Analysis of various causes of otalgia- a hospital based study

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Source(s) of support: Nil
Presentation at a meeting: Nil
Conflicting Interest (If present, give more details): Nil
Acknowledge: Nil

Author contributions:
All authors contributed to the study’s conception and design. Material preparation, data collection and analysis were performed by the first author.

Abstract

Introduction: Otalgia is the most common presenting symptom among all age groups. It can be broadly divided into primary and secondary otalgia. Primary otalgia arises from diseases of ear and secondary otalgia arises from diseases in surrounding structures.

Materials and methods: A prospective study was conducted in the department of ENT in a tertiary care center in Tamil Nadu from February 2022 to August 2022. A study population of 100 patients with complaints of otalgia were included in the study. Among those 56 were children and 44 were adults. Causes of otalgia among different age groups were studied.

Results: This study shows that majority of complaints of otalgia were due to otogenic causes. Acute otitis media was the most common cause of otogenic otalgia and dental caries was the most common cause of referred otalgia. A thorough examination of surrounding structures proves vital in finding the etiology of referred otalgia. The most frequently associated symptom of otogenic otalgia was found to be hearing disturbance. Sore throat was most common accompanying symptom of referred otalgia.

Conclusion: Through this study we have found that otogenic otalgia is most common cause of ear pain in children. Referred otalgia is more common in adults. This indicates that types of otalgia were dependent on age groups.

INTRODUCTION

Otalgia is a common presenting symptom in the ENT OPD. It can be classified into primary and referred otalgia. Primary otalgia is ear pain that originates inside the ear, whereas referred otalgia is ear pain that originates from outside the ear. Pain is a protective mechanism that occurs in response to tissue injury. In the case of referred pain, cell damage and stimulation of nociceptors occurs at sites remote from the area where pain is perceived, i.e. the sensation of pain will be generally felt in the territory the nerve serves (somatic dermatome) even though the damage originates elsewhere (visceral tissue). Primary otalgia is mostly due to the diseases of pinna, external auditory canal, tympanic membrane and middle ear. They include perichondritis, impacted wax, otomycosis, otitis externa, malignant otitis externa, furunculosis, acute otitis media, chronic otitis media, mastoiditis, aero otitis media and carcinoma of middle ear.
Referred otalgia is ear pain due to pathologies in the adjacent structures. This is attributed to the innervation of ear and the adjacent structures by the same nerve.

Mandibular branch of trigeminal nerve supplies ear (via auriculo temporal nerve), temporomandibular joint and oral cavity. The auriculotemporal nerve derived from mandibular division of trigeminal nerve (V) sends sensory afferents to tragus, anterior auricle, anterior wall of external canal and anterior portion of lateral tympanic membrane. Temporomandibular joint disease and dental pathologies are associated with referred otalgia via auriculotemporal nerve (9). Therefore disorders of TMJ, dental caries and ulcerative lesions of oral cavity can cause ear pain (9).

The posterior auricular nerve, branch of facial nerve, supplies sensory afferents to posterior wall of external auditory canal, posterior lateral surface of tympanic membrane and posterior skin of auricle. Otalgia referred from facial nerve (VII) may occur following an attack of herpes zoster (10).

Jacobson’s nerve, a branch of glossopharyngeal nerve (IX) provides sensation to the middle ear, eustachian tube and medial surface of tympanic membrane. Lesions or inflammatory processes of nasopharynx, palatine tonsil, soft palate or posterior third of tongue are associated with referred otalgia via cranial nerve IX (8).

Arnold’s nerve, branch of vagus nerve (X) provides sensation to inferior and posterior aspects of external auditory canal, concha and lateral surface of tympanic membrane. Thyroid lesions, lesions of larynx and gastroesophageal reflux can present with referred otalgia via cranial nerve X (11).

C2, C3 nerves supply pinna. Diseases like cervical spondylosis can present with ear pain through C2,C3 (12).

This complex innervation serves an advantage as hearing is an important function and any pain in ear gives a sense of alarm. Prompt assessment and treatment of otalgia needs detailed evaluation of its all possible etiologies, thus, the aim of our study was to evaluate various etiologies of otalgia.

Materials and methods

A prospective study was conducted in the department of ENT in a tertiary care center in Tamil Nadu from February 2022 to August 2022. A study population of 100 patients with complaints of otalgia were included in the study. Among those 56 were children and 44 were adults. Informed consent was obtained from all the adult patients and the parents of the children. Their history of presenting illness, associated symptoms, associated medical conditions were all evaluated by using a questionnaire. Otogenic symptoms like ear fullness, hearing disturbance, otorrhea, dizziness, tinnitus and non otogenic symptoms symptoms like rhinorrhea, nasal obstruction, sore throat, fever, postnasal drip were documented in the questionnaire. History of prolonged usage of headphones, swimming were also documented to obtain any predisposing factor the patient has.

Complete examination of ear including examination of pinna, external ear canal and otoscopic examination of tympanic membrane was done. Examination of nose by anterior and posterior rhinoscopy was done. Paranasal sinuses were also examined. Examination of oral cavity and oropharynx was done.

INCLUSION CRITERIA:

-Any patient with ear pain who is willing to participate in the study were included.

EXCLUSION CRITERIA:

- Patients with previous history of ear surgery or head & neck surgery were excluded from our study.

Causes of otalgia among different age groups were studied.

OTALGIA QUESTIONNAIRE

DEMOGRAPHIC DETAILS

1. Patient name:
2. Age
3. Sex
4. Occupation
5. Address

PAIN

1. Onset : sudden/ gradual
2. Duration: ____ days
   (OR) ____weeks
   (OR) ____ months
3. Character: pricking/dull aching
4. Radiation: yes/no
5. Aggravating factors (If any)

**ASSOCIATED COMPLAINTS**
1. Ear fullness: yes/no
2. Burning sensation of ears: present/not present
3. Hearing disturbance: yes/no
4. Ear discharge: yes/no
5. Tinnitus (ringing in ears): yes/no
6. Dizziness: present/not present
7. Previous upper respiratory tract infections: present/not present
8. Sore throat: present/not present
9. Rhinorrhea: present/not present
10. Fever: present/not present
11. Nasal obstruction: present/not present
12. Postnasal drip: present/not present
13. Voice change: present/not present
14. Pain while opening or closing jaw: present/not present
15. Dental caries: present/not present
16. H/o using earphones
17. H/O using earbuds, instrumentation
18. H/o water entry in ears

**MEDICAL HISTORY:**
- Diabetic: yes/no
- Hypertension: yes/no

**RESULTS**
A study population of 100 patients with complaints of otalgia was included in the study. Among those 56 were children and 44 were adults, 60 patients were females and 40 were males. Mean age of the study population is 29 years. Out of the 100 patients, 75 were diagnosed to have otogenic otalgia and 25 were diagnosed to have referred otalgia. Of these, autogenic otalgia is more common in children whereas referred otalgia is more common in adults. The most common cause of otogenic otalgia was found to be AOM in children which is followed by eustachian tube dysfunction, impacted wax and otitis externa. The most common cause of referred otalgia was found to be dental infections followed by sinusitis and tonsillitis in adult age group. Hearing disturbance and ear fullness were the most common associated symptoms.

<table>
<thead>
<tr>
<th>DISEASES</th>
<th>TOTAL</th>
<th>ADULT (%)</th>
<th>NUMBER OF ADULTS</th>
<th>CHILDREN (%)</th>
<th>NUMBER OF CHILDREN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute otitis media</td>
<td>20</td>
<td>10</td>
<td>2</td>
<td>90</td>
<td>18</td>
</tr>
<tr>
<td>CSOM</td>
<td>5</td>
<td>80</td>
<td>4</td>
<td>20</td>
<td>1</td>
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<tr>
<td>OME</td>
<td>5</td>
<td>40</td>
<td>2</td>
<td>60</td>
<td>3</td>
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<tr>
<td>ET dysfunction</td>
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<td>23.07</td>
<td>3</td>
<td>76.92</td>
<td>10</td>
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<td>15</td>
<td>33.33</td>
<td>5</td>
<td>66.66</td>
<td>10</td>
</tr>
<tr>
<td>Impacted wax</td>
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<td>30</td>
<td>3</td>
<td>70</td>
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<tr>
<td>Dental caries</td>
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<td>87.5</td>
<td>7</td>
<td>12.5</td>
<td>1</td>
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<tr>
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<td>8</td>
<td>20</td>
<td>2</td>
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<tr>
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<td>85.71</td>
<td>6</td>
<td>14.28</td>
<td>1</td>
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<tr>
<td>Traumatic rupture of eardrum</td>
<td>7</td>
<td>57.14</td>
<td>4</td>
<td>42.85</td>
<td>3</td>
</tr>
</tbody>
</table>

**TABLE 1-SHOWING THE VARIOUS CAUSES OF OTALGIA**
Analyzing the data, we have found that acute otitis media is the most common cause of ear pain (20%) and children are more frequently affected (90%) than adults (10%). Otitis externa is seen in 15 patients (15%) and children are commonly affected (66.6%) than adults (33.3%). Eustachian tube dysfunction is seen in 13 patients (13%) and it affected more children (77%) than adults (23%). Impacted ear wax is seen in 10 patients (10%) and is commonly seen in children (70%) than adults (30%). Dental caries caused otalgia in 8 patients (8%) in which 7 patients were adults (88%) and 1 child was affected (12%). Tonsillitis is found to be the cause of otalgia in 10 patients (10%) and is commonly seen in adults (80%) than children (20%). Sinusitis caused ear pain in 7 patients (7%) and is commonly seen in adults (86%) than children (14%). Traumatic rupture of ear drum which may occur as a result of slap injury, sudden exposure to loud noise, self induced trauma by ear buds/pins caused otalgia in 7 patients (7%) and is commonly seen in adults (57%) than children (43%). CSOM caused ear pain in 5 patients (5%) and is commonly seen in adults (80%) than children (20%). Otitis media with effusion is seen in 5 patients (5%) and is commonly seen in children (60%) than adults (40%).

Among the 75 patients with otogenic otalgia, 32 patients had hearing disturbance, 24 patients had ear discharge, 20 patients had ear block and 16 patients had tinnitus.
CHART 3 - COMMON ASSOCIATED SYMPTOMS IN OTOGENIC OTALGIA

Among the 25 patients with referred otalgia, 8 patients had upper respiratory tract infection, 11 patients had sore throat, 5 patients had rhinorrhea, 8 patients had dental pain, and 6 patients had post nasal drip.

CHART 4 - COMMON ASSOCIATED SYMPTOMS IN REFERRED OTALGIA

**DISCUSSION**

Otalgia is the most common presenting symptom in the ENT OPD. Ear pain indicates stimulation of the sensory nerves supplying the ear. This may be caused by local disease or in case of referred pain by pathology as distant as cranial cavity and chest. Although the mechanism of referred otalgia is slightly controversial, the most accepted theory is the convergence-projection theory, which states that multiple nerves converge onto a single shared neural pathway, with the central nervous system unable to differentiate the origin of stimulation. In referred otalgia, there is convergence of common sensory pathways between the complex sensory innervation supplying both the ear and cranial nerves innervating head and neck, with the CNS being unable to correctly pinpoint the location of pathology. There was female preponderance (60%) in our study, which was comparable to studies conducted by Saraf et al., Jaber JJ et al., and Taboo ZA et al. However, Kiakojoori et al., showed male preponderance in their study.
Our study showed 25% of patients with referred otalgia. Taziki et al (19), in their study showed 12.2% cases of referred otalgia only. Kikkojori et al in their study showed 46% of their study population had referred otalgia. In a study conducted by Saraf et al, out of 110 patients with ear pain- 65 patients (59.09%) had referred otalgia. This observation was consistent with the studies conducted by Taboo et al., (64.5%) and Siamak et al (65%) (20). Our study showed tonsillitis and dental problem to be the most common causes for referred otalgia. This observation was comparable to study conducted by Taboo et al, who showed dental problem to be the most common cause of referred otalgia. Kim et al (21) and Taziki et al, showed that dental pathology was the most common cause of referred otalgia. However, Behnoud et al (22), showed temporomandibular joint disease to be most common cause. In our study, no patient presented with earache due to temporomandibular joint disease.

CONCLUSION

Otogenic otalgia was found to be more common than referred otalgia. This was associated with age group variations. Children more commonly presented with otogenic otalgia. Adults more commonly presented with referred otalgia. Referred otalgia is a difficult and challenging symptom for otologists. As observed with our study, dental pathology can lead to ear ache revealing how important dental hygiene is. Thus, all cases of otalgia should undergo thorough and complete examination of oral cavity, pharynx, larynx and neck, if ear examination is normal.

REFERENCES

9. Luiz Alberto Alves Mota1, Katia Maria Gomes de Albuquerque2, Maria Heloisa Pedrosa Santos3, Renata de Oliveira Travassos3.