

## Idiopathic Sudden Hearing Loss: Relationship with Stress Perception, Coping Styles, Temperament and Personality Traits

### İdiopatik Ani İşitme Kaybı: Stres Algısı, Baş Etme Stilleri ve Mizaç ve Kişilik Özellikleri ile İlişkisi

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Received: 11 February 2020 / Accepted: 20 February 2020 / Publication date: 26 March 2020

**Cite as:** Karaman Koç A, Akyüz Karacan F. Idiopathic sudden hearing loss: Relationship with stress perception, coping styles, temperament and personality traits. Med J Bakirkoy 2020;16(1):90-4.

#### ABSTRACT

**Objective:** Literature knowledge about the etiology of idiopathic sudden sensorineural hearing loss (ISSHL) is limited. In many cases any cause cannot be demonstrated and the disease is termed as idiopathic. We aimed to compare the sudden hearing loss patients with healthy controls, in terms of their stress perception, coping styles and temperament and character traits. We hypothesized that ISSHL patients have higher stress levels and they are more sensitive to stressful conditions.

**Method:** The study was conducted with a total of 94 participants, consisting of 44 patients with a diagnosis of sudden sensorineural hearing loss and 50 healthy controls. Any participant with a psychiatric disease, history of medical treatment for psychiatric or organic brain disorder were excluded from the study. All participants were evaluated by self reports of The Perceived Stress Scale, Coping Inventory, for Stressful Situations Temperament and Character Inventory (TC) applied to the patients on the day of their hospitalization.

**Results:** Compared to healthy controls, patients with ISSHL had higher perceived stress scores, lower harm avoidance scores and higher reward dependence scores when compared to controls. The ways of coping with stress were not different in-between the patients with sudden hearing loss and healthy controls. Moreover there was no correlation between the perceived stress levels and temperament and personality traits in groups.

**Conclusion:** In the present study, ISSHL patients had higher stress levels, lower harm avoidance, and higher reward dependence scores compared to controls. These findings point out the importance of psychosocial factors in the etiology of ISSHL. ISSHL patients should be evaluated together with consultation-liaison psychiatry outpatient clinic, character, temperament characteristics and stress perception should be taken into consider.

**Keywords:** Idiopathic sudden sensorineural hearing loss, stress perception, coping styles, temperament and character

#### ÖZ

**Amaç:** İdiopatik ani sensorinöral işitme kaybının (ISSHL) etiyolojisi hakkında literatür bilgisi sınırlıdır. Birçok durumda herhangi bir neden gösterilemez ve hastalık idiopatik olarak adlandırılır. Bu çalışmada ISSHL hastalarının, stres algıları, başa çıkma stilleri, mizaç ve kişilik özellikleri sağlıklı kontrollerle karşılaştırıldı. ISSHL hastalarının stres düzeylerinin daha yüksek olduğu ve stres koşullarına daha duyarlı oldukları varsayıldı.

**Yöntem:** Çalışma, 44'ü ISSHL tanısı alan ve 50'si sağlıklı kontrol olmak üzere toplam 94 katılımcı ile gerçekleştirildi. Psikiyatrik bir hastalığı olan, psikiyatrik veya organik beyin hastalığına yönelik tıbbi tedavi öyküsü olan hastalar çalışma dışı bırakıldı. Tüm katılımcılar, hastaneye yatış gününün de Algılanan Stres Ölçeği, Başa Çıkma Envanteri, Mizaç ve Karakter Envanteri ile değerlendirildi.

**Bulgular:** Kontrol gurubu ile karşılaştırıldığında, ISSHL olan hastalarda, algılanan stres puanları ve zarardan kaçınma puanları düşük ve ödül bağımlılık puanları ise daha yüksek bulundu. Stresle başa çıkma yolları açısından ISSHL hastaları ve sağlıklı kontroller arasında anlamlı farklılık bulunmadı. Ayrıca algılanan stres düzeyleri ile mizaç ve kişilik özellikleri açısından gruplar arasında bir ilişki bulunamamıştır.

**Sonuç:** Bu çalışmada, ISSHL hastalarının, stres düzeyleri daha yüksek, zarardan kaçınma skorları daha düşük ve kontrollerle karşılaştırıldığında ödül bağımlılık skorları daha yüksek olarak bulundu. Bu bulgular ISSHL etiyolojisinde psikososyal faktörlerin önemine işaret etmektedir. ISSHL hastaları konsültasyon-liezon psikiyatrisi polikliniği ile birlikte değerlendirilmeli, karakter, mizaç özellikleri ve stres algısı dikkate alınmalıdır.

**Anahtar kelimeler:** İdiopatik ani sensorinöral işitme kaybı, stres algısı, başa çıkma stilleri, mizaç ve karakter

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## INTRODUCTION

Idiopathic Sudden Sensorineural Hearing Loss (ISSHL) is characterized by the development of at least 30 dB hearing loss in 3 consecutive audiometric frequencies measured within less than three days<sup>(1)</sup>. Vestibular symptoms, tinnitus, and fullness in the effected ear can accompany the hearing loss<sup>(2)</sup>. ISSHL can affect patients with any age however the incidence peaks between 43-53 years of age<sup>(3)</sup>. The disease is slightly more common in males<sup>(4)</sup>.

Etiological factors can be determined in only 7% to 45% of ISSHL patients and the disease is termed as idiopathic in vast majority of cases<sup>(2)</sup>. Its pathophysiological mechanisms may include not only viral infections, tumor and immune system dysfunction but also psychological stress and vascular events can be the etiological factors<sup>(3)</sup>. Cochlea has an increased risk for damage due to hypoxia or ischemia because of it is an end organ in terms of vascularisation. Kropp & Rad suggested that acute or chronic psychological stress may cause increased intravascular hemoconcentration in the cochlear artery and cause hypoxia or ischemia.

Stress is the effort that an individual exerts beyond his/her physical and psychological boundaries due to disturbing conditions in surrounding physical and social environment<sup>(5)</sup>. Stress stimulates the sympathetic nervous system and hypothalamo-pituitary-adrenal axis. Allostatic load effects many types of tissues and organs and leads to neuronal atrophy, immune deficiency and atherosclerosis. Thus high level of stress causes negative consequences such as worsening of well-being, reducing and compelling the capacity of the person<sup>(6)</sup>. The stress level of an individual relates to the characteristics of stressful condition and also specific features of the individual. The specific features are stress perception, coping styles and personality traits. Each individual may perceive different levels of stress and use different ways of coping in a particular stressful situation. Coping with stress is defined as behavioral and mental effort that focus on controlling external or internal reactions or conflicts in between them with the purpose of decreasing the perceived threat and the resulting damage<sup>(5,7)</sup>.

Personality is another feature which determines the person's response to stress. Personality directly effects stress perception level of the individual. Different kind of personality classifications have been performed. Cloninger et al, distinguish between seven personality traits within the domains of temperament (Novelty Seeking, Harm Avoidance, Reward Dependence, Persistence), and character (Self-Directedness, Cooperativeness, Self-Transcendence)<sup>(8,9)</sup>. Importance of knowing personality, temperament and character specialities in the pathophysiology and prognosis of the diseases has been reported.

Schüssler et al. showed that disease prognosis was positively influenced by tendency towards negative dependency and balanced emotional personality traits in patients with ISSHL<sup>(10)</sup>. In another study, it was observed that ISSHL patients had emotional instability and aggressive personality traits<sup>(11)</sup>. In addition, ISSHL has been shown to be associated with sensuality, guilt, and repressed seizures<sup>(12)</sup>.

However, according to the English-language literature there is lack of knowledge about the etiology of ISSHL. In the present study we aimed to investigate the relationship between stress perception, coping skills and personality traits with ISSHL.

## MATERIALS and METHODS

### Participant and Treatment Protocol

The charts of 94 patients were evaluated retrospectively. Perceived Stress Scale, Ways of Coping Inventory, Temperament and Character Inventory tests were applied to a total of 44 patients who were admitted to the Ear Nose Throat Clinic in Bakırköy Dr Sadi Konuk Training and Research Hospital with sudden hearing loss and diagnosed as ISSHL. Patients with a psychiatric disease, history of medical treatment for psychiatric or organic brain disorder were excluded from the study. The control group consisted of 50 healthy participants who were subjected to Perceived Stress Scale, Ways of Coping Inventory, Temperament and Character Inventory tests

### Statistical Analysis

Number Cruncher Statistical System (NCSS) 2007 (Kaysville, Utah, USA) program was used for statistical

**Table 1. Distribution of descriptive features.**

	Total (n=94)	Patient Group (n=44)	Control Group (n=50)	P
Age; mean±SD	38,19±9,51	38,77±9,74	37,68±9,47	<sup>a</sup> 0,699
Gender: n (%)				
Male	38 (40,4)	18 (40,9)	20 (40)	<sup>b</sup> 0,949
Female	56 (59,6)	26 (59,1)	30 (60)	

<sup>a</sup> Independent Samples test (Student t test)

<sup>b</sup> Ki-Square test

analysis. Independent Samples t-test (Student t test) was used as descriptive statistical methods (mean, standard deviation, median, frequency and ratio), and for the correlation analysis of normally distributed variables in groups. Pearson’s chi-Square test was used to compare qualitative data. Significance was evaluated at  $p < 0.05$ .

**RESULTS**

Patient and control groups consisted of 94 participants. The mean age of participants was  $39.19 \pm 9.51$  (22-25) years. Thirty -eight (40.4%) cases were male; and fifty-six (59.6%) were women. Distribution of descriptive features is presented in Table 1. The groups were similar in terms of age and sex of the participants ( $p > 0.05$ ).

There were not any statistically significant differen-

**Table 4. Distribution of Perceived Stress Scale scores in groups.**

	Perceived Stress Score		P
	Mean	SD	
Patient Group	30,95	8,62	0,001**
Control Group	23,08	3,10	
Total	26,77	7,39	

Independent Samples test (Student t test)

\*\* $p < 0,01$

ces between groups according to scores of novelty seeking (NS), persistence, self-directedness (SD), cooperativeness and self-transcendence (ST) in temperament and personality inventory ( $p > 0.05$ ). The patient group had statistically significantly lower Harm Avoidance (HA) and statistically significantly higher Reward Dependence (RD) scores than the control group ( $p < 0.01$ ). Distribution of the scores of subdimensions of temperament and character inventory are shown in Table 2.

There were no statistically significantly differences between the patient and control groups according to the scores of problem solving, social support and avoidance subscale scores of WCI ( $p > 0.05$ ) (Table 3).

Perceived stress scores were found to be statistically significantly higher in the patient group than the control group ( $p < 0.01$ ) (Table 4).

**Table 2. Distribution of the scores of sub-dimensions of temperament and character inventory.**

Temperament and Character Inventory	Total Mean±SD	Patient Group Mean±SD	Control Group Mean±SD	P
Novelty Seeking	15,87±3,88	15,41±4,08	16,28±3,74	0,449
Harm Avoidance	20,51±5,19	17,77±6,09	22,92±2,50	0,001**
Reward Dependence	15,66±3,20	17,32±3,64	14,20±1,80	0,001**
Persistence	4,77±1,61	4,55±1,54	4,96±1,67	0,383
Self directedness	24,38±7,03	25,68±6,07	23,24±7,72	0,239
Cooperativeness	26,70±5,23	25,82±7,14	27,48±2,54	0,310
Self-Transcendence	19,57±4,84	19,32±5,87	19,80±3,84	0,738

Independent Samples test (Student t test), \*\* $p < 0,01$

**Table 2. Distribution of the scores of sub-dimensions of temperament and character inventory.**

Stress-Coping Style Inventory Subscales	Total Mean±SD	Patient Group Mean±SD	Control Group Mean±SD	P
Problem Solving	19,96±4,12	20±3,95	19,92±4,35	0,948
Social Support	18,51±4,27	18,32±4,01	18,68±4,57	0,776
Avoidance	20,57±4,30	20,55±4,83	20,60±3,88	0,966

Independent Samples test (Student t test), \*\* $p < 0,01$

## DISCUSSION

In the present study, we aimed to compare ISSHL patients with healthy controls according to their stress perception, ways of coping mechanisms, temperament and character traits. We found that ISSHL patients had higher perceived stress scores, lower harm avoidance scores and higher reward dependence scores than the control group. The ways of coping with stress were not different between the ISSHL patients and healthy controls. Furthermore there was no correlation between the perceived stress levels and temperament and personality traits in two groups.

Miguel et al. (2009) suggested that stress causes vasoconstriction, hyperviscosity and platelet aggregation in the labyrinthine artery, inner ear hypoxia or ischemia<sup>(13)</sup>. In ISSHL, patients reported higher stress levels and more stressful life-events before the sudden hearing loss occurred when compared with healthy controls. While certain single-case studies have reported the association between stress and ISSHL which used qualitative interviews as assessment instruments<sup>(14-16)</sup>. However, any standardized assessment methods were not found, and quantitative statistical analysis of the collected data was not performed. Two other studies, which limited by method and design, had similar results<sup>(14,16)</sup>. Consistent with these previous researches in our study, the results showed that patients with ISSHL have significantly higher levels of perceived stress scores compared with the control group.

However the disease is termed as idiopathic. Many factors have been stated in the etiology of ISSHL. Yamasoba et al. (1993) reported that insufficiency of the vertebrobasilar system can cause sudden hearing loss<sup>(17)</sup>. Suckfüll et al. found higher plasma fibrinogen ratio in ISSHL patients which indicates the increased coagulability<sup>(18)</sup>. In 3% of ISSHL patients vascular or hematologic pathologies were causative factors<sup>(19)</sup>. Psychological stress is an important factor in vascular pathologies. It stimulates the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis and causes vasoconstriction in visceral organs and reduces tissue perfusion<sup>(20)</sup>. Psychological stressors, depression and anxiety have been shown to cause severe hypercoagulability in patients with atherosclerosis<sup>(21)</sup>.

Coping mechanisms are important in determining how the individual experiences the stress in a specific stressful situation. In other words the ways of coping with stress are important for psychiatric and physiological outcomes of stress on our body. The negative effects of stress are directly related to the coping behavior. It was reported that the ability of using effective coping strategies has protective effects on the individual health<sup>(7)</sup>.

There are similarities in the pathophysiology of acute myocardial infarction and ISSHL. In our study, reward dependence (RD) scores were found to be higher in the patient group than in the control group. Similar to our study, In a study RD scores were found to be higher in patient with acute MI than in control group<sup>(22)</sup>. The patients with higher RD scores are defined as having tendency to be affectionate, warm, sensitive, dependent and social. They seek a social relationship and are open to communicate with others. Although capable of warm social relationships is one of the most important advantage of people with high RD, these people has an important disadvantage; their opinions and emotions can be easily influenced by others. Efforts to please the other people is a major burden on these people who have higher reward dependence levels<sup>(22,23)</sup>.

Harm avoidance scores were found to be higher in patients who had psychosomatic disease, chronic pain, irritable bowel syndrome or tinnitus. Increased harm avoidance scores are related to careful planning and high cautiousness in the event of danger<sup>(23,24)</sup>. In our study, the harm avoidance scores were found to be lower in ISSHL patients than the control group. The people with lower harm avoidance scores are confident, relaxed, courageous, energetic, sympathetic, optimistic even in situations that concern most people. It was thought that lower harm avoidance scores could be related to the possibility of danger or stress situation that cannot be predicted and higher perception of stress in stressful life events<sup>(23,25)</sup>. Studies have shown that patients with ISSHL have a higher level of emotional instability, aggressive personality traits, and repressed guilt associated with very severe attacks of anger<sup>(11,12)</sup>.

Schüssler et al. suggested that; while psychosocial factors may have an affect on the onset of ISSHL,

there is a positive effect of balanced emotional personality, good friendship and reduction of stress factors on the prognosis of the disease and the prognosis is worse in patients with a tendency to addiction <sup>(10)</sup>. Personality traits may exert an important role on the occurrence and prognosis of the disease <sup>(26)</sup>. ISSHL patients should be evaluated together with consultation-liaison psychiatry outpatient clinic and the patients must be evaluated in terms of character, temperament characteristics and stress perception.

In conclusion we found that ISSHL patients had higher stress levels, lower harm avoidance and higher reward dependence scores compared to the control group. These findings point out the importance of psychosocial factors in ISSHL etiology. Consideration of psychosocial factors in a case-specific approach may contribute to the understanding of the pathophysiology, prognosis and also treatment of the disease. We suggest that the treatment of ISSHL patients should be done in a multidisciplinary approach.

**Ethics Committee Approval:** Bakırköy Dr. Sadi Konuk and Research Hospital Clinical Research Ethics Committee approval was received (2020/65).

**Conflict of Interest:** None

**Funding:** None

**Informed Consent:** Informed consent was obtained from all individual participants included in the study.

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