

**Referred otalgia as a presenting symptom: frequency and causes**Ahmed Fadhil Hasan<sup>1\*</sup>, Duraid Ahmed Mahmood<sup>2</sup>, Jafaar Muhsen Khalaf<sup>2</sup>**Abstract**

Ear pain or Otolgia is an important patient presenting symptom to ENT clinic, that may reflect an underlying serious problem in or outside the ear because of the complex innervations which is derived from different neural segments (V, VII, IX, X Cranial nerves, C2 and C3 Cervical plexus). The term Referred Otolgia applied when the ear examination is normal, so it is important to search for the secondary cause in other structures like pharynx, larynx, teeth, TM, nose, sinuses, salivary glands, neck, and rarely thoracic structures like esophagus, bronchus and heart. The aim of the study is to identify the frequency and causes of referred Otolgia as a presenting symptom (not associated symptom) in patients visiting ENT clinic in Basrah, Iraq. A prospective study of 400 patients presenting to the ENT clinic from September 2013 to October 2015 with ear pain only, i.e those patients whose chief complaint includes sore throat, nasal obstruction, toothache or other symptoms and associated with ear pain. Those undergo surgery in pharynx, larynx or nose are excluded from the study. all patients are subjected to full history and ENT examination, in addition to examination of Temporo-mandibular joint (TMJ) and neck. Some patients were sent for audiological and radiological assessment according to the finding in the examination and some had maxillofacial or orthopedic consultation. From all patients, 91 were found to have referred Otolgia (22.75%). More than half of them were between 16-40 years of age (51.6%). Female were found to be more affected than male (65.9%). Right ear was found to be affected slightly more than left ear (42.9%). The study also found that the most common cause of referred Otolgia is TMJ dysfunction (48.4%). In conclusion; Ear pain or Otolgia is an important presenting symptom to ENT clinic with more than one fifth of those patients having referred pain, the commonest cause of referred Otolgia is TMJ dysfunction which constitutes about half of cases, most causes of referred Otolgia are related to the trigeminal nerve especially mandibular division, this is may be due to its length and numerous tributaries supplying structures in the head and neck region.

**Key words:** Referred; Pain; Otolgia; Presenting; Symptom

\* Correspondence author: hamadafh2003@yahoo.com

<sup>1</sup> Al shafaa general hospital, Basrah, Iraq<sup>2</sup> Al sadr teaching hospital, Basrah, Iraq

Received 02 January 2019, Accepted 29 March 2019, Available online 07 April 2019

This is article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Copyright © 2019 AH  
<http://dx.doi.org/10.18081/2410-4590/2019-30-37>

## Introduction

Ear pain or Otolgia is one of the commonest symptoms that brings a patient to an ENT clinic, it affects any age group and may reflect a serious disease process in or outside the ear. Therefore, Otorhinolaryngologist need to have a comprehensive knowledge about the anatomy and neuro anatomy of the ear and its related structures. The ear is consider that the only structure in the body of comparable size that is supply by sensory nerves from so many different neural segments. Tremble (1965) has described the specific portions of the ear that are innervated by various nerves and has related these to the evaluation of Otolgia [1]. The auriculotemporal branch of the mandibular division of fifth cranial nerve, greater auricular nerve (a branch of C3 cervical nerves), lesser occipital nerve (a branch of C2 and C3 derivation), auricular branch of the vagus nerve (also called Arnolds nerve), and twigs from the seventh cranial nerve all contribute to the sensory innervations of the auricle and external auditory meatus [2]. The tympanic plexus, which is composed of the Jacobson nerve (tympanic branch of the glossopharyngeal nerve) and the superior and inferior carotico-tympanic branches of the sympathetic plexus which is surrounding the carotid body, provides sensory innervations to the middle ear, including the medial aspect of the tympanic membrane. While the lateral aspect of the tympanic membrane is supplied by the facial nerve, the auricular branch of the vagus (Arnolds nerve) and the auriculo-temporal branch of the mandibular nerve [3]. Bonica defined pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. Tissue injury whether caused by trauma or disease, constitute a noxious stimulus that will activate nociceptors (receptors preferentially to noxious stimulus or to a stimulus that would become noxious if prolonged) at the termination of thinly myelinated A (group III) and unmyelinated C (group IV) afferent nerve fibers in the skin, muscles, joints, fascia and other deep somatic structures [3]. Ear pain or Otolgia cause could be in the ear and or temporal bone and called primary Otolgia, or outside the ear and called secondary or referred Otolgia. the mechanism by which pain may be referred to the ear is meet with the concept of central convergence. Sessle et al, have shown extensive convergence of cutaneous, tooth pulp, visceral, neck and muscle afferents onto nociceptive and non-nociceptive neurons in the trigeminal sub nucleus caudalis or medullary dorsal horn (MDH) and suggested a role for these neurons in mediating pain, its spread and referral [3].

## Patients and Methods

This prospective study was conducted for two years period from September 2013 to October 2015 on four hundred (400) patients visited an ENT clinic at Basrah city southern Iraq complaining from ear pain. Ninety-one (91) patients from those had normal otological

examination (i.e had referred Otagia). A complete history and examination of the head and neck and audiological (pure tone audiometry and tympanometry), and radiological (plain cervical spine x-ray, C.T scan temporal bone) if indicated, has been done for those patients. The patients were selected above age of four years to facilitate an informative history taking and cooperative examination. Patients whose presented with non-otologic symptoms like sore throat or neck pain or nasal discharge and others as a chief complain and associated with Otagia had been excluded from the study because the Otagia was not the presenting symptom. Those patients who's subjected to recent (within 3 weeks) oral, pharyngeal and nasal operations -such as adenoidectomy and tonsillectomy and sino-nasal surgery- were excluded from the study because we already know the cause of referred Otagia. The history includes the name, gender, occupation, the onset, severity and nature of pain, duration, aggravating and relieving factors of the pain and any associated otological and non otological symptoms, history of nasal disorders, pharyngeal and laryngeal history and any relevant positive history in other systems. A full examination done include inspection , palpation of the ears and the surrounding structures, otoscopy, tuning fork tests, nasal examination, oral examination and teeth, TMJ examination, pharynx, larynx (by indirect mirror, or endoscopy if history and or examination suggestive of laryngeal disease), examination of salivary glands, parotids, submandibular and submental glands plus intra oral palpation for any pathology. Neck examination by inspection and palpation for any mass, lymph node, cervical spine movement and tenderness, facial nerve examination, and other cranial nerves if the history and examination had relevant association. TMJ assessment included: Pain and tenderness in or around the joint, trismus, crepitus, tenderness during palpation intra orally between zygomatic arch and coronoid process of mandible. In some cases, we referred some patients to the dentist for those with dental or TMJ problems and to rheumatologist for those with cervical musculo-skeletal problem to confirm the diagnosis and treatment. Data were analyzed by using IBM SPSS statistics program.

## Results

Total number of patients is four hundred (400) visiting an ENT clinic complaining from Otagia. From those, ninety-one (91) patients had referred pain 75.22%. The age is divided into three (3) groups, the age group (16-40) years old is found to be more common (51.6%) than other groups, where the age group (above 40) is about 33% and the age group (4-15) is 14% only as showing in table 1.

**Table1.**

Frequency and percentage of affected patients according to age group

Age group	Frequency	(%)
4-15 years	14	15.4
16 – 40 years	47	51.6
Above 40 years	30	33.0
Total	91	100.0

Females were found to be more complaining from referred Otagia: (65.9%) compared to the male patients (34.1%) according as in table 2.

**Table 2.**

Distribution of cases according to sex

Sex	Frequency	%
Male	31	34.1
Female	60	65.9
Total	91	100.0

Regarding the ear side affected with referred Otagia, the right ear was found to be slightly more affected than the left side, while bilateral pain less common (right 42.9%, left 41.8% and bilateral in 15.4%) as in the following table 3:

**Table 3.** Distribution of patients according to ear side

Ear side	Frequency	Percent (%)
Right	39	42.9
Left	38	41.8
Bilateral	14	15.4
Total	91	100.0

As in table 4, the most common cause of referred Otagia in this study was found to be TMJ dysfunctions (48.4 %), followed by pharyngitis (27.5 %), then cervical musculo skeletal disorders (8.8 %), rhinosinusitis (5.5 %), dental problems (3.3 %), the other causes includes parotitis and intra parotid LN infections, ophthous ulceration and submandibular gland infection. Each constitute about (2.2 %) of all the study cases.

**Table 4.**

Causes of referred Otagia

Cause of referred Otagia		Frequency	Percent
	TMJ dysfunction	44	48.4
	Dental problems	3	3.3
	Pharyngitis	25	27.5
	Rhinosinusitis	5	5.5
	Cervical Musculoskeletal Problems	8	8.8
	Parotits & intraparotid LN infection	2	2.2
	Ophthous ulceration	2	2.2
	Submandibular gland Infection	2	2.2
	Total	91	100.0

According to the study age groups, the female were more than males in all age groups as in table 5.

**Table 5.**

Distribution of patient s sex according to age group

		Sex		Total
		male	Female	
age group	4-15	5	9	14
	16-40	15	32	47
	above40	11	19	30
Total		31	60	91

The most common cause of referred Otagia is pharyngitis in age group (4-15) years, while in other age groups (16 -40) years and (above 40), TMJ dysfunctions are more common as in table 6.

**Table 6.**

Distribution of causes according to age group

		age group			Total
		4-15	16-40	Above 40	
Cause of referred Otagia	TMJ dysfunction	0	27	17	44
	Dental problems	1	1	1	3
	Pharyngitis	11	8	6	25
	Rhinosinusitis	1	1	3	5
	Cervical musculoskeletal problems	0	5	3	8
	Parotits & intraparotid LN infection	1	1	0	2
	Ophthous ulceration	0	2	0	2
	Submandibular gland infection	0	2	0	2
Total		14	47	30	91

Regarding the causes of referred Otagia in relation to sex, pharyngitis is more in males while TMJ dysfunctions are more common in females as in table 7.

**Table7.**

Causes of referred Otagia regarding gender of patient

		Sex		Total
		Male	Female	
Cause of referred Otagia	TMJ dysfunction	7	37	44
	Dental problems	1	2	3
	Pharyngitis	12	13	25
	Rhinosinusitis	2	3	5
	Cervical musculoskeletal problems	6	2	8
	Parotits & intraparotid LN infection	1	1	2
	Ophthous ulceration	2	0	2
	Submandibular gland infection	0	2	2
Total		31	60	91

## Discussion

From a total of four hundred (400) patients having Otagia, a ninety-one patients (91) have referred causes constitutes 22.75 %. So this study is coincide with the results of Geetha K study in 2014(4) where the percentage of referred Otagia was 24.4% [4]; and in a study done in 2015 by Sang Hoon Kim, et al (29.3 %) [5] while a slightly higher percentage was found by a study done by Saurabh Gandhi et al in 2017 (about 31%) [6]. Other studies found a lower percentage of referred ear pain as in the Iranian study of Mohammad Hosein et al. 12.2% in 2012, [7] and Sumitha R et al (11.9%) in 2015 [8]. Similarly, a higher percentage was found in the study of Zhraa Abd-Alkader (64%) [9] and Gaurav Kataria et al (58.19%) [10]. Females were found to be more complaining from referred Otagia in this study 60 patients (65.9%) while male patients 31 patients (34.1%). This agrees with most of the international studies as in the study of Geetha K [4] and Sang Hoon Kim [5], Mohammad Hosein [7]. In contrast to the study of Saurabh Gandhi [6] who found male was more affected than female and Sumitha study was equal percent [8]. Regarding the affected ear side by referred Otagia, the present study shows that the right ear is more affected in 39 patients (42.9%) than the left one in 38patients (41.8%) and it was found to be bilateral in 14 patients 15.4%. Both Saurabh and Sang Hoon found that both ears equally affected [6, 5], while Mohammad Hosein, Sumitha R and Gaurav K, found that the left side is more affected [7,

8, 10]. In this study the most common age group affected by referred Otagia was found to be (16-40 years) about 51.6%, then (above 40) with a percentage of 33% and (4-15 years) in 14 patients (15.4%). This agree with Geetha's study where he found most common age group is 20-40 years was 48.5 % [4] and Gaurav's one that was 32.7% for age group 31-40 years [10]. Also, it agrees with the result found by Sumitha R (30-45 years) [8]. While Zahraa Taboo found the most common age group is above 15 years [9]. The most common cause of referred Otagia in this study was found to be TMJ dysfunctions which occurs in 44 patients (48.4%), followed by pharyngitis in 25 patients (27.5%), then cervical musculoskeletal disorders in 8 patients (8.8%), rhinosinusitis in 5 patients (5.5%), dental causes in 3 patients (3.3%), then parotids & intra parotid LN infection, ophthous ulceration and submandibular gland infection each have 2 patients (2.2%). So, this study has a closely similar results with the study of Sumitha R et al study, where TMJ dysfunctions was 36.9%, then dental causes 31.06%, pharyngitis 16.5% then ophthous ulceration 11.7% [8]. Keersmaeker's study found that out of 400 patients with TMJ dysfunctions, 75% have aural symptoms. From those, 42% have Otagia [11].

Similarly, Mejersjac et al study found 68% of TMJ dysfunctions have aural symptoms including Otagia [12]. According to Geetha's study, dental cause is most common 30.8%, then cervical spine causes 26.6% and TMJ dysfunctions 19.5% (4). A slightly similar result was found by Zahraa Abd-Alkader who found that dental causes is the more in 26.5%, TMJ dysfunction 25%, cervical spine problems 24.3%, pharyngitis 2.9% and sinusitis 2.2% [9]. Gaurav Kataria on the other hand, found that dental causes are the most common cause (55.45%) followed by pharyngitis (11%), tonsillitis (7.27%) and then TMJ dysfunctions (4.54%) [10].

This is close to what Mohammad Hosein found, dental causes were found to be more in 62.8%, then pharyngitis 24.5%, TMJ dysfunctions 8.8% & sinusitis 2.1% [7]. While Sang Hoon Kim found pharyngitis is more common than other causes in 27.1 %, then nasal lesion 20%, TMJ dysfunctions 8.1%, and problems of salivary glands 2.3% [5]. Saurabh Ghandi found tonsillitis and dental causes most common than other causes. Jabber et al found that the most common cause for referred Otagia in non-cervical spine syndrome is TMJ dysfunctions [13].

For Pharyngitis, the present study found that it is more common in age group (4-15 years), TMJ dysfunctions is more in (16 – 40 years) and (above 40 years) groups. This is agreed with Mohammad Hosein Taziki study where pharyngitis is more in (6-20 years) and TMJ dysfunctions is more in (36-50 years) group [7].

## Conclusion

Ear pain or Otolgia is an important presenting symptom to ENT clinic with more than one fifth of those patients having referred pain, the commonest cause of referred Otolgia is TMJ dysfunction which constitutes about half of cases, most causes of referred Otolgia are related to the trigeminal nerve especially mandibular division, this is may be due to its length and numerous tributaries supplying structures in the head and neck region.

## Ethical Approval

The study was approved by the Ethical Committee.

## Conflicts of Interest

The authors declare that they have no competing interests.

## Authors' Contributions

Both authors shared in conception, design of the study, acquisition of data, and manuscript writing, the critical revising and final approval of the version to be published.

## References

1. Michael M. Paparella , Timothy T. K. Jung, Otolgy and Neuro - otology volume II, section 3; disease of the ear; part 2: external ear, chapter 22: otology
2. Michael E. Glasscock, Aina Julianna Gulya, Shambaugh. Surgery of the ear fifth edition 2003.
3. Gordon B. Hughes, Myles L. Pensak and John S. McDonald: Chapter 34: third edition. Otolgia, clinical otology.
4. Geetha K. Siddapur, Kishan R. Siddapur. Clinical Profile of Referred Otolgia in a tertiary health center: a retrospective study. IJCRR 2014;6(14):17-24.
5. Sang Hoon Kim, et al. Clinical differences in types of Otolgia; J Audiol Otol 2015; 19(1): 34-38. <https://doi.org/10.7874/jao.2015.19.1.34>
6. Saurabh Gandhi, Hiren Soni; Referred Otolgia: Epidemiological profile; International Journal of Otorhinolaryngology and Head and Neck Surgery 2017;3. <https://doi.org/10.18203/issn.2454-5929.ijohns20171026>
7. Mohammad Hosein T. and Nasser B. A Study of the Etiology of referred Otolgia. Iranian Journal of Otorhinolaryngology 2012;24(69): 171-176.
8. Sumitha R, Joseph N. Referred Otolgia - A case series; Asian Journal of Pharmaceutical and Clinical Research 2015;8.
9. Abd-alkader T, Burra M. Etiology of Referred Otolgia; The Iraqi Post graduate Medical Journal 2013;12.
10. Kataria G, Saxema A, Kataria S, et al. Referred Otolgia: Etiological Spectrum. Journal of Research in Otorhinolaryngology - Head and Neck Surgery 2016;2: 5-7.
11. Keersmaekers K. DeBoever, et al. Otolgia in patients with temporo-mandibular joint disorders; J Prosthet Dent. 1996;75:72-6. [https://doi.org/10.1016/S0022-3913\(96\)90421-7](https://doi.org/10.1016/S0022-3913(96)90421-7)
12. Mejersjo C, Naslund I. Aural symptoms in patients referred for temporo-mandibular pain/dysfunction; Swed Dent J 2016; 40(1):13-20.

13. Jaber J J, Leonetti J P. Cervical spine causes for referred Otagia; Otolaryngology - Head and Neck Surgery SAGE journals 2008;138.  
<https://doi.org/10.1016/j.otohns.2007.12.043>