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The impact of Covid 19 on the sinuses, with a logistical assessment to know the risk factors.

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Abstract
Background: Sinusitis is the inflammation of the paranasal sinuses; these are cavities that we have in the face, as well as in the head, around the nose, and inside it. When such inflammation occurs, and this affects the nasal passages.
Objective: This paper is interested to analyze the effect of the Covid 19 on the sinuses, with a logistical assessment to know the risk factors.
Patients and methods: This study was conducted, by making a cross-sectional study of patients with sinuses, where this paper focused on the analysis of the impact of Covid 19 on the sinuses, with a logistical assessment to know the risk factors in Iraq. This study was applied to patients between the ages of younger than 20 to older than 40 years of age, for both sexes, male and female, in different hospitals in Iraq for a study that ranged from 5th of June 2021 to 11th April 2022. This study examined and analyzed all the data collected through the use of the program SPSS. The study data were divided into two groups, where the first group represented CRSwNP patients, which included 120 patients, where represented the patients have covid-19. The second group included CRSsNP patients, where represent patients who have covid-19 and they have already been treated for it, which include 100 patients.
Results and Discussion: In the current investigation, we draw the conclusion that CRS could not be regarded as a risk factor for COVID-19 due to the low prevalence of COVID-19 in patients with CRS and its resemblance to infection positive in the general population.
Additionally, hyposmia and anosmia have been shown to be the most common symptoms. Meanwhile, this study resulted with low-frequency cases of patients with Asthma, with 18 (15%) in the CRSwNP patients' group which our study's findings on the low prevalence of COVID-19 in individuals with CRS, demonstrate that this condition, unlike asthma and allergy conditions, is not a risk factor for SARS-CoV-2 infection. However, the extent of SNOT alterations following the intervention modalities may be influenced by patient-specific characteristics. Notably, our data showed that the average SNOT-22 score for CRS patients with COVID-19 was the same across all four categories (runny nose, cough, fever, and asthma).
Conclusion: our study showed that the outcomes of the CRSsNP patients' group were better than the CRSwNP patients' group in the impact of symptoms side on the sinus patients. To follow-up, this study found the most effect symptoms on the patients are Runny nose, Anosmia, and Cough, which had the most frequency of patients' cases. In the SNOT-22 side, our study found cases of patients on covid-19 by sinuses, but the score of SNOT-22 assessment was low in comparison with another group which had rid of covid-19.

Keywords: Covid-19; sinuses; CRSwNP; CRSsNP; asthma; and SNOT-22 score.

Introduction

Sinusitis is the inflammation of the paranasal sinuses; these are cavities that we have in the face, as well as in the head, around the nose, and inside it. When such inflammation occurs, and this affects the nasal passages [1]. Prof. Dr. Enrique Pérez Girala [2,3], a Specialist in Otorhinolaryngology at the Hospital de Clínicas, explained the symptoms that can occur in people with sinusitis and the possible treatments to alleviate it. Postnasal drip or rhinorrhea is the secretion that falls from the nose to the throat, nasal discharge that can be

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green or yellowish in color, nasal obstruction, sensitivity at the level of the eyes and nose, as well as headache in the front area and around the eyes, jaws, teeth, and in some cases, fever, constitute the symptoms of sinusitis [4]. The factors that predispose the appearance of this condition are the person's habits, such as tobacco consumption, patients with allergic pathologies, the immunocompromised, deviations of the septum, craniofacial malformations, adenoid hypertrophy, among others; but it should be noted that anyone can suffer from it. In the event that the origin is infectious, it can occur through contagion or infection by some bacteria in the community. [5]

Regarding treatment, anti-inflammatories and symptomatic management of the disease can be applied, in addition to specific antibiotic therapies for each germ, and in case of recurrence or complicated pathologies, it can lead to surgical intervention. The complications of sinusitis can be very complex and even put the general condition of the patient at risk since the nose and paranasal sinuses are practically in the middle of the face and head [6]. These complications can be local or remote; the local ones are of concern because the eyes are located in that area, above the base of the skull, the endocranium and noble structures to the back, as well as blood vessels with a lot of irrigation, which can cause these infections to migrate. To other places putting the eye or the central nervous system at risk", mentioned Prof. Dr. Pérez. [7]

The rapid spread of COVID-19 and concerns about viral transmission highlight the importance of identifying early or subclinical symptoms of infection. At the otorhinolaryngological level, the main symptoms are the loss of smell and taste reported by the patients. Identifying the timing and association of loss of smell and taste in COVID-19 is critical, as it can help facilitate early detection and isolation of cases. [8,9]

In the study by Hopkins [10,11] conducted in April 2020 in the United Kingdom, patients reporting onset anosmia during the COVID-19 pandemic were evaluated through a survey of 2428 subjects. 64% of the respondents were under 40 years old; most reported the onset of their anosmia in the last week, and 17% did not report any other symptoms considered to be associated with COVID-19. In patients who reported other symptoms, 51% had a cough or fever and therefore met current guidelines for self-isolation. Anosmia is reported along with well-reported coronavirus symptoms, but 1 in 6 patients with new-onset anosmia report it as an isolated symptom. This could help identify asymptomatic disease carriers and trigger targeted testing.

In the study by Lechien [12,13] carried out in April 2020 in twelve European countries, the appearance of olfactory and taste dysfunctions in patients with COVID-19 was investigated. Patients completed the National Health and Nutrition Examination Survey and the short version of the Olfactory Disorders-Negative Statements Questionnaire (sQOD-NS). A total of 417 patients with mild-moderate COVID-19 completed the study. The most frequent general symptoms consisted of cough, myalgia, and loss of appetite. Facial pain and nasal obstruction were the otorhinolaryngological symptoms most related to the disease. Olfactory and gustatory dysfunctions were reported by 85.6% and 88.0% of the patients, respectively. There was a significant association between both disorders. Olfactory dysfunction appeared before the other symptoms in 11.8% of cases [14]. sQOD-NS scores were significantly lower in patients with anosmia compared with normosmic or hyposmia individuals. Among the 18.2% of patients without nasal obstruction or rhinorrhea, 79.7% were hyposmia or anosmia. The early olfactory recovery rate was 44%. [15,16,17]

On the other hand, the specialist commented that the appearance of sudden symptoms should be considered since, in the early stages, it is difficult to differentiate between covid-19 and sinusitis because both can present very similar signs such as fever, headache throat, nasal obstruction, cough, or difficulty breathing. [18,19]

Among the suggestions, the specialist noted that, in the event of any symptom of a respiratory condition, the necessary precautions should be taken, such as isolation, the use of face masks, and all the preventive measures governed by the Ministry of Health, since laboratory tests can confirm or rule out the existence of the covid-19 virus [20]. This paper is interested to analyze the effect of the Covid 19 on the sinuses, with a logistical assessment to know the risk factors.

Patients and Methods

This paper was conducted, by making a cross-sectional study of patients with sinuses, where this paper was interested to search the analysis of the effect of the Covid 19 on the sinuses, with a logistical assessment to know the risk factors in Iraq. This study was applied to patients between the ages of younger than 20 to older than 40 years of age, for both sexes, male and female, in different hospitals in Iraq for a study that ranged from

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5th of June 2021 to 11th April 2022. This study examined and analyzed all the data collected through the use of the program SPSS.

The data of this paper had distributed into two groups, where the first group represented CRSwNP patients, which included 120 patients, where represented patients who have covid-19, and the second group included CRSsNP patients, where represent patients who have covid-19 and they have already treated it which include 100 patients.

In the beginning, and Comorbid as presented all demographic characteristics about patients' sinuses that affect during the covid-19 period where contain Age have < 20, 35-40, and >40, Sex that includes Male, Female, Smoking which choose Yes, no, Education level have Low, Middle, High, as well as and Comorbid diseases include Runny, Stuffy nose, Postnasal drip, Congestion, and Pressure feeling in the face where all these details can be shown **Table 1**.

Follow-up, this paper was extended into previous studies that exist to sinuses patients during the covid-19 period in by present symptoms in comparison between CRSwNP patients and CRSwNP patients, which show in **Table 2,** where these are include Runny nose, Stuffy nose, Fever, Cough, Headache, Tiredness, and Vomiting.

According to Table 3, this paper was examined and submitted in the distribution of patients' sinuses complaint in terms of CRSwNP patients and CRSsNP patients which have Nasal blockage, Anterior nasal secretion, Posterior nasal discharge, Facial pain, Reduction or loss of smell, and Nasal blockage where can be shown in **Table 3.**

In the progress of study wide in the covid-19 period where this study progressed into risk factors to sinuses patients where include Nasal allergies, Asthma, Nasal polyps, deviated septum, and weakened immune system, that are present in **Table 4**. This study was evaluated of outcomes of sinuses patients within the covid-19 period by SNOT-22 Test that include medical clinical by Blow nose, Sneezing, Cough, running nose, and Postnasal discharge which can be seen in **Figure 1**. This study assessed the statistical relationship between patients and symptoms were presented with basic parameters have Runny nose, Cough, Fever, and Facial pain by evaluation of two R-correlation and Sig, which can be shown in **Table 5**.

Results

Table-1: Characteristics details of sinuses patients in terms of CRSwNP patients and CRSsNP patients.

Variables	CRSwNP patients (N=120)	CRSsNP patients (N=100)	P-value
Age			
< 20	25 (20.83%)	27 (27%)	0.0422
35-40	41 (34.17%)	30 (30%)	0.0467
>40	54 (45%)	43 (43%)	0.0482
Sex			
Male	70 (58.33%)	65 (65%)	0.4211
Female	50 (41.67%)	35 (35%)	0.4532
Smoking			
Yes	85 (70.83%)	77 (77%)	0.0436
No	35 (29.17%)	23 (23%)	0.0445
Education level			
Low	50 (41.67%)	42 (42%)	
Middle	30 (25%)	20 (20%)	
High	40 (33.33%)	38 (38%)	
Comorbid diseases			
Runny	40 (33.33%)	35 (35%)	0.0488
Stuffy nose	33 (27.5%)	20 (20%)	0.0428
Postnasal drip	24 (20%)	18 (18%)	0.0481
Congestion	14 (11.67%)	15 (15%)	0.0463

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Pressure feeling in the face	9 (7.5%)	12 (12%)	0.0444

Table-2: Presentation of sinuses symptoms patients in the covid-19 period.

Variables	**CRSwNP patients (N=120)**	**CRSsNP patients (N=100)**	**P-value**
Runny nose	19 (15.83%)	10 (10%)	0.04472
Anosmia	15 (12.5%)	8 (8%)	0.0433
Fever	10 (8.33%)	6 (6%)	0.0487
Cough	11 (9.17%)	5 (5%)	0.0461
Headache	7 (5.83%)	4 (4%)	0.0493
Tiredness	7 (5.83%)	2 (2%)	0.0475
Vomiting	9 (7.5%)	1 (1%)	0.0466

Table-3: Distribution of patients' sinuses complaint in terms of CRSwNP patients and CRSsNP patients.

Variables	**CRSwNP patients (N=120)**	**CRSsNP patients (N=100)**	**P-value**
Nasal blockage	15 (12.5%)	14 (14%)	0.04832
Anterior nasal secretion	21 (17.5%)	18 (18%)	0.04921
Posterior nasal discharge	17 (14.17%)	9 (9%)	0.04233
Facial pain	9 (7.5%)	8 (8%)	0.0495
Reduction or loss of smell	13 (10.83%)	8 (8%)	0.04834
Nasal blockage	7 (5.83%)	6 (6%)	0.04944

Table-4: Progress of risk factors to sinuses patients.

Variables	**CRSwNP patients (N=120)**	**CRSsNP patients (N=100)**	**P-value**
Nasal allergies	11 (9.17%)	7 (7%)	0.0488
Asthma	18 (15%)	9 (9%)	0.0465
Nasal polyps	16 (13.33%)	4 (4%)	0.04225
Deviated septum	6 (5%)	4 (4%)	0.049
A weakened immune system	5 (4.17%)	3 (3%)	0.0493

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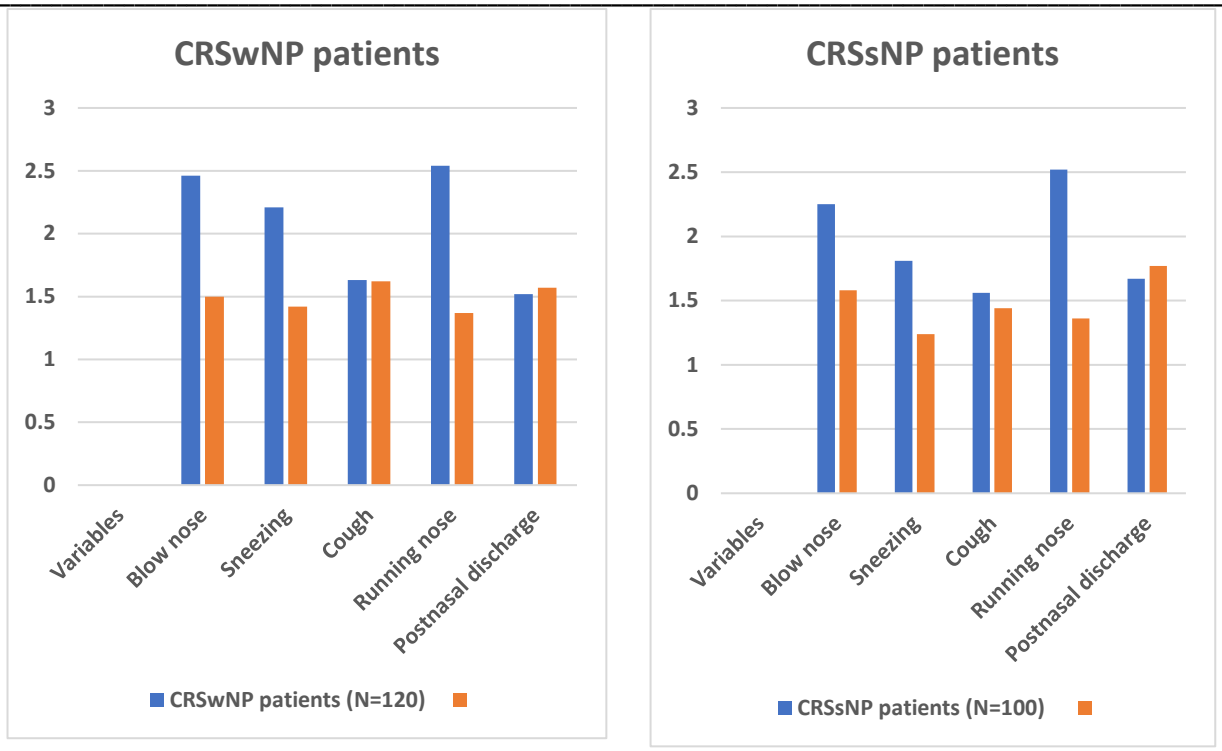

Figure-1: Outcomes of sinuses patients within the covid-19 period by SNOT-22 Test.

Table-5: Assessment of the statistical relationship between patients and symptoms.

Variables	**Symptoms**	**CRSwNP patients**	**CRSsNP patients**
R correlation Sig **Runny nose**	1 1	0.99 0.001	0.8 0.06
R correlation Sig **Cough**	1 1	0.93 0.01	0.92 0.03
R correlation Sig **Fever**	1 1	0.9 0.04	0.8 0.05
R correlation Sig **Asthma**	1 1	0.85 0.003	0.87 0.05

Discussion

In the current investigation, we draw the conclusion that CRS could not be regarded as a risk factor for COVID-19 due to the low prevalence of COVID-19 in patients with CRS and its resemblance to infection

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positive in the general population [21]. Additionally, hyposmia and anosmia have been shown to be the most common symptoms. Additionally, the low average SNOT-22 score seen in individuals with CRS after a year from the start of the pandemic implies that the patients must follow the health regimens. We evaluated the prevalence and clinical signs of COVID-19 in the current study. Additionally, we assessed how the pandemic affected the patients with CRS's quality of life. In reality, only a few epidemiological studies are currently being conducted globally to ascertain the incidence of COVID-19 in individuals with CRS. CRS often manifests as a chronic inflammation of the nasal and paranasal sinus mucous membranes [22]. In the meanwhile, it's possible that CRS might encourage SARS-CoV-2 infection, given that topical corticosteroid therapy serves as the baseline therapeutic gold standard for the illness. According to research, asthmatic individuals do, nevertheless, exhibit type 2 immune inflammations. Meanwhile, this study resulted with low-frequency cases of patients with Asthma, with 18 (15%) in the CRSwNP patients' group which our study's findings on the low prevalence of COVID-19 in individuals with CRS, demonstrate that this condition, unlike asthma and allergy conditions, is not a risk factor for SARS-CoV-2 infection [23]. This could be brought on by immunological disorders and the primary medication used to treat CRS, intranasal corticosteroids. Additionally, a recent study discovered that asthmatic individuals with eosinophilia had a protective effect against hospitalizations and fatalities linked to COVID-19. Compared to CRSsNP, COVID-19 severity, and SARS-CoV-2 infection are both severe. As a result, we draw the conclusion that since CRS, particularly CRSwNP, is linked to type 2 inflammation [24], it is highly unlikely that it is the cause of the high prevalence of SARS-CoV-2 infection. In actuality, the SNOT-22 serves as the standard questionnaire to evaluate individuals with CRS's health state and quality of life. However, the extent of SNOT alterations following the intervention modalities may be influenced by patient-specific characteristics. Notably, our data showed that the average SNOT-22 score for CRS patients with COVID-19 was the same across all four categories (runny nose, cough, fever, and asthma) [25]. Finally, COVID-19 did not worsen sinonasal symptoms in CRS patients, which may have impacted QoL. Although our investigation demonstrated that SNOT-22 scores obtained in CRS patients after a year from the start of the pandemic were considerably lower than another group levels, the sum of mean SNOT-22 score differences fell below the minimum clinically relevant difference. [26]

Conclusion

In this present, the impact of covid-19 is dropping and cannot be represented as a risk factor on chronic rhinosinusitis patients. Furthermore, our study showed that the outcomes of the CRSsNP patients' group were better than the CRSwNP patients' group in the impact of symptoms side on the sinus patients. To follow-up, this study found the most effect symptoms on the patients are Runny nose, Anosmia, and Cough, which these had the most frequency of patients' cases. In the SNOT-22 side, our study found cases of patients on covid-19 by sinuses, but the score of SNOT-22 assessment was low in comparison with another group which had rid of covid-19.

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