

Prevalence and Risk Factors of Chronic Sinusitis among People in Jazan Region' KSA

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ABSTRACT

Background: Chronic Sinusitis results from the impairment of paranasal sinus ventilation. Symptoms of chronic sinusitis include facial pressure, fullness or pain, nasal obstruction, headache, clear or mucopurulent nasal discharge and hyposmia or anosmia. Risk factors of chronic sinusitis involve smoking, allergy, septal deviation, aspirin sensitivity and bronchial asthma.

Objective: To determine the prevalence of chronic sinusitis and it's related risk factor as well as correlation with demographics. **Methods:** The present study included 867 participants using Monkey survey for investigation which included 20 questions.

Results: There were 25.3% of participants had chronic sinusitis, 26.4% of the males and 22.4% of females suffer from the disease. Chronic sinusitis was more prevailed among young, the younger aged participants in addition to those living in rural area. Chronic sinusitis was less prevalent in married persons and those working in a medical job. Presence of any type of allergy was a risk factor for chronic sinusitis.

Conclusion: Chronic sinusitis and allergy consider as risk factors for chronic sinusitis.

Keywords: Chronic Sinusitis (CS), CS in KSA, Risk factors for CS, Allergy.

INTRODUCTION

The paranasal sinuses involve the maxillary, frontal, sphenoidal and ethmoidal sinuses, which develop as diverticula from the nasal mucosa, they are rudimentary at birth, and then expand during the eruption of permanent teeth and at puberty^[1]. Sinusitis which is also known as rhino sinusitis is an inflammation of the lining membranes of one or more of the sinuses^[2]. Several inflammation causes lead to sinusitis, chronic inflammation which leads to chronic disease, pathophysiology which causes obstruction of the sinus cavity and subsequent infection leads to acute sinusitis^[3]. Sinusitis is characterized by Sub-acute symptoms that last for 4 to 8 weeks, acute symptoms which last for less than 4 weeks and chronic symptoms that last for longer than 8 weeks^[4]. There are several factors that contribute to the chronicity of sinusitis including ostial blockage, mucus "recirculation" and osteitis^[5].

Chronic Sinusitis (CS) is caused by drainage disorders and the impairment of paranasal sinus ventilation which caused by a blockage of the ostiomeatal complex in the middle nasal meatus^[6]. Symptoms of chronic sinusitis persist for more than 90 days, either with or without acute exacerbations^[3]. A chronic disease which is defined as an inflammation of paranasal sinuses and nose which lasts for 12 weeks or longer^[7].

Diagnosis of chronic sinusitis is based on the presence of two symptoms from a variety of symptoms which last for 12 consecutive weeks, symptoms including facial pressure, fullness or pain, nasal obstruction, headache, clear or mucopurulent nasal discharge and hyposmia or anosmia^[8]. The previous symptoms are not specific, so physical examination is required and in certain situation diagnosis by using enhanced CT is recommended^[8]. Chronic Sinusitis is a big health problem worldwide that affects almost 15% of humans^[2], the prevalence rate was reported to be in the range of 6 % to 27.1 %^[2, 9-12]. In the USA the prevalence rate of chronic rhinosinusitis was 12%^[13] and in Europe, it was 10.9%^[9]. In Saudi Arabia, the prevalence of chronic rhinosinusitis is in the eastern province^[7], an increase in the prevalence in Saudi Arabia has been noted^[14]. In one study in Saudi Arabia, it was found that half of the participants had infected with chronic sinusitis^[7]. Chronic sinusitis is related to bronchial asthma, analgesic intolerance and nasal polyposis^[15,16], almost 20% of chronic sinusitis patients have nasal polyposis^[17].

Chronic sinusitis is associated with serious medical treatment costs, reduced workplace productivity^[12, 18] and a substantially impaired quality of life^[19]. This disease is common in all

age groups, however the highest prevalence in patients with the age range of 44 to 64 years old [20]. The risk factors for this disease including smoking, socioeconomic status, the rural or urban area of residence, age, sex, race, industrial employment, and coexisting allergic disease [21]. There were two studies identified septal deviation, allergic rhinitis, and influenza vaccination as risk factors for chronic sinusitis [22,23]. A cross-sectional survey conducted in Denmark revealed that occupational exposure to fumes, dust, gases or smoke was associated with increased the prevalence of chronic rhinosinusitis [24].

There are few studies that focused on the prevalence and risk factors of chronic sinusitis, so this study aims to investigate the prevalence and risk factors of chronic sinusitis in Jazan region, KSA.

MATERIALS AND METHODS

SUBJECTS

The present study included 867 participants. This study was performed using Monkey survey during August 2017. The survey included 20 questions to investigate the sociodemographic and risk factors of chronic sinusitis.

Statistical analysis

Data were analyzed using SPSS software version 16, the simple descriptive analysis in the form of means and standard deviations were calculated for numerical data. Qualitative data were described using numbers and percent distribution and chi-square was used as a test of significance to compare among patients with sinusitis and without. Odds ratio (OR) and 95% confidence intervals (CI) were computed, a significant level of less than 0.05 was considered.

RESULTS

The present study included 867 participants, most of them 617 (71.2%) were males and 250(28.8%) were females. The mean age of participants was 28.75 ± 9.59 , the most common age between participants was the age range 20-39 years old representing 687(79.2%), while participants with age range 40-59 represented 116(13.4%), followed by those with age range <20 years old 56 (6.5%) and finally those with age of ≥ 60 years old 8(0.9%). There were 453 (52.2%) of

participants were singles, 402 (46.4%) were married, 8(0.9%) were divorced and 4 (0.5%) were widow. The large majority of participants 844 (97.3%) were Saudi, while 23 (2.7%) only were non-Saudi.

There were 865 (99.8%) were Muslims and only 2 (0.2%) were Christians. Most of the participants were from urban areas 491 (56.6%) while 376 (43.4%) were from rural areas. Regarding the type of work, there were 624 (72%) working in the non-medical job while 243 (28%) were working in a medical job. The large majority of participants had university education 630 (72.7%), followed by those who had secondary education 153(17.6%) then a close Percentage for those who were postgraduate and who had intermediate education 34 (3.9%) and 32 (3.7%) respectively and finally the lowest Percentage was for those with primary education 11(1.3%) and who were uneducated 7(0.8%). There were 415 (47.9%) individuals whose income was <5000 SR, 214 (24.7%) whose income was 5000-10000 SR, 131 (15.1) whose income was 10001-15000 SR and 107 (12.3%) whose income was >15000SR. The basal habits and characteristics of participants are shown in table 1.

By studying several risk factors for sinusitis, it was found that more male had sinusitis than female, but with no significance difference (P-value=0.2). Regarding age, more individuals with age less than 40 years old suffered sinusitis than those with age more than 40 years old and there was a significant difference between the two age groups (P-value=0.001). More Saudi persons suffered sinusitis than non-Saudi, but The difference was insignificant (P-value=0.1). Higher Percentage of persons were Those living in the rural area had sinusitis when compared to those living in urban areas (P-value=0.001). Sinusitis was more common in married individuals than unmarried ones (P-vale=0.001), regarding education level there was no significant difference in different education level suffering from sinusitis (P-value=0.8). Sinusitis was less common in persons working in the medical job than those working in a non-medical job (P-value=0.03), the presence in sinusitis didn't differ by the difference in income of individuals (P-value=0.6). The correlation between the presence of sinusitis and demographics as risk factors is shown in table2.

The correlation between the presence of sinusitis and habits of participants as risk factors is shown in table 3. Smoking was not a factor related to sinusitis, where only 34 smokers had sinusitis, while 185 nonsmokers had sinusitis, however, no significant difference was found (P-value=0.9).

There were significant differences regarding injuries, nasal deformities, allergy, bronchial asthma, aspirin sensitivity and exposure to pollution. No significant difference was found regarding immune system disturbance between those with and without sinusitis (P-value=0.52).

Table1: Basal habits and Characteristics of participants

Habits/characteristics.	No. (%)	
	Yes	No
Smoking	133 (15.3%)	734 (84.7%)
Injury exposure	202(23.3%)	665(76.7%)
Chronic sinusitis	219(25.3%)	648(74.7%)
Nasal deformities	67(7.7%)	800(92.3%)
Allergy	323(37.3%)	544(62.7%)
Bronchial asthma	57(6.6%)	810(93.4%)
Aspirin sensitivity	13(1.5%)	854(98.5%)
Immune system disturbance	39(4.5%)	828(95.5%)
Exposure to pollution	70(8.1%)	797(91.9%)

Table2: Correlation with demographics and Sinusitis

Demographics		No. (%)		p-value
		Having sinusitis	Not having sinusitis	
Sex	Male	163 (26.4%)	454 (73.6%)	0.217
	Female	56 (22.4%)	194(77.6%)	
Age	<40 y	167 (22.5%)	576 (77.5%)	<0.001*
	≥40 y	52 (41.9%)	72 (58.1%)	
Nationality	Saudi	216 (25.6%)	628 (74.4%)	0.171
	Non-Saudi	3 (13.0%)	20 (87.0%)	
Residence	Urban	103 (21.0%)	388 (79%)	0.001*
	Rural	116 (30.9%)	260 (69.1%)	
Marital status	Married	129 (32.1%)	273 (67.9%)	0.001*
	Unmarried	90 (19.4%)	375 (80.6%)	
Education	Secondary and low levels	52 (25.6%)	151 (74.4%)	0.894
	University and post	167 (25.2%)	497(74.8%)	
Occupation	Medical	49 (20.2%)	194 (74.8%)	0.031*
	Non-medical	170 (27.2%)	454 (72.8%)	
Income	<10000	156 (24.8%)	473 (75.2%)	0.614
	>10000	63 (26.5%)	175 (73.5%)	

*P-value; significant

Table3: Correlation between sinusitis and expected risk factors

Risk factors		No. (%)		p-value
		Having sinusitis	Not having sinusitis	
Smoking	Yes	34 (25.6%)	99 (74.4%)	0.930
	No	185 (25.2%)	549 (74.8%)	
Injuries	Yes	64 (31.7%)	138 (68.3%)	<0.061*
	No	155 (23.3%)	510 (76.7%)	
Deformities	Yes	29 (43.3%)	38 (56.7%)	0.001*
	No	190 (23.8%)	610 (76.2%)	
Any allergy	Yes	151 (46.7%)	172 (53.3%)	0.001*
	No	68 (12.5%)	476 (87.5%)	
Bronchial asthma	Yes	28 (49.1%)	29 (50.9%)	0.001*
	No	191 (23.6%)	619 (76.4%)	
Aspirin sensitivity	Yes	7 (53.8%)	6 (46.2%)	0.017*
	No	212 (24.8 %)	642 (75.2%)	
Immune system disturbance	Yes	15 (38.5%)	24 (61.5%)	0.052
	No	204 (24.6%)	624 (75.4%)	
Exposure to pollution	Yes	34 (48.6%)	36 (51.4%)	0.001*
	No	185 (23.2%)	612 (76.8%)	

*P-value; significant

DISCUSSION

The present study included 617 (71.2%) males and 250 (28.8%) females. The mean age of participants was 28.75±9.59; the dominant age group was the group included individuals with age 20-39 years old 687(79.2%). Most of the participants in this study weren't smokers (84.7%), weren't exposed to injuries (76.7%), didn't complain nasal deformities (92.3%), and didn't have bronchial asthma (93.4%). Also, the large majority had no aspirin sensitivity (98.5%), no immune system disturbance (95.5%) and 91.9% weren't exposed to pollution, there were 37.3% had an allergy. The prevalence of chronic sinusitis in this study was 25.3%, while the prevalence in Korean population was reported as 1.01% [21], in the USA it represented 12% [13] and in Europe, it was 10.9 % of the population [9]. In a previous Saudi study [7] half of the participants included in the study had chronic sinusitis.

In the present study, chronic sinusitis was more prevalent in males (163males) than females (56 females), however, there was no significant difference between the two genders (P-value=0.2). In a Saudi study on chronic maxillary sinusitis [25], it was found that chronic maxillary sinusitis was more prevalent in males than in

females; also **Brook et al.** [26] and **Hanna et al.** [27] reported the same findings. A study from China [10] showed that chronic sinusitis was more prevalent in males. In the contrary to the previous findings, it was found in a Saudi study [7] that the majority of participants who had chronic sinusitis were females (61.6%).

Regarding age, in the current study sinusitis was more common (167 individuals) in those with age less than 40 years than those older than 40 years (52 individuals), the Significant difference was found between the two age groups regarding presence and absence of sinusitis. Our findings were in agreement with a previous Saudi study [7], whereas, 55.6% of chronic sinusitis patients were in the age of 21-30 years old. Another study [22] showed that higher prevalence was seen in younger age persons with age range of 15-34 years old. The opposite was found in a study [28] that showed the prevalence of chronic sinusitis was greater in an age group older than 40 years.

The present study showed that sinusitis was more common in those from the rural area (116 individuals) than those from the urban area (103 individuals), there was a significant difference between the persons in the two residential areas in presence and absence of

sinusitis. In the current study we found that marital status and type of job are significantly influenced presence of sinusitis, where sinusitis was more common in married persons (129 individuals) than in non-married ones (90 individuals) (P-value=0.001) and those who were in medical jobs were less to have sinusitis than those who worked in non-medical jobs; 49 vs. 170 individuals have sinusitis respectively (P-value=0.03). Regarding education level and income, we found an insignificant difference in presence and absence of sinusitis.

Dutre *et al.* [14] showed that exposure to tobacco smoke increases the risk of chronic sinusitis. Persons with particular problems in immune systems have an increased risk of developing chronic sinusitis [7]. Deviated septum is another risk factor for increasing chronic sinusitis [29] as it causes nasal blockage in one or both nostrils [7]. The present study revealed that smoking, injuries, nasal deformities, bronchial asthma, aspirin sensitivity, immune system disturbance and exposure to pollution weren't risked factors for having sinusitis. Most of the persons with sinusitis didn't expose to the previous risk factors. Although there were significant differences between presence and absence of sinusitis regarding injuries (P-value=0.01), nasal deformities (P-value=0.001), bronchial asthma (P-value=0.001), aspirin sensitivity (P-value=0.01) and exposure to pollution (0.001), the large majority of individuals suffered from sinusitis weren't exposed to the previous risk factors. Allergy was found to be the only risk factor for sinusitis, where sinusitis was more prevalent in those with allergy (151 individuals) than those without allergy (68 individuals).

Brook and Hausfeld [30] demonstrated that chronic sinusitis was more prevalent in smokers than non-smoker patients, this was opposite of our findings. A Saudi study [7] finding was in agreement with ours, where it was reported that the patients of the study weren't smokers. In a Saudi study [25], it was reported that 9.7% of the chronic maxillary sinusitis cases had allergic rhinitis. In the same previous study [25], it was found that bronchial asthma was associated with chronic maxillary sinusitis in 10.7% of patients. Also, **Slavin** [31], **Polmar** [32] and **Ferrante *et al.*** [33] found that chronic maxillary sinusitis was more

common in patients with asthma. **Shi *et al.*** [10] reported that having asthma or a nasal allergy significantly increase the risk of chronic sinusitis. In our study sinusitis was more dominant in patients without nasal deformities than those without it, this was in agreement with **Abualnasr *et al.*** study [7], where 82.9% of patients hadn't nasal polyps, **Danese *et al.*** [34] and **McNally *et al.*** [35] reported higher incidence of septal deviation between chronic maxillary sinusitis patients, while **Kim *et al.*** [36] did not report any relationship. Poor association between aspirin sensitivity and chronic maxillary sinusitis was reported [25], while another study [5] demonstrated the presence of a correlation. In a Korean study [21] it was shown that smoking wasn't a significant factor for chronic sinusitis. Several studies demonstrated a correlation between chronic sinusitis and nasal polyposis, bronchial asthma and aspirin hypersensitivity [15, 16]. In Conclusion, the present study revealed that the prevalence of chronic sinusitis was low. Younger age, living in rural area, being married and having any allergy were risk factors for chronic sinusitis. Other studies are recommended to investigate the other risk factors with chronic sinusitis correlation.

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