İstanbul Med J 2022; 23(4): 279-84
DOI: 10.4274/imj.galenos.2022.48264

Prevalence of Sensitive Skin Syndrome and Accompanied Diseases Among Women Doctors: A Nationwide Study

Vildan Manav[1], Müge Göre Karaali[2]

[1]University of Health Sciences Turkey, İstanbul Training and Research Hospital, Clinic of Dermatology, İstanbul, Turkey
[2]İrmet Hospital International, Clinic of Dermatology, Tekirdağ, Turkey

ABSTRACT

Introduction: Sensitive skin is one of the small fiber neuropathies that significantly affects the quality of life with its accompanying comorbidities. Our aim in this study was to determine the frequency of irritable bowel syndrome (IBS) and/or fibromyalgia that may accompany sensitive skin.

Methods: Nine hundred and ninety-two female physicians participated in the study online with a questionnaire organized with the hybrid method. The study was conducted on female physicians with all three diseases (sensitive skin, fibromyalgia, and IBS) via a link using a Google form through WhatsApp, e-mail, and social media. The interviewed participants; for the diagnosis of IBS according to the Rome III criteria about chronic abdominal pain and altered bowel habits and for the diagnosis of FMS according to the criterion suggested by Wolfe et al. about generalized pain and its characteristics, were asked to answer questions.

Results: Participants with sensitive skin declared that they had fibromyalgia (15.0%) and IBS (14.6%). The prevalence of fibromyalgia and IBS was significantly higher in "moderately sensitive" and "very sensitive" patients than in others (p=0.017 and p=0.008).

Conclusion: In those with sensitive skin, care should be taken in terms of other disorders that may accompany sensitive skin and have a common pathogenesis with sensitive skin.

Keywords: Fibromyalgia, irritable bowel syndrome, sensitive skin, small fiber neuropathy

Introduction

Sensitive skin syndrome (SSS) is defined by tingling, prickling, heat, burning, pain, itching, and erythema on the skin due to multiple factors that do not trigger discomfort in healthy skin. SSS usually refers to the facial skin, but it may be seen in all areas of the body (1,2). It is a health problem that significantly affects the quality of life. SSS has recently been reported with increasing frequency. The European prevalence of sensitive skin in women was shown to be as high as 40%, but lower in men (3).

Cutaneous comorbidities of SSS include atopic dermatitis, psoriasis, rosacea, acne, vitiligo, and contact dermatitis (1,4,5). However, comorbidities of SSS other than skin diseases have been evaluated less frequently. Irritable bowel syndrome (IBS) is a disease accompanied by SSS, which has been conducted in a preliminary study (6). Patients with IBS suffer from abdominal pain and/or discomfort associated with bloating and/or defecation disorders and/or altered bowel habits (7). Although the pathophysiology of both diseases (SSS and IBS) is not clearly known, and multifactorial mechanisms are considered to play a role, peripheral and central neural mechanisms are thought to be major factors in the pathophysiology of these diseases (6,8-10). Fibromyalgia syndrome (FMS) is a chronic disease characterized by widespread and persistent non-inflammatory musculoskeletal pain. Its mechanisms are also unknown. Clearly, the presence of central sensitization to pain may be an important part of the pathophysiology of the disease (11,12). The relationship between SSS and FMS has not been previously evaluated.

In the cutaneous biopsy study of Buhé et al. (13), using immunohistochemical methods to detect neurosensory pathology, the intra-epidermal nerve fiber density was evaluated, and it showed that peptidergic C fibers are especially lower in the sensitive skin group. Small somatic sensory fibers and autonomic C fibers form small fibers. Therefore, if a decrease in peptidergic C fibers is detected, small fiber neuropathy (SFN) may develop (14). Therefore, studies evaluating the presence of SFN in sensitive skin have been conducted (15-17). Since it is thought that there is various organs and systems affected in SFN, FMS, and irritable bowel sensation have been investigated as SFN (18-20).

Our aim in this study was to investigate the comorbidities of participants with sensitive skin in a nationwide survey.

Methods

Study Participants

An online survey was performed among women doctors all around the country from August 2020 to October 2020. Nine hundred ninety-two

Address for Correspondence: Vildan Manav MD, University of Health Sciences Turkey, İstanbul Training and Research Hospital, Clinic of Dermatology, İstanbul, Turkey
Phone: +90 533 432 35 24 **E-mail:** drvildanmanav@gmail.com **ORCID ID:** orcid.org/0000-0002-0044-7414

Cite this article as: Manav V, Göre Karaali M. Prevalence of Sensitive Skin Syndrome and Accompanied Diseases Among Women Doctors: A Nationwide Study. İstanbul Med J 2022; 23(4): 279-84.

Received: 05.07.2022
Accepted: 19.10.2022

participants were interviewed via a link using a Google form through WhatsApp, e-mail, and social media. The study was conducted on female physicians as all three diseases (sensitive skin, fibromyalgia and IBS) are most common in women and because of their medical skills, the accuracy of their reports may be high for all three diseases. All participants completed the written consent form before the questionnaire, provided information and gave permission to use that information in the study regarding the online survey. Ethics committee approval was received from University of Health Sciences Turkey, İstanbul Training and Research Hospital Scientific Research and Publication Ethics Board (diary number: 2486, date: 24.07.2020).

Questionnaire

The questionnaire was designed with a hybrid method (open-ended and multiple-choice questions), and it consisted of two sections.

In the first section, the demographic and clinical data of the participants were questioned. It included, in order: age, residential area, marital status, age of menarche (9-12 years, 13-15 years, and >15 years), women's life stages were self-declared by participants (periods: premenopausal = having regular menses, perimenopausal = irregular menses for 12 months, postmenopausal = no menses for 12 months), use of smoke, BMI (kg/m^2), presence of self and/or family atopy history (asthma, allergic rhinitis, atopic dermatitis, etc.), and presence of systemic, autoimmune and dermatological diseases.

The interviewed doctors were asked to answer questions for the diagnosis of IBS according to the Rome III criteria about chronic abdominal pain and altered bowel habits (21).

Additionally, the interviewed participants were asked to answer questions regarding FMS according to the criterion suggested by Wolfe et al. (22) about generalized pain and its characteristics.

For the second section, information about the sensitive skin was questioned, and evaluations were made with the Sensitive Skin scale-10 (23). Ten symptoms (skin irritability, stinging, burning, sensation of heat, tautness, itching, pain, general discomfort, flushing, redness) were evaluated. Additionally, the severity of sensitive skin (not sensitive, slightly sensitive, moderately sensitive, very sensitive), sensitivity localizations (face and body), and duration of sensitivity were recorded.

Statistical Analysis

SPSS 22.0 for Windows was used for statistical analyzes. Descriptive statistics were number and percentage for categorical and numerical variables as mean, standard deviation, minimum, maximum, and median. The rates in the independent groups were compared using the chi-square test. Since the numerical variable did not meet the normal distribution condition, comparisons of more than two groups were made using the Kruskal-Wallis test. Subgroup analyses were performed using the Mann-Whitney U test and interpreted with Bonferroni correction. The statistical alpha significance level was set as $p<0.05$.

Results

Demographic, Clinical, and Sensitive Skin Data

The mean age of the 992 female doctors in the study was 36.2±12.2 years (minimum-maximum: 23-68 years). Most of the participants were married (68.3%) and lived in a metropole (75.0%). 16.6% of the patients were smokers. Eight hundred eleven of the patients stated that their skin was sensitive (81.7%). Regarding skin sensitivity, 37.2% were slightly sensitive, 35.0% were moderately sensitive, 8.5% were very sensitive, and 19.2% were not sensitive (Figure 1). Duration of sensitivity in the patients was more than 10 years in 32.4% (264) of the patients, between 5 and 10 years in 27.2% (222), between 1 and 4 years in 25.8% (210), and less than one year in 14.6% (119). Four hundred and seventy-six (47.6%) participants had a dermatological disease affecting the face, and the distribution of dermatological disease is shown in Table 1. Rashes and scaling on the face with sensitivity were determined mostly in the "very sensitive skin" group ($p<0.001$). Therefore, the rate of applying to

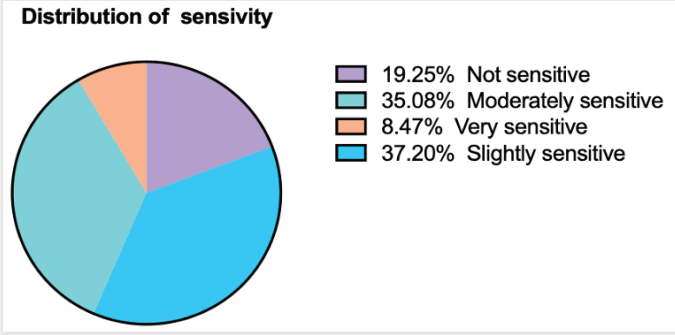

Figure 1. Distribution of sensivity

Table 1. Distribution of dermatological disease in sensitive skin

	Total, (n %)	Not sensitive, (n %)	Slightly sensitive, (n %)	Moderately sensitive, (n %)	Very sensitive, (n %)	p
Presence of any dermatologic disease affecting the face (n=999)	476 (47.6)	47 (28.3)	141 (39.8)	219 (61.5)	53 (64.6)	**<0.001**
Acne	264 (26.4)	34 (20.5)	96 (27.1)	98 (27.5)	23 (28.0)	0.330
Atopic dermatitis	42 (4.2)	-	6 (1.7)	23 (6.5)	13 (15.9)	**<0.001**
Seborrheic dermatitis	79 (7.9)	8 (4.8)	21 (5.9)	44 (12.4)	6 (7.3)	**0.004**
Rosacea	79 (7.9)	3 (1.8)	10 (2.8)	53 (14.9)	12 (14.6)	**<0.001**
Psoriasis	5 (0.5)	-	-	4 (1.1)	1 (1.2)	0.081
Allergic contact dermatitis	43 (4.3)	1 (0.6)	9 (2.5)	23 (6.5)	9 (11.0)	**<0.001**
Photocontact dermatitis	31 (3.1)	-	8 (2.3)	15 (4.2)	8 (9.8)	**<0.001**
Others	22 (2.2)	5 (3.0)	4 (1.1)	9 (2.5)	3 (3.7)	0.223

dermatology clinics was statistically significantly higher in those who were "very sensitive" (p<0.001). The body sensitivity of the participants is shown in Figure 2.

The rate of those who were "very sensitive" was higher for single participants than for married, and the rate of those who were "slightly sensitive" and "not sensitive" was higher in married participants than in singles (p=0.04). There was no significant difference in sensitive skin severity regarding BMI and smoking habit (p>0.05). There were no significant differences between the pre-, peri-, and postmenopausal groups (p=0.313), but those with an age of menarche significantly below 15 years had a higher occurrence of "very sensitive skin" (p=0.002). Discomfort (burning, itching, stinging, etc.) was statistically significant with episodic attacks (p <0.001).

Sensitive Skin Scale

When discomfort sensations felt on the face over the last three days were evaluated, there was a statistically significant difference in "very sensitive" (p<0.001; for all) (Table 2).

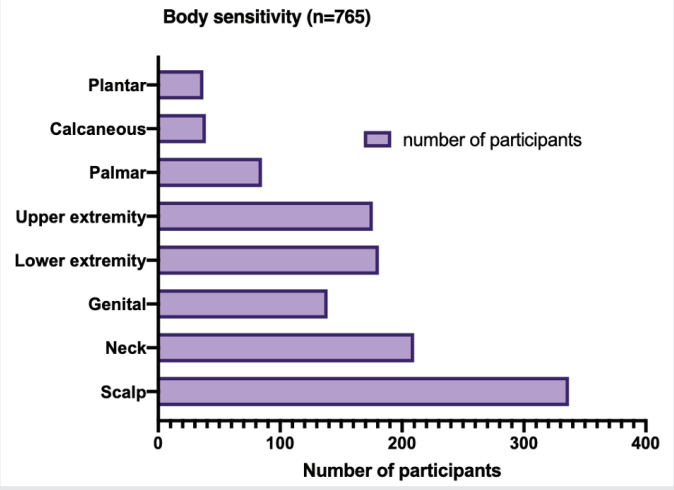

Figure 2. Body sensivity (n=765) in the body; neck (p<0.001), genital (p=0.019), upper extremity (p=0.001), and palmar region (p=0.002) were evaluated as "very sensitive"

Sensitive Skin Syndrome and Comorbidities

Two hundred sixty-two patients (26.4%) had a systemic disease, and 183 patients (18.8%) had an autoimmune disease (Table 3). The rates of self-atopy history, family atopy history, and systemic disease were high in the "moderately and very sensitive" groups (p<0.001, p<0.001, p=0.032).

Irritable Bowel Syndrome and Fibromyalgia Syndrome

Participants with sensitive skin had had FMS (15.0%) and IBS (14.6%). The prevalence of FMS and IBS was significantly higher in "moderately sensitive" and "very sensitive" patients than in others (p=0,017 and p=0,008) (Figure 3). Flushing occurred at a significantly higher rate on the very sensitive skin with FMS than in those with very sensitive skin with IBS (Table 4).

Discussion

SSS is an underestimated problem that significantly affects the quality of life. Frequently, environmental factors, including air pollution, heat, cold and wind, cosmetic usage, diet and alcohol consumption, and physiological factors, such as stress, or endogenous hormones, induce or worsen the symptoms of sensitive skin (24,25).

Although the pathophysiology of the disease is not clearly known, disruption of the epidermal barrier function, neurosensory dysfunction (alteration of nerve fiber density, functional hyperreactivity of cutaneous nerves, central sensitization, peripheral sensitization), the activation of transient receptor potential vanilloid 1 (TRPV1), and endothelin receptors are hypothesized to play a role in the induction of sensitive skin (1,24-26).

SSS has some known cutaneous comorbidities, including atopic dermatitis, psoriasis, rosacea, acne, vitiligo, and contact dermatitis (1,4,5). In a study from Korea, those in the sensitive skin group with cutaneous comorbidities were 2-4 times likelier to suffer from each skin disorder (atopic dermatitis, acne, seborrheic dermatitis, and facial blushing) than the nonsensitive skin group. Furthermore, a history of atopic dermatitis or eczema in childhood occurred more frequently in the sensitive skin group than in the non-sensitive skin group (27). In parallel with these studies, the cutaneous disorders most frequently stated in our study were acne, seborrheic dermatitis, and rosacea.

Table 2. The senstive scale 10 of patients according to severity of sensitive skin

	Not sensitive	Slightly sensitive	Moderately sensitive	Very sensitive	p
	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	
Skin irritability	1 (1-1)	1 (1-2)	2 (1-3)	3 (1-5)	<0.001
Stinging	1 (1-1)	1 (1-1)	1 (1-3)	2 (1-5)	<0.001
Burning	1 (1-1)	1 (1-2)	2 (1-4)	3 (1-5)	<0.001
Sensations of heat	1 (1-1)	1 (1-2)	2 (1-4)	3 (1-6)	<0.001
Tautness	1 (1-1.5)	2 (1-3)	2 (1-4)	3,5 (1-7)	<0.001
Itching	1 (1-1)	2 (1-3)	2 (1-4)	3 (1-6)	<0.001
Pain	1 (1-1)	1 (1-1)	1 (1-1)	1 (1-1.5)	<0,.01
General discomfort	1 (1-1)	1 (1-2)	2 (1-4)	3,5 (1-7)	<0.001
Flushes	1 (1-2)	1 (1-3)	2 (1-4)	3 (1-6)	<0.001
Redness	1 (1-2)	2 (1-3)	3 (2-5)	4 (2-8)	<0.001

IQR: Interquartile range

We observed a statistically significant difference in the rates of atopic dermatitis, seborrheic dermatitis, rosacea, allergic contact dermatitis, and photocontact dermatitis with respect to facial sensitivity. However, according to our study, sensitive skin can be considered a skin disease and a systemic disease because atopy and systemic diseases were significantly higher in the group with sensitive skin.

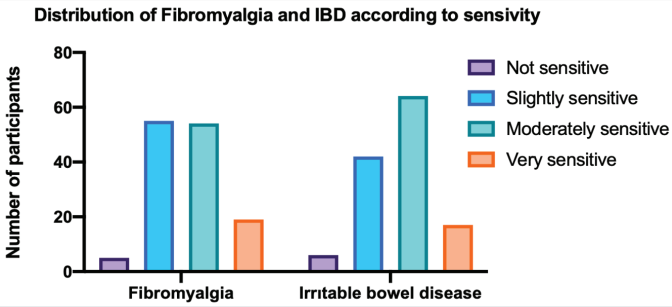

Figure 3. Distribution of fibromyalgia and irritable bowel disease according to sensivity
IBD: Irritable bowel disease

IBS is a disease accompanied by SSS that was conducted in a preliminary study. In this study, it was found that SSS was statistically significantly more common in patients with IBS, and the presence of SSS was highly associated with the presence of abdominal pain or discomfort (6). Similar findings were obtained in this study. Additionally, the SSS relationship with FMS was also evaluated, and flushing was significantly higher in participants with very sensitive skin who had FMS than in those with IBS.

The significant frequency of SSS with FMS and IBS and sensory symptoms' predominancy in these syndromes suggests that there is a common pathway in the pathogenesis of the diseases. As a matter of fact, from the perspective of IBS, hypersensitivity to physiological or experimental visceral stimuli is considered to play a major role (8). In Stabell et al.'s (28) study, patients with IBS showed increased visceral and somatic pain sensitivity. The sensitization of peripheral nociceptive afferents has been considered as one of the major mechanisms in the development of visceral hypersensitivity. SSS and IBS share similar mechanisms in terms of central sensitivity and peripheral sensitization-induced neural signaling in spinal and/or supraspinal structures, and which provokes

Table 3. Comorbidities according to severity of sensitive skin

		Not sensivite	Slightly sensitive	Moderately sensitive	Very sensitive	
		n (%)	n (%)	n (%)	n (%)	p
Atopy (self)		48 (28.1)	187 (51.2)	237 (63.7)	64 (73.6)	<0.001
Systemic disease		32 (20.0)	88 (24.9)	108 (30.3)	28 (34.1)	0.032
Diabetes Mellitus		1 (0.6)	6 (1.7)	9 (2.5)	5 (6.1)	0.051
Hypertension		5 (3.1)	14 (4.0)	21 (5.9)	4 (4.9)	0.483
Heart and vascular disorders		0 (0.0)	5 (1.4)	8 (2.2)	3 (3.7)	0.090
Thyroid disorders		18 (11.3)	57 (16.1)	60 (16.8)	9 (11.0)	0.257
Asthma		0 (0.0)	5 (1.4)	9 (2.5)	3 (3.7)	0.071
Renal disorders		2 (1.2)	0 (0.0)	3 (0.8)	1 (1.2)	0.107
Malignancy		2 (1.3)	3 (0.8)	5 (1.4)	0 (0.0)	0.752
Others		4 (2.5)	8 (2.3)	14 (3.9)	3 (3.7)	0.565
Autoimmune disease	Yes	19 (11.9)	68 (19.6)	74 (21.3)	17 (21.7)	0.081
Autoimmune disease	No	141 (88.1)	279 (80.4)	274 (78.7)	64 (79.0)	-

Table 4. IBS and FMS and SSS

	Very sensitive + FMS (n=19)		Very sensitive + IBS (n=17)	
	Mean ± SD	Median (IQR)	Mean ± SD	Median (IQR)
Skin irritability	3.25±2.18	3 (1.25-5.5)	3.88±3.16	3 (1-6.25)
Stinging	2.56±2.25	2 (1-3)	3.33±2.66	3 (1-6)
Burning	3.69±2.77	3 (1-6)	3.80±3.55	2 (1-6)
Sensations of heat	3.44±2.96	2.5 (1-6.25)	4.07±3.63	2 (1-9)
Tautness	3.88±2.87	3.5 (1-6.75)	4.86±3.39	5.5 (1-7.25)
Itching	3.84±2.41	4 (1-6)	4.41±3.12	4 (1-7)
Pain	1.94±1.73	1 (1-2.75)	3.00±2.65	2 (1-4.5)
General discomfort	4.00±2.78	3 (1.5-6)	4.71±3.12	4.5 (1.75-7)
Flushes	4.18±3.63	3 (1-8.5)	3.87±3.68	2 (1-8)
Redness	4.28±3.01	3 (1.75-7.25)	4.88±3.56	3.5 (1.25-8.75)
p#	0.005		0.152	

#Friedman test *Wilcoxon test p=0.003 [Bonferroni correction (if not p<0,001)] minimum p-level. IBS: Irritable bowel syndrome, FMS: Fibromyalgia syndrome, SSS: Sensitive skin syndrome, SD: Standard deviation, IQR: Interquartile range

hyperexcitement in the central nervous system (9,10). Disruption of the balance of various neurotransmitters and neuromodulators has also been found to play a common role in the pathogenesis of IBS and SSS. Induction of visceral hypersensitivity by rectal tension in IBS has been demonstrated by rectal administration of capsaicin (29). TRPV1 hyperactivation is also one of the most widely known mechanisms of SSS, which induces neurogenic inflammation resulting in hyperalgesia. All these mechanisms can be explained by SFN (26,30).

From the perspective of FMS, the pathophysiology of FMS is also not precisely known. Central sensitization to pain, disruption in endogenous pain inhibition mechanisms, greater responses in areas of the neuromatrix that process pain during pain evocation, and SFN are among the hypotheses considered in the pathogenesis of the disease (12,31-33). In our study, the prevalence of FMS and IBS was significantly higher in the "moderately sensitive" and "very sensitive" groups of participants. Although there are many obscurities about these disorders, it is observed that there are common mechanisms. This is the first study to show a relationship between SSS and FMS. It also supports the relationship between SSS and IBS.

Study Limitations

Although the study was conducted on a population with a very high level of consciousness, such as women doctors, it was conducted by a questionnaire. A study in which dermatological and physical are examined will give much clearer results.

Conclusions

SSS may mean more than a skin disease. SSS, IBS, and FMS are diseases of unknown pathophysiology that are related to sensory perception. Determining the relationships among these disorders will shed light on the pathogenesis of the disease. The determination of common pathogenetic mechanisms will help us understand these diseases, and it may open up even new therapeutic pathways. It is important to be aware of the accompanying disorders in patients with SSS. Large epidemiological and pathophysiological studies are needed on this subject.

Ethics Committee Approval: Ethics committee approval was received from University of Health Sciences Turkey, İstanbul Training and Research Hospital Scientific Research and Publication Ethics Board (diary number: 2486, date: 24.07.2020).

Informed Consent: All participants completed the written consent form before the questionnaire, provided information and gave permission to use that information in the study regarding the online survey.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions: Surgical and Medical Practices: V.M., M.G.K.; Concept: V.M., M.G.K.; Design: V.M., M.G.K.; Data Collection or Processing: V.M., M.G.K.; Analysis or Interpretation: V.M., M.G.K.; Writing: V.M., M.G.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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