

# Prevalence of Allergic Rhinitis and its Impact on Quality of Life Among Pediatric Patients in Tabuk, Saudi Arabia

Sawsan Mohammed S. Alblewi<sup>1\*</sup>, Lama Mousa Alenazi<sup>2</sup>, Rawan Saud Alshahrani<sup>2</sup>, Rahaf Thamer Alharbi<sup>2</sup>, Nouf Abdulla Alotaibi<sup>2</sup>, Hadeel Mousa D. Albalawi<sup>2</sup>, Dalal Luai S. Albalawi<sup>2</sup>, Atiaf Abdullah Alfaidi<sup>2</sup> and Danah Ali H. Abu Sabir<sup>2</sup>

<sup>1</sup>Pediatric Department, Faculty of Medicine, University of Tabuk, Tabuk, Saudi Arabia

<sup>2</sup>Medicine and Surgery, Faculty of Medicine, University of Tabuk, Tabuk, Saudi Arabia

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## ABSTRACT

**Objectives:** Allergic rhinitis (AR) is a common condition among schoolchildren in various regions of Saudi Arabia, manifesting primarily through nasal symptoms. It significantly affects sleep, mood, and academic performance due to exposure to allergens. AR places a considerable burden on the quality of life (QoL), often leading to moderate to high levels of stress. We aimed to assess the prevalence and impact of AR on the QoL among children. **Methods:** This cross-sectional observational study was conducted from September 2023 to April 2024 in Tabuk, Saudi Arabia. Data was collected from a self-administered questionnaire adapted from previous studies. **Results:** The study included 235 pediatric patients. The prevalence of diagnosed AR among the participants was 64.3% (n = 151). Symptoms duration varied, with seasonal allergies affecting 63.4% (n = 149) and perennial allergies affecting 41.7% (n = 98) of the children. Notably, sleep quality was significantly compromised in 79.1% (n = 186) of cases, and emotional well-being was impacted in 78.3% (n = 184). AR was significantly correlated with impaired daily activities, school performance, and social interactions ( $p < 0.001$ ). It also had a profound impact on sleep quality ( $p < 0.001$ ), emotional well-being ( $p < 0.001$ ), and physical activity ( $p < 0.001$ ), indicating a broad and severe effect on QoL. Management strategies demonstrated significant associations, with education or counseling ( $p = 0.009$ ) and psychological support ( $p = 0.043$ ), showing the strongest correlation with the prevalence and management of AR. **Conclusions:** This study demonstrated that AR has a significant and multifaceted impact on pediatric patients in Tabuk, Saudi Arabia, affecting daily activities, sleep, emotional well-being, and physical activities. While educational initiatives and psychological support showed promise in managing the condition, further efforts are required to address environmental factors and enhance comprehensive management strategies.

Allergic rhinitis (AR) is the most common immunological disorder, with prevalence rates reaching up to 50% in some countries. Often underestimated, AR is a global health problem that contributes to significant morbidity. In children, AR not only diminishes the quality of life (QoL) through its symptoms but also affects contiguous organs such as the sinuses, ears, and chest. Additionally, it causes sleep disturbances, leading to reduced school performance, family difficulties, and decreased participation in outdoor activities. Much of our understanding of pediatric AR epidemiology is derived from the International Study of Asthma and

Allergies in Childhood survey, first conducted in 1997 and subsequently repeated.<sup>1</sup>

AR is an immunoglobulin E-mediated condition triggered by exposure of the nasal mucosa to allergens. A study among Saudi schoolchildren reported a prevalence rate of 27.1%.<sup>2</sup> AR can lead to nasal obstruction, itching, and psychological effects such as stress, depression, and anxiety, interfering with sleep, mood, and academic performance.<sup>3</sup> In 2023, a study conducted in Al-Ahsa demonstrated that AR significantly impacts the QoL and is associated with moderate to high stress levels.<sup>3</sup>

Several studies have explored the prevalence, patterns, and severity of AR among children and

\*Corresponding author: ✉swalbalawi@ut.edu.sa

teenagers in Saudi Arabia. Alhazmi reported a prevalence rate of 51.3% for AR or symptoms indicative of AR in this demographic in the Al-Qassim region.<sup>4</sup> In 2020, a study in Madinah examined the prevalence, knowledge, and practices regarding AR, revealing a significant proportion of the population was affected, particularly those from favorable family backgrounds.<sup>5</sup> Additionally, a study by Albaloushi, involving 807 participants, found an increasing prevalence of AR, with 76% of participants either diagnosed with AR or exhibiting symptoms consistent with the condition.<sup>6</sup>

The literature on the impact of AR on the QoL is limited. To our knowledge, no studies have been conducted to evaluate this in Tabuk. Therefore, this study aimed to assess the prevalence and impact of AR among pediatric patients aged < 14 years.

## METHODS

This cross-sectional observational study was conducted from September 2023 to April 2024 in Tabuk, Saudi Arabia. The study aimed to assess the prevalence and impact of AR among pediatric patients aged < 14 years. Ethical approval was obtained from the Research Ethics Committee at the University of Tabuk. The study adhered to the Declaration of Helsinki, with informed consent appropriately obtained and participants' privacy and confidentiality maintained. The committee issued an official approval letter (number UT-310-155-2023), which was mandatory for initiating the data collection process.

A simple random sampling method was used to estimate a sample size of 385 with a 95% confidence levels using the Qualtrics calculator, and a 50% assumed prevalence of AR, a conservative estimate given that the exact prevalence was unknown.<sup>7</sup> This method ensured that every pediatric patient had an equal chance of being selected for the study. A comprehensive list of all eligible pediatric patients was compiled, from which 385 participants were randomly selected using random number generation techniques. This approach minimized selection bias. This sample size was chosen to ensure sufficient statistical power to detect significant associations and maintain the reliability and validity of the study findings. Ultimately, 300 participants responded, resulting in a 78.1% response rate.

The inclusion criteria included pediatric patients and their parents residing in Tabuk who

consented to participate in the electronic self-administered questionnaire. Exclusion criteria included individuals who refused to participate, those living outside of Tabuk, pediatric patients with other chronic illnesses that could confound the study results, parents or guardians unable to provide informed consent, and children who had not been diagnosed with AR. Data were collected through an online structured questionnaire derived from similar previous studies.<sup>1,8-10</sup> The questionnaire ensured anonymity and confidentiality of personal information for research purposes. The children were already diagnosed with AR by their treating physician according to the Saudi guidelines. A comprehensive statistical analysis was conducted on the dataset, encompassing descriptive and inferential methodologies. Descriptive statistics were used to summarize the demographic characteristics of the participants, including age, gender, and other relevant features. Means, medians, SD, and frequency distributions were calculated as appropriate for continuous and categorical variables.

Inferential analysis included the use of the chi-square test and multivariate logistic regression. The chi-square test was applied to assess the association between categorical variables, such as the presence of AR, and demographic characteristics like gender and age groups. This test is particularly suitable for large sample sizes, ensuring that the expected frequencies within each category are sufficiently high. Additionally, multivariate logistic regression analysis was conducted using IBM SPSS (IBM Corp. Released 2023. IBM SPSS Statistics for Windows, Version 29.0.2.0 Armonk, NY: IBM Corp.) to identify predictors and assess the strength of associations between multiple independent variables and the dependent variable, the presence of AR. The regression model incorporated factors such as age, gender, environmental influences, family history, and other relevant variables.

The significance level was set at a *p*-value of < 0.05, with a 95% CI. Odds ratios (ORs) with corresponding CIs were reported to quantify the strength of associations.

## RESULTS

The study initially included 300 participants, with 65 excluded based on the exclusion criteria, resulting in 235 pediatric patients. Among them, 129 (54.9%)

were female and 106 (45.1%) were male. The age distribution was as follows: 70 (29.8%) were < 5 years, 98 (41.7%) were 5–10 years, and 67 (28.5%) were 11–14 years old. The majority of participants, 219 (93.2%), were Saudi nationals, with 16 (6.8%) being non-Saudi. Most of the children's parents were married ( $n = 209$ , 88.9%), while 26 (11.1%) were widowed or divorced. The predominant level of education among fathers was a bachelor's degree ( $n = 168$ , 71.5%), and 179 (76.2%) mothers also held bachelor's degrees. Employment was common among fathers ( $n = 161$ , 68.5%) and mothers who were either employed ( $n = 124$ , 52.8%) or housewives ( $n = 68$ , 28.9%). Most families reported a monthly income above 10 000 SAR ( $n = 152$ , 64.7%) [Table 1].

Table 2 shows various features of AR among participants. Of the 235 participants, 151 (64.3%) children had been diagnosed with AR, while 84 (35.7%) had not. The duration of symptoms varied: 55 (23.4%) children experienced symptoms for less than six months, 47 (20.0%) for 6–12 months, 25 (10.6%) for 1–3 years, and 24 (10.2%) for > 3 years. The mean age at diagnosis was  $56.2 \pm 33.7$  months, ranging from 6–156 months. Symptom frequency varied, with 62 (26.4%) children experiencing symptoms several times a week, 45 (19.1%) less than once a week, 25 (10.6%) once a week, and 19 (8.1%) daily. Seasonal allergies were reported by 149 (63.4%) children, while 98 (41.7%) had constant allergies. Allergy testing was performed on 57 (24.3%) children, revealing a median of five allergens (IQR = 3–6), ranging from 1–15 allergens.

Figure 1 shows the severity of different symptoms of AR among participants. The severity of symptoms varied among participants. Sneezing was experienced with a mild severity by 34.0%, moderate severity by 25.1%, and severe symptoms by 17.9%. A runny nose was reported with mild severity by 33.6%, moderate severity by 26.0%, and severe symptoms by 15.7%. Nose itching was experienced with mild severity by 35.3%, moderate severity by 24.7%, and severe symptoms by 14.9%. A stuffy nose affected 30.2% with mild severity, 23.0% with moderate severity, and 16.6% with severe symptoms. Continuous tearing in the eyes was reported with mild severity by 32.8%, moderate severity by 19.1%, and severe symptoms by 14.0%.

Table 3 evaluates the QoL among the participants, revealing varying degrees of impact on daily activities, school performance, and social

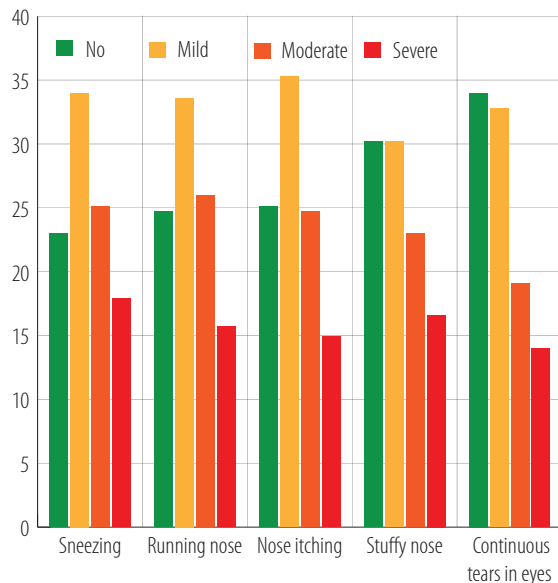
**Table 1:** Sociodemographic features of participants (N = 235).

Variables	Frequency n (%)
<b>Sex</b>	
Female	129 (54.9)
Male	106 (45.1)
<b>Age, years</b>	
< 5	70 (29.8)
5–10	98 (41.7)
11–14	67 (28.5)
<b>Nationality</b>	
Non-Saudi	16 (6.8)
Saudi	219 (93.2)
<b>Marital status of parents</b>	
Widowed/divorced	26 (11.1)
Married	209 (88.9)
<b>Educational status of fathers</b>	
Illiterate/primary to intermediate	23 (9.8)
Secondary education	44 (18.7)
Bachelor's degree	168 (71.5)
<b>Educational status of mothers</b>	
Illiterate/primary to intermediate	14 (6.0)
Secondary education	42 (17.9)
Bachelor's degree	179 (76.2)
<b>Employment status of fathers</b>	
Employee	161 (68.5)
Health practice	23 (9.8)
Freelancer	17 (7.2)
Student/unemployed	7 (3.0)
Retired	27 (11.5)
<b>Employment status of mothers</b>	
Employee	124 (52.8)
Housewife	68 (28.9)
Health practice	18 (7.7)
Freelancer	12 (5.1)
Student/retired	13 (5.5)
<b>Monthly income, SAR</b>	
< 5000	12 (5.1)
5000–10 000	71 (30.2)
> 10 000	152 (64.7)

interactions. Notably, 45 (19.1%) children were unaffected, while 51 (21.7%) were greatly affected. Regarding school or activity absenteeism, 61 (26.0%) children were not affected, and 64 (27.2%) were mildly affected. Symptoms experienced at school included tiredness in 123 (52.3%) children, drowsiness from nasal congestion in 49 (20.9%), learning and concentration difficulties in 42 (17.9%), and other disorders in 21 (8.9%). Sleep quality was compromised for 186 (79.1%) children, with 49 (20.9%) unaffected. General mood and emotional

**Table 2:** Different features of allergic rhinitis among participants (N = 235).

Questions		n (%)
Has your child been diagnosed with allergic rhinitis?	No	84 (35.7)
	Yes	151 (64.3)
How long has your child suffered from symptoms of allergic rhinitis?	< 6 months	55 (23.4)
	6–12 months	47 (20.0)
	1–3 years	25 (10.6)
	> 3 years	24 (10.2)
What is the age (in months) at which a child is diagnosed with allergic rhinitis?	Mean $\pm$ SD	56.2 $\pm$ 33.7
	Range	6–156
How often does your child suffer from symptoms of allergic rhinitis?	Less than once a week	45 (19.1)
	Once a week	25 (10.6)
	Several times a week	62 (26.4)
	Daily	19 (8.1)
Does your child suffer from seasonal allergies?	No	86 (36.6)
	Yes	149 (63.4)
Does your child suffer from constant allergies?	No	137 (58.3)
	Yes	98 (41.7)
Have you conducted any allergy tests on your child to determine the allergens?	No	178 (75.7)
	Yes	57 (24.3)
How many allergens does the child suffer from?	Median (SD)	5 (2.9)
	Range	1–15

**Figure 1:** Degree of allergic rhinitis symptom severity.

well-being were impacted, with 68 (28.9%) children mildly affected, 74 (31.5%) moderately affected, and 42 (17.9%) greatly affected. Emotional symptoms

**Table 3:** Assessment of quality of life among participants (N = 235).

Questions		n (%)
How does allergic rhinitis affect your child's daily activities (such as school performance and social interactions)?	Doesn't affect	45 (19.1)
	Mildly	62 (26.4)
	Moderately	77 (32.8)
	Greatly	51 (21.7)
How often does your child miss school or other activities due to symptoms of allergic rhinitis?	Doesn't affect	61 (26.0)
	Mildly	64 (27.2)
	Moderately	57 (24.3)
	Greatly	53 (22.6)
Does your child suffer from any of the following symptoms at school?	Tired	123 (52.3)
	Drowsiness due to nasal congestion	49 (20.9)
	Difficulty learning and concentrating	42 (17.9)
	Other disorders	21 (8.9)
How does allergic rhinitis affect your child's sleep quality?	Doesn't affect	49 (20.9)
	Mildly	60 (25.5)
	Moderately	79 (33.6)
	Greatly	47 (20.0)
How does allergic rhinitis affect your child's general mood and emotional well-being?	Doesn't affect	51 (21.7)
	Mildly	68 (28.9)
	Moderately	74 (31.5)
	Greatly	42 (17.9)
Does your child suffer from any of the following symptoms?	Nothing	133 (56.6)
	Anger	41 (17.4)
	Frustration	25 (10.6)
	Sorrow	17 (7.2)
	Isolation	19 (8.1)
Does your child suffer from restrictions in participating in physical activities due to allergic rhinitis?	Yes	96 (40.9)
	Doesn't affect	73 (31.1)
How does allergic rhinitis affect your child's general enjoyment of life?	Mildly	55 (23.4)
	Moderately	73 (31.1)
	Greatly	34 (14.5)
Any specific environmental factors that you think are contributing to his or her allergic rhinitis symptoms?	Yes	101 (43.0)

included anger in 41 (17.4%) children, frustration in 25 (10.6%), sorrow in 17 (7.2%), and isolation in 19 (8.1%). Physical activity restrictions were reported by 96 (40.9%) children. General enjoyment of life was unaffected in 73 (31.1%) children, mildly affected in 55 (23.4%), moderately affected in 73 (31.1%), and greatly affected in 34 (14.5%). Additionally, 101 (43.0%) parents identified environmental factors as contributors to their children's symptoms.



Table 4 presents the knowledge and practices related to the management and prevention of AR among the 235 participants. Among these, 135 (57.4%) children received treatment for AR, while 100 (42.6%) did not. During the past week, 118 (50.2%) children received no treatment, 58 (24.7%) used nasal steroids, 50 (21.3%) took oral antihistamines, and nine (3.8%) used non-steroidal nasal treatments. Parental knowledge about AR varied, with 46 (19.6%) parents being unfamiliar with the condition, 139 (59.1%) having moderate knowledge, and 50 (21.3%) being very knowledgeable. Education or counseling was provided to 112 (47.7%) children, whereas 123 (52.3%) received none. Psychological or emotional support was sought by 85 (36.2%) parents, while 150 (63.8%) did not pursue such support. Satisfaction with available support and resources was reported as follows: 30 (12.8%) parents were not satisfied, 129 (54.9%) were neutral, and 76 (32.2%) were very satisfied. Preventive measures were known by 150 (63.8%) parents.

Table 5 examines the association between AR and various aspects of QoL among the participants. AR significantly impacted daily activities, school performance, and social interactions ( $p < 0.001$ ), with 90.2% ( $n = 46$ ) of children greatly affected by these issues having AR compared to 22.2% ( $n = 10$ ) of those not affected. School absenteeism was significantly related to AR ( $p < 0.001$ ), with 84.9% ( $n = 45$ ) of those greatly affected experiencing AR. Symptoms at school, such as tiredness (61.8%) and drowsiness (65.3%), were common among children with AR, although this was not statistically significant ( $p = 0.819$ ). Sleep quality was significantly affected ( $p < 0.001$ ), with 89.4% ( $n = 42$ ) of those greatly affected by poor sleep quality having AR. Emotional well-being was also significantly impacted ( $p < 0.001$ ), with 88.1% ( $n = 37$ ) of those greatly affected by emotional issues having AR. Emotional symptoms, including anger ( $n = 31$ , 75.4%), frustration ( $n = 21$ , 84.0%), sorrow ( $n = 14$ , 82.4%), and isolation ( $n = 17$ , 89.5%), were significantly more prevalent among those with AR ( $p < 0.001$ ). Physical activity restrictions were more common ( $n = 79$ , 82.3%) among those with AR ( $p < 0.001$ ). Lastly, general enjoyment of life was significantly reduced ( $p < 0.001$ ), with 91.2% ( $n = 31$ ) of those greatly affected by reduced enjoyment experiencing AR.

**Table 4:** Knowledge about treatment, management, and prevention of allergic rhinitis (N = 235).

Questions		n (%)
Has your child received any treatment for allergic rhinitis?	No	100 (42.6)
	Yes	135 (57.4)
What treatment did your child receive last week?	Nothing	118 (50.2)
	Local steroidal	58 (24.7)
	Oral antihistamines	50 (21.3)
	Local non-steroidal	9 (3.8)
How knowledgeable do you feel about allergic rhinitis and how to deal with it?	Not familiar	46 (19.6)
	Moderate	139 (59.1)
	Very knowledgeable	50 (21.3)
Has your child received any education or counseling about allergic rhinitis?	No	123 (52.3)
	Yes	112 (47.7)
Have you sought any psychological or emotional support for your child to cope with the impact of allergic rhinitis on their quality of life?	No	150 (63.8)
	Yes	85 (36.2)
How satisfied are you with the support and resources available to improve your child's quality of life despite allergic rhinitis?	Not satisfied	30 (12.8)
	Neutral	129 (54.9)
	Very satisfied	76 (32.2)
Do you know any preventive measures to reduce the symptoms of allergic rhinitis in your child?	Yes	150 (63.8)

Table 6 examines the association between various management aspects and the prevalence of AR among the participants. Specific environmental factors did not show a significant association with AR prevalence, with OR of 1.506 (95% CI: 0.782–2.901) and a  $p$ -value of 0.221. Similarly, knowledge about AR and its management was not significantly associated with prevalence, with an exponential value of (B) (Exp(B)) of 1.439 (95% CI: 0.820–2.524) and a  $p$ -value of 0.204. However, children who received education or counseling had a significantly higher likelihood of having AR, with an Exp(B) of 2.620 (95% CI: 1.269–5.411) and a  $p$ -value of 0.009. Additionally, receiving psychological or emotional support was significantly associated with a higher prevalence of AR, with an Exp(B) of 2.349 (95% CI: 1.029–5.365) and a  $p$ -value of 0.043. Satisfaction with available resources did not show a significant association, with an Exp(B) of 0.967

**Table 5:** Association between different aspects of quality of life and allergic rhinitis.

Questions		Diagnosed allergic rhinitis		Sig. value
		No n (%)	Yes n (%)	
How does allergic rhinitis affect your child's daily activities (such as school performance and social interactions)?	Doesn't affect	35 (77.8)	10 (22.2)	< 0.001 <sup>a</sup>
	Mildly	25 (40.3)	37 (59.7)	
	Moderately	19 (24.7)	58 (75.3)	
	Greatly	5 (9.8)	46 (90.2)	
How often does your child miss school or other activities due to symptoms of allergic rhinitis?	Doesn't affect	42 (68.9)	19 (31.1)	< 0.001 <sup>a</sup>
	Mildly	21 (32.8)	43 (67.2)	
	Moderately	13 (22.8)	44 (77.2)	
	Greatly	8 (15.1)	45 (84.9)	
Does your child suffer from any of the following symptoms at school?	Tired	47 (38.2)	76 (61.8)	0.819 <sup>a</sup>
	Drowsiness due to nasal congestion	17 (34.7)	32 (65.3)	
	Difficulty learning and concentrating	14 (33.3)	28 (66.7)	
	Disorder	6 (28.6)	15 (71.4)	
How does allergic rhinitis affect your child's sleep quality?	Doesn't affect	34 (69.4)	15 (30.6)	<0.001 <sup>a</sup>
	Mildly	22 (36.7)	38 (63.3)	
	Moderately	23 (29.1)	56 (70.9)	
	Greatly	5 (10.6)	42 (89.4)	
How does allergic rhinitis affect your child's general mood and emotional well-being?	Doesn't affect	36 (70.6)	15 (29.4)	< 0.001 <sup>a</sup>
	Mildly	28 (41.2)	40 (58.8)	
	Moderately	15 (20.3)	59 (79.7)	
	Greatly	5 (11.9)	37 (88.1)	
Does your child suffer from any of the following symptoms?	Nothing	65 (48.9)	68 (51.1)	< 0.001 <sup>a</sup>
	Anger	10 (24.4)	31 (75.4)	
	Frustration	4 (16.0)	21 (84.0)	
	Sorrow	3 (17.6)	14 (82.4)	
	Isolation	2 (10.5)	17 (89.5)	
Does your child suffer from restrictions in participating in physical activities due to allergic rhinitis?	No	67 (48.2)	72 (51.8)	< 0.001 <sup>a</sup>
	Yes	17 (17.7)	79 (82.3)	
How does allergic rhinitis affect your child's general enjoyment of life?	Doesn't affect	43 (58.9)	30 (41.1)	< 0.001 <sup>a</sup>
	Mildly	25 (45.5)	30 (54.5)	
	Moderately	13 (17.8)	60 (82.2)	
	Greatly	3 (8.8)	31 (91.2)	

<sup>a</sup>Chi-square test.

(95% CI: 0.575–1.626) and a *p*-value of 0.898. Finally, knowledge about preventive measures did not significantly impact the prevalence of AR, with an Exp(B) of 1.303 (95% CI: 0.663–2.560) and a *p*-value of 0.443.

## DISCUSSION

In this study, the prevalence of AR was 64.3%, higher than the prevalence reported among schoolchildren in the Jazan region (27.1%).<sup>2</sup> A plausible explanation

might be the different age groups. A previous study conducted among children and teenagers in Qassim reported a prevalence of 51.3%, similar to our findings.<sup>4</sup> AR significantly impacts the QoL, contributing to nasal symptoms and psychological effects such as stress and depression. According to Mou et al,<sup>11</sup> AR adversely affects QoL and work efficiency, potentially leading to mental health issues, including depression and anxiety, in a significant percentage of patients. Additionally, Albaloushi et al,<sup>3</sup> identified an association between AR and

**Table 6:** Association between different aspects of management and allergic rhinitis prevalence.

Variables	B	p-value	Exp(B)	95% CI	
				Lower	Upper
Specific environmental factors	0.409	0.221	1.506	0.782	2.901
Knowledge about allergic rhinitis and how to deal with it	0.364	0.204	1.439	0.820	2.524
The child receives education/ counseling	0.963	0.009	2.620	1.269	5.411
The child receives psychological/ emotional support	0.854	0.043	2.349	1.029	5.365
Satisfied with the resources	-0.034	0.898	0.967	0.575	1.626
Knowledge about preventive measures	0.265	0.443	1.303	0.663	2.560
Constant	-1.010	0.131	0.364		

*Exp(B): exponential value of B.*

intermediate to high stress levels in the studied population in Al-Ahsa.

Our study indicated a higher prevalence of AR among children, at 64.3%. This rate aligns with a research conducted in environments with substantial exposure to dust, pollen, and other allergens. Similarly, Kef et al,<sup>12</sup> reported that AR prevalence varies between 10–58.5% across different geographical regions. Interestingly, our gender distribution data showed a slightly higher prevalence among females (54.9%) than males (45.1%), contrasting with other studies. The discrepancy in gender-related prevalence could be explained by hormonal changes during puberty, gut microbiota diversity, and lifestyle factors.<sup>13</sup>

The impact of AR on daily activities, school performance, and social interactions is significant. Our study found that 21.7% of children were greatly affected, corroborating findings from previous studies that highlighted substantial impairments in daily activities and school performance due to AR. Schuler and Montejo noted that AR, the most prevalent chronic condition among children, disrupts sleep, causes daytime sleepiness, leads to school absenteeism, reduces attention (presenteeism), and results in mood disturbances and lower academic performance.<sup>14</sup> Furthermore, our study revealed that school absenteeism was notably high, with 22.6% of children frequently missing school. This finding echoes the results of Aburiziza et al,<sup>15</sup> who reported higher absenteeism rates among children with AR.

AR symptoms severity varied among the study participants, with sneezing, runny nose, and nasal itching being predominant. Akhouri et al,<sup>16</sup> reported

similar findings, noting common symptoms such as nasal congestion, clear rhinorrhea, sneezing, postnasal drip, and nasal pruritis. The prevalence of moderate to severe symptoms in our study aligns with observations from the Global Allergy and Asthma European Network, which also documented widespread severity among children.<sup>17</sup> Continuous tearing from the eyes was frequently reported, highlighting its common occurrence as a comorbidity in AR.<sup>18</sup>

Sleep quality was significantly impaired among children with AR, with 79.1% experiencing disturbances. This finding is consistent with a research demonstrating that AR adversely affects sleep quality, leading to daytime fatigue and impaired cognitive function. Liu et al,<sup>19</sup> similarly, found that AR is associated with a higher risk of daytime sleep-related dysfunctions, including difficulty waking up.

Emotional well-being was notably affected, with a substantial proportion of children experiencing emotions such as anger, frustration, sorrow, and social isolation. These emotional disturbances are in line with findings from Conway et al,<sup>20</sup> which linked AR to various psychological issues stemming from chronic discomfort and limitations in social interactions.

Our study revealed that 57.4% of children diagnosed with AR received medication, primarily nasal steroids and oral antihistamines. This treatment approach is consistent with recommendations outlined in the Next-generation AR and its Impact on Asthma guidelines, which advocate for these medications as first-line treatments.<sup>21</sup> However, it is concerning that 50.2% of children did not receive any treatment within the past week, suggesting

potential gaps in ongoing management and follow-up care.

Parental knowledge about AR varied, with 59.1% possessing moderate knowledge levels. Education and counseling significantly increased the likelihood of receiving a diagnosis, underscoring the pivotal role of parental awareness in early detection. Similarly, Kostecka et al,<sup>22</sup> reported higher levels of parental knowledge in families regularly visiting allergists, whereas families relying solely on regular pediatric appointments showed lower awareness levels despite their children exhibiting similar symptoms.

Psychological and emotional support emerged as crucial factors, with recipients showing a higher prevalence of diagnosed AR. This underscores the importance of a holistic approach in AR management that includes psychological support. Wang et al,<sup>23</sup> demonstrated improved AR symptoms and enhanced QoL through combined treatment with imipramine and levocetirizine, highlighting the benefits of addressing psychological stress in AR management.

In addition, our findings corroborate previous studies highlighting the high prevalence of AR and its significant impact on QoL, which surpasses rates observed in other countries such as Brazil. The disruptions in daily activities, school performance, and sleep underscore the complex interplay of regional and environmental factors influencing AR prevalence.

Addressing these multifaceted aspects through comprehensive management strategies is crucial for optimizing outcomes and enhancing the well-being of children affected by AR. Further research should continue to explore effective interventions that encompass both medical and psychosocial dimensions of AR care.

Despite providing valuable insights into the prevalence and impact of AR in Tabuk, our study has several limitations. The cross-sectional design restricted our ability to establish causal relationships between AR and its effects on QoL. Furthermore, reliance on self-reported data from parents introduced potential biases.

Our findings underscore the high prevalence and significant impact of AR on pediatric QoL. This highlights the necessity for targeted interventions that enhance awareness, education, and support to alleviate the burden on affected children and their families. Future research should consider longitudinal designs to better elucidate causal

pathways and explore interventions aimed at mitigating the impact of AR on children's lives.

## CONCLUSION

Our findings highlighted the high prevalence of AR and its significant impact on the QoL in children in Tabuk, including disruptions in daily activities, school performance, and sleep. Addressing these multifaceted aspects through comprehensive management strategies is crucial for optimizing outcomes and enhancing the well-being of children affected by AR. Further research should explore effective interventions encompassing AR care's medical and psychosocial dimensions.

## Disclosure

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