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A PROSPECTIVE CROSS SECTIONAL STUDY ON ASSESMENT OF NASAL MUCOCILIARY CLEARANCE MECHANISM IN PATIENTS FOLLOWING COVID 19 INFECTION

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ABSTRACT

Nasal mucociliary clearance duration is prolonged in viral respiratory tract infections and chronic sinusitis. The aim of our study was to record the mucociliary clearance time using Saccharin clearance test on all selected patients coming to our opd with two week post covid status.Out of 200 Patients included in our study, 90 were males and 110 were females and Mean age of study group was 32.6+/- 7.632.Mucociliary clearance time was measured on an average of 2 weeks after covid infection, and the mean time recorded was 16.26 +/- 2.732 minutes. P value was 0. 112(>0.05), so there was no statistically significant relation between mucociliary clearance time and covid 19 infection and our study concludes that there is no long term adverse effect on nasal mucosa following covid 19 infection.

KEYWORDS

Nasal mucociliary clearance, covid19,Saccharin test

INTRODUCTION

Nasal mucociliary clearance is the primary defence mechanism of the respiratory system. The mucous membrane starts in the nose and extends to the upper and lower airways. Inhaled particles adhere to the nasal mucosa, which lines the nasal cavity in a single a layer, and efficient and coordinated ciliary activity transports the mucus towards the oropharynx. In this way, mucociliary clearance protects the respiratory system against inhaled particles and microorganisms. Ineffective ciliary activity can lead to acute or chronicinfections in the upper and lower respiratory tract.[1]

The saccharin test is a simple, easy-to-perform, widely used, inexpensive test. It was first described by Andersen and is used to measure nasal mucociliary clearance time.It is based on measuring the time until the taste of the saccharin placed 1 cm behind the anterior end of the lower turbinate is felt by the patient.[2]The mucociliary clearance time varies in healthy adults, and it is 10-15 minutes on an average. Values over 20 min have been reported to be prolonged mucociliary clearance time. Both acute and chronic respiratory infections can disrupt mucociliary function.[3] As COVID-19 is an acute respiratory condition, we conducted a mucociliary clearance test on all selected patients coming to our opd with post covid status.[4]

MATERIALS AND METHODS

The study was conducted in department of ENT ,Sapthagiri institute of medical sciences and research Centre on 200 patients from february 2021 to July 2021.patients, with post covid status of 2 weeks, who were tested positive for SARS-CoV-2 by RT PCR.

All of the patients included in the study were assessed by the same Clinician, All participants underwent an ENT examination and were subjected to saccharine test.

INCLUSION CRITERIA

1. All Patients with post covid status of 15 days between age group of 20 -55 years were included in the study.

EXCLUSION CRITERIA

1. Patients with history of smoking.
2. Comorbid systemic disease like HTN, DM or any chronic infection.
3. Active infection and history of allergy in nose, throat, oral cavity.
4. History of nasal surgery/ trauma/DNS
5. Pregnant women.

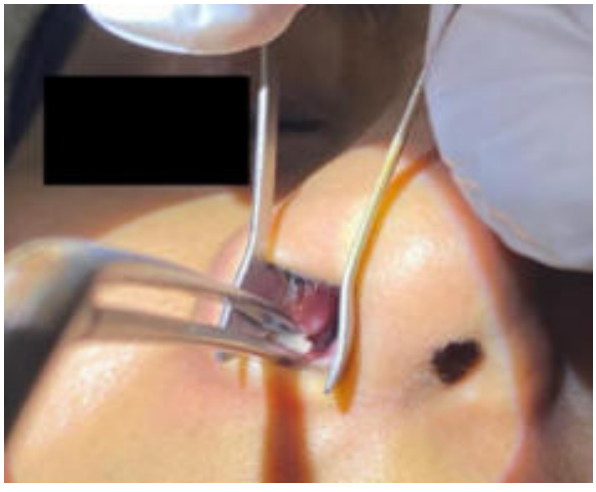
PROCEDURE

The saccharine test was performed on all participants using appropriate personal protective equipment to measure mucociliary clearance. Oral intake was discontinued within 1 hour before the test and the patients were rested for 30 minutes. A 0.5-mm saccharin particle was then placed approximately 1 cm behind the medial surface of the inferior turbinate with the help of a Tilley's forceps while the participant was seated in the upright position and the participants were asked not to sneeze, sniff or wipe their nose throughout the test. During the test, the participant was asked to swallow at 30-second intervals and report when she/he felt the taste of saccharin.

The time from the placement of saccharin in the nasal cavity to the perception of taste was evaluated as mucociliary clearance time.

The mucociliary clearance time of all participants were calculated and compared in their own age group according to the reference values reported in the literature

Picture 1: SACCHARINE TEST- placement of saccharine pellet at the anterior end of inferior turbinate



STATISTICAL METHOD

The data collected was entered in MS Excel sheet and analysis was done by using SPSS v.20. Result was expressed in the form of descriptive and inferential statistics.

RESULT

Out of 200 Patients included in our study, 90 were males and 110 were females and Mean age of study group was 32.6+/- 7.632.

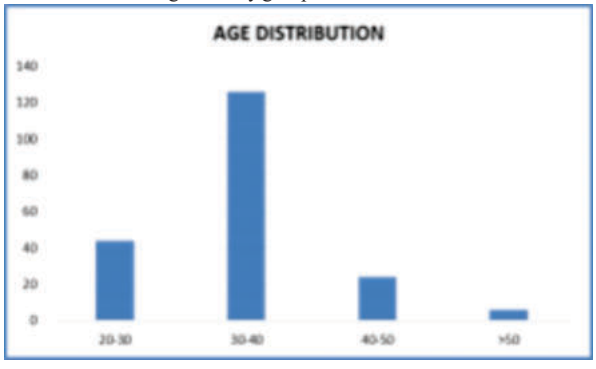


Figure 1 : AGE DISTRIBUTION

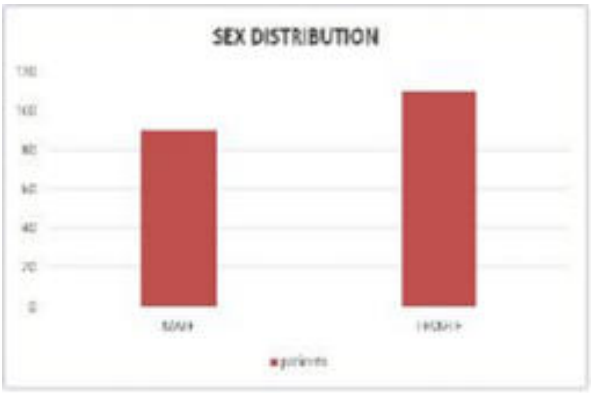


Figure 2 : SEX DISTRIBUTION

Mucociliary clearance time was measured on an average of 2 weeks after covid infection, and the mean time recorded was 16.26 +/- 2.732 minutes.

Although different values have been reported in the literature, the mean reference mucociliary clearance time was between 10-15 minutes. P value was 0. 112(>0.05), so there was no statistically significant relation between mucociliary clearance time and covid 19 infection.

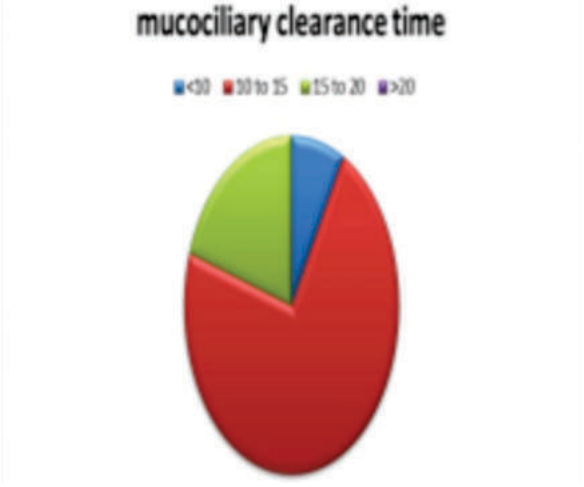


Figure 3 : MUC0CILIARY CLEARANCE TIME

DISCUSSION

Nasal mucociliary clearance depends on two principal components, the properties of the cilia like beat frequency, coordination and the physiological and chemical qualities and quantity of the mucus. The saccharin test is an useful screening tool for measuring nasal mucociliary clearance as it is less expensive, simple to do, and reproducible as given in study by Stanley et al (5.Acute infections ofthe upper respiratory tract can affect the nasal mucociliary clearance by direct damage to the cilia and change in the properties of the nasal secretions.

When the normal mucociliary clearance mechanisms are disrupted, this is followed by mucus stasis and secondary infections occur as a result of increased exposure of the airway to antigens. Therefore, the preservation of mucociliary clearance during viral infections is a vital factor affecting the course of disease. Previous studies of the effects of age and sex on mucociliary clearance have yielded conflicting findings. Although some authors have concluded that age and sex have no influence on mucociliary clearance.6

Studies reporting the frequency of upper respiratory symptoms and olfactory dysfunction in COVID-19 disease have been published in literature. In a study conducted by Mao et al out of 214 patients with the diagnosis of COVID-19 reported anosmia (7). In previous studies, viral infections such as human immunodeficiency virus and Crimean–Congo hemorrhagic fever have been shown to affect mucociliary clearance time.8 In a study by Çeçen A et al no statistically significant difference was found in intergroup mucociliary clearance time (*P*= 0.760).Although the authors found that smoking and viral infections prolong the MCC duration in their study, they did not find a statistically significantdifference between the groups in terms of MCC duration.9

There are multiple factors affecting the nasal mucociliary clearance including smoking, old age, certain infections, irritants and allergy, our study could not establish a correlation between COVID 19 and mucociliary clearance. Though virus was detected in all the swab samples from the study group, which shows active infection of the epithelium, the saccharin test time was within the reference values.

CONCLUSION

Nasal mucociliary clearance is a crucial airway defense mechanism, which may lead to a wide array of diseases including pulmonary pathology, though few viral infections prolong the mucociliary clearance duration, in our study, mucociliary clearance time was not prolonged significantly as a sequel of covid 19 infection indicating no long term adverse effect on nasal mucosa following the infection.

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