

Chronic Otitis Media in Patient of Diabetes Mellitus**Md. Raziq Anwar¹, Kamlesh Chandra², Sheelu Shafiq³**¹Senior Resident, Department of ENT, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India²Professor & Chairman, Department of Otorhinolaryngology, J.N. Medical College, AMU, Aligarh, Uttar Pradesh, India³Professor, Department of Endocrinology, J.N. Medical College, AMU Aligarh, Uttar Pradesh, India

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Conflict of interest: Nil

Abstract**Introduction:** In the senior population, diabetes is a significant cause of hearing loss. The diagnosis of chronic otitis media (COM) denotes a permanent abnormality of the pars tensa or flaccida, most often the outcome of prior acute otitis media, negative middle ear pressure, or acute otitis media with effusion. Middle ear and mastoid mucosa are not inflamed, but inactive mucosal COM causes a persistent perforation of the pars tensa.**Method:** This study was carried out from 2017 to 2019 at the Jawaharlal Nehru Medical College and Hospital, AMU, Aligarh, and the Rajiv Gandhi Centre of Diabetes and Endocrinology and Department of Otorhinolaryngology.**Result:** 64 (64%) of the 100 patients were from urban regions, and 36 (36%) were from rural areas, although this difference was statistically significant ($p=0.00511$). Of the 100 patients, the majority (87%) of the patients had hearing loss, followed by ear discharge (54%), vertigo (13%), tinnitus (12%), otitis externa (10%), and otomycosis (9%), but this was statistically significant ($p<0.05$).**Conclusion:** Because of this, the current study has shown that hearing loss in otological problems is a significant side effect of diabetes.**Keywords:** Chronic otitis media, mucosal COM, squamous epithelial COM,This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

In the older population, diabetes is a significant etiological factor for the beginning of hearing loss. Hearing impairment is a common sensory disability that affects the ability to understand sound in the auditory pathway of one or both ears. It can be brought on by conductive (outer and/or middle ear), sensori-neural (inner ear), mixed (outer/ middle/ inner ear), or central (brain stem lesions) types of hearing impairment. Compared to the general population who do not have diabetes, diabetic patients have a higher prevalence of hearing loss. An elevated risk of long-term problems, including harm to the nerves and arteries of the auditory system, causes neuronal degeneration and reduces hearing capacity in older persons. There hasn't been much research done on the prevalence of otological diseases linked to hearing loss in relation to diabetes. The purpose of the current investigation was to identify the start and severity of otological abnormalities in diabetic individuals that are linked to hearing loss. 2016 Manche Santoshi Kumari et al. [1]

Hearing loss and DM go hand in hand. Blood vessels of all sizes, even tiny ones, are impacted by DM.

Ischemia and hypoxia in brain tissues are caused by metabolic diseases, atherosclerotic alterations, and micro vascular diseases, which cause nerve injury. Cochlear and/or neural hearing loss follows when such pathogenic alterations affect the cochlea and auditory nerve. Due to the high frequency of hearing loss associated with DM, it frequently remains unnoticed and unreported. Clinically speaking, a hearing monitoring approach is crucial. Diabetes-related hearing loss must be managed with interventions targeted at reducing the risk of morphological and functional alterations in the cochlea. To create an effective treatment for inner ear problems brought on by DM-related cochlear microcirculation abnormalities, more research is required. (2013) Li Xipeng et al. [2]

The diagnosis of chronic otitis media (COM) denotes an ongoing abnormality of the pars tensa or flaccida, most likely brought on by an earlier episode of acute otitis media, negative middle ear pressure, or acute otitis media with effusion. COM is synonymous with the historical term chronic 'suppurative' otitis media, which is no longer

recommended because COM is not always brought on by 'the collection of pus. It is still possible to distinguish between active and inactive COM, where there is no inflammation or pus production but there is a chance that the ear could become active at some point in the future. Healed COM is a third clinical condition in which the pars tensa has permanent abnormalities, but the pars tensa is intact and the pars tensa and flaccida have not significantly retracted, preventing the ear from becoming active. Successful surgery may also leave patients with "healed COM." The earlier, primarily anatomical distinction between "tubo tympanic" and "attico-antral" sickness has been rendered obsolete by our modern ability to precisely evaluate a person's ear, particularly under magnification. It is inaccurate and deceptive to use the labels "safe" and "unsafe" because difficulties might arise from any ear with active COM, regardless of its pathophysiology [3].

The pars tensa is permanently perforated in inactive mucosal COM, although the middle ear and mastoid mucosa are not inflamed. A perforation may be entirely encircled by a pars tensa remnant or it may just partially reach the fibrous annulus. Sometimes the lamina propria around a perforation becomes thicker as a result of the growth of fibrous tissue. Usually, but not always, the mucocutaneous junction is found at the perforation's edge. The middle ear can be invaded medially by squamous epithelium. Medial migration can occasionally be seen in perforations that are completely encircled by a remnant of the pars tensa, even though its occurrence is higher with perforations that reach the annulus. It is crucial for an otologic surgeon to remove such ingrown squamous epithelium during tympanoplasty because it appears velvety beneath the operating microscope.

With variable degrees of oedema, submucosal fibrosis, hypervascularity, and infiltration with lymphocytes, plasma cells, and histiocytes, active mucosal COM is chronic inflammation inside the middle ear and mastoid mucosa. Granulation tissue can occur when blood vessels, fibroblasts, and inflammatory cells proliferate in the mucosa in specific areas, causing ulceration. A perforation in the tympanic membrane allows mucopurulent discharge to drain. 'Aural polyps' that can emerge through holes in the tympanic membrane may develop as a result of the mucosal alterations as they evolve and coalesce. It is crucial to understand that the inflammatory alterations previously described affect the entire middle ear cleft, including the mastoid antrum and different air cell tracts of the temporal bone [4,5].

Epithelial COM is present in inactive squamous, tympanic membrane retractions (atelectasis) can be caused by negative static middle ear pressure. A portion of the eardrum is invaginated into the middle ear space to form a "retraction pocket," which can either be fixed when it is adherent to middle ear structures or free when it can move medially or laterally

depending on the level of middle ear inflation. The term "epidermization" describes a more sophisticated form of retraction in which the middle ear mucosa is replaced by keratinizing squamous epithelium without the retention of keratin debris. One or both sides of the middle ear cavity may be affected by the epidermization. The development of cholesteatoma or aggressive suppuration is rare in epidermization, which frequently remains dormant. The need for surgical intervention is therefore not indicated by epidermization alone.

Retention of keratinous debris is a cholesteatoma's defining characteristic. As a result, the name "keratoma" would be more accurate histologically. Histologically, a cholesteatoma's squamous epithelial lining, or "matrix," resembles skin. A layer of inflammatory, vascular, subepithelial connective tissue frequently surrounds the matrix. A cholesteatoma may include keratin and be fairly dry, or it may be linked to an active bacterial infection that causes profuse, foul-smelling otorrhoea. In addition, in an ear with cholesteatoma, the mucosal and submucosal portions of the middle ear cleft may exhibit inflammatory alterations that are very similar to those reported in active mucosal COM. Cholesteatomas have the potential to promote bone resorption, which could result in issues inside the skull or the temporal bone. Research is still being done to determine the molecular pathways by which cholesteatomas cause bone resorption.

A 'dimeric' membrane made up of mucosa and epidermis results from the loss of the tympanic membrane's lamina propria due to atrophy or failure to reconstruct during perforation healing. If there is negative static middle ear pressure, such a thin membrane is vulnerable to retracting.

Materials and Methods:

Study Area:

From 2017 to 2019, this research was conducted in the Department of Otorhinolaryngology and Rajiv Gandhi Centre of Diabetes and Endocrinology, Jawaharlal Nehru Medical College and Hospital, AMU, Aligarh.

Study Population:

This study included patients who were admitted as indoor patients to the otorhinolaryngology and endocrinology wards at Jawaharlal Nehru Medical College and Hospital, AMU, as well as those who attended the otorhinolaryngology and endocrinology outpatient departments.

Inclusion Criteria:

1. Age range: 20 to 60.
2. Men and women both have sex.
3. Diabetes Mellitus patients having otologic issues.

4. Those who suffer from malignant otitis externa, recurrent otomycosis, and recurrent otitis externa.

Exclusion Criteria:

1. Age: 20 to 60 years old
2. immune-deficient patients.
3. patients taking immunosuppressive drugs.
4. individuals with diabetes who engage in swimmin

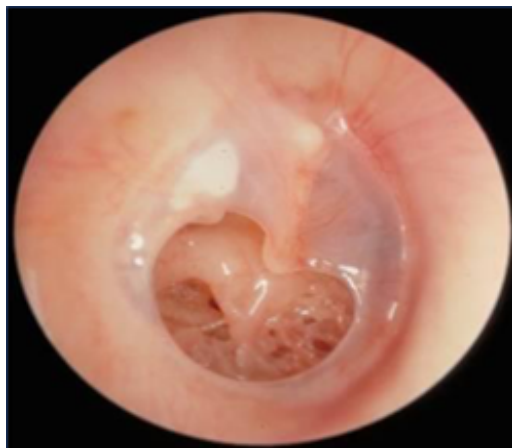


Figure 1: Inactive mucosal COM

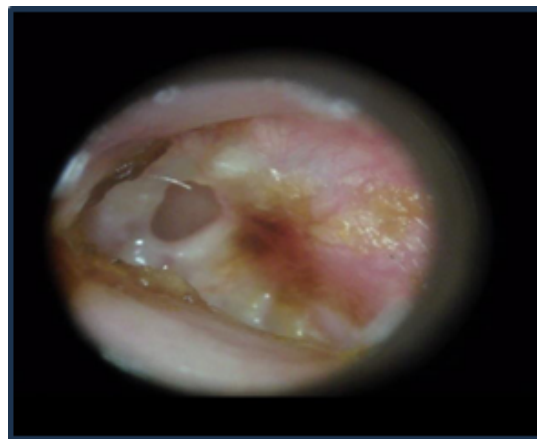


Figure 2: Active mucosal COM



Figure 3: Active squamous epithelial COM



Figure 4: Healed perforation

Results:

The following study was conducted in the endocrinology and otology departments of the JNMCH, AMU, Aligarh beginning in JULY 2017. The trial included a total of 100 patients.

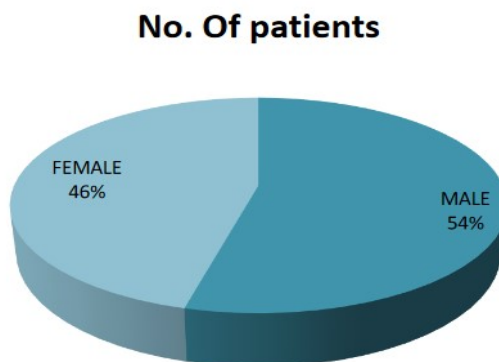


Figure 5: Sex wise distribution

Out of 100 patients, 54 were male and 46 were female, according to the preceding table, however this difference was statistically insignificant ($p=0.4237$).

Table 1: Population wise distribution of patients

Population	No. of patients	%	Chi. square	P value	Significance
URBAN	64	64%			
RURAL	36	36%	7.84	0.00511	significant
TOTAL	100	100%			

According to the above table, 64 (64%) of the 100 patients were from urban regions, and 36 (36%) were from rural areas, although this difference was statistically significant (p=0.00511).

Table 2: Clinical parameter in diabetic ear

Clinical Parameter	No. of patients	%	Chi. square	P value	Significance
EAR DISCHARGE	54	54%			
HEARING LOSS	87	87%			
TINNITUS	12	12%	171.08	2.2X10 ⁻¹⁶	Significant
VERTIGO	13	13%			
OTITIS EXTERNA	10	10%			
OTOMYCOSIS	9	9%			

The above table shows out of 100 patients, most of the patients presented with hearing loss (87%) followed by ear discharge (54%), vertigo (13%), tinnitus (12%), otitis externa (10%) and otomycosis (9%) however this was statistically significant (p<0.05).

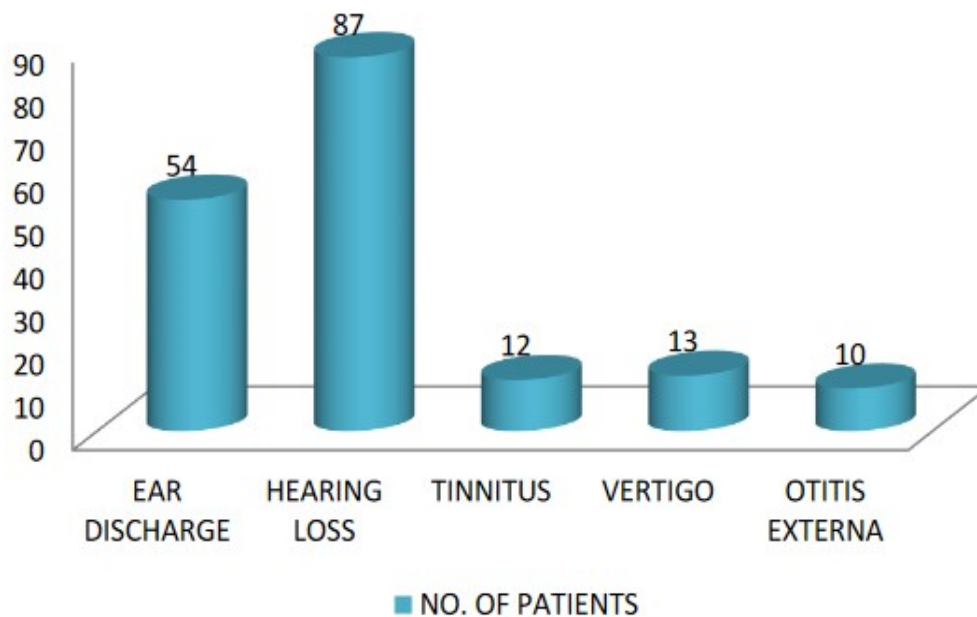


Table 3: Distribution of types of hearing loss in patients (locality wise)

HEARING LOSS	RURAL	URBAN	Chi. Square	P Value	Significance
SNHL	6	14			
CONDUCTIVE	25	36	1.9028	0.3862	Not
MIXED	1	5			significant
TOTAL	32	55			

The distribution of different hearing loss categories in urban and rural locations is shown in the table above. Only 1 patient out of 32 patients in rural areas had mixed hearing loss, while 25 patients out of 55 patients in urban areas had mixed hearing loss. In

contrast, 6 patients out of 32 patients in rural areas had sensorineural hearing loss, 25 patients had conductive hearing loss, and only 5 patients had mixed hearing loss. (p=0.3862) This was not statistically significant.

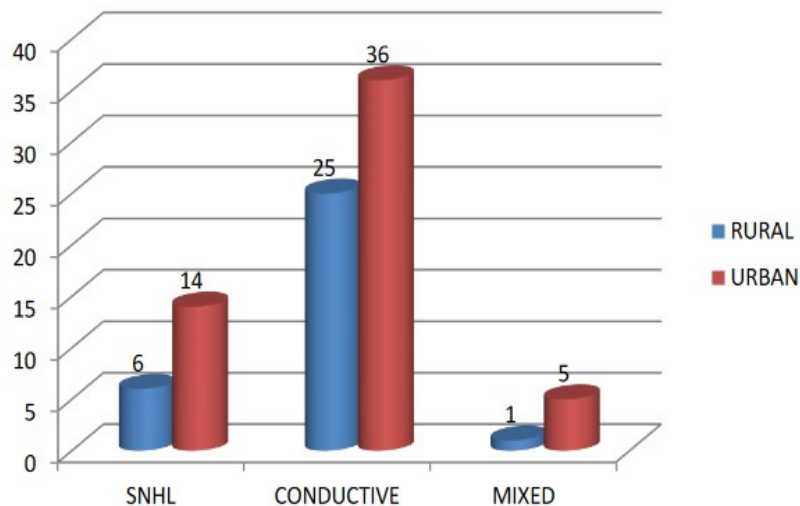
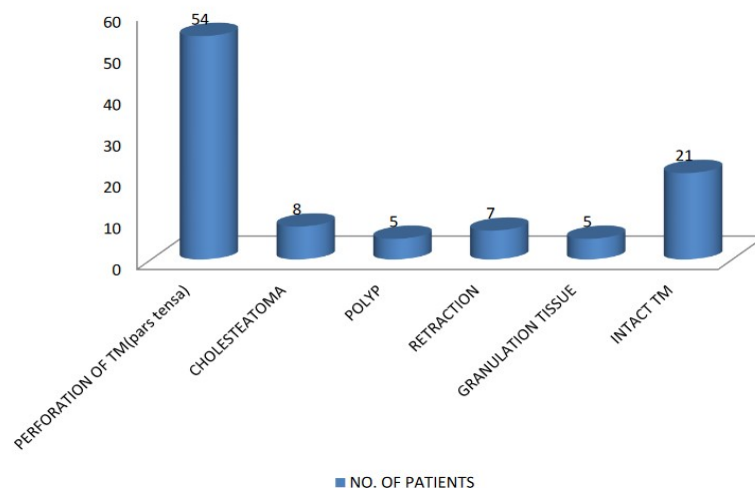


Table 4: Otoscopic findings in diabetic patients

Otosopic finding	No. of patients	%	Chi. square	P value	Significance
PERFORATION OF TM	54	54%			
CHOLESTEATOMA	8	8%			
POLYP	5	5%	101.2	2.2x10-16	Significant
RETRACTION	7	7%			
GRANULATION TISSUE	5	5%			
INTACT TM	21	21%			
Total	100	100%			

The otoscopic findings of diabetic patients are shown in the above table. Tympanic membrane perforation was the most common finding (54%) followed by intact tympanic membrane (21%), and cholesteatoma, polyps, retraction, and granulation tissue were less common (8%, 5%, 7%, and 5%, respectively). However, this difference was statistically significant ($p < 0.05$).



Discussion

Out of 100 participants in our study, 54 (54%) were men and 46 (46%) were women. According to Manche Santoshi Kumari et al, there is a higher male preponderance for otological manifestation in diabetic patients, with 65.5% of patients being male and 34.5% female [1].

Out of 100 patients in our study, the majority (87%) had hearing loss, followed by ear discharge (54%), vertigo (13%), tinnitus (12%), otitis externa (10%), and otomycosis (9%), but this was statistically significant ($p < 0.05$). In agreement with Manche Santoshi Kumari et al. [1], our study was conducted.

According to Rao et al. (1994), the most prevalent symptom of chronic suppurative otitis media was

discharge, which was present in every case. Itching was next, observed in 7.5% of cases, followed by impaired hearing and tinnitus in 5.8% and 0.83 percent of cases, respectively [6].

Gulati et al. (1969) conducted a thorough investigation into the disease's forms of presentation using data from 215 patients. According to them, there was central perforation in 96.3 percent of instances, and only 8 showed marginal variation. Regarding the nature of the discharge, mucopurulent (57.2%), mucoid (6.5%), and frank purulent (36.3%) cases were reported [7].

In our study, the majority of patients—61%—presented with conductive hearing loss, followed by sensorineural hearing loss (20%), mixed hearing loss (6%), and normal hearing (13%). In terms of statistics, this was significant ($p < 0.05$).

28 of the 86 diabetes individuals had normal hearing, while 58 of the 86 suffered hearing loss. The audiogram was used to identify the kind of hearing loss. All 58 of the individuals with diabetes had symmetrical bilateral sensorineural hearing loss. In contrast, SNHL was present in 20 out of 86 non-diabetic controls. Diabetes patients had a prevalence of sensorineural hearing loss of 67.44% compared to 23.26% in the non-diabetic control group. [8] Jyothi Anand Chavadaki et al.

In our study, the majority of patients (54%) had a perforated tympanic membrane, which was followed by an intact tympanic membrane (21%), and only a small number of patients (8%), had polyps, retracted, or had granulation tissue (5%); nonetheless, this difference was statistically significant ($p < 0.05$).

A study on 60 instances of chronic suppurative otitis media (safe type) was done by Mathur et al. They claimed that four patients (or 6.7%) had perforations that were limited to the anterior region of the tympanic membrane. In some cases, there was a central perforation that ranged in size from tiny (5% of cases) to medium (28.3%) to big (43.3%), and polyp was present in 16.7% of cases. When the middle ear mucosa was visible via the opening, it appeared normal in 75.8% of cases and hypertrophied in 25% of them. They observed posterior marginal pathology in 32%, attic involvement in 44%, and entire pars tensa perforation in 2% of patients who had a hazardous form of chronic suppurative otitis media. In 10% of cases, the pars tensa was completely perforated along with the attic being destroyed.

There were 94 ears examined, and the otoscopic results included normal ($N = 77$), otitis media with effusion ($N = 2$), myringosclerosis ($N = 5$), healed perforation ($N = 6$), perforation ($N = 2$), and retraction

pocket/cholesteatoma ($N = 2$). Kenny H. Chan and others, [9]

Conclusion

The findings of the current study, which identified hearing loss as a significant diabetic complication, suggest that metabolic testing may be helpful for detecting patients who have hearing loss. Additionally, the study provided evidence of the prevalence of otological abnormalities in diabetes people, which are brought on by middle and inner ear dysfunction. Various otological diseases and male hearing loss patterns were substantially correlated with diabetes. In order to limit the prevalence of deafness in the elderly and maintain a high quality of life, good diabetes management is crucial.

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