Research Article

The Risk of Sensorineural Hearing Impairment in Preeclampsia

Risiko Gangguan Pendengaran Sensorineural pada Pasien Preeklamsia

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Abstract

Objective : To determine the risk of sensorineural hearing impairment in preeclampsia patients and to in Obstetric and Gynecology Department in Dr. Mohammad Hoesin Hospital Palembang.

Methods : An analytic observational case-control study was held in Dr. Mohammad Hoesin Hospital Palembang from 1st January to 31st December 2016. Subjects were obtained through consecutive sampling. Hypothetical tests used were unpaired t-test, Chi-square test and Fisher test for expected deviation standard <5, significance determined based on p-value if p<0.05. Data progressing and analysis were done using SPSS version 17.0 for windows.

Results : Characteristics distribution of the subjects were overall homogenous. With the Chi-square test, no significant difference was found in hearing function examination with OAE and tympanometry in both groups (p>0.05). From unpaired t-test, there was no significant difference between mean Air Conducting (AC) and Bone Conducting (BC) of the right ear in severe preeclampsia group and healthy pregnancy group (p=0.340), as well as mean AC and BC of the left ear in severe preeclampsia group and healthy pregnancy group (p=0.059). Based on the Fisher's Exact test, no significant relation was found between severe preeclampsia and sensorineural hearing impairment (p=0.999).

Conclusions : There was no significant relation between severe preeclampsia and sensorineural hearing impairment in Obstetric and Gynecology Department in Dr. Mohammad Hoesin Palembang.

Keywords : otoacoustic emission, preeclampsia, sensorineural hearing impairment.

Abstrak

Tujuan : *Mengetahui risiko gangguan pendengaran sensorineural pada pasien dengan preeklamsia di Departemen Obstetri dan Ginekologi RSUP Mohammad Hoesin Palembang.*

Metode : *Penelitian analitik observasional dengan disain kasus kontrol pada wanita hamil di RSMH sejak 1 Januari – 31 Desember 2016. Subjek dipilih secara pengambilan sampel berturut - turut. Analisis dengan uji t tak berpasangan, Chi-square, dan uji Fisher untuk ekspektasi sd<5, kemaknaan ditentukan berdasarkan (p) jika p<0.05. Proses mengolah dan analisis data ini dilakukan menggunakan SPSS 17.0 for windows.*

Hasil : *Distribusi karakteristik umum subjek secara keseluruhan adalah homogen. Berdasarkan uji Chi Square, tidak didapatkan perbedaan bermakna hasil pemeriksaan fungsi pendengaran dengan OAE dan Timpanometri pada kedua kelompok (p>0,05). Dengan uji T tidak berpasangan, tidak didapatkan perbedaan bermakna rerata Air Conducting (AC) dan Bone Conducting (BC) telinga kanan kelompok PEB dan kelompok hamil normal (p=0,340), begitu juga dengan rerata Air Conducting (AC) dan Bone Conducting (BC) telinga kiri kelompok PEB dan kelompok hamil normal (p=0,059). Berdasarkan uji statistik Fisher, tidak didapatkan hubungan bermakna antara preeklamsia berat dengan gangguan pendengaran sensorineural (p=0,999).*

Kesimpulan : *Tidak terdapat hubungan yang bermakna antara preeklamsia berat dengan gangguan pendengaran sensorineural berdasarkan pemeriksaan audiometri di Departemen Obstetrik dan Ginekologi RSUP Dr. Mohammad Hoesin Palembang.*

Kata kunci : *gangguan pendengaran sensorineural, otoacoustic emission, preeklamsia*

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INTRODUCTION

Hypertension in pregnancy is a group of disorders including gestational hypertension, preeclampsia, eclampsia, chronic hypertension, and superimposed preeclampsia on chronic hypertension. Preeclampsia and eclampsia affect 2-8% pregnancies worldwide and are the leading cause of maternal mortality due to hypertensive disorder in pregnancy.[1,2]

A study showed resistance to ultrastructural change in arterial subendothelium in women with preeclampsia. Decreased blood flow causes distribution disorder and tissue ischemia that leads to necrosis, bleeding, and other organs disorder. This systemic disorder in preeclampsia may also affect hearing ability.[3]

This research is aimed to determine the risk of sensorineural hearing impairment in women with preeclampsia and to compare otoacoustic emissions appearance between women with severe preeclampsia and normotensive women.

METHOD

This analytic observational case-control study was held from 1st January to 31st December 2017 in Obstetrics and Gynecology Department of Dr. Mohammad Hoesin Hospital Palembang/Medical Faculty of Universitas Sriwijaya Palembang.

A sample of 50 women who fulfilled the inclusion criteria was obtained. Inclusion criteria include women with severe preeclampsia in Dr. Mohammad Hoesin Hospital Palembang, who was pregnant with single live fetus, and agreed to join the study and has signed an informed consent form. Exclusion criteria in this study are women with a history of hearing impairment; history of ear, nose, or throat surgery that may affect hearing ability; had upper respiratory tract diseases, acute otitis media, or otitis media with effusion at the time of examination; who consumed ototoxic drugs; were older than 40 years old; and women with obesity, heart disease, diabetes mellitus, chronic hypertension, kidney disease, and endocrine disorders.

Data was collected by measuring blood pressure, body weight, and body height; checking for the presence of proteinuria and other laboratory abnormalities through laboratory examinations, and performing the hearing test in pregnant women with severe preeclampsia in Dr. Mohammad Hoesin Hospital Palembang. Blood pressure was measured twice in lying down position. Hearing test was performed with tympanometry and Transient Evoked Otoacoustic Emission at frequency 1000, 1500, 2000, 3000, and 4000.

Data analysis was done with unpaired t-test, Chi-square test, and Fisher test using SPSS version 17.0 for windows.

RESULT

A sample of 50 women who fulfilled inclusion criteria was divided into severe preeclampsia group (n=25; 50%) and normotensive group (n = 25; 50%).

In the severe preeclampsia group, 84% of women were within the age group of 20-35 years old with mean age 28.68 ± 5.77 years old. Similarly, in the normotensive group, 96% of women were within the age group of 20-35 years old with a mean age of 27.12 ± 4.09 years old. Full-term gestational age (≥ 37 weeks gestation) in both groups were 68% in severe preeclampsia group and 100% in normotensive group. Preterm pregnancies were found in 32% severe preeclampsia group with the youngest gestation of 23 weeks gestation. Distribution of gravidity characteristic in both groups was similar, both with 64% multiparous and 36% primiparous. Distribution of general characteristics of study subjects is homogenous.

Statistical analysis showed no significant difference in hearing function test with OAE and tympanometry in both groups was found ($p > 0.05$). The result of the hearing function test with OAE and tympanometry was shown in table1.

Audiometry evaluation showed the mean value of right ear Air Conducting (AC) and Bone Conducting (BC) was 19,69 ± 3,18 dB in severe preeclampsia group and 20,43 ± 2,19 dB in the normotensive group. With unpaired t-test, no significant difference was found between these two groups ($p=0.340$). Similarly, audiometry of the left ear showed mean values of AC dan BC in severe preeclampsia group was 19,40 ± 3,80 dB

and 19,40 ± 3,80 dB in the normotensive group. No significant difference was found (p=0.059). The result of audiometry examination was shown in table 2.

Table 1. Result of Hearing Test with OAE and Tympanometry

Examinations	Groups				*P-value*
	Severe preeclampsia		Normotensive		
	n	%	n	%	
Right OAE					
Pass	25	100.0	25	100.0	0.999*
Refer	-	-	-	-	
Left OAE					
Pass	25	100.0	25	100.0	0.999*
Refer	-	-	-	-	
Right tympanometry					
Type A	25	100.0	25	100.0	0.999*
Other types	-	-	-	-	
Left tympanometry					
Type A	25	100.0	25	100.0	0.999*
Other types	-	-	-	-	
Total	25	100.0	25	100.0	

P-value = Chi Square test, p > 0.05

Table 2. Comparison of Hearing Threshold in Severe Preeclampsia Group and Normotensive Group

Audiometry examination	Severe preeclampsia	Normotensive	*P-value*
Right ear	19.69±3.18	20.43±2.19	0.340
Left ear	19.40±3.80	21.10±2.19	0.059

Unpaired T-test

Hearing impairment is defined as AC and BC values more than 25 dB in one or both ears based on audiometry examination. In the severe preeclampsia group, one subject (4.0%) had mild sensorineural hearing impairments (27.75 dB) of the left ear. No hearing impairment was found in normotensive pregnancies.

Prevalence of hearing impairment in severe preeclampsia group was 4% and none found in the normotensive group. Statistical analysis showed no significant relationship was found between severe preeclampsia and sensorineural hearing impairment (p=0.999) (Table 3).

Table 3. Relationship between Severe Preeclampsia and Sensorineural Hearing Impairment

Pregnancies	Hearing impairment				*P-value*
	Yes		No		
	n	%	n	%	
Severe preeclampsia	1	4.0	24	96.0	0.99
Normotensive	0	0.0	25	100.0	9

Fisher test

DISCUSSION

A Continuous condition of oxidative stress in severe preeclampsia causes endothelial dysfunction that potentially disrupt blood flow and blood vessels not only in the placenta but in all maternal blood vessels, including cochlear blood vessels. In the cochlea, hypoxia may cause transient or permanent dysfunction of both outer and inner hair cells, and may even lead to damage of the hair cells, which will lead to sensorineural hearing impairment. These conditions commonly decrease or disappear entirely after termination of pregnancy. This may explain the lack of sensorineural hearing impairment found in this study.[4-8]

From the audiometry test, the mean value of AC and BC of 19,69 ± 3,18 dB was found in severe preeclampsia group and 20,43 ± 2,19 dB in the normotensive group. Both were within the normal threshold of less than 25 dB. No significant relationship was found between severe preeclampsia and sensorineural hearing impairment in this study.

This finding was in contrast with a study by Bakhshaee that found a significant relationship between severe preeclampsia and sensorineural hearing impairment based on OAE examination. The test in Bakhshaee study was performed in clinics before the patients were referred to central referral hospital and were done two weeks after delivery. On the other hand, this study was held in a central referral hospital, and tests were performed two days after delivery, in which case, patients were assumed to have received appropriate management of severe preeclampsia. It is also assumed that patients referred from smaller health care had received treatment for preeclampsia before being referred to the central referral hospital. This resulted in a protective effect against complications of preeclampsia.The lack of a significant relationship between severe preeclampsia and sensorineural hearing impairment in this study might also be due to the small sample size, 25 subjects in each group.[6,8,9,10]

CONCLUSION

Based on this study, it can be concluded that no early hearing damage, especially in the cochlea, was found in OAE examination. Prevalence of sensorineural hearing impairment in severe preeclampsia was 4% based on audiometry examination. Sensorineural hearing impairment was not found in normotensive pregnancies. There was no significant relationship between severe preeclampsia and sensorineural hearing impairment based on audiometry examination.

SUGGESTION

Further study with a bigger sample size is needed. Hearing tests should be performed in clinics and before delivery.

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