

Fibromiyalji Sendromlu Hastalarda Otoakustik Emisyon Ölçümleri

Otoacoustic Emission Measurements in Patients with Fibromyalgia Syndrome

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ÖZ

GİRİŞ ve AMAÇ: Fibromiyalji sendromlu (FMS) hastalarda koklear fonksiyonların analizini amaçladık.

YÖNTEM ve GEREÇLER: Çalışma prospektif bir vaka kontrol çalışması olarak tasarlanmıştır. Çalışmaya Amerikan Koleji Romatoloji (ACR) 2010 kriterlerine göre FMS tanısı konan 24 kadın ve 2 erkek hasta alındı. Kontrol grubu 31 sağlıklı yaş, cinsiyet ve vücut kitle indeksi (VKI) eşleştirilmiş deneklerden oluşmaktadır. Katılımcıların sosyodemografik verileri (yaş, cinsiyet, boy, kilo) kaydedildi. Otoakustik emisyon testleri (AOETs); Distorsiyon ürünleri (DP) ve geçici emisyon (TE) değerleri FMS ve kontrol gruplarında değerlendirildi.

BULGULAR: Çalışma grubumuz 28 kadın ve 2 erkek olup yaşları ortalama 42.9 ± 10.6 yıl idi. Ortalama VKI 30.1 ± 5 kg / m² idi. Kontrol grubumuz 27 kadın ve 4 erkek olup ortalama yaş 38.3 ± 15.1 yıl idi. VKI ortalaması 29.4 ± 2.4 kg / m² idi. Her iki grup yaş, cinsiyet ve VKI ile benzerdi. FMS grubumuzdaki AOET'lerdeki farklı frekansların çoğunda düşük sonuçlar gözlemlendi. İşitme değerlendirmesi 250 ve 8.000 Hz arasındaki frekanslarda, odyometride iki grup arasında (FMS grubunda yüksek işitme frekansları) anlamlı bir fark olduğunu gözlemlendi.

TARTIŞMA ve SONUÇ: FMS hastalarında, koklea yüksek frekanslarda daha fazla etkilenebilir ve bu hastalarda koklear, tüy hücreleri disfonksiyonuna neden olabilir.

Anahtar Kelimeler: fibromyalji, koklear fonksiyon, otoakustik emisyon

ABSTRACT

INTRODUCTION: We aimed to analyze the cochlear functions in patients with Fibromyalgia syndrome (FMS).

METHODS: The study designed as a prospective case-control study. Twenty-eight female and two male patients diagnosed with FMS according to American College of Rheumatology (ACR) 2010 criteria were included in the study. The control group consisted of 31 healthy age, gender and body mass index (BMI) matched subjects. Participants' sociodemographic data (age, gender, height, weight) were recorded. Otoacoustic emission tests (AOETs); distortion products (DP) and transient emission (TE) values were evaluated in FMS and control groups.

RESULTS: Our study group consisted of 28 females and 2 males at the age of 42.9 ± 10.6 years. The mean BMI was 30.1 ± 5 kg / m². Our control group consisted of 27 females and 4 males aged 38.3 ± 15.1 years. The mean BMI was 29.4 ± 2.4 kg / m². Both groups were similar in age, sex, and BMI. Lower results were observed in most of different frequencies at AOETs in our FMS group. The hearing assessments at frequencies between 250 and 8.000 Hz showed a significant difference between the two groups (high hearing frequencies in the FMS group) in audiometry.

DISCUSSION and CONCLUSION: In FMS patients, cochlea may be more affected at higher frequencies and it may cause cochlear, hair cell dysfunction in these patients.

Keywords: fibromyalgia, cochlear function, otoacoustic emission

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INTRODUCTION

Kidney Fibromyalgia (FM) is a complex chronic condition of unknown etiology, characterized by deep and widespread pain, sleep problems, cognitive impairment, fatigue, and other well-known functional symptoms (1). It is an entity with multiple concomitant disorders, rather than a single disorder. The common symptoms of FMS include sleep disorders, affective disorders, chronic generalized pain, and fatigue (2). The pathophysiology of FMS has not been elucidated yet, and no treatment is available for relieving all of the symptoms (3).

Neurological symptoms are common in FMS patients with central sensitization. Neuroaudiologic complaints such as dizziness, tinnitus, hearing loss, vertigo are frequently seen in the FMS patients in agreement with the severity of the disease. These symptoms are explained by central hypersensitivity, dysregulation of nervous system, which causes perception change (4-6).

Otoacoustic emissions (OAEs) are sounds measured in the external ear canal that reflect movement of the outer hair cells in the cochlea. Energy produced by outer hair cell motility serves as an amplifier within the cochlea, contributing to better hearing. Indeed, normal outer hair cells are essential for perfectly normal auditory function. OAEs are produced by the energy from outer hair cell motility that makes its way outward from the cochlea through the middle ear, vibrating the tympanic membrane, and propagating into the external ear canal. The OAEs finding by KEMP in 1978 contributed largely for the early detection of the auditory deficiency (7,8). These tests were used in different areas of work (9,10) and it is necessary to go on with these works, mainly in special population, such as FMS. Up to date there isn't enough related data. Here, we analyzed the cochlear functions in patients with FMS.

METHODS

The study designed as a prospective case-control study. Twenty-eight female and two male patients diagnosed with FMS according to American College of Rheumatology (ACR) 2010 criteria were included in the study. The control group consisted of 31 healthy age, gender and BMI- matched subjects.

Participants' sociodemographic data (age, gender, height, weight) were recorded. Otoacoustic emission tests; distortion products (DP) and transient emission (TE) values were evaluated in FMS and control groups.

Subjects were excluded if they had a history of any systemic or chronic disease, chronic use of any medications, a previous history of otologic disease, a family history of early-onset hearing loss, hearing loss due to other causes, or a history of high-risk noise exposure or ototoxic drug therapy.

Audiological Evaluation

Subjects with normal external ear canal and normal tympanic membrane on the otoscopic examination were included in the study. Tympanograms, stapes acoustic reflexes, pure audio audiometry, speech audiometry, OAE tests (TEOAE and DPOAE) were applied in the clinic of the audiology. Pure voice hearing tests were performed at 125 Hz and 8000 Hz intervals. For each set of tests, the mean values of air and bone conduction at each frequency value were calculated for both groups.

OAE Test with TE and DP with Madsen Capella OAE device; Interacoustics AZ 26 (226 Hz) impedance meter with tympanogram, stapes acoustic reflex; Pure audio and speech audiometry tests have been performed with the Interacoustics AC40 Pure Tone Audiometer. DPOAE, S / N ratio arithmetic mean values were taken. The S / N data obtained above the frequency 3 value indicate DPOAE and TEOAE positivity. Acoustic reflexes were recorded and evaluated at the same time.

Statistics analysis

Analyses were performed using SPSS. Continuous data were presented as mean \pm SD. Categorical variables were summarized as percentages. Kolmogorov Smirnov test was used for the evaluation of normal distribution. Comparisons between groups were made using chi-square tests for categorical variables, independent samples Student's t tests for normally distributed continuous variables and Mann-Whitney U tests when the distribution was skewed. A p value <0.05 was considered statistically significant.

RESULTS

Our study group consisted of 28 females and 2 males at the age of 42.9 ± 10.6 years. The mean BMI was 30.1 ± 5 kg / m². Our control group consisted of 27 females and 4 males aged 38.3 ± 15.1 years. The mean BMI was 29.4 ± 2.4 kg / m². Both groups were similar in age, sex, and BMI (Table 1). Distortion products (DP) and transient emission (TE) values ??at different frequencies of both ears of the study and control group were summarized at Table 2 and Table 3 respectively. Accordingly, lower results were observed in most of different frequencies at at OAETs in our FMS group (Figure 1). The hearing assessments at frequencies between 250 and 8.000 Hz showed a significant difference between the two groups (high hearing frequencies in the FMS group) in audiometry. DP and TE values > 3 were accepted as positive response. TEOAE positivity was 73.3% (p=0.18); DPOAE positivity was 63.3%(p=0.003) in study group. TEOAE positivity was 87.1%; DPOAE positivity was 93.5% in study group. No significant difference was found between the two groups in terms of the presence of stabilo-acoustic reflex (p=0.48).

Table 1: Distribution of demographic data of both groups

	FMS	Control	P
Age	42,9±10,6	38.3±15.1	0.06
Gender (F/M)	28/2	27/4	0.34
BMI	30.1±5	29.4±2.4	0.21

FMS: Fibromyalgia syndrome; BMI: body mass index.

Table 2: Distortion products (DP) results of the groups

Hearing Frequency	FMS	Control	P
DPrigh0.75	4.3±5	6.6±5.1	0.084
DPrigh1*	4.5±7.6	9.3±4.8	0.004
DPrigh1.5*	5.8±6.3	10.9±3.5	0.00
DPrigh2*	5.8±6.8	9.3±3.5	0.033
DPrigh3*	5.7±6	10.4±3.8	0.001
DPrigh4*	5.8±5.8	14.4±5.5	0.00
DPrigh6*	5.1±7.3	19.4±29.9	0.013
DPrigh8*	3.9±7.4	11.7±6.3	0.00
DPleft0.75	4.5±5.9	7±4.8	0.083
DPleft1	7±4.2	9.3±5.5	0.083
DPleft1.5	7±6.1	9.4±4.4	0.082
DPleft2*	6.8±7.1	8±5.2	0.048
DPleft3*	6±7.3	9.8±3.4	0.011
DPleft4*	7.9±5.9	12.9±5.3	0.001
DPleft6*	7.8±6.1	14.4±7.6	0.001
DPleft8*	3.8±6.1	11.3±7.4	0.00

FMS: Fibromyalgia syndrome, *statistically significant difference.

Table 3: Transient emission (TE) results of the groups

Hearing frequency	FMS	Control	P
TE right 0.75 Hz	7±6.3	9.3±6.5	0.16
TE right 1.25*	10.6±7,2	14.2±6.4	0.044
TE right 1.75*	7,3±7	11.3±4.3	0.01
TE right 2.5*	7.1±6.1	12.1±5.8	0.002
TE right 3.5*	7.6±6.8	10.9±6.7	0.06
TE right overall	8.2±5.5	10.9±7	0.21
TE left 0.5 Hz	5.9±6	8.7±6.3	0.084
TE left 1.25*	9.3±6.3	12.9±6.4	0.031
TE left 1.75*	7±5.5	12±6.1	0.002
TE left 2.5*	7.4±5.9	11.9±5.4	0.004
TE left 3.5*	5.9±5.9	11.6±5.7	0.000
TE left overall*	6.9±5	10.3±5.9	0.022

FMS: Fibromyalgia syndrome. *statistically significant difference.

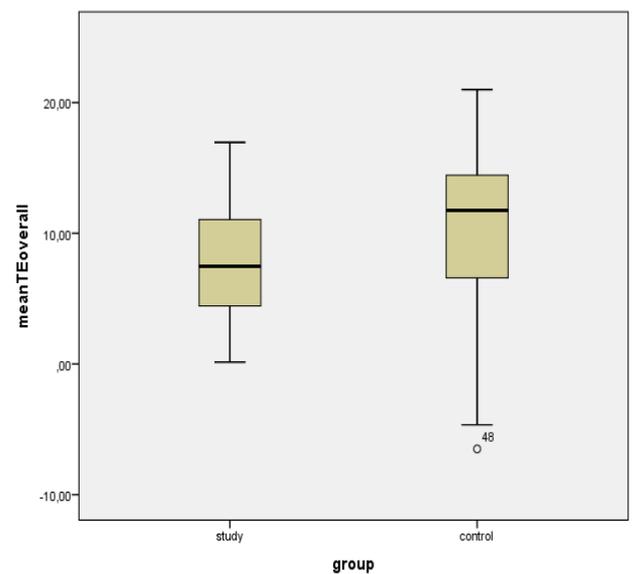


Figure 1: Boxplot of mean TE overall according to the groups.

DISCUSSION

Today's audiological functional diagnostics is based on a variety of hearing tests, whose large number takes account of the variety of malfunctions of a complex sensory organ system and the necessity to examine it in a differentiated manner and at any age of life. The objective is to identify nature and origin of the hearing loss and to quantify its extent as far as necessary to dispose of the information There are objective methods, based on physical measurements: preliminary hearing tests, pure tone threshold, suprathreshold processing of sound intensity, directional hearing, speech understanding in quiet and in noise, dichotic hearing, tympanogram, acoustic reflex, otoacoustic emissions and auditory evoked potentials (11,12).

The aim of our study was to assess the profile of OAEs in patients of FMS. As otoacoustic emissions are objective and non-invasive they can be used in hearing evaluation as an adjunct to conventional hearing testing.

Pathological changes within the middle ear will usually affect the sound transmission to the inner ear and subsequently lead to a conductive hearing loss. Since these changes also affect the antidromic sound transmission from the inner through the middle ear into the outer ear canal, these ears present with absent or markedly reduced OAE amplitude (13,14). The middle ear status has to be considered when OAEs results are interpreted (15).

The primary purpose of OAE Ts is to determine cochlear status, specifically hair cell function. This information can be used to (1) screen hearing (particularly in neonates, infants, or individuals with developmental disabilities), (2) partially estimate hearing sensitivity within a limited range, (3) differentiate between the sensory and neural components of sensorineural hearing loss, and (4) test for functional (feigned) hearing loss (15,16).

Currently on FMS pathogenesis, there is increasing evidence of neurogenically derived inflammatory mechanisms occurring in the peripheral tissues, spinal cord and brain. These involve a variety of neuropeptides, chemokines and cytokines with activation of both the innate and adaptive immune systems (17). In a small number of studies, audiological complaints were not correlated with objective findings. These complaints may develop due to abnormal presentation of stimuli from internal or external circulation due to neural disintegration, events associated with neural mediators, systemic features of the disease (4,6). In the literature, audiological disorders in FMS patients have not been sufficiently investigated. There is little data on this subject. Gündüz B et al¹⁸ found a statistically significant decrease in transiently evoked OAEs amplitudes after contralateral suppression in FMS patients. Yılmaz M et al¹⁹ found no significant difference between the DPOAE results of the patients and controls. In our study we observed lower results in most of different frequencies in OAETs and high hearing frequencies in the FMS group in audiometry.

CONCLUSION

Depending on the various mechanisms in the pathogenesis of the disease in FMS patients, the cochlea, may be more affected at higher hearing frequencies and it may cause cochlear and hair cell dysfunction in these patients.

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