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# Prevalence and determinants of Allergic Rhinitis among the population of Jeddah Saudi Arabia

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## ABSTRACT

The clinical aspects of allergic rhinitis (AR) and its impact on the quality of life of the population in Jeddah city were studied in a cross-section study of 650 subjects. Validated questionnaires on AR and quality of life were used. AR was encountered among 37% of the subjects. Socio-demographic characteristics, family and personal history of allergy were significantly associated with having AR. Skin rash, asthma and eczema were significantly more common among subjects with AR. Nasal blockage, sneezing, runny nose, headache and itching of the nose were common symptoms of AR. The knowledge of the patients on predisposing factors, symptoms and signs, prognosis and treatment of AR was inadequate. AR is a chronic morbidity that affects the quality of life of the subjects.

**Keywords:** Allergic rhinitis, Saudi Arabia, AR

## 1. INTRODUCTION

Allergic rhinitis is a frequent morbidity that is often goes unnoticed in primary care. Nasal congestion, nasal irritation, rhinorrhea, and sneezing are common symptoms of the disease. Diagnosis of AR requires detailed inquiry and clinical assessment. Antihistaminic and topical inhaled corticosteroids are usually prescribed for its management (Tai et al., 2022). AR can have a huge burden on the health system. Sleep disturbance is one of the factors that reclassify the severity of AR from mild to moderate-severe (Mahdavinia and Grammer, 2013; Al-Rasheedi et al., 2022). Allergic rhinitis has economic, clinical and social negative consequences (Phoff et al., 2015).

It can lead to work loss in adults and school work loss and learning difficulties in children (Al-Shehri and Abou-Elhamd, 2016). AR could manifest itself as a systemic airway disease as well (Ma et al., 2022). AR was reported as common morbidity among those with a lower socioeconomic condition and was also related to smoking and exposure to air pollution (Al-Shatti et al., 2020). Thus, the present study aimed to study the burden, clinical

aspects and correlates of RS and coping methods of the population, particularly, in Jeddah city which is known for being a coastal city and having many industrial areas.

## 2. SUBJECTS AND METHODS

**Study design**

The study had a cross-sectional design.

**Study setting**

Between July 5 and November 20, 2022, an anonymous, Arabic language electronic survey was distributed nationwide through social media networks. The sampling method was a non-probability convenient one.

**Study subjects**

Eligibility criteria included adults who reside in Jeddah Saudi Arabia. Any participant who resides outside the targeted setting was excluded. The required Sample size was calculated using G-Power software and according to effect size= 0.3, alpha= 0.05, power=0.95 and degree of freedom (df) = 5 the expected sample size was found to be 277 subjects. For the present study the enrollment number of participants was 650.

**Data collection**

A questionnaire was used to provide information on the socio-demographic as well as personal characteristics, morbidity history and clinical aspects of AR. It included also the 2016 ARIA guide lines (Rahim et al., 2021; Brozek et al., 2017).

*Operational definition:*

Symptoms and signs of intermittent AR continue for ≤4 days per 7 days for < one month, whereas symptoms and signs of persistent AR continue for more than 4 days per week for > one month (Brozek et al., 2017).

Patients with intermittent AR suffered from rhinorrhea, irritation of the eye and sneezing; while patients with persistent AR have nasal obstruction, mucoid secretions, smell disturbances and postnasal drip.

The severity of AR is based on the clinical picture and its effect on the quality of living. Mild effect does not affect pattern of sleep nor it affect routine activity, such as work activities or exercise or leisure activities. Moderate to severe clinical pattern interfere with one or more of the usual activities.

**Data management and analysis**

The SPSS statistical software (version 25, IBM, NY, USA), was used to analyze the data. The associations between the different categorical variables were studied using the Chi square test of significance. The level of significance for the present study was 0.05.

**Ethical consideration**

All participants had given informed consents for their participation. The Institutional Research Review Board of Ibn Sina National College of health sciences (Protocol # IRRB-01-25122022), approved this study.

## 3. RESULTS

The present study included 650 subjects (67% females and 33% males). The number of subjects with AR was 240 (37.0%). About 80% with AR were of the intermittent type, while 20% were of the persistent type (Figure 1). It occurred in both males and females similarly ($p > 0.05$). AR was significantly higher among those with higher educational level.

Occupation and monthly income were irrelevant to AR ($p>0.05$). Smoking was significantly associated with AR ($p<0.05$). Married subjects were significantly more encountered among those with AR ($p<0.05$). Area of residence, having animals or plants at home were irrelevant to AR ($p>0.05$). Positive family history of AR was a significant determinant of AR in the studied subjects where the p value was < 0.0 (Table 1).

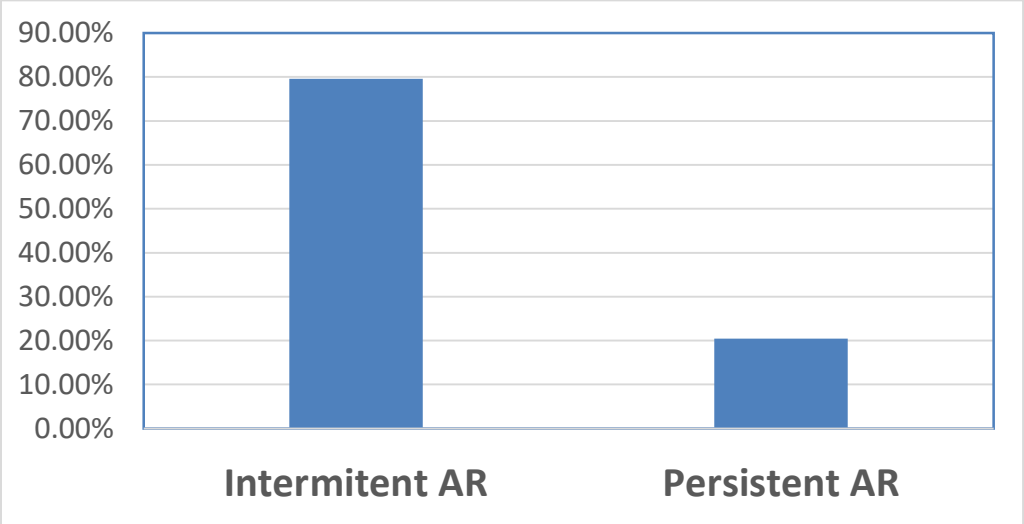


**Figure 1** Distribution of subjects with AR according to type of impairment

**Table 1** Distribution of the studied according to socio-demographic characteristics and occurrence of AR

| Variable | Category | AR | | | | Total | | x2 (p) |
|---|---|---|---|---|---|---|---|---|
| | | Yes | | No | | | | |
| | | No. | % | No. | % | No. | % | |
| Gender | Male | 68 | 28.3% | 146 | 35.6% | 214 | 32.9% | 3.629 |
| | Female | 172 | 71.7% | 64.4 | 67.1% | 436 | 67.1% | .057 |
| Education | < University | 66 | 27.5% | 165 | 40.2% | 231 | 35.5% | 10.732 |
| | > University | 174 | 72.5% | 245 | 59.8% | 419 | 64.5% | .001 |
| Occupation | Work | 104 | 43.3% | 147 | 35.9% | 251 | 38.6% | 3.777 |
| | Minor Work | 12 | 5% | 27 | 6.6% | 39 | 6% | .151 |
| | Not Working | 124 | 51.7% | 236 | 57.6% | 360 | 55.4% | |
| Smoking | Smoker | 61 | 25.4% | 83 | 20.2% | 144 | 22.2% | 6.555 |
| | Ex-Smoker | 21 | 8.8% | 21 | 5.1% | 42 | 6.5% | .038 |
| | Non-Smoker | 158 | 65.8% | 306 | 74.6% | 464 | 71.4% | |
| Monthly income | 0-5k | 102 | 42.5% | 234 | 57.1% | 336 | 51.7% | 17.769 |
| | 5k-10k | 31 | 12.9% | 59 | 14.4% | 90 | 13.8% | .000 |
| | >10k | 107 | 44.6% | 117 | 28.5% | 224 | 34.5% | |
| Marital status | Single | 112 | 46.7% | 252 | 61.5% | 364 | 56% | 13.452 |
| | Married | 128 | 53.3% | 158 | 38.5% | 286 | 44% | .000 |
| Area of residency | Southern | 15 | 6.3% | 33 | 8% | 48 | 7.4% | 3.449 |
| | Northern | 5 | 2.1% | 18 | 4.4% | 23 | 3.5% | .327 |
| | Eastern | 15 | 6.3% | 21 | 5.1% | 36 | 5.5% | |
| | Western | 205 | 85.4% | 338 | 82.4% | 543 | 83.5% | |
| Have pets at home | Yes | 56 | 23.3% | 94 | 22.9% | 150 | 23.1% | .014 |
| | No | 184 | 76.7% | 316 | 77.1% | 500 | 76.9% | .906 |
| Have plants at home | Yes | 88 | 36.7% | 165 | 40.2% | 253 | 38.9% | .815 |
| | No | 152 | 63.3% | 245 | 59.8% | 397 | 61.1% | .367 |
| Living near an industrial area | Yes | 17 | 7.1% | 38 | 9.3% | 55 | 8.5% | .933 |
| | No | 223 | 92.9% | 372 | 90.7% | 595 | 91.5% | .334 |
| Family history of AR | Yes | 223 | 92.9% | 283 | 69% | 506 | 77.8% | 50.108 |
| | No | 17 | 7.1% | 127 | 31% | 144 | 22.2% | .000 |

Having history of allergic diseases was a significant determinant of occurrence of AR (p <0.05). Food allergy and drug allergy were significant determinants of AR (p<0.05). Type of Air conditioner was not significantly associated with AR (p>0.05). Subjects with AR tended to change house frequently (p<0.05). Subjects with AR used medications for allergy and Nasal spray significantly more than those who were not suffering from AR (p<0.05). Family history of AR was a significant determinant of occurrence of AR in the subjects (p<0.05). Skin rash and eczema were significant complaints in subjects with AR (p<0.05). Subjects with AR had skin testing placed on them significantly more than those without AR (Table 2).

**Table 2** Distribution of studied subjects according to having AR and personal and clinical history of allergy

| Variable | Category | AR | | | | Total | | x2 (p) |
|---|---|---|---|---|---|---|---|---|
| | | Yes | | No | | | | |
| | | No. | % | No. | % | No. | % | |
| History of allergic disease | Yes | 207 | 86.3% | 70 | 17.1% | 277 | 42.6% | 296.238 .000 |
| | No | 33 | 13.8% | 340 | 82.9% | 373 | 57.4% | |
| Food allergy | Yes | 66 | 27.5% | 51 | 12.4% | 117 | 18% | 23.265 .000 |
| | No | 174 | 72.5% | 359 | 87.6% | 533 | 82% | |
| Have any drug allergy | Yes | 43 | 17.9% | 32 | 7.8% | 75 | 11.5% | 15.165 .000 |
| | No | 197 | 82.1% | 378 | 92.2% | 575 | 88.5% | |
| Type of air conditioner | Window Air conditioner | 90 | 37.5% | 155 | 37.8% | 245 | 37.7% | 1.816 .611 |
| | Split air conditioner | 115 | 47.9% | 206 | 50.2% | 321 | 49.4% | |
| | Central air | 33 | 13.8% | 48 | 11.7% | 81 | 12.5% | |
| | Fan | 2 | 0.8% | 1 | 0.2% | 3 | 0.5% | |
| Houses you changed in the last 5 years | None | 149 | 62.1% | 220 | 53.7% | 369 | 56.8% | 7.085 .029 |
| | Once | 72 | 30% | 132 | 32.2% | 204 | 31.4% | |
| | More than once | 19 | 7.9% | 58 | 14.1% | 77 | 11.8% | |
| Use oral medication for allergy | Yes | 142 | 59.2% | 96 | 23.4% | 238 | 36.6% | 83.375 .000 |
| | No | 98 | 40.8% | 314 | 76.6% | 412 | 63.4% | |
| Use nasal spray frequently | Yes | 83 | 34.6% | 38 | 9.3% | 121 | 18.6% | 64.036 .000 |
| | No | 157 | 65.4% | 372 | 90.7% | 529 | 81.4% | |
| Family history of AR | Yes | 176 | 73.3% | 192 | 46.8% | 368 | 56.6% | 43.295 .000 |
| | No | 64 | 26.7% | 218 | 53.2% | 282 | 43.4% | |
| Tested for any kind of allergy | Yes | 145 | 60.4% | 88 | 21.5% | 233 | 35.8% | 99.886 .000 |
| | No | 95 | 39.6% | 322 | 78.5% | 417 | 64.2% | |
| Have rash, skin eruption or eczema | Yes | 60 | 25.0% | 58 | 14.1% | 118 | 18.2% | 12.002 .001 |
| | No | 180 | 75.0% | 352 | 85.9% | 532 | 81.8% | |

Great proportion of the studied subjects (34%) didn't know the number of sinuses in humans and 31% said 4 sinuses. This was similar in those with or without AR (p< 0.417). Almost all subjects heard about AR (93.2%); however, those with AR were significantly more than those without AR (97% and 91% respectively), where p was < 0.003. Great proportion of the studied subjects (43%) believed that AR is caused by viruses; this was similar in those with or without AR (p <0.078). Great proportion of the studied subjects (44%) believed that antibiotics are used to treat AR if it is caused by bacteria; this was similar in those with or without AR (p <0.417).

Great proportion of the studied subjects (85.5%) believed that full course of antibiotic should be completed even if the patient condition is improved; this was significantly higher among those with AR compared to those without AR (p<0.041). Great proportion of the studied subjects (79%) reported that mites did make their condition worse; this was similar in those with or without AR (p <0.545). Subjects with AR, significantly sometimes avoid sources that may contain the allergen compared to those without AR (p <0.000). Majority of the studied subjects (67%) did not consider AR as a serious disease; this was similar in those with and without AR (p <.0.471).

Greater proportion of the studied subjects (45.4%) did not know when to consider AR acute or chronic; this was significantly more among those without AR (p<0.016). Almost 70% of the subjects believed that rest and hydration relieve sinusitis; this was

similar in both groups (with and without AR) as p was >0.05. Greater proportion of the subjects (68.3%) mentioned that cold compression relieves AR. Almost half of the subjects (both those with or without AR) knew methods to relieve AR (Table 3).

**Table 3** Distribution of studied subjects according to having AR and knowledge about RS

| Variable | Category | AR | | | | Total | | x2 (p) |
|---|---|---|---|---|---|---|---|---|
| | | Yes | | No | | | | |
| | | No. | % | No. | % | No. | % | |
| Number of sinuses do human have | 2 | 39 | 16.3% | 62 | 15.1% | 101 | 15 | 3.923 .417 |
| | 3 | 14 | 5.8% | 23 | 5.6% | 37 | 5.7 | |
| | 4 | 77 | 32.1% | 129 | 31.5% | 206 | 31.7 | |
| | 7 | 37 | 15.4% | 46 | 11.2% | 83 | 12.8 | |
| | DK | 73 | 30.4% | 150 | 36.6% | 223 | 34.3% | |
| heard about AR | Yes | 233 | 97.1% | 373 | 91.0% | 606 | 93.2% | 8.948 .003 |
| | No | 7 | 2.9% | 37 | 9.0% | 44 | 6.8% | |
| The most common cause of AR | Viruses | 96 | 40.0% | 187 | 45.6% | 283 | 43.5% | 8.403 .078 |
| | Bacteria | 42 | 17.5% | 83 | 20.2% | 125 | 19.2% | |
| | Fungi | 16 | 6.7% | 11 | 2.7% | 27 | 4.2% | |
| | Parasite | 1 | 0.4% | 2 | 0.5% | 3 | 0.5% | |
| | DK | 85 | 35.4% | 127 | 31.0% | 212 | 32.6% | |
| Antibiotics are used to treat AR if it is | Bacterial | 102 | 42.5% | 187 | 45.6% | 289 | 44.5% | 2.835 .418 |
| | Viral | 23 | 9.6% | 38 | 9.3% | 61 | 9.4% | |
| | Both | 47 | 19.6% | 60 | 14.6% | 107 | 16.5% | |
| | DK | 68 | 28.3% | 125 | 30.5% | 193 | 29.7% | |
| Full course of antibiotic should be completed even if the patient condition is improved | Yes | 214 | 89.2% | 342 | 83.4% | 556 | 85.5% | 4.049 .044 |
| | No | 26 | 10.8% | 68 | 16.6% | 94 | 14.5% | |
| What is the factor that makes your condition worse? | Mites | 197 | 82.1% | 318 | 77.6% | 515 | 79.2% | 2.135 .545 |
| | Pollen | 14 | 5.8% | 26 | 6.3% | 40 | 6.2% | |
| | Mold | 6 | 2.5% | 13 | 3.2% | 19 | 2.9% | |
| | Animal | 23 | 9.6% | 53 | 12.9% | 76 | 11.7% | |
| How often do you avoid sources that may contain the allergen? | Always | 45 | 18.8% | 77 | 18.8% | 122 | 18.8% | 34.232 .000 |
| | Often | 74 | 30.8% | 97 | 23.7% | 171 | 26.3% | |
| | Sometimes | 90 | 37.5% | 112 | 27.3% | 202 | 31.1% | |
| | Rarely | 22 | 9.2% | 48 | 11.7% | 70 | 10.8% | |
| | Never | 9 | 3.8% | 76 | 18.5% | 85 | 13.1% | |
| Do you think AR is a serious disease? | Yes | 82 | 34.2% | 129 | 31.5% | 211 | 32.5% | .50 .47 |
| | No | 158 | 65.8% | 281 | 68.5% | 439 | 67.5% | |
| AR is considered acute / chronic if it less / more than | 7 weeks | 38 | 15.8% | 59 | 14.4% | 97 | 14.9% | 10.3 .016 |
| | 12 weeks | 39 | 16.3% | 62 | 15.1% | 101 | 15.5% | |
| | DK | 91 | 37.9% | 204 | 49.8% | 295 | 45.4% | |
| Hydration relieve AR | Yes | 165 | 68.8% | 301 | 73.4% | 466 | 71.7% | 1.6 .203 |
| | No | 75 | 31.3% | 109 | 26.6% | 184 | 28.3% | |
| Rest relieve AR | Yes | 165 | 68.8% | 282 | 68.8% | 447 | 68.8% | .000 .994 |
| | No | 75 | 31.3% | 128 | 31.2% | 203 | 31.2% | |
| Cold compression relieves AR | Yes | 66 | 27.5% | 140 | 34.1% | 206 | 31.7% | 3.089 .079 |
| | No | 174 | 72.5% | 270 | 65.9% | 444 | 68.3% | |
| Do you know any method to relieve RS? | Yes | 117 | 48.8% | 181 | 44.1% | 298 | 45.8% | 1.2 .256 |
| | No | 123 | 51.3% | 229 | 55.9% | 352 | 54.2% | |

Nasal blockage was reported by majority of patients with AR (72.9%), followed by sneezing (23.3%). Majority of the patients (67%) reported that they feel respiratory disorders when they had complaints of AR. Majority of the AR patients had AR symptoms accompanied by itchy and watery eye during the past 12 months. Among the subjects with AR headache (30%), nasal blocking (25%) and sneezing (20%) were the manifestations which occurred in the past year without flu infection. Majority of the subjects with AR (67%) suffered from itchy/red/ watery eyes during the year.

Great proportion of the patients with AR (82%) experience runny nose/nasal obstruction/nasal itching for many consecutive days. Great proportion of the patients with AR (79.2%) admitted that eye and nose symptoms do occur or worsen during a specific time of the year. Among the subjects with AR about 80% reported that the symptoms last for more than 4 weeks and about half the subjects admitted that AR affects both their sleep and daily activities (Table 4).

**Table 4** Distribution of studied subjects with AR according to signs and symptoms of AR

| Variables | Categories | Frequency | Percent % |
|---|---|---|---|
| What are the symptoms of rhino sinusitis? | Vomiting | 0 | 0.0% |
| | Nasal congestion | 175 | 72.9% |
| | Cough | 3 | 1.3% |
| | Nasal bleeding | 1 | 0.4 |
| | Sneezing | 56 | 23.3% |
| | DK | 5 | 2.1% |
| Did you feel respiratory disorder when you had any complaints? | Yes | 162 | 67.5% |
| | No | 78 | 32.5% |
| In the past 12 months, did you suffer from nasal and problem and watering of the eye with itching? | Yes | 186 | 77.5% |
| | No | 54 | 22.5% |
| In the last 12 months, did you have any of the following symptoms without a cold or flu? | Sneezing | 48 | 20.0% |
| | Runny nose | 44 | 18.3% |
| | Nasal block | 61 | 25.4% |
| | Headache | 71 | 29.6% |
| | Non | 16 | 6.7% |
| Have you seen a doctor for these symptoms? | Yes | 86 | 35.8% |
| | No | 142 | 59.2% |
| Do you suffer from watering, congestion and itching of the eye? | Yes | 161 | 67.1% |
| | No | 79 | 32.9% |
| Do you experience itching, blocking and rhinorrhea for many consecutive days? | Yes | 197 | 82.1% |
| | No | 43 | 17.9% |
| Do your eye and nose symptoms usually start or worsen during a specific time of the year? | Yes | 190 | 79.2% |
| | No | 50 | 20.8% |
| How long do your symptoms last? | > 4 days a week | 191 | 79.6% |
| | > 4 weeks in a row | 49 | 20.4% |
| How do the symptoms affect you? | Disturb your sleep | 42 | 17.5% |
| | Affects my daily activity | 40 | 16.7% |
| | Both | 129 | 53.8% |
| | None of the above | 29 | 12.1% |
| How much did this nose problem interfere with your daily activity, in the past 12 months? | Not at all | 22 | 9.2% |
| | A little | 119 | 49.6% |
| | Moderate amount | 66 | 27.5% |
| | A lot | 33 | 13.8% |

Hypertension and cardiac diseases were significantly associated with AR ($p<0.05$), but not DM or autoimmune diseases (> 0.05). Allergies, asthma and eczema were significantly associated with AR where the p value was < 0.05 (Table 5).

**Table 5** Distribution of studied subjects according to history of clinical morbidity and AR

| Variable | Category | AR | | | | Total | | x2 (p) |
|---|---|---|---|---|---|---|---|---|
| | | Yes | | No | | | | |
| | | No. | % | No. | % | No. | % | |
| Hypertension | Yes | 28 | 11.7% | 14 | 3.4% | 42 | 6.5% | 17.056 |
| | No | 212 | 88.3% | 393 | 96.6% | 608 | 93.5% | .000 |
| Diabetes | Yes | 17 | 7.1% | 25 | 6.1% | 42 | 6.5% | .243 |
| | No | 223 | 92.9% | 385 | 93.9% | 608 | 93.5% | .622 |
| Heart disease | Yes | 11 | 4.6% | 6 | 1.5% | 17 | 2.6% | 5.786 |
| | No | 229 | 95.4% | 404 | 98.5% | 633 | 97.4% | .016 |
| Allergy | Yes | 207 | 86.3% | 70 | 17.1% | 277 | 42.6% | 296.238 |
| | No | 33 | 13.8% | 340 | 82.9% | 373 | 57.4% | .000 |
| Asthma | Yes | 54 | 22.5% | 64 | 15.6% | 118 | 18.2% | 4.837 |
| | No | 186 | 77.5% | 346 | 84.4% | 532 | 81.8% | .028 |
| Autoimmune Disease | Yes | 6 | 2.5% | 16 | 3.9% | 22 | 3.4% | .911 |
| | No | 234 | 97.5% | 394 | 96.1% | 628 | 96.6% | .340 |
| Eczema | Yes | 55 | 22.9% | 57 | 13.9% | 112 | 17.2% | 8.625 |
| | No | 185 | 77.1% | 353 | 86.1% | 538 | 82.8% | .003 |

## 4. DISCUSSION

The present study was conducted to explore the aspects and correlates of AR among the population of Jeddah city. AR was encountered among 37% of the subjects. Thus, RS is a common disorder among Jeddah population; this is similar to findings from other studies (Tai et al., 2022). It was found similar in males and females and in different occupational groups, however these was not in line with other studies (Mahdavinia and Grammer, 2013). Smoking habit, higher educational level and higher monthly income and marriage were significantly associated with AR. This could be due to stress (Al-Shehri and Abou-Elhamd, 2016).

Having pets or plants at home or residing near industrial area was not determinant of occurrence of AR. This is not in line with other studies (Al-Shatti and Ziyab, 2020; Brozek et al., 2017). In a previous study a significant familial risk was confirmed, suggesting a genetic component of chronic AR (Philpott et al., 2018). This is in line with the findings from the present study. Having history of allergy or drug allergy was significantly associated with chronic AR. This was similar to findings from previous studies (Ates and Sahiner, 2022; Steiner et al., 2018). Using air conditioner was not significantly associated with AR. This is in line with a previous study (Alharthi et al., 2022).

Subjects with AR tend to change house frequently. This is in line with a previous study; as this could expose them to new environment and new sensitizers (Helman et al., 2020). Subjects with RS used medications for allergy and Nasal spray significantly more than those who were not suffering from AR. This is in line with previous studies (Li et al., 2021; Adegbiji et al., 2020). Skin rash and eczema were significant complaints in subjects with RS. Subjects with AR had skin testing placed on them significantly more than those without RS. This is in line with other studies (Helman et al., 2020; Rajasekaran and Puja, 2018).

The sinuses are situated behind the bones of the upper face. They are air spaces covered with a mucous layer and cilia. Cilia help trap and push out pollutants and bacteria, preventing them from reaching the lungs (Li et al., 2021). Nasal blockage, sneezing and headache were common manifestations in subjects with AR, which occurred even when the subject did not have flu. On the other hand, itching, watering and redness of the eye were common manifestations in the subjects with AR and this was accompanied by itching of the nose and rhinorrhea. This was in line with a previous study (Daniels, 2020). The level of knowledge on AR among the population is reduced with increased prevalence of the morbidity.

The knowledge of the subjects with AR on its causes, predisposing factors, symptoms and signs, impact and treatment is defective. This is in line with previous studies (Adegbiji et al., 2020; Daniels, 2020). The link between the atopic disorders AR, Eczema and asthma is well reported before (Staessen et al., 2000). This is in line with the present study. In the present study AR was significantly associated with occurrence of heart disease and hypertension. The underlying mechanism for association between AR and cardiovascular disease occurrence was postulated in a previous study (Hill and Spergel, 2018). Although AR is not a life-threatening condition, it could adversely affect daily activities and style and quality of living (Nyaiteera et al., 2018). This is in line with findings from the present study.

**Limitations**

There are some limitations to this study: As this study is cross-sectional, the causal relationship remains unknown and we do not know if the relationship of these variables with AR will persist in the long term. It is also a nonprobability convenient sample and its generalization to the population may be defective; however, it is an exploratory study.

## 5. CONCLUSION

AR is a common disorder among the population of Jeddah city. It is characterized by nasal blockage, headache and sneezing. It is associated with allergic disorders and affects the daily activities of the subjects. Patient's awareness on clinical aspects and adverse impact of AR and ways to cope with it and handle it is below average.

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**Author Contributions**

F.G. contributed to study design, analyzing data and writing the draft. KA, LA, KA, AM and AM contributed to collecting data and writing the draft. There was a unanimous agreement of the authors to the presented manuscript for publication.

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**Conflict of interest**

The authors declare that there is no conflict of interests.

**Data and materials availability**

All data sets collected during this study are available upon reasonable request from the corresponding author.

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