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The Saudi population's Awareness of Rhinosinusitis Risk Factors and Symptoms Correlates to Covid-19 in Riyadh Region

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ABSTRACT

Background: Rhinosinusitis is an inflammation of the nasal cavity mucosa and paranasal sinuses; it is considered as one of the most common inflammatory illnesses affecting the population. The study aims to assess the behavior and practices of rhinosinusitis patients and how the level of awareness affects their attitude and, thus, lifestyle. Finally, the study aims to investigate the relationship between RS awareness and Covid-19 among those who have not been infected and had a history of infection.

Methods: The study employed a cross-sectional based on an electronic questionnaire for data collection. The study was conducted on 435 individuals, of which 222 were male and 213 were female. However, the study has nine sections and 39 questions; it asked about rhinosinusitis awareness and knowledge and rhinosinusitis symptoms and their relationship with Covid-19 before and after immunization.

Results: The study included 176 (40%) participants with a history of rhinosinusitis, and 172 (39.5%) had been infected with Covid-19. Around 16% mentioned their lack of knowledge of the disease. The data also showed a highly significant association in participants with rhinosinusitis history, but no association was found regarding Covid-19 infection. With an exception for etiology, the estimate of effect showed a positive predictive effect on the attitude. The effect was significant with a quality-of-life, manifestations, and management p-value (0.001, 0.001, 0.000), respectively. The overall analysis showed an average level of awareness among the respondents.

Conclusions: It could be beneficial to determine the disparities in rhinosinusitis awareness between gender, rhinosinusitis history, and Covid-19 in order to build an effective approach for the people in the targeted locations. Our findings point to the necessity for rhinosinusitis education initiatives encompassing the most affected regions, especially those aimed at persons under the age of 30. It is crucial to emphasize increasing awareness and perception of its etiology, management, and how it influences the attitude, functions, and quality of life.

Key words: Awareness, Rhinosinusitis, Covid-19, Immunization

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INTRODUCTION

Rhinosinusitis is an inflammation of the nasal cavity mucosa and paranasal sinuses [1]. Within the skull, there are four paired air chambers called nasal sinuses. The frontal, maxillary, sphenoidal, and ethmoidal sinuses are derived from the bones in which they are placed. The respiratory mucosa of each sinus is made up of ciliated pseudo stratified epithelium interspersed with mucus-secreting goblet cells. The whole function of the paranasal sinuses is unknown; however, they provide a rise inside the bone structure without adding significant mass, and they collaborate with the nose to humidify, filter, warm, and feel what we breathe [2]. RS is one of the most common inflammatory illnesses, affecting approximately 10% of the population [3]. Children are four times as likely as adults to be affected

by it. In addition, it is more common in women than men [4,5]. Acute or chronic RS can occur. Acute rhinosinusitis is caused by infection, with viruses such as rhinovirus being the most prevalent cause. Symptoms typically disappear within 12 weeks of onset. On the other hand, chronic rhinosinusitis has an idiopathic etiology, while infection and inflammation can play a significant role. Furthermore, symptoms persist for more than 12 weeks [6]. Nasal polyps, which can manifest as a severe type of inflammation and remodeling, have a strong relationship with RS [3]. RS patients may also experience symptoms such as headache, face pressure, toothache, nasal congestion, hyposomnia/anosmia, and purulent nasal discharge. Risk factors include allergic and non-allergic rhinitis, upper airway virus infection, certain drugs, and certain medical disorders (such as pregnancy and cystic fibrosis) [4]. Patients with RS may be unaware of their disease or be diagnosed and treated for RS while suffering from other medical issues such as migraines [4]. If two or more symptoms continue for 12 weeks [6], physicians can diagnose CRS based on symptoms. Endoscopic and CT scan changes can also be used to diagnose it [7]. Orbital and intracranial infection extension are two RS consequences that are uncommon but serious [8,9]. Over the last few years, the prevalence of RS has increased in Saudi Arabia, making it a prevalent health problem and topic among the Saudi community [4]. In one Saudi Arabian study, it was discovered that half of the participants had chronic sinusitis. Furthermore, CRS is more common in the eastern province [4]. The impact of CRS on Covid-19, according to Covid-19, is mostly unknown. Several studies found that COVID-19 individuals had a low incidence of CRS comorbidity (between 0% and 3%). However, these investigations were based on a review of Covid-19 patients' medical records, which could understate the actual rate of CRS comorbidity due to insufficient data during an emergency. Moreover, it is unclear whether CRS comorbidity is linked to the severity of Covid-19 sickness [9]. Furthermore, the study's goal is to assess the behavior and practices of rhinosinusitis patients and how the level of awareness affects their attitude and, thus, lifestyle. Finally, the study aims to investigate the relationship between RS awareness and covid-19 among those who have not been infected and had a history of infection.

METHODOLOGY

Individuals with rhinosinusitis and non-rhinosinusitis were studied quantitatively in cross-sectional research (435 individuals). Between April and May 2022 the survey was conducted on participants aged 18 and above of both genders. The sample size that should be taken in this study will be according to this formula with significance adopted at p>0.05 [$n=NZ^2P\ (1-P)/(D^2+NZ^2P\ (1-P)]$, and the total respondents should be about=*382*. This study's electronic questionnaire used for data collection has nine sections and 39 questions. The first section asked about the patient's sociodemographic characteristics (including age, gender, education level, and whether to smoke or not). The second section asked about rhinosinusitis awareness and knowledge, information sources, and rhinosinusitis prevalence in Saudi Arabia and worldwide. The participants' knowledge of media/ Internet, friends/relatives, ear, nose, and throat doctors, other doctors, and other sources was reflected in the answers to the second part of the questionnaire, which was about the sources of rhinosinusitis information, and the remaining answers for the other questions. With the answers of "yes," "no," and "I do not know." The third section included rhinosinusitis etiology, the cause of rhinosinusitis, genetic associations with rhinosinusitis, rhinosinusitis contagion, rhinosinusitis incidence during the seasons, and rhinosinusitis occurrence throughout the year. The participants' knowledge of microorganisms, innocuous foreign substances (allergens), spiritual causes, and knowledge assessment was reflected in their replies to the third portion of the questionnaire. This regards the cause of rhinosinusitis as well as the remaining responses to the other questions. The fourth section asked about rhinosinusitis awareness and knowledge in relation to the quality of life, specifically whether rhinosinusitis affects sleep quality, rhinosinusitis impairs attention, rhinosinusitis patients require isolation, and rhinosinusitis causes poor school attendance. The fifth section reflected rhinosinusitis awareness and knowledge and its manifestations (does rhinosinusitis cause bouts of sneezing, catarrh, nasal blockage, itching ear, throat, and eye, nasal foreign bodies' sensation, headache). The sixth section asked about rhinosinusitis awareness and management (whether symptoms improve with herbs, whether over-the-counter drugs relieve symptoms, whether rhinosinusitis needs pharmacy drugs or surgery if rhinosinusitis needs specialist care patients with rhinosinusitis needs to avoid allergens, does rhinosinusitis curable). The seventh section discussed the signs and symptoms of rhinosinusitis (have you ever been diagnosed with Rhinosinusitis, Do you think Headache is a symptom of Rhinosinusitis, Do you think Nasal Obstruction is a symptom of rhinosinusitis, and lastly, Do you think Nasal discharge is a symptom of rhinosinusitis). The eighth section asked about the Rhinosinusitis attitude domain (Should you consider Rhinosinusitis disease as a priority, Do you think that you have sufficient knowledge about rhinosinusitis, is it essential to know more information about Rhinosinusitis disease, I think rhinosinusitis should be treated regardless of its severity, I take my medications once the doctor prescribes them). The ninth section included two questions concerning rhinosinusitis symptoms and their relationship with Covid-19 before and after immunization (Have you been diagnosed or tested as Covid-19 positive). The second question (Do you think the covid-19 vaccination changes the incidence of rhinosinusitis symptoms?) The questionnaire was created in English and then translated into Arabic. The study used a pilot test with two individuals to determine how long it would take each of them to complete the

questionnaire. Experts have reviewed and discussed the questionnaire. Each participant's consent was collected via an internet questionnaire. The information gathered throughout the study will be kept confidential and safe.

Objectives

- Evaluates the Saudi population's awareness and knowledge of the etiology of rhinosinusitis.
- Evaluates Saudi residents' general knowledge and awareness of rhinosinusitis.
- Evaluate the Saudi population's awareness of the impact of rhinosinusitis on quality of life and learning.
- Evaluates the Saudi population's awareness and knowledge of rhinosinusitis and its manifestations.
- Evaluates the Saudi population's awareness and knowledge of Rhinosinusitis management.
- Determines whether the Saudi public is aware of the symptoms of rhinosinusitis.

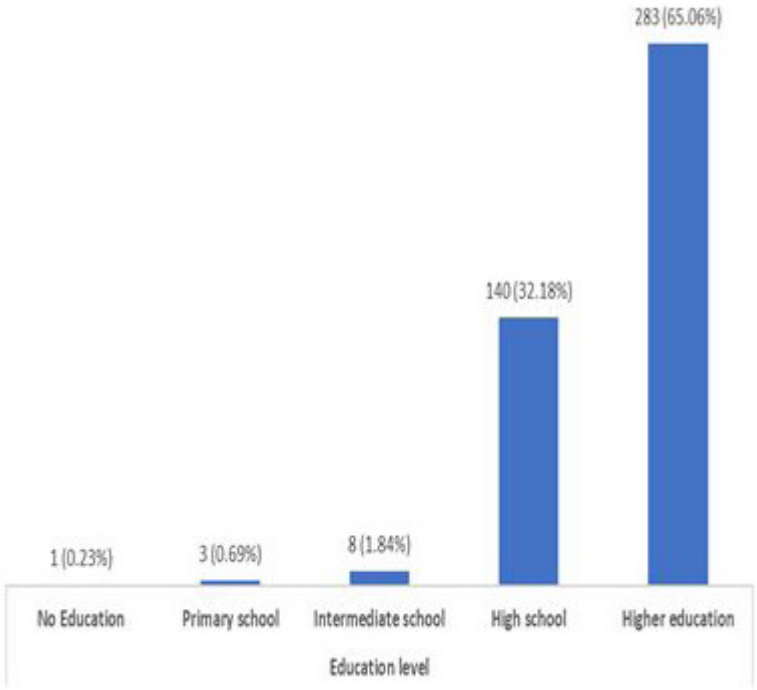

Figure 1: The participants' level of education.

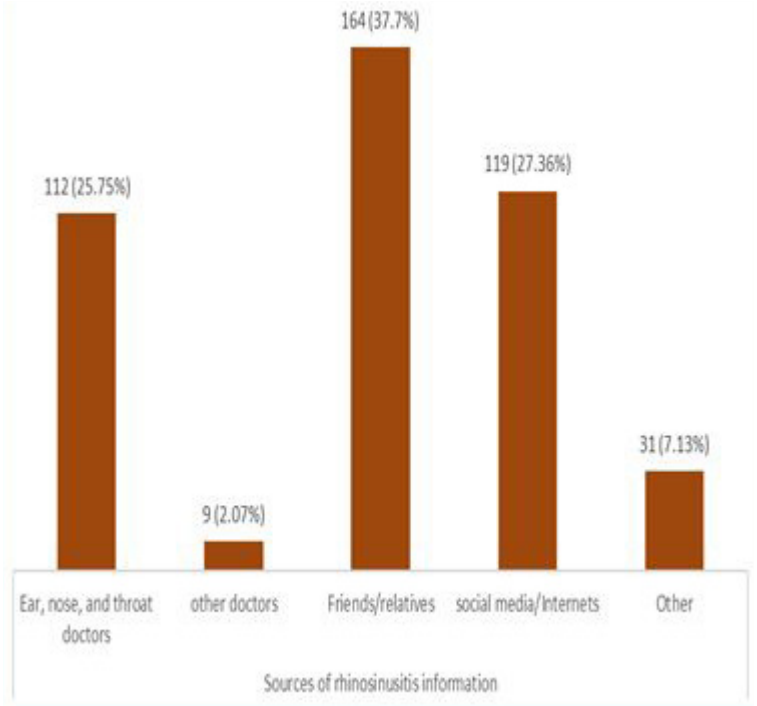

Figure 2: The participant's source of information regarding the rhinosinusitis.

- Determines the Saudi population's awareness and attitude toward rhinosinusitis.
- Assesses the relationship between rhinosinusitis symptoms and covid-19 vaccination in the Saudi population before and after vaccination.

Aim of the study

The study aims to assess several aspects of the Saudi population's knowledge and awareness of rhinosinusitis. To begin, a general understanding of rhinosinusitis and its etiology. Second is the influence of rhinosinusitis on someone's quality of life, including its symptoms. The third point is Rhinosinusitis symptoms and treatment. Fourth, the relationship between Rhinosinusitis symptoms and Covid-19 before and after immunization. Finally, increasing the awareness level will impact the attitude toward rhinosinusitis.

RESULTS

A total of 435 participants were included in the study, of which 222 (51%) were male and 213 (49%) were females. The age mean was 29.13 SD ±11.36. The participants were divided into five groups based on their age: less than 20 were 66 (15.28%), 20 to 30 were 202 (46.76%), 30 to 40 were 75 (17.36%), 40 to 50 were 50 (11.57%), and older than 50 were 39 (9.03%). Out of 435 participants, 213 (49%) were healthy, 222 (51%) were diagnosed with rhinosinusitis, 172 (39.5%) were healthy, and 263 (60.5%) had a history of Covid-19. In addition, around 64 (15%) of the participants are/were smokers, and the majority were highly educated 65% (Figures 1 and 2).

The majority of respondents were highly educated (65%). The findings have shown that microorganisms

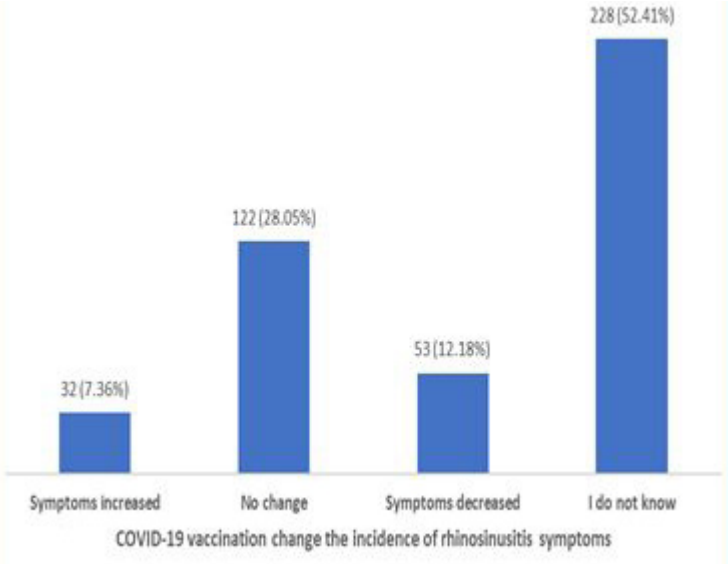

Figure 3: The participants' knowledge about the symptoms of rhinosinusitis post-Covid 19 infection.

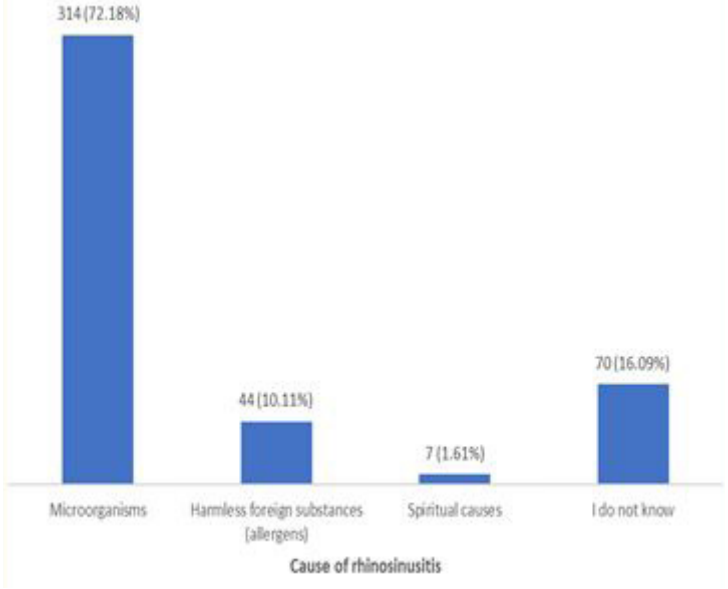

Figure 4: The participants' knowledge about the causes of rhinosinusitis.

are the leading cause of the disease. The most sources of information they get their information mainly from relatives and acquaintances (37.7%), then social media and ENT doctors (27.36%) and (25.75%), respectively. However, around 16% mentioned their lack of knowledge of the disease (Figures 3 and 4).

Association between the awareness of rhinosinusitis and the gender, history of rhinosinusitis, and covid-19

Chi-square analysis of the data revealed a significant association with gender, etiology, and manifestations of rhinosinusitis. The data also showed a highly significant association between participants with rhinosinusitis history. No association was found between Covid-19 and the level of awareness of rhinosinusitis Table 1.

Likert analysis

Each level of awareness was computed, and the means for each category were extracted; the responses were unified where one referred to "I do not know", two referred to "No" and three referred to "Yes". The means were average across the majority of the categories; it indicates that the level of awareness is average. When conducting a detailed analysis, the gender means difference was higher in males than females. Unexpectedly, respondents

Table 1: Chi-Square association by gender, history of Rhinosinusitis, and Covid-19.

	Gender	Diagnosed with Rhinosinusitis	Positive for Covid-19
Awareness and knowledge of rhinosinusitis			
Sources of rhinosinusitis information	0.010**	0.000***	0.229
Common worldwide	0.068	0.002**	0.411
Common in Saudi Arabia	0.392	0.014*	.045*
Commonly seen in the hospital	0.006**	0.000***	0.051
Awareness and knowledge of the etiology of rhinosinusitis			
Cause of Rhinosinusitis	0.012*	0.077	0.352
Rhinosinusitis passes from parents by a gene	0.133	0.155	0.448
Rhinosinusitis is transferred from person to person	0.001***	0.000***	0.129
Rhinosinusitis occurs during the season	0.001***	0.000***	0.091
Rhinosinusitis occurs around the year	.009**	0.000***	0.45
Awareness and knowledge of rhinosinusitis and quality of life			
Rhinosinusitis reduces sleep quality	0.031*	0.002**	0.695
Rhinosinusitis causes impairing concentration	0.772	0.000***	0.159
Rhinosinusitis causes an absence of functions (isolation)	0.337	0.001***	0.904
Rhinosinusitis causes poor school attendance	0.048*	0.000***	0.302
Awareness and knowledge of rhinosinusitis and its manifestations			
Rhinosinusitis cause Bouts of sneezing	0.378	0.473	0.094
Rhinosinusitis causes Catarrh	0.622	0.000***	0.592
Rhinosinusitis causes Nasal blockage	0.181	0.000***	0.063
Rhinosinusitis cause itching ear, throat, and eye	0.000***	0.000***	0.139
Rhinosinusitis patient feels a Nasal foreign body (crawling) sensation	0.621	0.000***	0.87
Rhinosinusitis cause headache	0.002**	0.001***	0.266
Awareness and knowledge of management of rhinosinusitis			
Rhinosinusitis patient needs Herbs to feel better	0.113	0.000***	0.604
Rhinosinusitis can take over-the-counter drugs to relieve symptoms	0.278	0.000***	0.887
Rhinosinusitis patient needs Pharmacy Drugs or Surgery	0.966	0.007**	0.563
Rhinosinusitis patient needs Specialist care	0.757	0.214	0.72
Rhinosinusitis patient needs to avoid allergens	0.841	0.154	0.577
Rhinosinusitis is curable	0.569	0.000***	0.889
Symptoms of Rhinosinusitis			
Headache is a symptom of Rhinosinusitis	0.027*	0.000***	0.227
Nasal obstruction is a symptom of Rhinosinusitis	0.572	0.001***	0.579
Nasal discharge is a symptom of Rhinosinusitis	0.144	0.000***	0.33
Attitude domain regarding rhinosinusitis			
Should you consider rhinosinusitis disease as a priority?	0.074	0.007**	0.059
Do you think that you have sufficient knowledge about rhinosinusitis?	0.543	0.000***	0.533
Is it important to know more information about my rhinosinusitis disease?	0.153	0.034*	.041*
I think rhinosinusitis should be treated regardless of its severity.	0.009**	0.013*	0.523
I take my medications once the doctor prescribes them.	0.169	0.195	0.155
Rhinosinusitis Symptoms and their association with covid-19 before and after vaccination			
Do you think the COVID-19 vaccination changes the incidence of rhinosinusitis symptoms?	0.314	0.000*	.007*
*The Chi-square statistic is significant at the 0.05 level			
**The Chi-square statistic is significant at the 0.01 level			
***The Chi-square statistic is significant at the 0.001 level			

Table 2: Mean and SD of the scores by category.

	Mean	Std. Deviation
Awareness	1.8931	0.60103
Etiology	1.8634	0.47288
Quality of life	1.6029	0.044277
Manifestations	1.4077	0.47784
Management	1.5881	0.44575
Symptoms	1.4178	0.41743
Attitude	1.3614	0.38206
Vaccination	2.246	0.55292

Table 3: Mean and SD of the scores by category by gender, pervious infection with rhinosinusitis and Covid-19.

	Gender		Diagnosed with rhinosinusitis		Positive for Covid-19	
	Male	Female	No	Yes	No	Yes
Awareness	1.65 SD ± 0.67	1.47 SD ± 0.56	1.68 SD ± 0.67	1.39 SD ± 0.51	1.62 SD ± 0.65	1.47 SD ± 0.59
Etiology	1.93 SD ± 0.52	1.8 SD ± 0.41	1.95 SD ± 0.52	1.73 SD ± 0.36	1.88 SD ± 0.49	1.83 SD ± 0.45
qualty of life	1.62 SD ± 0.48	1.58 SD ± 0.4	1.7 SD ± 0.49	1.46 SD ± 0.32	1.62 SD ± 0.45	1.58 SD ± 0.44
Manifestations	1.46 SD ± 0.5	1.35 SD ± 0.45	1.51 SD ± 0.53	1.25 SD ± 0.34	1.45 SD ± 0.51	1.35 SD ± 0.42
Symptoms	1.59 SD ± 0.46	1.59 SD ± 0.43	1.67 SD ± 0.48	1.46 SD ± 0.35	1.6 SD ± 0.46	1.56 SD ± 0.42
Attitude	1.47 SD ± 0.64	1.38 SD ± 0.53	1.54 SD ± 0.65	1.24 SD ± 0.37	1.45 SD ± 0.6	1.38 SD ± 0.54
Vaccination	1.4 SD ± 0.42	1.32 SD ± 0.33	1.42 SD ± 0.42	1.27 SD ± 0.3	1.39 SD ± 0.42	1.32 SD ± 0.32

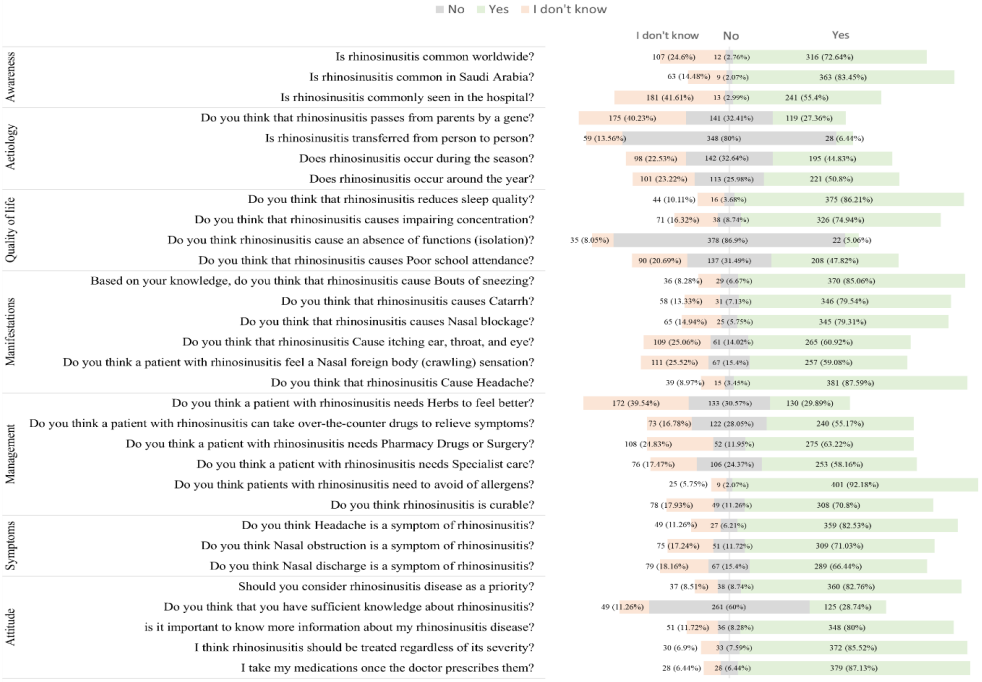

Figure 5: The frequency and percentage of the participants' response.

with no prior history of Rhinosinusitis and Covid-19 should have slightly higher mean scores in Tables 2 and Table 3. The estimate of the effect of each category was tested for the effect of each awareness category on the attitude. The outcomes revealed that except for etiology, all categories showed a positive predictive effect with the attitude Table 2. The effect was significant, with a quality-of-life p-value of 0.001, manifestations p-value of 0.001, and management p-value of 0.000. For each one-unit increase of awareness, there was a positive predictive increase of the attitude toward rhinosinusitis in the log odds by the amount of (0.241). It was negative for the etiology by (-0.206). It was positive also with the quality of life (0.677), manifestations (0.579), management (1.474), symptoms (0.102), and after being infected with Covid-19 (0.069).

DISCUSSION

The study aimed to test the awareness and attitude toward rhinosinusitis at seven awareness levels: knowledge of rhinosinusitis, etiology of rhinosinusitis, rhinosinusitis effect on the quality of life, its manifestations, symptoms management, and attitude toward the disease rhinosinusitis.

Our findings revealed a good level of awareness about the disease and how commonly seen, especially in Saudi Arabia. Despite the lack of knowledge regarding

the disease's etiology, over 50% of the participants showed good knowledge and background. However, the outcomes raise the need to increase awareness, especially about how it affects the quality of life and how to change the attitude toward it Figure 5.

After reading through the Likert analysis, it is safe to say that increasing the level of awareness positively impacts the attitude. The effect is significant for each unit to increase awareness of the disease's manifestations, management, and quality of life.

Our results reveal a disparity in the knowledge of RS and its risks; the overall results indicate an average level of awareness. These outcomes agree with previous studies which stated average knowledge of the disease [4]. Saeed et al. also conducted another study and observed a satisfactory level of awareness [5]. However, it is controversial to consider that around 50% of the participants are satisfactory. Our conclusion does not negate the fact that there is still a need to raise awareness and disease perception [10].

In the current study, a small percentage was unable to identify the causes of rhinosinusitis, its management, and how it affects their quality of life. We found significant association across all levels of awareness with gender and previous history of rhinosinusitis table 2. However, subsequent to Covid-19 infection, no significant associations were found among the participants.

Although few studies conducted in this regard in Saudi Arabia indicated an average-to-heightened level of awareness of the disease; evidence in the literature showed a high prevalence of rhinosinusitis in some region which raise the need to increase the population's perception about rhinosinusitis and how it is one of the health problems that has a significant burden on the health system [11-13].

CONCLUSION

Identifying the disparity in awareness of rhinosinusitis concerning gender, history of rhinosinusitis, and Covid-19 could be beneficial to develop a good strategy for targeted areas\population. Our data indicate the need for rhinosinusitis education programs covering the most affected areas, including programs targeting people less than 30 years old. It is crucial to emphasize increasing awareness and perception of its etiology, management, and how it influences the attitude, functions, and quality of life.

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AUTHORS CONTRIBUTIONS

This work was performed in collaboration with all authors. They designed the study, collected and processed questionnaires, created the manuscript, and approved the final version of the manuscript.

CONFLICT OF INTERESTS

The authors declare that there are no conflicts of interest.

AVAILABILITY OF DATA AND MATERIALS

The data are available upon request from the authors.

ETHICS APPROVAL

All steps implemented in this study meet the ethical guidelines of the Standing Committee of Bioethics Research of Prince Sattam bin Abdulaziz University, Approval No (SCBR-028-2022).

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