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The correlation between tonsillectomy and Covid-19 infection

Hani Hameed Wadi (MSc)[2], Ahmed Amer Hadi Al-Majmaie(FIBMS)[2], Anfal Shakir Motib (PhD)[3]

[1] Specialist Doctor in otolaryngology, Diyala health centre, Ministry of Health,Diyala, Iraq

[2] Otorhinolaryngologist head and neck surgeon, Baquaba teaching hospital, Diyala health directorate, Diyala, Iraq

[3] College of Medicine, University of Diyala, Diyala, Iraq

Abstract

Background: The role of tonsillectomy history on the course of COVID-19 infection has not been determined, including COVID-19 colonization in the tonsillar tissue and reduce the cytokine activity of palatine tonsil tissue and the immune response of humoral with cellular immune.

Objective: To determine the effect of tonsillectomy in the development of COVID-19 infection.

Patients and Methods: It was collected 150 cases diagnosed with COVID-19 and they admitted to Diyala Hospitals. Data including age, gender, smokers, and symptom status were collected.

Results: The total number of the patients who were positive COVID-19 was 150, the 102 (68%) of them were males and 48 (32 %) were females. It was found that the highest incidence rate was noticed among non-smoking patients (114 cases) compare to smokers (36 cases) ($p<0.0001$). It was appeared a significant difference ($p<0.0001$) of the symptoms of COVID-19 patients with tonsillectomy relative to the patients without tonsillectomy history.

Conclusion: Patients that infected with COVID-19 and they have a history of tonsillectomy have more systemic response including fever, chills and other symptoms compare to the patients without tonsillectomy history.

Keywords: Tonsillectomy, COVID-19, Smoking, Tonsillar tissue.

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Correspondence Address: Hani Hameed Wadi
Specialist Doctor in otolaryngology, Diyala health centre, Ministry of Health,Diyala, Iraq
Email: wadihani@yahoo.com

Website: https://djm.uodiyala.edu.iq/index.php/djm

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Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) or Coronavirus- 2019 (COVID-19) was determined in the Hubei province of China firstly and then spread around the world [1]. In 2019, Coronavirus (COVID-19) caused severe acute respiratory syndrome coronavirus 2 (SARS- CoV-2) which appeared a wide range of asymptomatic infection and sever respiratory failure. It was reported that there are several symptoms caused by this virus including fever, cough, shortness of breath with gastrointestinal disturbances and myalgia with malaise [2]. Several risk factors were determined that play a role in symptom severity and prognosis including sex, coexisting chronic disorders and smoking. Coronaviruses are

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enveloped RNA viruses which have crown-like spikes on their surface [3,4]. The current study aimed to identify the role of tonsillectomy in COVID-19 patients and development of sign and symptoms of this virus in patients with tonsillectomy history.

The mortality rate is between 2% to 5% according to different studies and this is may be due to different patient's history or prevalence of infection [5,6].

It was found that COVID-19 present in stool samples of patients that infected by this virus and the extracted RNA was present for longer time than in respiratory samples [7]. The diagnosis of this virus form conjunctival samples was confirmed. It was suggested that the transmission of this virus is not limited to the respiratory tract and the eyes provide an effective method for COVID-19 to enter the body [8]. It was reported that human breast milk contains traced COVID-19 RNA (9). It was showed that there are many factors play an important role on COVID-19 transmission and its pathogenicity including the age which considers an essential factor for severe COVID-19. Older aged above 60 years are important risk factor for severe COVID-19 with complication and increase the fatality rates within this ages [10,11]. It was showed that the gender-associated predisposition to COVID-19, it was reported that the men being more severe disease than women [10,12,13,14]. It was showed that patients with chronic disease including, cardiovascular disease with age over of 60, hypertension, obesity, and smoking are at a higher risk in COVID-19 infection [15]. It was reported that tonsillectomies patients showed increased developing the disease including, higher temperatures, malaise and chills. It was possible that malaise and chills were complicated of the fever [16,17]. It was appeared that patients with history of tonsillectomy are more severe symptoms than other patients [18].

Patients and Methods

Patients with COVID-19 in Diyala Hospitals were selected in this study. Data including age, gender, and the symptoms status were recorded. In addition, the chronic diseases of these patients and the history of tonsillectomy surgery were recorded. All COVID-19 patients used in this study appeared PCR test positive results [19,20].

Study Design

This study included 150 patients with COVID-19 in Epidemiological Monitoring Unit at Emergency Department in Diyala Hospitals from 1st of January to the 11th of November 2022.

Statistical Analysis

It was used Graphpad Prism software (Graphpad, California, USA) for analysis the results of this study. The results were expressed as means ± standard error of the mean (SEM), significance was defined as (* $p<0.05$, ** $p<0.01$, *** $p<0.001$ and **** $p<0.0001$).

Results

The total number of the patients who were positive COVID-19 was 150, the 102 (68%) of them were males and 48 (32 %) were females, as shown in Table (1).

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Table(1): Distribution of patients according to Gender

Gender	Patients NO (%)
Male	102 (68 %)
Female	48 (32 %)
Total	150 (100%)

Patients were divided into four categories; the smallest age group was 15 years old and older age group was 90 years old. The highest number of patients 54 were in age group 15-35 years old, followed by 48 cases in age group 36-50 years old, while low frequency 21 cases was noticed within age group 71-90 years old. It was appeared highly significant differences among them as shown in Table (2).

Table (2): Distribution of patients according to their ages

Age group years	Patients No (%)
15-35	54 (36%)
36-50	48 (32%)
51-70	27 (18 %)
71-90	21 (14%)
Total	150 (100%)

The distribution of study population according to the presence of chronic disease, it was shown that Out of 150 patients with COVID-19, 33 were diabetic, 21 were hypertensive and 15 have cardiac disease as shown in Table (3).

Table (3): Distribution of patients according to their presence of chronic disease

Diabetes Mellitus	33 (22%)
Hypertension	21 (14%)
Cardiac Disease	15 (10%)
Asthma	9 (6%)
No Chronic Disease	72 (48%)

Distribution of study population according to smoking habit, it was found that the highest incidence rate was noticed among non-smoking patients (114 cases), in compare to smokers (36 cases) as shown in Table (4).

Table (4): Division of patients according to smoking habit. It was found there is a significant number between the number of smoking patients relative to non-smoking patients infected with COVID-19 **** ($p<0.0001$)

Smokers	36 (24%)
Non-Smokers	114 (76%)
Total	150 (100%)

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The distribution of patients according to the presence of tonsillectomy history, it was found that the patients without tonsillectomy history 108 (72 %) is higher than with tonsillectomy history 42 (28%) Table (5). However, the symptoms of COVID-19 infection in patients with tonsillectomy are more severe than in patients without tonsillectomy history Table (6).

Table (5): Distribution of patients according to the presence of Tonsillectomy History

Tonsillectomy History (+)	42 (28%)
Tonsillectomy History (-)	108 (72%)
Total	150 (100%)

Table (6): Distribution of patients according to the signs and symptoms of COVID-19 infection

Sign and symptoms	Tonsillectomy (+) n=42	Tonsillectomy (-) n=108
Asymptomatic	0 (0 %)	20 (18.52%)
fever	42 (100%)	88 (81.48 %)
cough	42 (100%)	85 (78.7%)
Shortness of breath	40 (95.24%)	78 (72.22%)
chills	40 (95.24%)	48 (44.44%)
malaise	38 (90.48%)	84 (77.78%)
Sore throat	35 (83.33%)	30 (27.78%)
headache	42 (100%)	85 (78.7%)
diarrhea	38 (90.48%)	80 (74.07%)
myalgia	42 (100%)	60 (55.56%)

*It was appeared a significant difference **** $p<0.0001$ of the symptoms of COVID-19 patient with tonsillectomy relative to the patients without tonsillectomy history

Discussion

It was showed that tonsillectomy patient's history showed an increased risk for developing the symptoms of disease. Tonsillectomy may be an indicator for reduction of Waldeyer's ring immune function. It was reported that the inflammatory response was increased by present chronic diseases which leads to a continuous cycle and surgery [3,9].

Tonsils will increase in the production of inflammatory mediators and chemotactic inactivity during the infection by activated dendritic cells (DCs), the most efficient APC, and interfollicular T-cell areas [6,18]. Furthermore, the T-cells was suppressed by B-regulatory cells and other lymphocytes cells, and all of them play a role in the immune response. These cells are found in all human lymphoid tissues, such as the palatine and naso- pharyngeal tonsils [21]. Moreover, the IgM and IgA secretion was showed their molecular role in a reduced cytoplasmic expression of" the J-chain, and the peptide that used in the formation of immunoglobulins in the patients with chronic tonsillitis [22]. It was reported that the routine application of a rapid salivary COVID-19 screening test that may be play an important role in the understanding the tonsils effect on mediating the production of secretive antibodies and eradication of the

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virus [1,4,8]. It was showed by many studies that the innate immunity in the pharyngeal MALT play a role in the response against viruses and transmission of COVID-19 [21,23]. It was examined that an inflammatory reaction that was uncontrolled against the COVID-19 which occurred by a dysfunctional Waldeyer's ring that can led to fever, higher temperatures and other associated symptoms. Therefore, it was determined that the tonsillectomy as an important indicator of the activity immune response of pharyngeal MALT, which can be altered immune response against COVID-19 infection [16,18]. The results of this study are confirmed by many research to determine the history of tonsillectomy, which could help physicians to determine the clinical manifestations of patients with COVID-19 infection [15,21,23].

Conclusions

The results of this study showed that the patients with COVID-19 and they have tonsillectomy history are more likely have severe symptoms with fever, chills and malaise than other patients. These results showed new line on the COVID-19 pathophysiology.

Recommendations

It was recommended that it is essential to determine the risk factors of patients that have COVID-19 infection when it was taken the history of patients especially the history of tonsillectomy which play an important role to develop and increase the symptoms of this viral infection.

Source of funding: The current study was funded by our charges with no any other funding sources elsewhere.

Ethical clearance: Ethical approval was obtained from the College of Medicine / University of Diyala ethical committee for this study.

Conflict of interest: Nil

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العلاقة بين استئصال اللوزتين والإصابة بفيروس كورونا

هاني حميد وادي [١]، احمد عامر هادي المجمعي [٢] ، انفال شاكر متعب٣

الملخص

خلفية الدراسة: لم يتم تحديد دور استئصال اللوزتين في مسار عدوى كوفيد-١٩، بما في ذلك تكاثر كوفيد-١٩ في انسجة اللوزتين و تقليل نشاط السيتوكينات في انسجة اللوزتين الحنكيه و الاستجابة المناعية الخلطيه مع المناعه الخلوية .

اهداف الدراسة: لتحديد تأثير استئصال اللوزتين في تطور عدوى كوفيد-١٩

المرضى والطرائق: تم جمع ١٥٠ حاله مصابة بفيروس كورونا و إدخالها الى مستشفيات ديالى. تم جمع البيانات بما في ذلك العمر والجنس و المدخنين و حالة الاعراض.

النتائج: بلغ إجمالي عدد المرضى الذين ثبتت إصابتهم بفيروس كورونا ١٥٠ ، منهم ١٠٢ (٦٨%) ذكور و ٤٨ (٣٢%) إناث. و قد وجد أن أعلى نسبة اصابة لوحظت بين المرضى غير المدخنين(١١٤ حالة) مقارنة بالمدخنين (٣٦ حالة) ($p < ٠،٠٠٠١$) . وقد ظهر أختلاف كبير ($p < ٠،٠٠٠١$) في أعراض مرضى كوفيد-١٩ الذين أجروا أستئصال اللوزتين مقارنةً بالمرضى الذين لم يجرو استئصال اللوزتين.

الاستنتاجات: المرضى الذين يعانون من كوفيد-١٩ و خضعوا لعملية أستئصال اللوزتين لديهم استجابة نظامية أكثر بما في ذلك الحمى والقشعريرة و الاعراض الاخرى مقارنة بالمرضى الذين لم يخضعوا لعملية أستئصال اللوزتين.

الكلمات المفتاحية: أستئصال اللوزتين ، التدخين ، أنسجة اللوزتين ، العلاقة بين أستئصال اللوزتين والاصابة بفيروس كورونا

البريد الالكتروني: wadihani@yahoo.com

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[١] مركز ديالى الصحي – وزارة الصحة – العراق
[٢] مستشفى بعقوبة التعليمي – دائرة صحة ديالى – ديالى – العراق
[٣] كلية الطب - جامعة ديالى - ديالى - العراق