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DEAFNESS IN HYPOTHYROIDISM, AN EVALUATION OF 47 PATIENTS.

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Summary

A prospective study of 47 patients with acquired hypothyroidism seen at Basrah General Hospital between March 1998 to March 1999. It comprises 17 males and 30 females with a ratio of 1.7:3 . The evaluation concentrated on the hearing state, audiometric assessment and ECG changes. Out of 47 hypothyroid patients, 35 of them found to have either clinically and/or audiometrically impairment of hearing. Although sensorineural deafness was predominate (17 patients, about 48.6%), an un-expected high incidence of conductive hearing loss was detected (14 patients, 40%). The remaining 4 patients (about 11.4%) emphasized mixed deafness. The severity of deafness was ranged from mild to moderate. No one has suffered a sever deafness. Symmetrical-frequency hearing loss was predominate (17 patients, 48.5%).

Introduction

Thyroid hormone plays an important role in hearing development. Hereditary hypothyroidism is frequently associated with sensorineural hearing loss as identified in both animal models and human patients[1].

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Reports of hearing loss in hypothyroidism date from Bircher (1883) and in a major text on the thyroid, De Groot and Stanbury (1975) quoted auditory involvement in one-third of all cases[2,3].

Hypothyroidism is a cause of hearing impairment worldwide, probably accounting for at least 50000 hearing-impaired infants born each year[4].

The problem is particularly prevalent in those parts of the world where endemic

goiter is common, as the use of iodized salt can prevent deafness due to hypothyroidism[5].

The aim of this study is to find out the incidence, severity, and types of deafness in a consecutive series of 47 patients with acquired hypothyroidism.

Patients and Methods

A team of a physician, otolaryngologist and surgeon assessed all patients provisionally-diagnosed as acquired hypothyroidism seen at Basrah General Hospital for a mean period of 12 months (ranging from March 1998 to March 1999).

A total number of 47 patients included in this study. Their ages range from 18 to 75 years with a median age of 44 years. The evaluation included the history physical examination, hearing state, audiometric assessment and ECG changes.

Other possible causes of deafness whether systemic or local have been excluded such as aging-process (presbyacusis), noise trauma, infection, and others. So the inclusion criteria are deafness without cause and primary acquired hypothyroidism.

Results

Subjectively, out of 47 hypothyroid patients 24 of them complained of diminished hearing acuity and 8 patients has tinnitus. Audiometrically, 35 patients (74.4%) found to have a several different element of hearing loss, 12 patients have normal threshold of hearing.

Table I shows the age and sex distribution of the studied group. Females are found to be more affected than males. The male : female ratio was 1.7:3. The age group of 40-50 years was more prevalent.

The geographical distribution of our hypothyroid patients is illustrated in Table II. The majority (27 patient, 57.4%) are from Basrah Center. The other important bulk (17 patients, 36.1%) are living in North of Basrah.

Among the 35 deaf hypothyroid patients evaluated clinically and audiometrically only 5 patients had unilateral deafness (about 14.3%) while the rest 30 patients had bilateral deafness (about 85.7%).

Sex / **Age (in years)**	**F**	**%**	**M**	**%**	**Total**
1-10	0	0	0	0	0
11-20	2	6.7	0	0	2
21-30	7	23.3	3	17.7	10
31-40	7	23.3	4	23.6	11
41-50	7	23.3	7	41.3	14
51-60	6	60.0	0	0	6
61-70	1	3.4	2	11.6	3
> 70	0	0	1	5.8	1
Total	**30**	**63.8**	**17**	**36.2**	**47**

Table I. Age and sex distribution of patients with hypothyroidism

Center of Basrah	**North of Basrah**	**South of Basrah**	**East**
27	17	2	1

Table II. Residency of patients with hypothyroidism.

Types of deafness of the 35 patients are shown in Table III. Although sensorineural deafness was predominate (17 patients, about 48.6%), an un-expected high incidence of conductive hearing loss was detected (14 patients, 40%). The remaining 4 patients (about 11.4%) emphasized mixed deafness.

Type of deafness / **Side of deafness**	**Sensorineural**	**Conductive**	**Mixed**	**Normal**	**Total**
Unilateral	2	3	0	0	5
Bilateral	15	11	4	12	42
Total	17	14	4	12	47

Table III. Types and sides of deafness

Regarding the severity of deafness among the 35 deaf hypothyroid patients, 18 patients (51.5%) were within the range of mild deafness (10-30 decibels hearing loss), 17 patients (48.5%) had moderate deafness (40-60 decibels hearing loss). No one of those 35 patients showed a sever deafness (above 60 decibels hearing loss).

Table IV clarifies the different degrees of deafness severity and also correlates the severity of deafness with the frequency of hearing. Symmetrical-frequency hearing loss was predominate (17 patients, 48.5%). High-frequency loss was detected in 14 patients (40%), while only 4 patients (11.4%) suffered a low frequency loss.

Frequency / Severity	Low	High	symmetrical	Total
Mild	4	6	8	18
Moderate	0	8	9	17
Sever	0	0	0	0
Total	4	14	17	35

Table IV. Severity of deafness in correlation with frequency.

Figures (1,2,3) are examples of pure tone audiograms in different types of frequency loss regardless of the types of deafness.

Discussion

Meyerhoff (1979) concluded that the lower central auditory pathways were functioning and identified the cochlea as the site for the hearing loss associated with hypothyroidism. He was able to support this as the site of the lesion for the sersorineural hearing loss by morphological and biochemical findings[6].

Ritter (1969) found a conductive loss in rats with myxoedematous infiltrates in the mucosa of the middle ear and austachian tube and Devos (1963) found changes in the spiral ganglion in rats, mice and hamsters[7].

The deposition of mucopolysaccharides in the skin of the external auditory meatus with thickening reduction of the lumen size may explain conductive deafness in some hypothyroid patients.

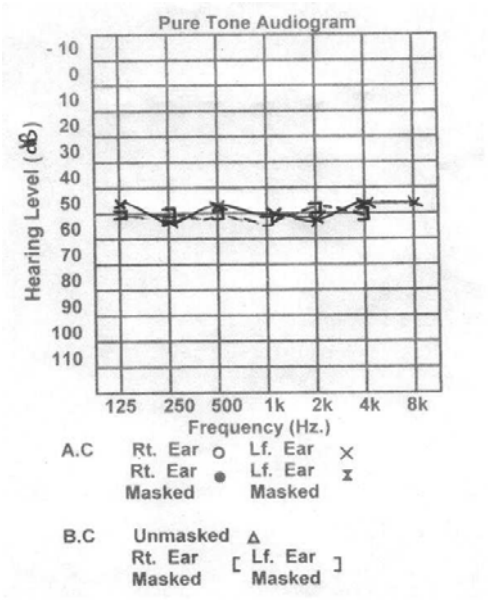
Van't Hoff and Stuart (1979) have reported an incidence of deafness of 85% in a series of 48 patients with myxoedema[8] in comparison with an incidence of deafness of 74.4% in our study. Also, in their report (Van't Hoff and Stuart), there was no difference between the effect on the high or low frequencies and in some cases the loss was unilateral[8], in contrast with this study where most of patients were suffered symmetrical hearing loss. (Table II). Van't Hoff and Stuart were in no doubt that the deafness was sensorineural[8].

Parving and Lyngse (1983) in a series of 15 patients with confirmed myxoedema, median age 76 years demonstrated a bilateral symmetrical or nearly symmetrical sensorineural loss in all patients[9].

We emphasize that a good number of our hypothyroid patients were suffering from conductive hearing loss.

Hall et al (1985) reported a prospective study undertaken to compare the auditory acuity in hypothyroid patients for a mean period of 7.5 months (range 2-24 months). Auditory thresholds were reduced over all frequencies but the difference being significant only at 2000-4000 Hz[10].

Anand et al (1989) carried out auditory investigations in 20 patients with hypothyroidism. Sixteen demonstrated a hearing loss: mild in five (31.25%), moderate in 11 (68.75%).


Pure Tone Audiogram
- 10
0
10
20
30
40
50
60
70
80
90
100
110
Hearing Level (dB)
125 250 500 1k 2k 4k 8k
Frequency (Hz.)
A.C
Rt. Ear
Rt. Ear Masked
Lf. Ear
Lf. Ear Masked
B.C
Unmasked
Rt. Ear Masked
Lf. Ear Masked

Audiometrically, 12 patients suffered sensorineural hearing loss, the rest (4 patients) with mixed deafness[11].

Bhatia et al, 1977 reported Audiometricallyubt that a conductive hearing loss can occur in humans with myxoedema, but more commonly, any hearing loss is sensorineural[12].

We concluded that among many different causes of deafness, acquired hypothyroidism is prooved to be a common cause of deafness both its conductive and sensorineural type, ranging from mild to moderate in severity.

Figure 1.
Pure-tone Audiogram
Symmertical Left Sensorineural Deafness

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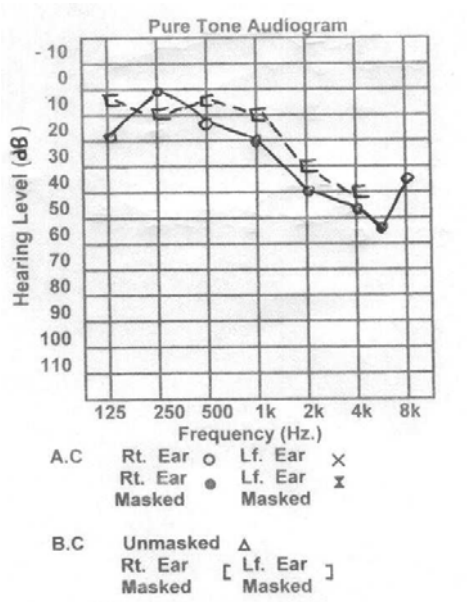

Figure 2.
Pure-tone Adiogram
High Frequency Right Sensorineural Deafness

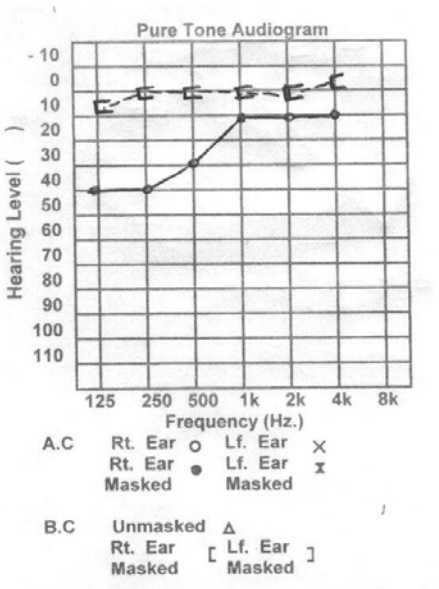

Figure 3.
Pure-tone Adiogram
Low Frequency Right Conductive Deafness

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