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Clinical study of middle ear function in chronic rhinosinusitis patients

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Abstract:
Background*: Disorders of the nose and paranasal sinuses can obstruct the eustachian tube and cause congestion, which can have an effect on the middle ear[1]. The mucosa of the eustachian tube may become inflamed as a result of infected sinus discharge, altering mucociliary clearance. Additionally, it may cause changes in middle ear pressure, raising the middle ear's threshold for sound conduction[2]. This study compared the impact of chronic rhinosinusitis on middle ear function over the previous 18 months in our institute.*
Materials and Methods*: This is a prospective study carried out on 113 patients of the age group of 11 to 60 years coming to the Department of otorhinolaryngology, NIMS Medical College.*
Results*:Out of 113 patients, 34 (30%) patients were females and 79 (70%) patients were male which shows amale preponderance. The majority of sinusitis patients fall under the age group of 31 to 40. There were 45 (39.8%) patients who had CRS for less than 3 years and 68(60.2) patients who had CRS for more than 3 years. The involvement of anterior ostiomeatal complex was found in 63 (55.8%) patients, with posterior osteomeatal complex 6 (8%) and with pan sinusitis 41(36.2%). Valsalva maneuver was positive in 96 (85%) patients while negative in 17(15%) patients. Patients with grade 1 retraction come out to be 51 (45.1%) while with grade 2 retraction were 45 (39.8%) and those with grade 3 / 4 retraction were 15%. To assess the hearing of the patients all 113 patients underwent pure tone audiometry and found that 28 patients (27.8%) had normal hearing, in 85 patients (75.2%) had conductive hearing loss, and there was no sensorineural hearing loss. Tympanometry was done on 113 patients and results were obtained as type A curve in 40 (35.4%), Type B in 3 (2.7%), and 70 (61.9%) patients were found Type C[3]. The sinusitis in relation to type c curve is 14 (19%) for anterior osteomeatal complex, 15 cases (22%) for posterior osteomeatal complex and 41 (59%) for pan sinusitis.*
Conclusion: *chronic rhinosinusitis affects the mucociliary function of eustachian tube and thereby affecting the middle ear function.*
Key Word*: Chronic Rhinosinusitis, Middle Ear Function, Eustachian tube dysfunction*

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I. Introduction

In addition to objective evidence, chronic rhino sinusitis is defined as the occurrence of at least two of the four cardinal symptoms (namely, facial pain or pressure, hyposmia or anosmia, nasal drainage, and nasal obstruction) for at least 12 weeks in a row. Physical examination, endoscopy, or radiography, preferably sinus computed tomography, can provide objective proof of chronic rhino sinusitis. Chronic rhino sinusitis (CRS) is phenotypically divided into those cases with nasal polyps (CRSWNP) and those without nasal polyps (CRSNPs) which is based on endoscopic findings.The mucosa of the nasal secretory channels as well as the nasal secretions' nature are altered by pathological alterations that take place in the nasal and sinus mucosa. By inflaming the lymphoreticular tissue and reducing the mucociliary clearance, these infected secretions might clog the eustachian tube aperture, prevent proper ventilation, and/or produce an ascending middle ear infection.

II. Material And Methods

We conducted a study of 113 patients over a period of 18 months in our hospital in Jaipur.

STUDY DESIGN: A prospective study.

STUDY AREA: Department of Otorhinolaryngology, National Institute of Medical Science Research and Hospital, Jaipur.

STUDY POPULATION A total of 113 cases with age group 11 to 60 yrs. coming to OPD of the Department of Otorhinolaryngology, National Institute of Medical Sciences & Research, Jaipur; having normal mental & physical status and are willing to participate in the study.

TIME FRAME: 1st January 2021 to 30th June 2022 (18 months).

INCLUSION CRITERIA

a) All the patients of age group 11 to 60 years with symptoms of chronic rhino sinusitis.

EXCLUSION CRITERIA

a) Cases of acute allergic rhinitis.
b) Any nasopharyngeal mass.
c) Patients with no history of ear discharge

METHODOLOGY

A total of 113 patients who were having chronic rhinosinusitis and who consented to take part in the study were recruited and in the case of adolescent subjects (between 12-18 yrs) consent was provided by the legal guardian. All the patients after a thorough history and general examination were examined by nasal endoscopy, otoendoscopy, X-ray laws lateral view, Valsalva maneuver, audiometry, and tympanometry.

Diagnostic nasal endoscopy

It was done to look for the changes at the eustachian tubal orifice, the presence of frank mucopus, post-nasal discharge, and any abnormal structures like polyps deviated nasal septum or any anatomical variation which can affect the middle ear function.

Ct scan of paranasal sinuses

Ct scan of chronic rhinosinusitis patients was obtained to look for the sinuses, anatomical variations etc.

X-RAY of BOTH MASTOIDS LATERAL OBLIQUE VIEW

It was taken to note the pneumatization of the mastoid.

VALSALVA TEST

It was conducted for seeing the eustachian tube function.

OTOENDOSCOPY

An otoendoscopic evaluation was done with the use of a rigid Hopkins zero-degree endoscope.

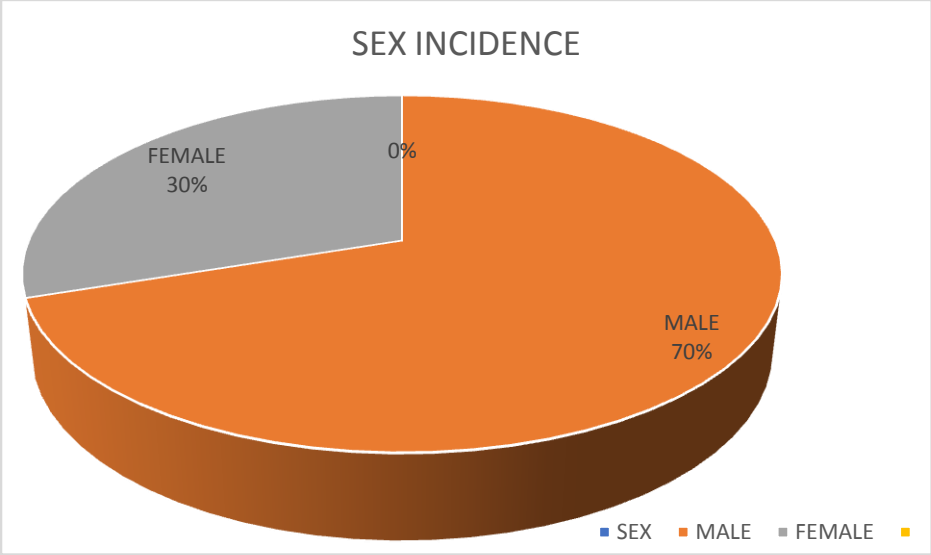
PURE TONE AUDIOMETRY was done to assess hearing and note if any elevation is present in the air conduction and or bone conduction thresholds.

IMPEDANCE AUDIOMETRY was done to assess the eustachian tube function.

III. Result

1. Sex incidence

Sex	No of patients	percentage
Male	79	70
female	34	30



2. Age Group Distribution of Patients

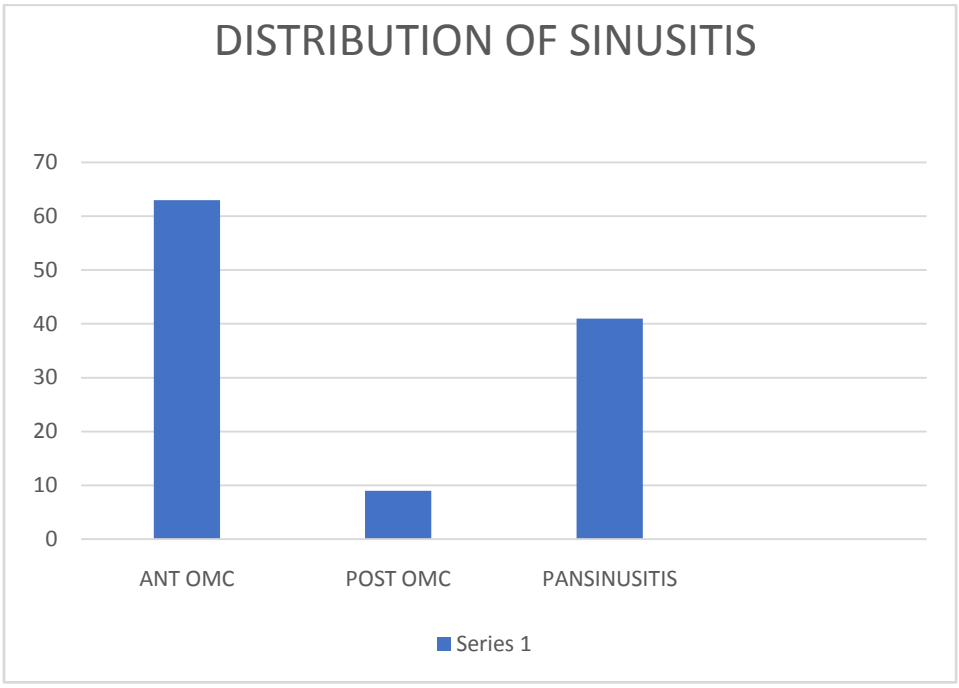
AGEiGROUPSi(iniyrs)	NOiOFiPATIENTS	PERCENTAGE
11-20	15	13.8
21-30	30	26.5
31-40	38	33.6
41-50	21	18.5
51-60	9	7.9

3. Number of Subjects with Regard to Duration

DURATION	NOiOFiPATIENTS	PERCENTAGE
LESSiTHANi3iYEARS	45	39.8
MOREiTHANi3iYEARS	68	60.2

4. Distribution of Sinusitis

OSTEOMEATALiCOMPLEXiINVOLVED	NUMBERiOFiCASES	PERCENTAGE
ANTERIORiOMC	63	55.8
POSTERIORiOMC	9	8
PANiSINUSITIS	41	36.2



5EFFECTiOFiVALSALVAiMENUERVRE

VALSALVAiMENUERVRE	NOiOFiCASES	PERCENTAGE
POSITIVE (MOBILITYiOFiTYMPANICiMEMBRANEiPRESENT)	96	85
NEGATIVEi(MOBILITYiOFiTYMPANICiMEMRANEiABSENT)	17	15

6iPATIENTSiWITHiRETRACTEDiTYMPANICiMEMBRANEi(PARSiTENSA)

GRADEiOFiRETRACTION	NUMBERiOFiCASES	PERCENTAGE
GRADEii1	51	45.1
GRADEii2	45	39.8
GRADEii3i/i4	17	15

7:iRESULTSiOFiPUREiTONEiAUDIOMETRY

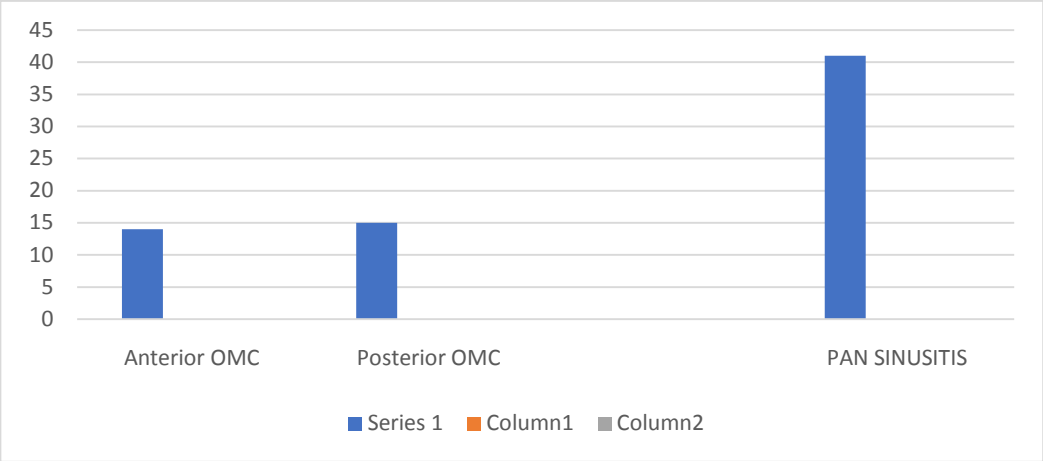
TYPEiOFiHEARINGiLOSS	NUMBERiOFiCASES	PERCENTAGE
NORMALiHEARING	28	27.8
CONDUCTIVEiHEARINGiLOSS	85	75.2
SENSORINEURALiHEARINGiLOSS	00	0

8iTYMPANOMETRYiCURVE

TYPEiOFiCURVE	NUMBERiOFiCASES	PERCENTAGE
TYPEiA	40	35.4
TYPEiB	3	2.7
TYPEiC	70	61.9

9iLOCATIONiOFiSINUSiINiRELATIONiTOiTYPEiCiCURVEi

Location	NOiOFiCASES	PERCENTAGE
AnterioriOMCi	14	19
PosterioriOMC	15	22
Pan sinusitis	41	59



IV. Discussion

In our study 34 (30%) patients were females and 79 (70%) patients were male which shows a female preponderance. the majority of sinusitis patients fall under the age group of 31 to 40. There were 45 (39.8%) patients who had CRS for less than 3 years and 68(60.2%) patients who had CRS for more than 3 years.The involvement of anterior ostiomeatal complex was found in 63 (55.8%) patients, with posterior ostiomeatal complex 6 (8%) and with pan sinusitis 41(36.2%).Valsalva maneuver was positive in 96 (85%) patients while negative in 17(15%) patients. Patients with grade 1 retraction come out to be 51 (45.1%) while with grade 2 retractions were 45 (39.8%) and those with grade 3 / 4 retraction were 15%.To assess the hearing of the patients all 113 patients underwent pure tone audiometry and found that 28 patients (27.8%) had normal hearing, in 85 patients (75.2%) had conductive hearing loss, and there was no sensorineural hearing loss[4].Tympanometry was done on 113 patients and results were obtained as type A curve in 40 (35.4%), Type B in 3 (2.7%), and 70 (61.9%) patients were found Type C[3].The sinusitis in relation to the type c curve is 14 (19%) for the anterior osteomeatal complex, 15 cases (22%) for the posterior osteomeatal complex, and 41 (59%) for pan sinusitis

V. Conclusion

Hearing is affected in patients with chronic rhinosinusitis[5].When there is pathology in the paranasal sinuses, the damage to the middle ear function worsens[6].Chronic rhino sinusitis involving the anterior groups of sinuses was more likely to cause middle ear dysfunction.In para nasal disease, the damage to middle ear function worsens with the duration of the disease.Middle ear function worsens with the duration of the disease.Patients with eustachian tube dysfunction are more likely to have sclerosed mastoids.

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