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Ultrahigh frequency acoustic variation in terms of the number and Times of dialysis patients with chronic renal failure and 12-month follow-up period in Kerman University of Medical Sciences- Shafa Hospital

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ABSTRACT

Hemodialysis is one of the most important and effective dialysis therapies for chronic renal failure. Despite hemodialysis Function is Blood detoxification but it has Complication such as fatigue, anemia, heart problems and hearing disorders that are created on the basis of these Complications, so patients should be followed in dialysis duration. In this study, patients were followed up for the high-frequency hearing losses are discussed. This a cohort study, Patients with chronic renal failure were randomly selected and examined prior to the start of dialysis. Patient with normal Examination were has been Test with Tympanometry and acoustic reflex testing SDT, SRT, PTA. 40 patients undergoing dialysis, 22 patients [57.1%] males and 18 [42.9%] female and the mean age of study participants was 15.4 ± 46.9 years. SDS test the relationship between the left and right were statistically significant. [P <0.001] between the right and left SRT test did not show any significant difference .In PTA testes in the High Frequency The mean follow-up of three frequencies 10000 and 12500, with p = 0.0001 and p = 0.005 statistically significant relationship was found., And the 16000 frequency with p = 0.212 There was no significant relationship. Frequencies 10000 and 12500 are more susceptible to hearing loss or Ototoxicity. Recommended it's better to follow hemodialysis patient use Ultra high frequencies.

Key words: Ultra high, Hearing loss, Hemodialysis

1. INTRODUCTION

Hemodialysis has been identified as one of the most important and effective dialysis therapy for chronic renal failure. As much as 250 thousand people in the United States are currently being treated with hemodialysis (1). Circulation is done by hemodialysis or peritoneal dialysis in the dialysis machine through a filter to filter. Despite the advantage of Hemodialysis (2) it has some complication such as Fatigue (3), anemia (4), heart problems (5) and hearing impairment (1, 6). However, many similarities in terms of anatomy, physiology, pharmacology, and pathology of the ear are the nephron and Cochlea. The overall difference between the two structures, but they are both in the epithelial tissue is rich in blood vessels. Bowman's capsule and the proximal tubule basement membrane in the kidney and other organs of the Court, is located near the capillary epithelium. Inner ear and kidney both in the homeostasis of body fluids are involved and their Epithelium containing sodium pump and potassium. There are various drugs that affect the inner ear and kidney. For example, the aminoglycoside antibiotics are nephrotoxic and ototoxic effect (7). In our study, the frequencies 10000, 12500, 16000 were selected and it seems in high frequencies has higher prevalence of hearing loss in audiometry \ in dialysis. This study is designed for the accuracy of the test and the early detection of hearing loss in patients with chronic renal failure.

2. MATERIALS AND METHODS

In Our Cohort Study 40 patients with chronic renal failure was confirmed by nephrologists And they were being treated with dialysis in Kerman Shafa Hospital Dialysis Center. Patients were randomly selected before the first dialysis session by residents in both ears Ear, nose and throat were examined by Otoscopy. If there are different ways of cerumen in the ear canal irrigated and suctioned out again "were examined. In case of perforation, Marengo sclerosis, granulation tissue, envelopes Retraction were excluded if the patient had a normal physical examination; the diagnosis was confirmed by the Executive of normal Audiometry. Audiometry's in the same condition [by an audiologist, a single device and an acoustic chamber] were performed. Tests [tympanometry and acoustic reflex SDT, SRT, PTA] were assessed. If there are air-bone gap in the PTA and tympanometry type B and C were excluded in addition to patients who are undergoing kidney transplantation were excluded. Patients before entering the study were fully satisfied. Patients were assured that as long as the study they can go out of study. Data collected for each patient, demographic data form, starting on dialysis, number of dialysis per month, Otologic examination results, the Otoscopy, and audiometric tests were recorded separately. Dialysis patients were recorded with the same material used in dialysis machines; dialysis experiments were responsible for all costs of the researchers. For all samples, pure tone audiometry [PTA], SDS and SRT in the acoustic chamber and audiometer calibration was performed by trained personnel. Hearing thresholds at frequencies of 125, 250, 500, 1000, 2000, 4000, 8000, 10000, 12500, 16000 were measured. According to our tests, the frequencies 10000 and 12500 and 16000, which had not been done in previous studies was Increase the accuracy of the test and the early detection of hearing loss in patients with chronic renal failure. All the samples before the first dialysis session every 6 months were audiometry. All patients completely follow up for 12 month and All data were entered into SPSS 17 software and To compare the hearing thresholds of patients before dialysis and in two [6 and 12 months] after track after dialysis was used to test T-Paired and Comparison Trends for hearing at zero, 6, 12 Repeated measure test was used.

3. RESULTS AND DISCUSSION

In our study, 40 dialysis patients who were enrolled, 22 patients [57.1%] males and 18 [42.9%] were female sex., mean age 15.4 ± 46.9 years, the minimum study participants aged 18 years and maximum age of the study participants was 75 years. Participants in our study, the mean disease duration was 11.6 ± 14.5 months, which was the minimum in a month and a maximum of 60 months. In our study the mean duration of dialysis patients at one year was 147.6 ± 2.2 times the minimum to the maximum of 210 times and 120 times respectively. Changes in mean audiometric hearing test using SRT, SDS and PTA were measured and the results are given in Table 1, Table 2.

Table 1. Mean of SDS and SRT tests

	SRT		SDS%	
	Left	Right	Left	Right
First Follow up	14.9±8.1	±15.69.5	±94.64.4	±95.43.7
Scened Follow up	±16.18.9	±17.29.5	±93.25.5	±94.44.7
،Third Follow up	±20.810.5	±21.49.3	±90.28.3	±90.55.9

Table 2. Mean of PTA tests

Test	frequencies	Minimum	Maximum	Mean	Std. Deviation
Before Dialysis	125 - 250	5	20	8.33	3.60
	500-1000-2000	5	35	12.85	6.82
	4000-8000	5	55	22.02	13.83
	10000	15	95	50.95	19.60
	12500	15	95	66.91	19.31
	16000	30	95	75.12	13.63
Six Month	125 - 250	5	25	8.93	4.49
	500-1000-2000	5	40	13.81	7.79
	4000-8000	5	55	24.88	14.03
	10000	15	95	56.07	20.64
	12500	15	95	68.45	19.58
	16000	30	95	76.19	11.35
Twelve Month	125 - 250	5	25	9.05	4.71
	500-1000-2000	5	40	16.55	8.93
	4000-8000	5	65	29.40	15.34
	10000	15	95	62.62	18.74
	12500	20	95	74.17	15.33
	16000	40	95	78.57	8.21

SDS after one year follow-up study of the variables measured three times by Repeated Measure test data in both tests and there is significant relationship found. [P <0.001] and The SRT test after one year follow-up study measured three times in each test Repeated Measure test based on and there is no statistical significant relationship. [P> 0.001]. PTA test results measured in three different sound frequencies are reported in Table 3.

Table 3. The mean PTA threshold tests for each measure

PTA	df	p-value	Mean	Std. Deviation
125 - 250	1	0.617	8.33	3.60
500-1000-2000	1	0.508	12.85	6.82
4000-8000	1	0.410	22.02	13.83
10000	1	0.005	50.95	19.60
12500	1	<0.001	66.91	19.31
16000	1	0. 212	75.12	13.63

The relationship between age, gender, and changes in tests of auditory SDS, SRT and PTA relationship was observed at different frequencies (Table 4).

Table 4. Comparison of audiometric threshold scores for each measure across gender and age

Test		Sex	Age
SDS	Right	0.119	0.165
	Left	0.213	0.253
SRT	Right	0.503	0.476
	Left	0.498	0.512
PTA	125 - 250	0.617	0.701
	500-1000-2000	0.508	0.587
	4000-8000	0.410	0.411
	10000	0.123	0.241
	12500	0.07	0.432
	16000	0.765	0.814

The duration of the disease, dialysis, and changes in tests of auditory SDS, SRT and PTA at different frequencies are shown in Table 5.

Table 5. Audiometric tests comparing each measurement frequency and duration of dialysis

Test		Dialysis Time	Disease Duration
PTA	125 - 250	0.640	0.971
	500-1000-2000	0.964	0.992
	4000-8000	0. 081	0.061
	10000	0.488	0.071
	12500	0.630	0.815
	16000	0.775	0.143
SDS	Left	0.777	0.789
	Right	0.799	0.771
SRT	Left	0.558	0.971
	Right	0.372	0.988

Hearing loss is a common complication of long term treatment with hemodialysis for chronic renal failure patients. Hearing loss is the average decrease in of more than 25 dB at a frequency of 5/0, 1, 2, and 4 kHz (8) The prevalence of hearing loss in patients who are undergoing hemodialysis studies have ranged from 20 to 75% (9) Some studies have reported hearing loss in the first 5 years of dialysis and hemodialysis after 5 years they will start hearing loss (9) but a study conducted in 1995 in Italy Bazzi et al, hearing loss was observed even at the start of hemodialysis, but no matter the severity of hearing loss, duration of dialysis (10). However, Nikolopoulos et al in a study on young people and children who have announced in significant changes in audiometric findings were found before and after hemodialysis (11). But four years later, in 2001, the results of the study showed Stavroulaki and colleagues in Greece, hearing loss, especially at high frequencies [8000-12000] is also significant in young people treated with hemodialysis (12). However, some older studies, hearing loss in the high frequencies and low frequencies were reported. The prevalence of hearing loss in dialysis patients in the low-frequency Gatland and co-workers [125,250] [41%], median frequency [500, 1000, 2000] 15%, and at High Frequency [4000, 8000] was 53% (13). Different characteristics between patients with significant hearing loss suggested, According to published standards that are widely used in the United States of America, Hearing is a significant change in one of the following conditions: 1. Hearing thresholds of 20 dB or greater at any frequency is decreased.2. Hearing thresholds of 10 dB or more at two adjacent frequencies is reduced.3. Hearing thresholds at three consecutive frequencies is

reduced (14). in this study in the frequency 10000 and 12500 and 16000 in dialysis patients during the follow-up period of 12 months compared to the average hearing loss was observed ein the standard Among 12,500 and 10,000 threshold in only two patients was reduced on average by about 13dB than standard. The thresholds of statistical tests on the two frequencies were statistically significantly in all patients. The hearing threshold at frequencies lower than standard 4000.8000 Nevertheless, a statistically significant change was observed in among participants in the study. Previous studies that investigated the relationship between the frequency of dialysis was performed PTA relationship was not observed at frequencies lower than 8000 (15-17) our findings revealed that only two frequencies 8000 Hz and 12500 10000 these results are significant. But despite the observed decreases in the frequency threshold of 16,000 patients were followed up at three stages of a statistically significant difference was observed. Threshold is likely to reduce the frequency of 16000 in normal people naturally exists There was no reason for this difference is the need to conduct further studies to confirm this theory. The limitation of our study was the difficulty in tracking patients and Patients were not evaluated groups. Young and old be any age It is recommended that future studies in dialysis patients compared with healthy individuals, the frequencies are Ultrahigh.

4. CONCLUSION

Our findings showed that the frequencies of 10000 and 12500 are more susceptible to hearing loss or Ototoxicity But there is no difference in the frequency of 16,000 despite the lower threshold. Follow-up is recommended that in hemodialysis patients frequencies of 10000 and 12500 are more sensitive due to the two frequencies can be used to monitor patients' hearing. And Gender, disease duration and frequency of dialysis, there was no correlation with changes in hearing at all frequencies.

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AUTHORS CONTRIBUTION

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CONFLICT OF INTEREST

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