

The correlation between vitiligo and hearing losse

Sharifian MR¹, Maleki M², Honarvar H³

¹Assistant professor of Otolaryngology, ²Assistant professor of Dermatology,
³Resident Otolaryngology

Abstract

Objective: To determine the correlation between vitiligo and hearing loss.

Materials and Methods: Fifty patients with active vitiligo and forty healthy subjects were included in this case control study. Pure tone thresholds were determined at frequencies between 250 and 8000Hz. We compared the results in control and patients group by use of chi-square test.

Results: M/F ratio was 10:40 in the patients group and 10:30 in the control group. Mean age in patients and control groups was 22 and 22.6 years old respectively. The mean hearing threshold in patients was 19.5±5.7 and 10±5.7 in control groups. High frequency sensor neural hearing loss was seen in 19 out of 50 patients (38%), whereas no hearing loss was observed in the control group ($X^2=19.26$, $P<0.001$). Bilateral, right ear and left ear involvement were 63.1%, 26.3% and 10.6% respectively. Statistical difference between bilateral and unilateral involvement was significant ($P<0.05$). No conductive hearing loss was seen in the control and patients groups.

Conclusion: Vitiligo, Which is a type of pigmentary disorder, seems to be an effective factor in hearing loss. The mechanism for this condition might be the absence of the preventive function of melanin – containing cells in the inner ear.

Keywords: Hearing Loss, Vitiligo

Introduction

Vitiligo is an acquired pigmentary disorder that is characterized with decrease of melanocytes of the epidermis, mucous membranes, and other tissues (1). It mostly affects the interfollicular melanocytes of the epidermis, and less commonly hair rizom melanocytes.

Onset of disease occurs between the ages 20-40 years; but it has been reported in ages higher than 85 years as well (1). Although skin depigmentation is the first sign in complaint of vitiligo, other symptoms may accompany the disorder. Hearing and sight difficulties that are seen in this disease suggest and support the hypothesis that extra epidermal melanocytes may involve in this disease (1).

Sharifian MR. MD
Assistant professor of Otolaryngology
Adders: Imam Reza (pbuh) Hospital
Mashhad, Iran.

Melanocytes are present in the stria vascular. Although the function of inner ear melanocytes is unknown, it is assumed that they have a correlation with hearing function and development (1,2,3).

There are reports about relative sensorineural hearing loss and unilateral or bilateral hypoacusis, and even complete deafness in vitiligo patients and other pigmentary disorders such as albinism (4,5).

Regarding the few studies that have been done and their contradictory results, we decided to carry out a scientific research on the background of the correlation between this disease and sensorineural hearing loss.

Method of Study

This study is a prospective case control study. By referring to the Dermatology Department of Imam Reza (Phuh) Hospital, 140 cases of vitiligo were selected initially. The patients were over 40 years of age and those who had recognizable hearing loss factors such as noise induced, head trauma, post meningitis and family history of hearing loss and other autoimmune disorders were omitted from the study. Finally, 50 patients were selected for this study, who had no complaints of hearing loss. Following otoscopy, they were sent for audiometry tests, including PTA, SDS and SRT.

Forty healthy, white-skinned patients from the same age level who did not have vitiligo or complaints of hearing loss were selected as control group. They were tested by otoscopy and the above-mentioned hearing tests, too. Results were gathered from both groups then analyzed by use of Chi-square test.

Study Results

This is a prospective case control study undergone in the year 2001 on Imam Reza (Phuh) Hospitals. Fifty patients with active vitiligo, and forty healthy white-skinned persons as the control group who had no complaints of hearing loss and no history of ear infections, trauma, use of ototoxic drugs such as amino glycosides or history of familial hearing loss were selected for the study. All patients had used only topical corticosteroids for cutaneous lesions previously. Hearing thresholds were determined by audiometry following otoscopy. The case and control groups were the same in age distribution and gender. There were 40 females and 10 males in the case group with an average age of 22 years (12-40 years). There were 30 females and 10 males in the control group with an average of 22.6 years (12-40 years). The average time of disease in the case group was 9 years (2-23 years). Otoscopy results in both groups were normal (Table 1).

Table 1- Comparison between patients with vitiligo and control group from the viewpoint of demographic factors and hearing variables

Group/ Number	Patients Group	Control Group	P Value
Total	50 persons	40 persons	
M/F Ratio	10:40	10:30	
Patients' Age	12-40	12-40	
Average Age	22	22.6	
Average Length of Disease	9		
Hearing Threshold Mean	19.5 ± 5.7	10 ± 5.7	0.000
Hearing Loss in speech frequencies	0.0%	0.0%	0.000
Hearing Loss in frequencies Higher than 2000 Hz	38%	0.0%	0.001

The mean hearing threshold in frequencies of 250 - 8000 Hz were compared in both groups. The mean hearing threshold for each ear was gained by adding hearing threshold at frequencies of 250,500,1000,2000,4000, 8000 Hz and dividing it by 6. Since there was no meaningful difference between hearing threshold in right and left ears in every person, we performed analysis for 100 case ears and also for 80 control ears. The mean of hearing threshold in the case groups was 10.5 ± 5.7 , and in the control group it was 10 ± 5.7 . The hearing threshold difference between case and control ears was 9.5 decibels ($P=0.000$).

In order to obtain prevalence of hearing loss, the ears with hearing threshold of more than 25 decibels were regarded. In high frequencies (above 2000 Hz) from 50 patients of the case group, 19 patients (38%) had sensorineural hearing loss ($P<0.001$ and $X^2=19.26$). From 19 patients, 3 were male and 16 were female. The average age of these patients was 22 years, and the average time of disease was 9 years (Table1).

Sensorineural hearing loss was bilateral in 63.1% and in 10.6% of cases only the left, ear and in 26.3% of cases only the right ear was involved (Table2).

Table 2- Specifications of hearing loss in 19 patients with hearing loss

Frequency Level			Intensity of Hearing Loss			Ear Involved		
4k Hz	4-8k Hz	2-8k Hz	56-70 Db	45-55 Db	35-40 Db	Bilateral	Left	Right
64%	18%	18%	0.0%	32%	68%	63.1%	10.6%	26.3%

From a statistical viewpoint, there was no meaningful difference between right and left ear involvement ($p>0.05$).

But there was a significant difference between unilateral and bilateral involvement ($p<0.05$). The amount of hearing loss in 68% of cases (13 patients) was between 35-40 and in 32% of cases (6 patients) between 45-55 decibels. Sensorineural hearing loss in 18% of cases was limited to the frequencies of 2-8 kilo Hz. In 18% of the cases, it was limited to frequencies of 4-8 kilo Hz, and in 64% of cases it was limited to the frequency of 4 kilo Hz only (table2).

It is notable that hearing loss was not seen in speech frequencies, and it was limited to only high frequencies, especially above 4 kilo Hz, that justifies

the lack of hearing loss complaints by patients. In none of the 40 persons in the Control group was seen any kind of hearing loss in speech frequencies or in high frequencies (Table 1).

Discussion

The inner ear is influenced during the vitiligo process and causes sensorineural hearing loss (1-3).

In mammals stria vascularis of the inner ear cochlea is formed basically from three kinds of cells-marginal, basal and interstitial cells. Interstitial cells are similar to melanocytes and they possibly originate from the neural crest and are scattered between marginal and basal cell layers (3). In a study on the process of the evolution of stria vascularis it became clear that the interstitial melanocytes-like cells may have a vital

role on the function and evolution of this organ and probably prevent destruction of inner ear hair cells against the environmental ototoxic agents (3).

It is believed that in vitiligo, synchronic with the loss of epidermal melanocytes, melanin containing cells in the inner ear loss their preventive function and predispose the inner ear to be affected by environmental damaging factors and sensorineural hearing loss subsequently (2,3).

In a study on 29 patients with vitiligo and 41 healthy persons as the control group, Pure tone thresholds of the vitiligo group were significantly lower than control group at frequencies higher than 4000 Hz ($P < 0.05$).

Reflex latencies for the two group had no difference, and males were more susceptible than females to hearing loss (6).

In our study, hearing loss in high frequencies is obviously clear. It occurred more in females, but the reason could have been due to the higher number of women participating in this study. In another study, statistically none significant difference was noted between both case and control group in regard to latencies, interpeak latencies and amplitudes of ABR waves which shows that the point of damage was merely cochlear not retrocochlear (7).

Another study showed that hearing loss in a patient with vitiligo and primary hypothyroidism that may be a common autoimmune pathogenesis for the three disorders (8).

Hearing disturbances were shown in a number of vitiligo related disorders such as retinitis pigmentosa, Waardenburg syndrome, alopecia areata and vogt-Koyanagi-Harada syndrome, providing the autoimmune response against to epidermal melanocytes and melanocyte-like cells in all parts of the body (9-12).

In a study on 50 patients with vitiligo and 40 healthy persons, hearing disorder was found in 8 (16%) of the patients in comparison with the healthy persons ($P < 0.01$

and $X^2 = 7.024$).

Five persons showed a mild hearing loss (less than 40 decibels) and 3 persons showed a moderate hearing loss (40-60 decibels). In 5 cases the hearing loss was unilateral, and in 3 cases it was bilateral. In 7 persons out of 8, hearing loss was limited to frequencies of 2-8 kilo Hz, and in the remaining patients it was limited to 4 kilo Hz (13).

This study, from the viewpoint of methodology and selection of the number of patients, was similar to our study. In our study, sensorineural hearing loss was seen in 19 patients out of 50 (38%) and bilateral involvement was almost double rather than unilateral involvement (63.1% versus 36.9%).

The amount of hearing loss in 13 cases of 10 patients was between 35-40 decibels, and for the remaining six patients it was between 45-55 decibels. hearing loss in 18% of cases was limited to 2-8 kilo Hz, and in 18% of the cases was limited to 4-8 kilo Hz, and in 64% of the remaining patients it was limited to 4 kilo Hz only (Tables 1,2).

Conclusion

Sensorineural hearing loss in vitiligo patients was more than in healthy persons. It probably resulted from the lack of preventive function of melanin-containing cells in the inner ear simultaneously with the loss of epidermal pigmentary cells. Although from a statistical viewpoint it is not considerable, in our case control study hearing disturbances in patients group in comparison with healthy persons was more common. Since hearing loss in speech frequencies was not observed, the results of this study is mostly interesting for biologists rather than clinicians. The result of this research clarifies that vitiligo sometimes can be presented as a systemic disease as a result of melanocyte-like cells involvement in all part of the body. In management of these patients, ear examinations at regular intervals are recommended to appropriate treatment if necessary.

Acknowledgement

The authors of this article would like to thank Dr. Ali Mohammad Jafari and the personnel of the audio 6-Kennet Arndt, metrology and dermatology wards at Imam Reza (Pbuh) Hospital for their kind cooperation in this research.

References

- 1- Kennet A, Lebo IT, Robinson W. Cutaneous medicine and surgery, an integrated program in dermatology. 2000; 1210-1217.
- 2- Hilding D, Ginzberg R. pigmentation of the stria vascularis. *Acta Otolaryngol* 1977; 84:24-37.
- 3- Steel KP, Barkway C. Another role for melanocytes: their importance for normal stria vascularis development in the mammalian inner ear. *Development* 1989; 107: 453-463.
- 4- Garber SR, Turner CW, Creel D et al. Auditory system abnormalities in human albinos. *Ear hear* 1982; 3:207-210.
- 5- Thermen TF, Jackson J, Fowler CG. Deafness and vitiligo. *Birth Defects* 1976; 12: 315-320.
- 6- Ardic FN, Aktan S, Kara CO, Sanli B. High frequency hearing loss and reflex latency in patients with pigment disorder. *Am J Otolaryngol* 1998 Nov-Dec; 19(6): 365-9.
- 7- Our MZ, Sahiner T, Aktan S, and Sanli B et al. Auditory evoked potentials in vitiligo patients. *Scand Audiol* 1998; 27(4): 225-8.
- 8- Nishida W, Mikai M, Sumimoto T, Hamada M, Hiwada K. Vitiligo with primary hypothyroidism and hypoacusis: a case report. *Jpn J med* 1990 Jan-Feb; 29(1):66-70.
- 9- Cowan CL, Grimes PE, Chakrabarti S, Minus HR, Kenney JA Jr. Retinitis pigmentosa associated with hearing loss, thyroid disease, vitiligo, and alopecia areata, retinitis pigmentosa and vitiligo. *Retinal* 1982; 2(2): 84-8.
- 10- Dereymaeker AM, Fryns JP, Ars J, Andresescu J, Van den Berghe H. Retinitis pigmentosa, hearing loss and vitiligo: report of two patients. *Clin Genet* 1989 May; 35(5): 387-9.
- 11- Kumakiri M, Kimura T, Miura Y, Tagawa Y. Vitiligo with an inflammatory erythema in Vogt-Koyanagi-Harada disease. *J Cutan pathol* 1982 Aug; 9(4): 258-266.
- 12- Preus M, Linstrom C, Pålpmeno RC, Milot J. Waardenburg syndrome—penetrance of major signs. *Am J Med Genet* 1983 Jul; 15(3): 383-8.
- 13- Orecchia G, Marelli MA, Fresca D, Robiolio L. Audiologic disturbances in vitiligo. *J Am Acad Dermatol* 1989 Dec; 21(6): 1317-8.

خلاصه

ارتباط بین ویتلیگو و کاهش شنوایی

دکتر محمدرضا شریفیان، دکتر مسعود ملکی، دکتر حسن هنر

هدف: مشخص کردن ارتباط بین ویتلیگو و کاهش شنوایی

مواد و روش ها: ۵۰ بیمار ویتلیگو فعال و ۴۰ فرد سالم در این مطالعه مورد شهادی شرکت کردند. آستانه تن شنوایی خالص در فرکانس های ۲۵۰ تا ۸۰۰۰ هرتز تعیین شد. نتایج گروه بیماران با گروه کنترل با استفاده از تست خی اسکور (chi-square) مقایسه شدند.

نتایج: نسبت مرد به زن در گروه بیماران و کنترل به ترتیب ۱۰/۴ و ۱۰/۳ بود و میانگین سنی در گروه بیماران ۲۲ و گروه شاهد ۲۲/۶ سال بود. میانگین آستانه شنوایی در گروه بیماران $5/7 \pm 19/5$ و در گروه کنترل $5/7 \pm 10$ بود. کاهش شنوایی حسی عصبی در فرکانس های بالا در ۱۹ بیمار از ۵۰ بیمار دیده شد (۳۸٪). در حالی که هیچ افت شنوایی در گروه کنترل مشاهده نشد ($p < 0/001$ ، $X^2 = 19/26$). درگیری ۲ طرفه، درگیری گوش راست و چپ به ترتیب ۱/۶۳، ۳/۲۶ و ۱۰/۱۶ بود. تفاوت آماری معنی داری بین درگیری ۲ طرفه و یک طرفه مشاهده شد ($p < 0/05$). هیچ مورد کاهش شنوایی در گروه بیماران یا کنترل مشاهده نشد.

نتیجه گیری: ویتلیگو که یک اختلال پیگمانتاسیون است به نظر می رسد در کاهش شنوایی اثر داشته باشد و مکانیسم این درگیری احتمالا به علت نبود اثر محافظتی سلول های حاوی ملانین در گوش داخلی می باشد.

واژه های کلیدی: کاهش شنوایی، ویتلیگو