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ORIGINAL PAPER

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Investigation the Relationship between Skin Involvement Severity and Hearing Loss Severity in Vitiligo Patients

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ABSTRACT

Introduction: Vitiligo is a common acquired depigmented systemic disorder influencing the entire pigmentary system including Cochlear melanocytes and vestibular system in the inner ear. Vitiligo can lead to social negative impact and poorer quality of life among these patients. This study was conducted to investigate the relationship between skin involvement severity and hearing loss severity among vitiligo patients. **Methods:** This cross-sectional study was performed on 98 patients with vitiligo referred to the dermatology clinic of Shahid Beheshti Hospital of Kashan during 2012-2014. Using Vitiligo Area Severity Index (VASI), the skin involvement was evaluated by a dermatologist. Then, patients referred to an otolaryngologist, and after otoscopic examination, they underwent audiometric testing including Audiometry, Tympanometry and Auditory Brainstem Response (ABR tests). Patients aged 10-50 years old without any other underlying diseases, and after rule out of other causes of depigmentation and leukoderma were included. Patients with congenital hearing impairment and patients with history of ototoxic drugs intake such as aminoglycosides, vancomycin and thiazide were excluded. **Results:** No significant association was found between severity of Vitiligo with conductive hearing loss. Vitiligo has not been correlated with sensory neural hearing loss. Also, there was no relationship between the duration of clinical manifestations of vitiligo with conductive and sensory neural hearing loss. **Conclusions:** Our finding showed that there was no relationship between skin involvement severity and hearing loss severity in vitiligo patients. In addition, no relationship was found between the conductive and sensory neural hearing losses with the incidence duration of clinical manifestation and extent of skin involvement of vitiligo.

Keywords: Vitiligo, hearing loss, Audiometry.

1. INTRODUCTION

Vitiligo is an acquired depigmentary disorder resulting from progressive destruction of melanocytes characterized by milky-white patches with circumscribed margin which leads to several undesirable social outcomes such as lower quality of life among the patients (1). The prevalence of the disease was reported about 1.8% and the most prevalence of the disease is in Africa and commonly occurs in women (2). Clinical manifestations of the disease appear in childhood and young adult. Upper extremities are the most common affected area reported by most of the vitiligo patients (3,4). Although vitiligo is an unknown etiology disease, several stimulants have been assumed to trigger the disease such as sunburn, and exposure to phenolic chemicals which cause an imbalance in the oxidant and antioxidant system in melanocytes. Melanocytes produce melanin, which is a pigment found in the skin, hair follicles, eyes, bones, heart, brain, and also in the human inner ear (5,6). Melanocytes are present in various area of the inner ear, such as cochlear ducts and vestibular system, and destruction of melanocyte can lead to inner ear dysfunction (7-9). The results of the previous study indicated that the incidence of the cochlear disorder is considerable in vitiligo patients with preponderance of male (10). Twenty patients with Vogt-Koyanagi-Harada (VKH) disease; a melanocyte ester related autoimmune disorder have been evaluated for internal ear function, which revealed that the incidence of internal ear involvement is very high in this autoimmune disease. Given the important role of melanocytes in regulation of both auditory and equilibrium functions of the inner ear, autoimmune disorder of these pigments impair the inner ear function (11). Waardenberg syndrome as a kind of pigmented disorders, is also associ-

ated with sensory hearing loss (12). In another study, it was found that hearing loss is very common in patients with Waardenberg syndrome, and there are also abnormalities in the temporal bone in all patients with hearing impairment and Waardenberg syndrome (13). Additionally, it has been reported the hearing loss is common in patients with systemic lupus erythematosus autoimmune disease (14). Given impairment in the function of melanocytes and, as a consequence of impairment in the production of melanin in vitiligo disease, melanocytes impairment in inner ear can also affect the function of the inner ear and causes hearing loss. Since, early diagnosis of these disorders in the early stage can prevent the disorders and help to improve auditory function and to prevent hearing loss in these patients, this study was aimed to investigate the relationship between skin involvement severity and hearing loss severity in patients with vitiligo.

2. PATIENTS AND METHODS

This cross-sectional study was performed on 98 vitiligo patients who referred to dermatology clinic at Shahid Beheshti Hospital in Kashan during 2012-2014. Diagnosis of the disease and determination of the severity of skin involvement using Vitiligo Area Severity Index (VASI), was performed by a dermatologist. On the VASI scale, the percentage of vitiligo involvement is calculated in terms of hand units, and one hand unit is approximately equal to 1% of the total body surface area. On the other hand, the amount of depigmentation is calculated as follows: a) 100%; complete depigmentation, or no pigmentation; b) 90%; present of spots pigmentation; c) 75%; Depigmented area exceeds the pigmented area; d) 50%; Pigmented and depigmented areas are equal; e) 25%; Pigmented area exceeds depigmented area; f) 10%; Only spots of depigmentation; Total body VASI score is calculated by the following formula: $VASI = \sum S \text{ All Body Site [Hand units]} \times [\text{Residual Depigmented}]$.

Then VASI score of 1-25% was considered as mild, score of 26-50%; moderate, score of 75-51%; severe, and score of 76- 100% was considered as serious involvement. Then the patients referred to an otolaryngologist, and after otoscopic examination, and confirmed to be healthy voluntary as a viewpoint of conductive auditory hearing loss, they underwent audiometric testing including Audiometry, Tympanometry and Auditory Brainstem Response (ABR) tests. Patients who had hearing impairment, were divided into 4 mild, moderate, severe and deep groups based on hearing loss, and Pure Tone Audiometry (PTA) were performed for ABR patients to confirm the accuracy of the results. Patients aged 10-50 years old, without any underlying diseases, and after rule out of other causes of depigmentation and leukoderma were included. Patients with congenital hearing impairment and patients with history of ototoxic drugs intake such as aminoglycosides, vancomycin and thiazide were excluded. The study protocol was approved by the Ethics Committee of Kashan University of Medical Sciences and all participants filled a written informed consent. Collected data were analyzed statistically using SPSS software version 18. Mean and standard deviation were used for descriptive statistic data. The Chi-square and Mann Whitney U tests were used to identify significant relation between qualitative data. The P-value less than 0.05 was considered significant level.

3. RESULTS

This study was performed on 98 patients with vitiligo. Table 1 showed the demographic and clinical characteristics of the patients. The mean age of the patients was 25.98 ± 10.96 years. Of the total, 67 (68.4%) of the subjects were female and 31 (31.6%) were male. In this study, 19 (19.4%) subjects had thyroid disease. Conductive hearing loss was seen in 9 cases (9.2%) and 4 cases (1.4%) had neural hearing loss. The audiometric disorder was found in 9 (9.2%) cases and 4 (1.4%) had abnormal ABR, and both of these disorders were mild.

Sex	Female	67	4/68%
	Male	31	6/31%
Education	Illiterate	4	7/3%
	Primary	23	5/23%
	Guidance	20	4/20%
	Diploma	30	6/30%
	Academic	21	4/21%
Thyroid Disease	Yes	19	4/19%
	No	79	6/80%
Conductive hearing loss	Yes	9	2/9%
	No	89	8/90%
Sensory hearing loss	Yes	4	9/95%
	No	94	1/4%

Table 1. Demographic and Clinical Specifications of our sample

The result of logistic regression analysis showed that there was no significant relationship between the variables including sex, skin involvement, duration of clinical manifestations, thyroid disease, family history and age with hearing loss ($P > 0.05$) (Table 2).

Variables	B	SD	Wald	df	Sig.	Exp(B)
Sex	-18.109	7.039E3	.000	1	.998	.000
Skin involvement	.335	.528	.404	1	.525	1.398
Duration of the disease	.006	.006	1.325	1	.250	1.006
Thyroid disease	-.764	1.056	.524	1	.469	.466
Family history	-.008	.047	.032	1	.858	.992
Age	-.034	.063	.298	1	.585	.966
Constant factor	16.228	7.039E3	.000	1	.998	1.117E7

Table 2. Logistic regression analysis to evaluate the relationship between the demographic and clinical variables of vitiligo disease with the rate of hearing loss

The result of logistic regression analysis showed that there was no significant relationship between the variables including sex, skin involvement, duration of clinical manifestation, thyroid disease, family history and age with ABR ($P > 0.05$) (Table 3).

4. DISCUSSION

Vitiligo is as an acquired hypomelanotic disorder characterized by destruction of melanocytes which lead to impairment of melanin production and consequently, inner ear dysfunction by interfering with endolymph calcium homeostasis and auditory cochlear function (9, 15). The aim of this study was to determine the relationship between skin involvement severity

Variables	B	SD	Wald	Df	Sig.	Exp(B)
Sex	2.312	1.453	2.532	1	.112	10.095
Skin involvement	-.017	.576	.001	1	.976	.983
Duration of the disease	.004	.007	.411	1	.521	1.004
Thyroid disease	-.167	1.463	.013	1	.909	.846
Family history	-.002	.011	.030	1	.862	.998
Age	.085	.072	1.381	1	.240	1.089
Constant factor	-5.070	3.278	2.392	1	.122	.006

Table 3. Logistic regression analysis to evaluate the relationship between the demographic and clinical variables of vitiligo disease with ABR

and hearing loss severity in patients with vitiligo. The results of this study showed that there is no significant relationship between the variables; gender skin involvement, duration of manifestation of disease, thyroid disease, family history and age with hearing loss. Also, we didn't find significant relationship between mentioned above variables, with ABR as a consequence of the disease. Similarly, Fleissig et al in 2013 showed that there was no relationship between the severity of skin involvement and hearing loss in vitiligo patients (16). In a study performed on two groups of patients with vitiligo and healthy subjects, it was found in patients with vitiligo, the auditory frequency was not different from the healthy subjects (17). In another study, no relationship found between the age and duration of the disease, with the rate of hearing loss (18). The result of another study conducted on patients with vitiligo, revealed that vitiligo patients had lower hearing thresholds than healthy subjects. There was also a decrease in peak I and an increase in wave I and III compared to the control group. In this study, there was also a significant increase in the range of action potentials of left ear, in comparison with healthy subjects (19). In the study by Aslan et al., 22 patients with vitiligo were compared with 22 age and sex matched healthy individuals, for auditory thresholds. They observed that hearing thresholds were significantly different in these two groups, and in Patients with vitiligo were lower than the healthy group. The threshold of hearing loss in patients with vitiligo at high frequencies was also significantly lower than that of the control group (20). In addition, it has been observed that men with vitiligo are more susceptible to hearing loss than women (21). In another study, a significant prevalence of hearing impairment has been reported in patients with vitiligo (16). In the study of Arya et al., It was found that the cochlea function reduced in patients with vitiligo, result in hearing impairment, so, they recommended a complete auditory monitoring for these patients (22).

5. CONCLUSION

According to the results, no relationship was found between skin involvement severity and hearing loss severity in Vitiligo patients. More studies with higher sample size and cohort studies are recommended for better assessment of auditory function in vitiligo patients.

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