectivity, with 5.9% of non-selective students, 21.4% of selective students, and 50% of very selective students having asthma (p=0.014). Similarly, there was a significant difference in the occurrence of allergic rhinitis among students based on their level of food selectivity, with 5.9% of non-selective students, 11.9% of selective students, and 37.5% of very selective students having allergic rhinitis (p=0.029). The prevalence of food allergy did not show a significant difference among different levels of food selectivity, with 11.8% of non-selective students, 10.7% of selective students, and 9.4% of very selective students having food allergies (p=0.922). The prevalence of allergic rhinitis in students with food allergies (38.5%) was significantly higher than that in students without food allergies (11.3%) (p=0.029) (Table 6).

Table 6. Comparison of the presence of asthma, allergic rhinitis, and eczema according to various parameters in gifted students

		Presence of asthma		Presence of allergic rhinitis		Presence of eczema	
		Number (%)	p *	Number (%)	p *	Number (%)	p *
Gender	Female	10 (23.8%)	0.965	7 (16.7%)	0.859	6 (14.3%)	0.272
	Male	8 (24.2%)		5 (15.2%)		8 (24.2%)	
Living place	Rural area	2 (100%)	0.055	2 (100%)	**0.024**	1 (50%)	0.341
	Urban area	16 (21.9%)		10 (13.7%)		13 (17.8%)	
School	Primary school	6 (30%)	0.544	5 (25%)	0.284	4 (20%)	0.858
	Middle school	12 (21.8%)		7 (12.7%)		10 (18.2%)	
Tobacco smoke at home	Yes	9 (40.9%)	**0.027**	5 (22.7%)	0.318	2 (9.1%)	0.210
	No	9 (17%)		7 (13.2%)		12 (22.6%)	
Pets at home	Yes	4 (28.6%)	0.731	4 (28.6%)	0.220	2 (14.3%)	0.641
	No	14 (23.0%)		8 (13.1%)		12 (19.7%)	
Night snoring	Never	12 (24.0%)	0.848	6 (12%)	0.316	9 (18%)	0.805
	Always	0		0		0	
	Only in the presence of respiratory tract infection	6 (25%)		6 (25%)		5 (20.8%)	
Recurren ear infection	Yes	10 (40%)	**0.022**	7 (28%)	0.091	2 (8%)	0.122
	No	8 (16%)		5 (10%)		12 (24%)	
Food selectivity behavior	I never select any food	1 (5.9%)	**0.014**	1 (5.9%)	**0.028**	1 (5.9%)	0.292
	I am selective	9 (21.4%)		5 (11.9%)		10 (23.8%)	
	I am very selective	8 (50%)		6 (37.5%)		3 (18.8%)	
Food allergy	Yes	6 (46.2%)	0.069	5 (38.5%)	**0.029**	3 (23.1%)	0.699
	No	12 (19.4%)		7 (11.3%)		11 (17.7%)	

* Chi-square analysis was applied.

DISCUSSION

Numerous studies have indicated that the socioeconomic background, as well as the social, emotional, and cognitive status of individuals, have a positive effect on intelligence (11). In a study conducted in 2023, Bıçakçı (12) reported that the prevalence of giftedness is higher among individuals with higher economic incomes, those residing in urban areas, and those with highly educated parents. The current study found that the income level of families with gifted children was significantly higher than that of families with average children (p=0.014). However, no significant association was observed between giftedness and the education level of parents or the rural/urban residence of the children.

In the current study, gifted children were found to have a significantly lower number of siblings compared to typical children (p<0.001). However, it is worth noting that Coşkun's (13) study conducted in 2018 reported no significant association between the number of siblings and giftedness. Additionally, David and Landau[14] noted a decline in the number of siblings in gifted families between 1983 and 2003.

In the present study, no significant difference in handedness was found between gifted students and typical students. This finding aligns with the results of Papadatou-Pastou and Tomprou's (15) meta-analysis, which also concluded that there was no difference in handedness between gifted and typical individuals. However, it is important to note that Piro et al. (16) reported a higher rate of left-handedness among gifted students in their study.

In the present study, the rate of snoring in gifted students (32%) when they had a respiratory tract infection was found to be significantly higher than the rate of typical students (16.8%) (p=0.025). Nosetti et al. (17) reported that 35% of children with primary snoring have allergic rhinitis and that snoring increases when a respiratory tract infection occurs.

In addition, the rate of recurrent ear infections was found to be significantly higher in gifted children (33.3%) than in typical students (20.5%) in the present study (p=0.028). Previous studies have shown that many factors, such as genetics, environment, and allergies, including allergic rhinitis and asthma, play a role in snoring and recurrent ear infections (18,19).

In the present study, 22.7% of the gifted students were not selective in food, 56% were selective, and 21.3% were very selective. Among typical students, 40% were not selective in food, 51.6% were selective, and 8.4% were very selective. There was a significant difference in selectivity between the groups (p=0.002). Similar to our findings, Daniels and Piechowski (20) stated that food selectivity was high in gifted children. Neihart (21) also stated that gifted children prefer foods with specific textures.

Similar to the present study, Parker et al. (22) reported that the prevalence of allergy in gifted students was nearly twice that of typical students (32.4%, 18.2%), and the prevalence of asthma was more than twice as high (2.8%, 1.3%). Karpinski et al. (7) also found higher rates of asthma (15.4%, 7.4%), food allergy (9.6%, 3.7%), and environmental allergy (33.2%, 10.6%) in gifted individuals compared to the average population. Shichtman[23] stated that some studies have found a high prevalence of allergies in gifted individuals due to their high sensitivity, with allergy-related conditions such as dermatitis, allergic rhinitis, and asthma being more common. However, Fries et al. (24) reported that while the prevalence of certain diseases such as chronic fatigue syndrome, autism spectrum disorders, depression, anxiety, and irritable bowel syndrome was higher in gifted individuals compared to the average population, there was no difference in terms of asthma and allergies.

In the present study, there was no difference in the incidence of asthma and eczema based on the place of residence. However, the rate of allergic rhinitis (100%) in gifted students living in rural areas was found to be significantly higher than in those living in urban areas (13.7%) (p=0.024). In a systematic review and meta-analysis conducted by Song et al. (25), no difference in allergic rhinitis was found in children aged 0-18 years between those living in urban and rural areas. However, asthma was reported to be more prevalent in urban areas. On the other hand, Moitra et al. (26) stated that many allergic diseases, including allergic rhinitis, are more common in urban areas due to air pollution, gas, dust, and fumes.

In the present study, the prevalence of asthma was found to be significantly higher among gifted students who were exposed to tobacco smoke at home (40.9%) than among those who were not exposed to smoke at home (17%) (p=0.027). Despite the claim of no difference, many studies (27,28) argue that exposure to environmental tobacco smoke, primarily in the home, increases the prevalence of various allergic diseases, including asthma. He et al. (29) reported that exposure to tobacco smoke increases the risk of asthma by 24%.

In the present study, the prevalence of asthma was found to be significantly higher among gifted students with recurrent ear infections (40%) than among those without recurrent ear infections (16%) (p=0.022). Consistent with the present study, previous research indicates that otitis media, allergic rhinitis, and asthma are often associated with eustachian tube dysfunction, and children with recurrent otitis media are at a higher risk of developing asthma (30,31). Kim et al. (32) in their study, found a higher prevalence of asthma in the group with chronic otitis media when compared to the control group (17.5% vs. 14.3%, $p < 0.001$).

In the present study, the prevalence of asthma was 5.9% among gifted students who did not select food, 21.4% among those who were selective, and 50% among those who were very selective, with a significant difference observed between these groups (p=0.014). Similarly, allergic rhinitis was observed in 5.9% of those who did not select foods at all, 11.9% of those who were selective, and 37.5% of those who were very selective, with a significant difference between these groups (p=0.029). These findings suggest a strong association between food selectivity behavior and allergic disorders, specifically asthma and allergic rhinitis, in gifted students. Interestingly, the present study did not find a relationship between food selectivity behavior and food allergy.

In the present study, no significant difference was observed in the rates of asthma and eczema among gifted students with food allergies. However, the rate of allergic rhinitis was found to be significantly higher in individuals with food allergies (38.5%) compared to those without food allergies (11.3%) (p=0.029). These findings align with the observations of Pénard-Morand et al. (33) who reported a positive association between food allergy, asthma, and allergic rhinitis. Nutten (34) also highlighted that atopic dermatitis and food allergy often coexist and that the presence of atopic dermatitis and food allergy in early childhood increases the risk of developing allergic rhinitis and asthma later in life. Furthermore, Tan and Corren (35) emphasized that asthma, allergic rhinitis, food allergy, and atopic dermatitis share common mechanisms involving the triggering of specific IgE in the nose, lungs, gastrointestinal tract, and skin. Taken together, these findings support the notion of interconnectedness among these allergic conditions.

Factors that cause air pollution such as dust increase the risk of allergic reactions and related allergic diseases due to themselves and the chemical, biological, and mineralogic components they carry (36). The occurrence of two earthquakes in Adıyaman on February 6, 2023, destroying numerous buildings, led to the release of dust and smoke from debris. The subsequent air pollution from the debris removal and demolition of severely damaged buildings and new construction sites replacing the destroyed buildings may have contributed to increased allergic reactions among the children in the study or potentially led to the misdiagnosis of dust-related disorders as allergic diseases. It should be noted that only two out of the 75 gifted students in the study (2.67%) lived in rural areas, and both had asthma and also allergic rhinitis. This limited representation of the rural areas in the study may have reduced the statistical power to compare the differences between urban and rural areas. Many studies have reported that there are exacerbations of many allergic diseases, such as asthma, during the spring season in the northern hemisphere, including Türkiye (37). Another limitation of the study is that it was conducted in the spring, rather than in the winter after the earthquakes, when allergic symptoms and diseases are typically heightened.

The study revealed higher rates of food allergy, recurrent ear infections, food selectivity, physician-diagnosed allergic rhinitis, self-reported allergic rhinitis, and asthma among gifted children. Moreover, the study showed that gifted children with recurrent ear infections have a higher prevalence of asthma, those with food allergies have a higher prevalence of allergic rhinitis, and those with food selectivity, regardless of food allergy, have higher rates of asthma and allergic rhinitis. These findings highlight the association between giftedness and various allergic conditions, suggesting that certain factors like recurrent otitis and food selectivity behavior may contribute to the higher prevalence of these conditions in gifted children.

Ethical approval

This study has been approved by the Adıyaman University Non-Interventional Research Ethics Committee (approval date 24/01/2023, number 2023/1-3). Written informed consent was obtained from the participants.

Author contribution

Concept: EÖ, OK; Design: MT, FEK; Data Collection or Processing: OK, HA; Analysis or Interpretation: OK, FB; Literature Search: EÖ, HT; Writing: EÖ, OK, OK. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

REFERENCES

1. Güllühalı EI, Gamze İ, Baltacı R, Melekoğlu M. From past to present gifted and talented: The evolution of terminologies. OJER. 2021; 8(2): 247-66.
2. Renati R, Bonfiglio NS, Dilda M, Mascia ML, Penna MP. Gifted children through the eyes of their parents: talents, social-emotional challenges, and educational strategies from preschool through middle school. Children (Basel). 2022; 10(1): 42. [Crossref]
3. Worrell FC. What does gifted mean? Personal and social identity perspectives on giftedness in adolescence. In: Horowitz FD, Subotnik RF, Matthews DJ, editors. The development of giftedness and talent across the life span. American Psychological Association; 2009: 131–52. https://psycnet.apa.org/doi/10.1037/11867-008
4. Papadopoulos D. Parenting the exceptional social-emotional needs of gifted and talented children: What do we know? Children (Basel). 2021; 8(11): 953. [Crossref]
5. Wood V, Laycraft K. How can we better understand, identify, and support highly gifted and profoundly gifted students? A literature review of the psychological development of highly-profoundly gifted individuals and overexcitabilities. Ann Cogn Sci. 2020; 4(2): 143-65. [Crossref]
6. Mohamed AHH, Abdelfattah F, Opoku M. Multi-Informant Assessment of High-Achieving Students' Behavioral and Emotional Strengths. J Child Fam Stud. 2022; 31(8): 2303-17. [Crossref]
7. Karpinski RI, Kolb AMK, Tetreault NA, Borowski TB. High intelligence: A risk factor for psychological and physiological overexcitabilities. Intelligence. 2018; 66: 8-23. [Crossref]
8. Sarıtaş E, Şahin Ü, Çatalbaş G. Science and Art Centers (SAC) According to the Parents. Journal of Qualitative Research in Education. 2019; 7(1): 114-33. [Crossref]
9. Asher MI, Keil U, Anderson HR, et al. International Study of Asthma and Allergies in Childhood (ISAAC): rationale and methods. Eur Respir J. 1995; 8(3): 483-91. [Crossref]
10. Oneş U, Sapan N, Somer A, et al. Prevalence of childhood asthma in Istanbul, Turkey. Allergy. 1997; 52(5): 570-5. [Crossref]
11. Batterjee AA. The relationship between SES and giftedness in Saudi Arabia. Mankind Q. 2013; 53(3): 3-52. [Crossref]
12. Bicakci M. Exploring the Relationship between Socioeconomic Status and Identification of Gifted in Turkey through Critical Systems Thinking. H. U. Journal of Education. 2023; 38(2):47-61. [Crossref]
13. Coşkun T. Üstün zekâlı çocuklarda zekâ bölümüne (IQ) olası etkili faktörlerin incelenmesi. JOHASS. 2018; 1(1): 1-9.
14. David H, Landau E. Characteristics of gifted students: Age and gender findings in three decades cohorts (A) General Introduction. Gift Educ Int. 2005; 20(2): 28-44. [Crossref]
15. Papadatou-Pastou M, Tomprou DM. Intelligence and handedness: Meta-analyses of studies on intellectually disabled, typically developing, and gifted individuals. Neurosci Biobehav Rev. 2015; 56: 151-65. [Crossref]
16. Piro JM, Ortiz C, Manouvrier L. Sleep behaviors and handedness in gifted and non-gifted children. Dev Neuropsychol. 2021; 46(6): 425-34. [Crossref]
17. Nosetti L, Piacentini G, Macchi A, et al. Nasal cytology in children with primary snoring and obstructive sleep apnoea syndrome. Int J Pediatr Otorhinolaryngol. 2019; 122: 133-7. [Crossref]
18. Gozal D, Kheirandish-Gozal L, Capdevila OS, Dayyat E, Kheirandish E. Prevalence of recurrent otitis media in habitually snoring school-aged children. Sleep Med. 2008; 9(5): 549-54. [Crossref]
19. Kumari MS, Madhavi J, Krishna NB, Meghanadh KR, Jyothy A. Prevalence and associated risk factors of otitis media and its subtypes in South Indian population. Egyptian Journal of Ear, Nose, Throat and Allied Sciences. 2016; 17(2): 57-62. [Crossref]
20. Daniels S, Meckstroth E. Nurturing the Sensitivity, Intensity, and Developmental Potential of Young Gifted Children. In: Daniels S, Piechowski MM, editors. Living with intensity: Understanding the sensitivity, excitability, and emotional development of gifted children, adolescents, and adults. Scottsdale, AZ: Great Potential Press; 2009: 41-2.
21. Neihart M. Gifted children with Asperger's syndrome. Gifted Child Quarterly. 2000; 44(4): 222-30. [Crossref]
22. Parker WD, Portesová S, Stumpf H. Perfectionism in mathematically gifted and typical Czech students. Journal for the Education of the Gifted. 2001; 25(2): 138-52. [Crossref]
23. Shichtman D. Concerns and problems of parents of academically successful gifted children [doctoral dissertation]. Teachers College, Columbia University; 1999. Available at: https://www.proquest.com/openview/34231ec03e9c3e7c00fc7054af0a7348/1?pq-origsite=gscholar&cbl=18750&diss=y
24. Fries J, Baudson TG, Kovacs K, Pietschnig J. Bright, but allergic and neurotic? A critical investigation of the "overexcitable genius" hypothesis. Front Psychol. 2022; 13: 1051910. [Crossref]
25. Song M, Hwang S, Son E, et al. Geographical Differences of Risk of Asthma and Allergic Rhinitis according to Urban/Rural Area: a Systematic Review and Meta-analysis of Cohort Studies. J Urban Health. 2023; 100(3): 478-92. [Crossref]
26. Moitra S, Mahesh PA, Moitra S. Allergic rhinitis in India. Clin Exp Allergy. 2023; 53(7): 765-76. [Crossref]

27. Huang S, Garshick E, Weschler LB, et al. Home environmental and lifestyle factors associated with asthma, rhinitis and wheeze in children in Beijing, China. Environ Pollut. 2020; 256: 113426. **[Crossref]**

28. Saulyte J, Regueira C, Montes-Martínez A, Khudyakov P, Takkouche B. Active or passive exposure to tobacco smoking and allergic rhinitis, allergic dermatitis, and food allergy in adults and children: a systematic review and meta-analysis. PLoS Med. 2014; 11(3): e1001611. **[Crossref]**

29. He Z, Wu H, Zhang S, et al. The association between secondhand smoke and childhood asthma: A systematic review and meta-analysis. Pediatr Pulmonol. 2020; 55(10): 2518-31. **[Crossref]**

30. Schuller DE. Prophylaxis of otitis media in asthmatic children. Pediatr Infect Dis. 1983; 2(4): 280-3. **[Crossref]**

31. Kim SY, Kim HR, Min C, Choi HG. Bidirectional association between asthma and otitis media in children. Allergy Asthma Clin Immunol. 2021; 17(1): 7. **[Crossref]**

32. Kim SK, Hong SJ, Yoo DM, Min C, Choi HG. Association between asthma or chronic obstructive pulmonary disease and chronic otitis media. Sci Rep. 2022; 12(1): 4228. **[Crossref]**

33. Pénard-Morand C, Raherison C, Kopferschmitt C, et al. Prevalence of food allergy and its relationship to asthma and allergic rhinitis in schoolchildren. Allergy. 2005; 60(9): 1165-71. **[Crossref]**

34. Nutten S. Atopic dermatitis: global epidemiology and risk factors. Ann Nutr Metab. 2015; 66(Suppl 1): 8-16. **[Crossref]**

35. Tan RA, Corren J. The relationship of rhinitis and asthma, sinusitis, food allergy, and eczema. Immunol Allergy Clin North Am. 2011; 31(3): 481-91. **[Crossref]**

36. Fussell JC, Kelly FJ. Mechanisms underlying the health effects of desert sand dust. Environ Int. 2021; 157: 106790. **[Crossref]**

37. Geat D, Giovannini M, Barlocco EG, et al. Characteristics associated with clinical response to Comano thermal spring water balneotherapy in pediatric patients with atopic dermatitis. Ital J Pediatr. 2021; 47(1): 91. **[Crossref]**