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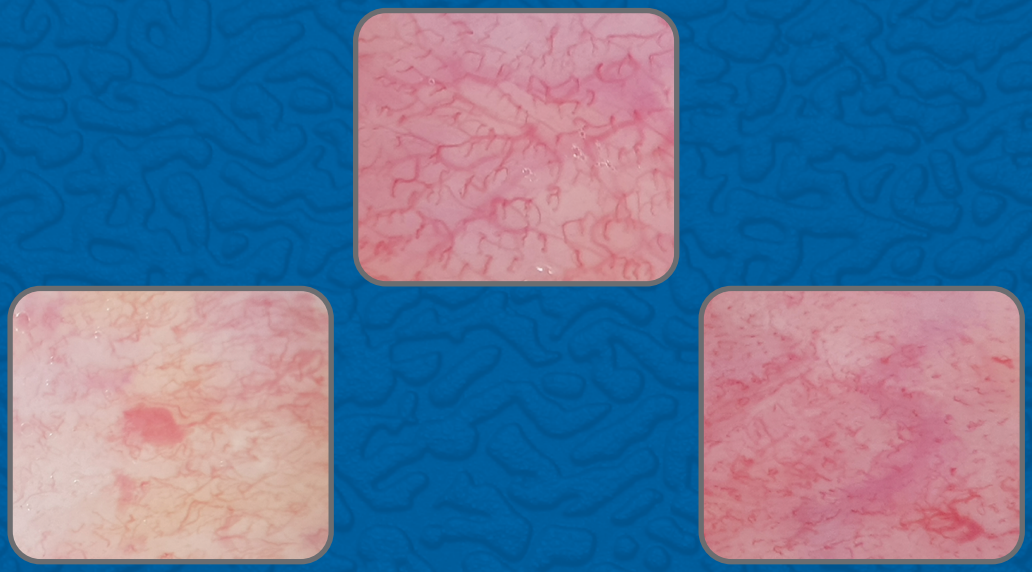

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Turkish Journal of Dermatology

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Original Articles

Original Article

Prevalence of Skin Diseases in Children Admitted to Mersin University School of Medicine, Dermatology Clinic

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Abstract

Objective: Skin disorders constitute an important problem in children living in developing countries. The aim of the study was to evaluate the prevalence of skin diseases in children aged 0–16 years. **Materials and Methods:** In the present study, data on a total of 12,206 children aged 0–16 years, admitted to the outpatient clinic of Dermatology Department, Mersin University School of Medicine, between 2001 and 2010 were analyzed. **Results:** Male/female ratio was 1.1/1. 44.2% of the patients were adolescents. The most common diseases were acne (12.4%), warts (10.5%), and atopic dermatitis (9.3%). **Conclusion:** Studies of the pediatric population, which constitutes the cornerstone of the community, can play an important role in determining the policies of protective medicine and public health.

Keywords: Child, prevalence, skin diseases

Introduction

There is growing interest in the social, economic, and psychological impacts of dermatological conditions.[1] Between 6% and 24% of the patients in pediatric clinics present with dermatology-related complaints. The biggest issue with pediatric patients is the paucity of data regarding the neonatal period. The aim of the present study was to evaluate the prevalence of skin diseases in children aged 0–16 years.

Materials and Methods

The study included 12,206 children aged between 0 and 16 years who applied to the dermatology outpatient clinic between 2001 and 2010. The patients were divided into four groups according to age: 0–2 years (infants), 3–5 years (preschool-age), 6–11 years (school-age), and 12–16 years (adolescents). Statistical Package for the Social Sciences, software version 16.0 (SPSS Inc., Chicago, IL, USA) was used to create a database and conduct all statistical analyses.

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Results

Sociodemographic characteristics of the patients

A total of 12,206 pediatric outpatients were included in the study. The female/male ratio was 1.1/1 (52.5% and 47.5%, respectively). The patients' age ranged from 2 days to 16 years. Their mean age was 9.71 ± 4.91 years.

When the patients were grouped by age, adolescents comprised the largest age group (44.2%). The patient population included 37 neonatal patients (0–28 days, 0.003%). When the age groups were evaluated in terms of gender, we observed that boys predominated in the infant and preschool-age groups (53% and 52.3%, respectively), while girls predominated in the school-age and adolescent groups (50.7% and 56.7%, respectively) [Table 1].

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Patient distribution based on disease percentages

The majority of the patients (n = 11,478, 94.1%) had a single diagnosis, 699 (5.7%) had two diagnoses, and 29 (0.2%) had three diagnoses. Therefore, a total of 12,963 diagnoses were recorded. Statistical analyses related to diseases were based on this number. A total of 205 dermatoses were classified in 28 general disease groups. The most common general disease groups were eczema (25.9%), viral diseases (14.2%), and sebaceous gland diseases (13%). These three groups accounted for 53.1% of all diseases. The most common diagnoses were acne, verrucae, and atopic dermatitis. The first 14 diagnoses with a prevalence over 2% accounted for 62.4% (8081 patients) of the total patient group [Table 2].

Sociodemographic characteristics of patients diagnosed with diseases of ≥2% prevalence

The most common diagnoses by gender were acne among girls (14%) and verrucae in boys (11.3%) [Table 3].

Seborrheic dermatitis (64.5%), acne (59.7%), and psoriasis (56.0%) were more prevalent among the female patients, while molluscum contagiosum (59.7%), pityriasis alba (55.7%), and impetigo (58.6%) were more prevalent in the males ($P < 0.05$).

Evaluation of disease distribution according to the age group showed that atopic dermatitis was the most common disease in the age groups of 0–2 and 3–5 years (20.9% and 19.6%, respectively). The most common conditions in the age groups of 6–11 and 12–16 years were verrucae (14.7%) and acne (26.1%), respectively.

Of the 37 neonatal patients in our study, 23 were female and 14 were male. The diseases seen in this age group are shown in Table 4.

Discussion

The first major study of skin disorders in the pediatric age group was conducted in South Africa in 1974 with 10,000 patients.[2] The female/male ratio of the patients in our study was 1.1/1. This gender distribution was similar to that in other studies conducted in this age group, both in our country and abroad.[3-5] Our study revealed that adolescents comprised the largest age group in our patient population. Similar results were also reported in previous studies.[4-6] There were 37 neonates among our patient population (0.003%). Newborns were found to comprise a small proportion of all pediatric patients in other studies as well (0.97% and 1.2%).[3,7] However, another previous report cited a higher proportion of neonatal patients (3.6%).[6]

A total of 205 dermatoses were recorded in our study. Another study conducted in Turkey reported 125 diagnoses for 6300 patients.[4] In a Kuwaiti study, 162 dermatoses were documented in a series of 10,000 patients.[3] As the patient number increases, it is expected to also see a greater number of dermatological diseases, which comprise a wide range of conditions.

The most common general disease groups were eczema, viral diseases, and sebaceous gland diseases. Other similar studies also reported eczema as the most common disease group.[3,4,8] In studies conducted among this age group in countries such as India, Nigeria, Brazil, and Ethiopia, infections and parasitic diseases were more common than eczemas.[6,9-11] These regional differences may be due to factors such as low socioeconomic levels, crowded living conditions, and poor hygiene. Mersin is one of the developed cities in Turkey and has a high urbanization rate, which may

Table 1: Number and gender characteristics by age groups

	n (%)	Female, *n* (%)	Male, *n* (%)
0-2 years	1348 (11.0)	634 (47.0)	714 (53.0)
3-5 years	1568 (12.8)	748 (47.7)	820 (52.3)
6-11 years	3898 (31.9)	1975 (50.7)	1923 (49.3)
12-16 years	5392 (44.2)	3055 (56.7)	2337 (43.3)

Table 2: Distribution of diseases in ≥2% frequency

Diagnose	*n* (%)
>9%	
Acne	1602 (12.4)
Verrucae	1362 (10.5)
Atopic dermatitis	1201 (9.3)
2-5%	
Contact dermatitis	773 (6.0)
Seborrheic dermatitis	547 (4.2)
Vitiligo	325 (2.5)
Pityriasis alba	309 (2.4)
Molluscum contagiosum	300 (2.3)
Psoriasis	298 (2.3)
Tinea versicolor	296 (2.3)
Alopecia areata	276 (2.1)
Insect bites	274 (2.1)
Melanocytic nevus	262 (2.0)
Impetigo	256 (2.0)

Table 3: Distribution of diseases by gender in ≥2% frequency

Diagnose	Female, *n* (%)	Male, *n* (%)
Acne	956 (14.0)	646 (10.6)
Verrucae	673 (9.8)	689 (11.3)
Atopic dermatitis	592 (8.6)	609 (10.0)
Contact dermatitis	403 (5.9)	370 (6.0)
Seborrheic dermatitis	353 (5.2)	194 (3.2)
Vitiligo	171 (2.5)	154 (2.5)
Pityriasis alba	137 (2.0)	172 (2.8)
Molluscum contagiosum	121 (1.8)	179 (2.9)
Psoriasis	167 (2.4)	131 (2.1)
Tinea versicolor	138 (2.0)	158 (2.6)
Alopecia areata	139 (2.0)	137 (2.2)
Insect bites	138 (2.0)	136 (2.2)
Melanocytic nevus	130 (1.9)	132 (2.2)
Impetigo	106 (1.5)	150 (2.5)

Table 4: Diseases seen in the neonatal patients

	n
Ichthyosis	6
Miliaria	4
Intertrigo	4
Pyoderma	2
Toxic erythema	1
Diaper dermatitis	1
Insect bites	1
Milium	1
Epidermolysis bullosa	5
Seborrheic dermatitis	4
Impetigo	2
Aplasia cutis congenita	2
Drug eruption	1
Acute urticaria	1
Folliculitis	1
Hemangiomas	1

explain the higher prevalence of diseases in the eczema group in our study.

The three most common diseases in our study (acne, verrucae, and atopic dermatitis) were similar to those reported in some other studies.[5,12] Studies from Spain[13] and Egypt[14] reported nevi and pediculosis capitis as the most common conditions, respectively.

Twenty-three (62%) of the neonatal patients were diagnosed with acute and/or transient conditions (miliaria, seborrheic dermatitis, intertrigo, etc.). The remaining 14 patients (38%) had chronic and genetic diseases (ichthyosis, epidermolysis bullosa, aplasia cutis congenita, and hemangioma). As can be seen, neonates predominantly present with acute and transient dermatoses that can usually be treated successfully by pediatricians. Chronic and genetic diseases are generally rare due to their low incidence in the community.

Conclusion

Although pediatric dermatology is a steadily developing subspecialty, it has yet to become established in Turkey or abroad. In the present study, we determined that pediatric patients frequently present to the dermatology outpatient clinic. In particular, we consider our finding that skin infectious and infestations were less common than eczema to be a promising sign for our country. Future studies in this area will improve our understanding of the prevalence of dermatological diseases in the pediatric population, as well as precautions that can be taken to prevent these conditions.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Original Article

Effectiveness of Combined 10,600 nm Fractional CO_2 and 1540 nm Erbium GaAs Laser Therapy on Acne Scar Score Alteration in Patients with Atrophic Acne Scars

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Abstract

Aim: The aim of this study is to determine the effectiveness of combined 10,600 nm fractional CO_2 and 1540 nm erbium GaAs laser therapy on atrophic acne scars. **Subjects and Methods:** The design of this study was pre- and post-test on patients with atrophic acne scars before and after receiving the combination laser therapy of fractional CO_2 and erbium GaAs. The sample size consisted of 20 medical records. The Acne Goodman-Baron Scar Score was used to score acne scars, which included morphology, quantity, depth, and width of the acne scars. The therapy was administered three times at 1-month intervals. The power and wavelength of the laser were adjusted based on the degree of the severity of the acne scar in each patient. The data were analyzed the hypothesis statistically using the Wilcoxon test, using the SPSS for Windows program, version 16.0. **Results:** There were significant differences ($P = 0.007$) between the means of the Goodman–Baron acne scar scores before and after combined 10,600 nm fractional CO_2 and 1540 nm erbium GaAs laser therapy. Side effects occurred in 50% of patients, where 35% experienced erythema and 15% experienced pruritus. **Conclusion:** The combination of 1540 nm erbium GaAs and 10,600 nm fractional CO_2 laser therapy can be effective for treating atrophic acne scars on the face, with minimal side effects. However, longer therapy sessions are required for better results.

Keywords: Acne scar, erbium GaAs laser, fractional CO_2 laser, Goodman–Baron score

Introduction

An atrophic acne scar is a physical disability that results from complications of acne vulgaris. Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit.[1-3] The postacne scar is a result of the disruption of collagen production, causing a topographical depression. A scar is a fibrous tissue that replaces normal skin after trauma to the skin. A scar results from the biological process of wounds on the skin and other tissues such that scars represent a process of interference in wound healing.[4,5] Scar acne can cause substantial psychological effects; thus, it is important to examine various therapies to handle the acne.[6,7] Based on research conducted in the UK, 77% of men who suffer from Vulgaris have experienced atrophic acne scars, whereas 58% of women have experienced atrophic acne scars. In research conducted at RSUP Dr. Kariadi Semarang, of 136 patients with acne vulgaris, 59 (43.4%) of them experienced acne scars. There are various therapeutic modalities for the management of atrophic acne scars, including operative techniques (punch graft, punch excision, and subcision), resurfacing techniques (dermabrasion, ablative laser therapy, and chemical surgery/chemical peeling), nonablative laser, autologous fat transfer, and dermal filler injection.[8]

Resurfacing fractional CO_2 laser combines the concept of fractional photothermolysis with an ablative wavelength of 10600 nm. This technology is effective for wrinkle

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therapy, photodamage, and acne scars.[9] The erbium GaAs laser is a nonablative laser with a wavelength of 1540 nm. This therapeutic modality has the advantage of having low complication rates and fast or no downtime recovery compared to ablative resurfacing, peeling or chemical surgery, or dermabrasion. The erbium GaAs laser can be used to treat fine wrinkles and atrophic scars on the face.[10,11]

The combination of ablative resurfacing laser therapy using a 10,600 nm fractional CO_2 laser and a 1540 nm erbium GaAs nonablative resurfacing laser is expected to be efficacious in repairing atrophic acne scars, with minimal side effects.[12]

Several researchers have investigated the effectiveness of a single fractional CO_2 laser therapy for atrophic acne scars and the effectiveness of a single erbium GaAs laser therapy for atrophic acne scars. The effectiveness of combining both laser therapies as a scar therapy has been studied but not specifically for atrophic acne scars. Therefore, this study aimed to investigate the effectiveness of combined fractional CO_2 laser therapy with erbium GaAs laser for atrophic acne scar.

Subjects and Methods

Research design

This study was a pre- and post-test design. The samples were based on medical records of patients with atrophic acne scars who received the combined treatment of fractional CO_2 laser and erbium GaAs laser therapy in three sessions at Kariadi Hospital Semarang. The inclusion criteria were ages 18–40 years and mild-to-severe scar degree. The exclusion criteria in this study were a medical record sample whose data were incomplete. The registered ethical clearance number for this study is No. 646/EC/FK-RSDK/X/2017.

The selection of patients was performed by consecutive sampling based on the medical records of patients with atrophic acne scars on the face treated at Kariadi Hospital Semarang in November 2017 until the number was fulfilled, which was 20 medical records. The formula used for the sample calculation method is as follows:

$$n = \left[\frac{(Z\alpha + Z\beta)\, S^2}{X_1 - X_2} \right] \quad (1)$$

$$n = \left[\frac{(1.64 + 0.842)\, 1.24^2}{(4.7 - 4)} \right] = 18 \; samples \quad (2)$$

The calculated sample number was 18. Anticipating a 10% dropout rate, 20 medical records were selected for this study.

Secondary data were taken from outpatient medical records at Kariadi Hospital Semarang, which included age, body mass index, acne scar score data before and after receiving combined CO_2 fractional and erbium GaAs laser therapy, and side effects observed during therapy. The patients were given therapy at a wavelength of 1540 nm with the following settings: power 8.0 W, pulse width 5.00 ms, and energy 40.0 mJ, while the settings at the 10,600 nm wavelength were as follows: power 25.0 W, pulse width 0.25 ms, and energy 6.2 mJ. The power and wavelength of the laser were adjusted based on the degree of the severity of the acne scar in each patient. The short procedure of administering therapy was to first cleanse the patient's face, then apply a topical anesthetic for 30 min. After the anesthesia cream was cleared, the patient was positioned; the operator used protective glasses, masks, and gloves. The laser was administered; both waves were transmitted together according to the settings of the laser machine. Afterward, the patient was compressed using NaCl, and then an antibiotic cream was applied. The therapy was administered three times at 1-month intervals. The Acne Goodman–Baron Scar Score was used to score the acne scars.

Statistical analysis

We collected the data until they were complete and correct. Then, we coded, tabulated, and inserted them into the computer. Numeric scale data were expressed as mean and standard deviation. They were analyzed statistically using Wilcoxon test. The difference was considered statistically significant with a $P \leq 0.05$, with a 95% confidence interval. Statistical analyses were carried out with the SPSS for Windows program, version 16.0. (IBM Corporation, Chicago, USA).

Results

This study was a pre- and post-test design. The samples included 20 medical records of patients with atrophic acne scar who received a combination treatment of fractional CO_2 laser and erbium GaAs laser therapy in three sessions at Kariadi Hospital Semarang. Secondary data were taken from outpatient medical records at Kariadi Hospital Semarang, which included age, body mass index, acne scar score data before and after receiving the combination of CO_2 fractional and erbium GaAs laser therapy, and side effects found during therapy. The Acne Goodman–Baron Scar Score was used to score acne scars.

Table 1 shows that the majority of the participants were male (65%). The mean age was 30.35 years, with the youngest age being 18 years and the oldest was 40 years. Most of the subjects had an undergraduate education (75%). The majority of the participants work as private employees.

Table 2 shows that the lightest body weight was 49 kg and the heaviest was 95 kg, while the shortest height was 155 cm and the tallest was 183 cm. The mean body mass index was 24.015, where the lowest was 19.1 and the highest was 30. The mean duration of having acne was 6.05 ± 2.114 years, and the mean duration of having acne scars was 3.63 ± 2.033 years.

Table 3 displays that the participants with an undergraduate education had more moderate or severe acne scars, but this was not significantly related ($P = 0.13$). The majority of the private employee subjects had mild and moderate acne scars, while the number of those with severe acne scars was the same as the college students and civil servants, but this was not significantly related ($P = 0.52$).

As shown in Table 4, all participants had the boxcar scar type, three had a mild degree, six had a moderate degree, and eleven had a severe degree. A moderate degree of the icepick scar type was observed in two participants with a moderate degree, while a severe degree was observed in eleven participants.

The results in Table 5 indicate that the data were not normally distributed. Therefore, a nonparametric test was performed using the Wilcoxon test.

Table 1: The demographic characteristics of the subjects (*n*=20)

Characteristic	*n* (%)
Sex	
Male	13 (65)
Female	7 (35)
Age	
Mean±SD	30.35±6.089
Minimum-maximum	18-40
Education level	
High school	2 (10)
Diploma	2 (10)
Undergraduate	15 (75)
Postgraduate	1 (5)
Occupation	
College student	3 (15)
Private employee	8 (40)
Civil servant	4 (20)
Medical doctor	5 (25)

SD: Standard deviation

Table 2: Characteristics of participants based on body weight, height, body mass index, duration of acne, and duration of acne scars (*n*=20)

Characteristic	Mean±SD	Minimum-maximum
Body weight (kg)	68.75±11.715	49-95
Height (cm)	168.85±7.836	155-183
BMI	24.02±2.979	19.1-30
Duration of acne (years)	6.05±2.114	3-10
Duration of acne scar (years)	3.63±2.033	1-8

BMI: Body mass index, SD: Standard deviation

Based on the results in Table 6, there was a statistically significant difference in the Goodman–Baron scores ($P < 0.05$).

A decrease in the acne score was observed in 35% of the participants, as shown in Table 7.

Table 8 shows that the duration of having acne, the duration of having acne scars, and body mass index did not correlate with the Goodman–Baron delta score. Table 9 illustrates that age did not correlate with a decrease in the Goodman–Baron score ($P = 0.530$). Some of the participants experienced side effects following treatment, namely erythema (35%) and itching (15%), while 50% of the participants did not complain of any side effects.

Discussion

The participants consisted of 20 medical records, 13 were for men and 7 were for women. Based on gender showed that men and women had an equal chance of suffering from acne scar atrophy, even though there were more men than women. Until now, there are no studies reporting that this disease is more dominant in one sex. However, a study stated that acne vulgaris as a cause of acne scar atrophy was more common in men (56%). This result was probably due to the greater level of the androgen hormone in men than women. Men also tend to ignore acne, which allows the acne to result in a scar. Men are less hygienic compared to women, which causes inflamed acne to become acne scars.[13]

The mean age of the participants was 30.35 ± 6.089 years, in which the youngest subject was 18 years of age, and the oldest subject was 40 years of age. Acne scars can form at all ages, but they usually more common in adulthood. Dermal damage has been reported to last longer in adults because of aging results in the loss of a fat layer, which increases the effect of acne scars; while at a young age, the collagen remodeling process and skin elasticity are better than in adults.[14]

Most of the participants had a bachelor's degree (75%). This level of education can be due to sufficient knowledge to go to the doctor to check the acne scar they experienced. Most of the participants worked as private employees (40%).

Table 3: Relationship between characteristics of participantsand degree of the severity of acne scars

	Mild acne scar (%)	Moderate acne scar (%)	Severe acne scar (%)	Total (%)	*P*
Education level					
High school	0	0	2 (18.2)	2 (10)	0.13
Diploma	2 (66.7)	0	0	2 (10)	
Undergraduate	1 (33.3)	5 (83.3)	9 (81.8)	15 (75)	
Postgraduate	0	1 (16.7)	0	1 (5)	
Occupation					
College student	0	0	3 (27.3)	3 (15)	0.52
Private employee	2 (66.7)	3 (50)	3 (27.3)	8 (40)	
Civil servant	0	1 (16.7)	3 (27.3)	4 (20)	
Medical doctor	1 (33.3)	2 (33.3)	2 (18.2)	5 (25)	

The mean body weight was 68.75 ± 11.715 kg, where the lightest participant was 49 kg, and the heaviest participant was 95 kg. The mean height was 168.85 ± 7.836 cm, where the shortest participant was 155 cm, and the tallest participant was 183 cm. Most of the nutritional statuses of the participants were normal, with a mean body mass index of 24.015 ± 2.9791. The nutritional status can affect the process of wound healing and re-epithelialization. In conditions of poor nutritional status (underweight), the process of healing wounds and re-epithelization becomes slower.[15]

The mean duration of having acne was 6.05 ± 2.114 years. This duration is one of the factors that cause acne scars. A longer inflammatory reaction causes damage to the dermal layer, thus forming deeper and larger acne scars.[16] The duration of having an acne scar can affect the outcome of therapy. The scars that are recently formed within a couple of months are more responsive to therapy because they are still in the remodeling phase. Moderate icepick acne scars were found in two participants, while severe icepick acne scars were found in eleven participants [Table 4.]. The icepick scar type is the most difficult to treat due to its depth, which reaches the dermis while rolling and boxcars are more superficial.

In this study, the Goodman–Baron scores before and after three treatments, at 1-month intervals, were significantly different ($P < 0.05$). The combination of fractional CO_2 and erbium GaAs laser therapy for acne scars, using a fractional photothermolysis mechanism, delivers light at the microthermal zone (MTZ), which is a column of controlled heat damage in the skin. The MTZ is surrounded by untreated skin, which causes rapid re-epithelialization through cell migration from the epidermis and adjacent follicular units. Chromophore or the intended target is water, one of the components in the skin. Warming of the dermis with laser beams emitted at these wavelengths triggers inflammatory mediators and collagenization. Repair of dermal damage is also faster because of the presence of healthy fibroblasts that can regulate collagen production, migrate to the treated dermis, and cause collagen remodeling.[17]

Table 4: Relationship of acne scar severity based on scar type

Scar type	Scar severity degree			*P*
	Mild	Moderate	Severe	
Icepick				
Yes	0	2	11	0.001
No	3	4	0	
Rolling				
Yes	0	1	7	0.052
No	3	5	4	
Boxcar				
Yes	3	6	11	

Of the 20 participants who were given fractional CO_2 and erbium GaAs combination laser therapy at the same time, only 7 (35%) experienced a decrease in the Goodman–Baron's acne score. However, there was no change in the degree of acne scar in all study participants before and after therapy. These results may indicate that more laser therapy sessions are needed to deal with those acne scars, especially for moderate-to-severe acne scars and the icepick type. Factors that may affect the outcome are the patient's compliance with medication, the patient's habit of not manipulating acne to avoid emerging new scars, and other therapies, such as other therapeutic modalities and daily skincare. In addition, to overcome acne atrophy, a combination with other therapeutic modalities is required to obtain better results.

In this study, the degree of acne scar severity was assessed using the Goodman–Baron Scale. This scale is a quantitative measurement method.[18] The measurement was carried out at every therapy session. The benefit of measuring the acne scar using the Goodman–Baron Score is that it can reflect the state of atrophy on the face qualitatively and quantitatively; however, it is limited as it cannot measure scar depth.

Half of the participants did not complain of side effects after receiving combined fractional CO_2 and erbium GaAs laser therapy, while 35% of participants complained of erythema or red spots, and 15% complained of itching. The duration of the side effect is usually about 3–5 days. Erythema occurred in participants with severe acne. The patients were treated using a laser at a wavelength of 1540 nm with the following settings: power 8.0 W, pulse width 5.00 ms, and energy 40.0 mJ, while the settings at the 10,600 nm wavelength were as follows: Power 25.0 W, pulse width 0.25 ms, and energy 6.2 mJ. However, not all participants who received laser therapy at those settings experienced erythema. Erythema is an effect that often occurs immediately after therapy. The degree of erythema is related to the depth of ablation and the magnitude of laser energy. It usually disappears spontaneously, but topical therapy can be given to reduce the degree of inflammation, such as corticosteroid cream and synchro creams.[19] In addition, compresses taken immediately after laser therapy can reduce facial erythema. Erythema and pruritus are the expected side effects of laser therapy.

Table 5: Normality test for Goodman Baron delta score data

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Significant	Statistic	df	Significant
Goodman Baron score before therapy	0.184	20	0.076	0.907	20	0.055
Goodman Baron score after therapy	0.190	20	0.057	0.880	20	0.018

Table 6: Differences of Goodman Baron scores before and after therapy

Goodman Baron Score	Mean±SD; median; minimum-maximum	*P*
Before therapy	22.55±15.028; 27.99; 2-54	0.007*
After therapy	20.55±15.609; 22.50; 2-54	

*Wilcoxon test. SD: Standard deviation

Table 7: Distribution of changes in Goodman Baron scores before and after therapy

Goodman Baron score	Frequency (%)
Decline	7 (35)
Not decline	13 (65)

Table 8: Correlation of delta Goodman Baron scores on various risk factors

	Delta score Goodman Baron (*r, P*)*
Duration of having acne (years)	−0.152, 0.521
Duration of having acne scar (years)	−0.094, 0.702
BMI	0.177, 0.456

*Pearson correlation test. BMI: Body mass index

Table 9: Correlation of age between declines and no decline in Goodman Baron score

Age	Mean±SD; median; minimum-maximum	*P*
Subjects who had declining Goodman Baron score	29.14±6.939; 29.00; 18-40	0.530*
Subjects who did not have a declining Goodman Baron score	31.00±5.774; 31.00; 24-40	

*Independent *t*-test. SD: Standard deviation

Conclusion

Based on this study, it can be concluded that a combination of 1540 nm erbium GaAs and 10,600 nm fractional CO_2 laser therapy can be used to treat atrophic acne scars on the face, with minimal side effects. However, additional therapy sessions are required to obtain better results.

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Conflicts of interest

There are no conflicts of interest.

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Original Article

Thiol/Disulfide Homeostasis in Patients with Telogen Effluvium: Is Oxidative Stress Important in the Pathogenesis of Telogen Effluvium?

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Abstract

Objective: The aim of this study was to assess the correlation between telogen effluvium (TE) with the new oxidative stress (OS) indicator of thiol/disulfide balance and to research the role of OS in the pathogenesis of TE. **Methods:** Our study included 101 patients with TE diagnosis and 39 healthy individuals. Serum thiol/disulfide was measured with a new automated spectrometric method developed by Erel and Neselioglu, and results were compared statistically. **Results:** Among the six thiol/disulfide parameters, there were statistically significant differences for native thiol, total thiol, disulfide, disulfide/native thiol, disulfide/total thiol, and native thiol/total thiol studied in the patient and control groups ($P = 0.042$, 0.044, <0.001, 0.013, 0.026, and < 0.001, respectively). **Conclusions:** Based on the results of this study, it can be said that OS is closely associated with TE pathogenesis. There is a need for new studies that will show the possible effects of OS on TE pathogenesis and research different OS markers in addition to thiol/disulfide parameters.

Keywords: Alopecia, diffuse hair loss, disulfide, oxidative stress, telogen effluvium, thiol

Introduction

Diffuse and nonscarring hair shedding is called telogen effluvium (TE).[1] The definite prevalence of TE is unknown; however, it has been reported as a common disorder. A large percentage of adults experience TE attacks at some point. TE may develop in both genders; however, there is a greater tendency to experience this situation in women due to hormonal changes after birth.[2]

The life cycle of a hair follicle follows three phases of the anagen (growth period), catagen (regression causing apoptosis), and telogen (resting period) phases.[3] A functional stress condition causes TE, by inducing a large amount of hair from anagen phase to suddenly enter the telogen phase. Accrual of telogen hair terminates after 1–6 months (mean 3 months); however, this disruption of growth is rarely noticed by patients. When hair enters the growth phase again (anagen), hair in the resting phase (telogen) falls from the follicle and is observed as hair loss.[2]

Headington defined five mechanisms for TE as anagen phase occurring immediately due to fever, stress and medication, delayed anagen phase linked to birth, short anagen phase causing chronic TE, sudden telogen phase with topical minoxidil treatment, and the theoretically possible delayed telogen phase.[4] Although it is known that TE is a reactive process that may be triggered by metabolic stress, hormonal changes or medications, the pathogenesis is not clear. It is associated with common trigger events such as acute fever diseases, severe infection, major surgery, severe trauma, hormonal changes after birth, especially reduced estrogen,

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hypothyroidism, cessation of medications containing estrogen, strict diets, low protein intake, heavy metal intake, and iron deficiency.[2,5]

Recent studies have revealed significant correlations between oxidative stress (OS) and certain diseases. There are various biochemical markers used with the aim of identifying OS and inflammation. One of these markers is dynamic thiol/disulfide balance. Dynamic thiol/disulfide level has crucial functions in regulation of transcription factors, apoptosis, antioxidant protection, cell signal mechanisms, detoxification, signal transduction, and enzyme activities.[6]

In addition, there is increasing evidence showing that abnormal thiol/disulfide homeostasis situations play a role in pathogenesis of a variety of diseases such as rheumatoid arthritis,[7] diabetes,[8] cancer,[9] cardiovascular disease,[10] acquired immunodeficiency syndrome,[11] chronic kidney disease,[12] Parkinson disease,[13] Friedreich's ataxia,[14] liver disorder,[15] and Alzheimer disease.[16]

Thiols, forming a significant proportion of total antioxidants in the body, are compositions containing sulfur and play a substantial role in aiding the body's defense versus reactive oxygen species. Plasma thiols scavenge free radicals through a variety of mechanisms and are commonly accepted as playing a physiologic role by acting as antioxidants.[17]

Recent reports have identified that the thiol/disulfide balance plays an important role in the pathogenesis of many skin diseases such as vitiligo,[18] psoriasis,[19] basal cell carcinoma,[20] urticaria,[21] and rosacea.[22]

The goal of this study was to evaluate thiol/disulfide balance as a novel marker of OS in TE patients and to investigate the importance of OS in TE pathogenesis. To the best of our knowledge, there is one study in the literature related to OS in TE patients.[23]

Methods

Other diseases causing hair loss such as trichotillomania, alopecia areata, and androgenetic alopecia were excluded in the patients. Diagnosis was placed with more than 100 days of hair shedding in the patient's history, detailed physical examination, and a positive hair pull test (more than four hairs shedding when lightly pulled). The control group had no complaints of hair loss and abided by the same exclusion criteria as the TE patient group, encompassing individuals over the age of 18 years attending the dermatology clinic as outpatients.

For the patient and healthy control group, those with chronic and systemic diseases, history of surgical operations, pregnancy, breastfeeding, irregular menstruation, excessive weight loss, low-calorie diet, receiving iron supplements, active smoking habit, and medication use that may cause hair loss were excluded from the study. Venous blood samples were collected from the two groups after at least 8–10 h fasting. Samples were centrifuged at 1500 g for 10 min and serum was obtained. The separated serum was immediately placed in Eppendorf tubes and left in a freezer at −80°C.

Thiol/disulfide homeostasis evaluation had performed by a fully-automatic method, developed by Erel and Neselioglu.[6] Disulfide bonds are first reduced with sodium borohydride to create functional thiol groups. Unused reducing agent, sodium borohydride, was removed with formaldehyde to prevent reduction of 5,5'-dithiobis-(2-nitrobenzoic acid) (DTNB). All thiol groups, including reduced and native thiol groups, were later fixed by reactions with DTNB. Half of the difference between total thiol and native thiol determined the dynamic disulfide amount. After determining native and total thiols, disulfide levels, disulfide/total thiol, disulfide/native thiol, and native thiol/total thiol ratios were calculated.

Statistical analysis

Statistical analysis was completed using IBM SPSS 23.0 (SPSS for Windows, SPSS Inc., Chicago, IL, USA). The Shapiro–Wilks test was used for normality testing of native thiol, total thiol, disulfide level, disulfide/native thiol, disulfide/total thiol, and native thiol/total thiol ratios. The groups displayed normal distribution. The independent samples *t*-test, among parametric tests, was used to investigate whether there were considerable differences between the groups. The differences between the sociodemographic characteristics of gender and age among the patient and control groups were investigated with the Pearson-Chi-square and Student's *t*-test. $P < 0.05$ was accepted as statistically significant.

Results

The current study was completed in accordance with the Helsinki Declaration and all patients and healthy controls provided written consent. It was also approved by the Ethics Committee of Tokat Gaziosmanpaşa Medicine Faculty with the number of 19-KAEK-003. This research included 101 patients (91 females and 10 males) older than 18 years attending the dermatology clinic with TE diagnosis and 39 healthy volunteers (34 females and 5 males). The mean age of the patient group was 31.49 ± 13.14 years, with mean age of the control group 34.38 ± 13.15 years. There were no statistically significant differences between the groups in terms of age and gender ($P = 0.246$ and 0.454, respectively). Among the six thiol/disulfide parameters, there were statistically significant differences for native thiol, total thiol, disulfide, disulfide/native thiol, disulfide/total thiol, and native thiol/total thiol studied in the patient and control groups ($P = 0.042$, 0.044, <0.001, 0.013, 0.026 and <0.001, respectively). The statistical correlations between demographic characteristics and thiol/disulfide parameters are shown in Table 1.

Discussion

TE is a disease characterized by hair thinning or shedding as a result of the early entry of hair into the telogen phase. Increased or synchronized telogen shedding occurs linked to

the disruption in the hair follicle cycle in TE. The trigger may frequently be found in the patient's history.[24]

The plasma thiol pool mainly comprises albumin thiols and protein thiols, followed by smaller amounts of low-molecular-weight thiols such as cysteine (Cys), cysteinyl glycine, glutathione, homocysteine, and γ-glutamyl Cys.[6] Thiols protect keratinocytes against the results of oxidative changes in the stratum corneum and regulate intracellular redox metabolism.[25] The main source of thiols in skin are mature dendritic cells, and thiols are the first antioxidants consumed in OS conditions. Measurement of plasma total thiol levels and identification of thiol/disulfide homeostasis is a good marker of excessive free radical formation in many diseases, and it also provides important clues about the dimension of free radical-mediated oxidation causing protein damage.[17,26]

Erel and Neselioglu developed a new fully-automated method to determine thiol/disulfide homeostasis by measuring native thiol, total thiol, and disulfide levels. Thiol parameters determined with this method may be good markers of antioxidant capacity in human metabolism. Erel and Neselioglu used this method to show higher plasma disulfide levels in degenerative diseases such as obesity, pneumonia, bronchiolitis, and diabetes mellitus compared to healthy groups; in other words, the thiol/disulfide homeostasis had slid toward disulfide. However, they showed that in proliferative diseases such as renal cancer, colon cancer, urinary bladder cancer, and multiple myeloma, this balance slid toward the thiol side.[6]

To date, thiol/disulfide homeostasis has been researched in many studies with this new method.[27] However, in the literature, there are few studies researching thiol/disulfide homeostasis in certain dermatologic diseases such as vitiligo, psoriasis, basal cell carcinoma, urticaria, rosacea, and tinea versicolor.[18-22,28]

Studies by Akbas *et al.* researching thiol/disulfide balance in vitiligo patients identified that serum thiol/disulfide levels were similar in patient and control groups and that vitiligo did not affect thiol/disulfide balance.[23] Kilinc *et al.* in a study assessing thiol/disulfide homeostasis in patients with tinea versicolor by measuring thiol and disulfide levels in serum reported no statistically significant difference between patient and control groups.[28] Yazici *et al.* detected that serum thiol levels in psoriasis patients were significantly low compared to a healthy group.[19] Demirseren *et al.* showed that thiol/disulfide balance in patients with basal cell carcinoma changed with reduced disulfide and elevated thiols, and there was a statistically significant difference compared to the healthy group.[20] In another study, Akbas *et al*. reported thiol/disulfide levels did not change in patients with acute urticaria compared to a healthy group, while thiol/disulfide levels significantly changed in patients with chronic spontaneous urticaria.[21]

Akbas *et al*., in their TE study, indicated that native thiol has not been changed but disulfide decreased. Since disulfide decreased, total thiol decreased and the ratio of native thiol/total thiol also decreased. Thorough their findings, there were no significant differences between patients and control group statistically in terms of native thiol, total thiol, and disulfide ($P > 0.05$).[23]

Reactive oxygen species forming as a result of chronic exposure of skin to both endogenous and environmental pro-oxidant materials may harm cellular components such as nucleic acids, proteins and cell membranes, and disrupt the antioxidant/oxidant balance. In addition, excessive production of free radicals and weak antioxidant defense contributes to formation of OS.[29]

In our study, the novel oxidative markers of thiol/disulfide parameters and thiol/disulfide balance were compared in TE patients and a healthy control group. There were statistically significant decreases observed between native thiol, total thiol, disulfide, disulfide/native thiol, disulfide/total thiol, and native thiol/total thiol values in patient and control groups ($P < 0.05$). The results of our study support the relationship between TE and OS. Akbas *et al*., reported that thiol/disulfide homeostasis is effected in TE, but the balance is not damaged.[23] Our findings are contrary to this study; thiol/disulfide homeostasis and balance are both effected.

A limitation of this study is that body mass index was not calculated in the patient and control groups.

Conclusions

To the best of our knowledge, our study is the second clinical research investigating the role of OS in TE pathogenesis using

Table 1: Thiol/disulfide homeostasis parameters and demographic features of patient and control groups

Parameter	Control ($n=39$)	Patients ($n=101$)	*P*
Age (years), mean±SD	34±13	31±13.1	0.246
Gender (male/female)	5/34	10/91	0.454
Native thiol (SH) (μmol/l), mean±SD	347.5±47.8	328.5±48.2	0.042
Total thiol (μmol/l), mean±SD	388.5±53.4	368.0±51.9	0.044
Disulphide (SS) (μmol/l)	21.8±3.7	18.6±4.3	<0.001
Disulfide/native thiol (%)	6.4±1.1	5.78±1.7	0.013
Disulfide/total thiol (%)	5.65±0.87	5.1±1.3	0.026
Native thiol/total thiol (%)	88.7±1.7	89.72±2.6	0.001

SD: Standard deviation

thiol/disulfide parameters. Based on the results of the study, it can be said that OS plays a key role in TE pathogenesis. In addition, there may be an important inspiration that antioxidant treatment would be beneficial in TE. There is a need for novel studies supporting our findings by showing the possible effects of OS on TE pathogenesis and researching different OS markers in addition to thiol/disulfide parameters.

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Conflicts of interest

There are no conflicts of interest.

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Original Article

Dermoscopy of Oral Labial Mucosa According to Age and Sex in Healthy Adults: First Observational Dermoscopic Study

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Abstract

Background/Aim: Information on dermoscopy of the labial mucosa is limited to dermoscopic examination of several dermatological diseases of the labial mucosa. In this study, we investigated whether dermoscopic features of labial mucosa differ in age and sex in healthy individuals. **Materials and Methods:** The study included 152 healthy individuals (76 females and 76 males) aged between 20 and 83 years who applied to the outpatient dermatology department. For the evaluation of dermoscopic features, the patients were divided into two groups as age under 40 years (Group 1) and over 40 years (Group 2). Dermoscopic data were analyzed by age and sex. **Results:** In Group 1, clear reticular arrangement (40.4% vs. 13.8%, $P = 0.001$) and honeycomb appearance (7.4% vs. 0%, $P = 0.033$) were significant. In Group 2, mixed reticular arrangement (61.7% vs. 82.8%, $P = 0.006$), grouped hairpin vessels (48.9% vs. 69%, $P = 0.016$), yellow background areas (87.2% vs. 98.3%, $P = 0.018$), dotted vessels (33% vs. 62.1%, $P = 0.000$), matchstick hairpin vessels (6.4% vs. 19%, $P = 0.017$), microaneurysm (3.2% vs. 32.8%, $P = 0.000$) were significant. While clear reticular arrangement and purple areas were more common in females, mixed reticular pattern and grouped hairpin vessels were more frequent in males. **Conclusion:** In this study, significant differences were found in dermoscopic features according to age and sex in healthy individuals. These results will serve as the basis for studies on the effect of systemic diseases on oral labial mucosa and studies on localized mucosal diseases.

Keywords: Dermoscopy, labial mucosa, oral mucosa

Introduction

The oral mucosa should be considered as a complex structure consisting of various anatomical and histological structures that share the same embryonic origin and the same anatomical localization. Indeed, different localizations of the oral mucosa have unique histological structures due to their characteristics such as differences in the number of cellular layers, the presence or absence of keratinized layer on the surface, and differences in mucosal thickness. All these differences are well known, and it is common practice to use terms such as labial mucosa, buccal mucosa, gingival mucosa, alveolar mucosa, or lingual mucosa when referring to the oral mucosa.[1,2]

The information about the vascular structures in the oral mucosa has been revealed by studies on capillaroscopy. Accordingly, the vessels in the labial mucosa are evaluated according to the direction of the loops and Curri's classification is used. In Curri Type 1, the direction of the loops is parallel to the surface, whereas in Curri Type 2, the surface is perpendicular. Curri Type 3 has both parallel and perpendicular loops.[3] The capillaries are arranged in a structure parallel to the surface. Its visibility is probably the best in the oral region. Therefore, the labial mucosa is the most suitable area for capillaroscopic examination of the oral mucosa.[3] Although there have been studies on capillaroscopic examination of the oral mucosa, no comprehensive studies have been conducted on dermoscopy of the labial mucosa. In this study, dermoscopic examination of oral labial mucosa of healthy individuals was performed.

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Materials and Methods

The study included 152 (76 females and 76 males) individuals aged 20–83 years who applied to outpatient dermatology department. Individuals with a history of smoking, have diseases that could affect microcirculation such as diabetes, hypertension, hyperlipidemia, and individuals receiving medical treatment were not included in the study. For the evaluation of dermoscopic features, the patients were divided into two groups as age under 40 years (Group 1) and over 40 years (Group 2). However, the patients were divided into groups according to their sexes and the data were evaluated.

This study includes three stages including dermatological and dermoscopic examination of the lesions, macroscopic and dermoscopic photographing (Dermatoscope Delta 20; Heine, Herrsching, Germany; Handyscope Fotofinder Systems), and evaluation of the findings. Macroscopic (at least 2) and dermoscopic (at least 15) pictures of all lesions in the study were taken and data were recorded. Vascular structures and nonvascular structures were defined as dermoscopic. To increase the picture quality and the visibility of the structures, the contact plate was wetted with saline before the dermoscopic images were taken. The pressure on the lesion was relieved to prevent collapse of the vascular structures.

All patient data were uploaded to SPSS 21.0 for Windows statistic application software (SPSS Inc., Chicago, IL). Data were analyzed with the Student's *t*-test for independent samples with regard to parametric data, and with the Mann–Whitney U-test with regard to non-parametric data. $P < 0.05$ was considered as indicating statistical significance.

Results

A total of 152 healthy individuals were enrolled in the study (76 men and 76 women; female mean ± standard deviation (SD) age 37.01 ± 16.70; male mean ± SD age 38.43 ± 17.28; all patients range 20–83).

The mean age of Group 1 (47 males and 47 females) was 26.22 ± 6.35 years; the mean age of Group 2 (29 males and 29 females) was 56.36 ± 11.15.

In all patients included in the study, the rate of superficial vascular network was 98% (n = 149), deep vascular network was 96.7% (n = 147), yellow background areas were 91.4% (n = 139), mixed reticular arrangement was 69.7% (n = 106), grouped hairpin vessels were 56.6% (n = 86), dotted vessels were 44.1% (n = 67), clear reticular arrangement was 30.3% (n = 46), purple areas were 27% (n = 41), hemorrhagic dot was 23.7% (n = 36), targetoid brown round areas were 22.4% (n = 34), yellowish-white streaks were 20.4% (n = 31), microaneurysm was 14.5% (n = 22), chain-shaped hairpin vessels were 14.5% (n = 22), hyperkeratosis was 14.5% (n = 22), macthstick hairpin vessels were 11.2% (n = 17), white dots were 9.2% (n = 14), honeycomb appearance was 4.6% (n = 7), glomerular vessels were 3.9% (n = 6) and microulceration was 3.3% (n = 5) [Figures 1-5].

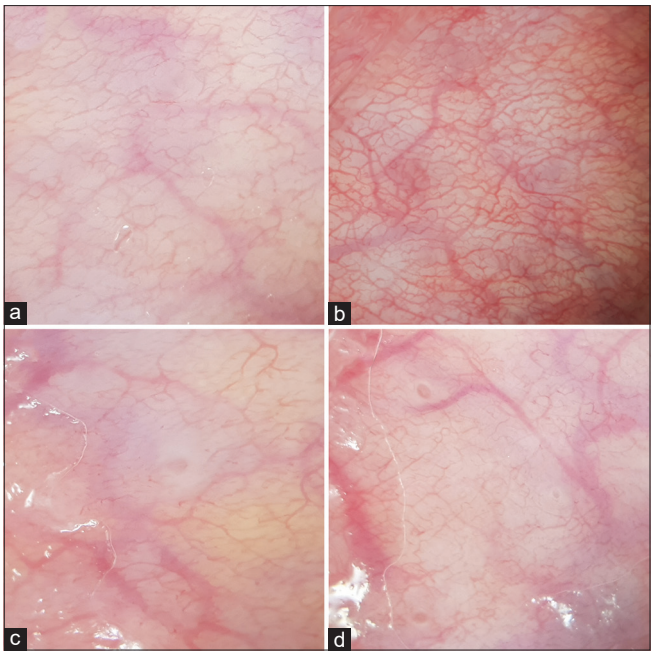

Figure 1: Clear reticular arrangement (a-d). Targetoid brown round area is seen in the middle (c) and in the upper left corner (d)

When the dermoscopic features of the labial mucosa of all patients were evaluated in terms of gender, the clear reticular arrangement was significantly higher in women (29 patients, 38.2%) than men (17 patients, 22.4%) (P = 0.034). Purple areas were significantly higher in women (27 patients, 35.5%) than men (P = 0.018). Grouped hairpin vessels were significantly more frequent in males (49 patients, 64.5%) than females (37 patients, 48.7%) (P=0.050). It was significant that mixed reticular arrangement was more common in males (60 patients, 78.9%) than females (46 patients, 60.5%) (P = 0.013).

When all patients were evaluated, there was no statistically significant difference between (respectively) males and females in terms of hemorrhagic dots (25% vs. 22.4%, P = 0.703), targetoid brown round areas (19.7% vs. 25%, P = 0.436), matchstick hairpin vessels (13.2% vs. 9.2%, P = 0.440), microulceration (3.9% vs. 2.6%, P = 0.649), microaneurysm (17.1% vs. 11.8%, P = 0.356), deep vascular network (96.1% vs. 97.4%, P = 0.649), superficial vascular network (97.4% vs. 98.7%, P = 0.560), chain shaped hairpin vessels (19.7% vs. 9.2%, P = 0.065), yellow background areas (92.1% vs. 90.8% P = 0.772), dotted vessels (50% vs. 38.2%, P = 0.141), glomerular vessels (5.3% vs. 2.6%, P = 0.405), white dots (9.2% vs. 9.2%, P = 1.0), honeycomb appearance (3.9% vs. 5.3%, P = 0.699), yellowish-white streaks (26.3% vs. 14.5%, P = 0.070), and hyperkeratosis (18.4% vs. 10.5%, P = 0.167).

In Group 1, clear reticular arrangement (40.4% vs. 13.8%, P = 0.001) and honeycomb appearance (7.4% vs. 0%, P = 0.033) were significant. In Group 2, mixed reticular arrangement (61.7% vs. 82.8%, P = 0.006), grouped hairpin

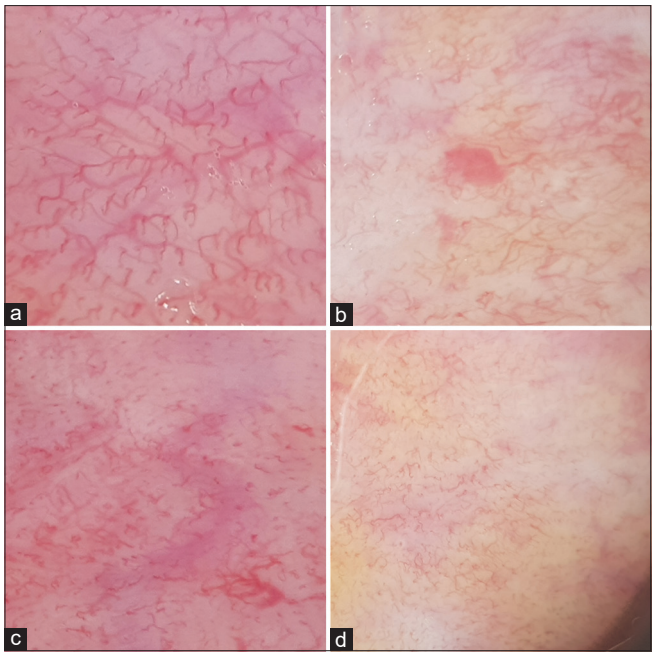

Figure 2: (a-d) Chain-shaped hairpin vessels and microaneurysms are seen on the mixed reticular arrangement

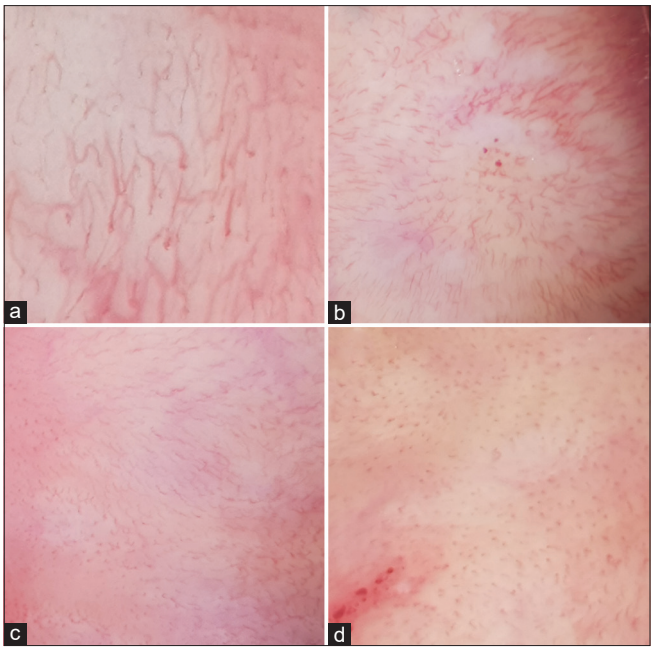

Figure 3: Matchstick hairpin vessels (a), hemorrhagic dot (b and d), hairpin vessels (b and c) and dot vessels (c and d) are seen on the mixed reticular arrangement

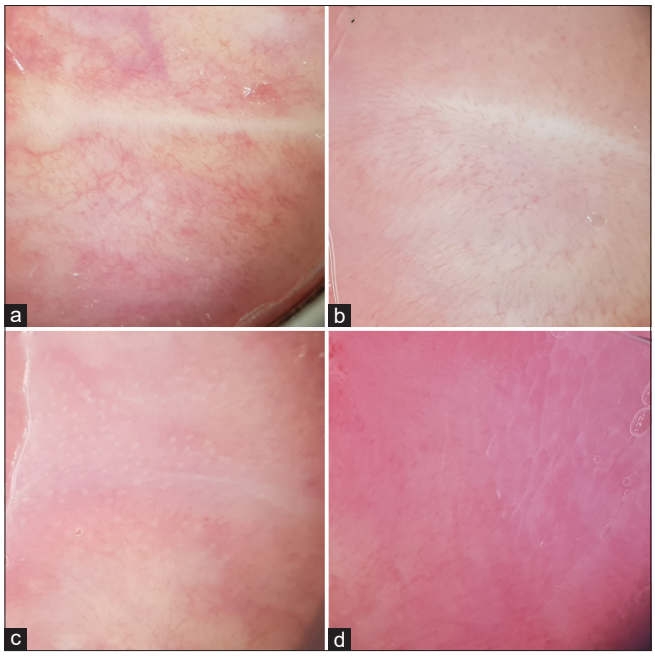

Figure 4: Dermoscopy shows yellowish-white streaks (a and b), white dots (c), and honeycomb appearance (d)

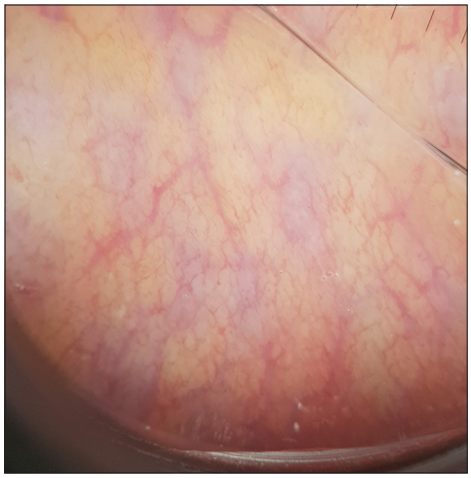

Figure 5: There are purple areas on the clear reticular arrangement

vessels (48.9% vs. 69%, P = 0.016), yellow background areas (87.2% vs. 98.3%, P = 0.018), dotted vessels (33% vs. 62.1%, P = 0.000), matchstick hairpin vessels (6.4% vs. 19%, P = 0.017), and microaneurysm (3.2% vs. 32.8%, P = 0.000) were significant.

There was no significant difference between Group 1 and Group 2 in terms of hemorrhagic dots (19.1% vs. 31%, P = 0.094), targetoid brown round areas (21.3% vs. 24.1%, P = 0.681), deep vascular network (96.8% vs. 96.6%, P = 0.931), superficial vascular network (98.9% vs. 96.6%, P = 0.305), chain-shaped hairpin vessels (18.1% vs. 8.6%, P = 0.177), purple areas (26.6% vs. 27.6%, P = 0.894), glomerular vessels (5.3% vs. 1.7%, P = 0.269), white dots (8.5% vs. 10.3%), P = 0.704), yellowish-white streak (13.8% vs. 15.5%, P = 0.774), and microulceration (2.1% vs. 5.2%, P = 0.307), respectively. All dermoscopic structures are shown in Table 1.

Discussion

The architectural framework of oral mucosal microcirculation is quite complex and is constantly changing with aging.[4,5] The properties in the capillary structures in the oral mucosa are probably a mirror of what happens in every organ of the

Table 1: Dermoscopic features of oral labial mucosa

Dermoscoic structures	Al l patients, *n* (%)	Female, *n* (%)	Male, *n* (%)	*P*	Group 1, *n* (%)	Group 2, *n* (%)	*P*
Deep vascular network	147 (96.7)	74 (97.4)	73 (96.1)	0.649	91 (96.8)	56 (96.6)	0.931
Superficial vascular network	149 (98)	75 (98.7)	74 (97.4)	0.560	93 (98.9)	56 (96.6)	0.305
Mixed reticular arrangement	106 (69.7)	46 (60.5)	60 (78.9)	0.013	58 (61.7)	48 (82.8	0.006
Clear reticular arrangement	46 (30.3)	29 (38.2)	17 (22.4)	0.034	38 (40.4)	8 (13.8)	0.001
Gruped hairpin vessels	86 (56.6)	37 (48.7)	49 (64.5)	0.048	46 (48.9)	40 (69)	0.016
Dot vessels	67 (44.1)	29 (38.2)	38 (50)	0.141	31 (33)	36 (62.1)	0.000
Chain shaped hairpin vessels	22 (14.5)	7 (9.2)	15 (19.7)	0.065	17 (18.1)	5 (8.6)	0.107
Microaneursym	22 (14.5)	9 (11.8)	13 (17.1)	0.356	3 (3.2)	19 (32.8)	0.000
Macthstick hairpin vessels	17 (11.2)	7 (9.2)	10 (13.2)	0.440	6 (6.4)	11 (19)	0.017
Glomerular vessels	6 (3.9)	2 (2.6)	4 (5.3)	0.405	5 (5.3)	1 (1.7)	0.269
Yellow background areas	139 (91.4)	69 (90.8)	70 (92.1)	0.772	82 (87.2)	57 (98.3)	0.018
Purple areas	41 (27)	27 (35.5)	14 (18.4)	0.018	25 (26.6)	16 (27.6)	0.894
Hemorrhagic dot	36 (23.7)	17 (22.4)	19 (25)	0.703	18 (19.1)	18 (31)	0.094
Targetoid brown round areas	34 (22.4)	19 (25)	15 (19.7)	0.436	20 (21.3)	14 (24.1)	0.681
Yellowish-white streaks	31 (20.4)	11 (14.5)	20 (26.3)	0.070	16 (17)	15 (25.9)	0.189
Hyperkeratosis	22 (14.5)	8 (10.5)	14 (18.4)	0.167	13 (13.8)	9 (15.5)	0.774
White dot	14 (9.2)	7 (9.2)	7 (9.2)	1.0	8 (8.5)	6 (10.3)	0.704
Honeycomb appearance	7 (4.6)	4 (5.3)	3 (3.9)	0.699	7 (7.4)	0 (0)	0.033
Microulceration	5 (3.3)	2 (2.6)	3 (3.9)	0.649	2 (2.1)	3 (5.2)	0.307

human body.[3] Morphological examination of microcirculation is essential. In fact, the microvascular bed is directly associated with both autoimmune etiopathogenesis pathologies and acute and chronic inflammatory etiopathogenesis pathologies.[6,7] Information on the dermoscopy of the labial mucosa is limited, and in the literature, dermoscopic examination has been performed in several dermatological diseases of the labial mucosa.[8,9] Information on the structure of oral mucosal vessels has been made possible over the last few years, thanks to modern techniques of *in vivo* capillaroscopic imaging.[10-13] *In vivo* capillaroscopy measures capillary loop caliber, length, and density of loops.[3] The density and length of capillary loops are, on average, higher in women than in men. Density tends to increase with aging in both men and women. In women, the density increases between the 5th and 7th decades and then becomes stable. In men between the 4th and 6th decades, the density decreases slightly and then increases almost to the 8th decade. At this time, the intensity becomes equal in both sexes.[3] That is, hormonal differences between the two sexes diminish during aging, leading to common vascular features in older men and women. Differences below the age of 50 are more pronounced.[3]

When the patients in our study were evaluated according to gender, it was significant that the superficial vascular network had a clear reticular arrangement and the presence of purple areas in women. The clear reticular arrangement was defined as a superficial vascular network in more than 90% of the labial mucosal area, and other vascular and nonvascular structures such as hairpin, dot, and glomerular vessels were very rare. It is thought that purple areas may be salivation ponds under the mucous membranes or reflections of vascular structures on the surface.

In males, it was found that superficial vascular network was in mixed reticular arrangement and grouped hairpin vessels were observed more frequently, and it was significant. Mixed reticular arrangement was defined as the structure where the dermoscopic image was not clear and the majority of the labial mucosal area was accompanied by other vascular and nonvascular structures, especially hairpin vessels, in addition to the superficial vascular network structure.

In our study, targetoid brown round areas were detected in 22.4% of all patients (n = 34). There was no significant difference in terms of gender and age. While the center of these dermoscopic structures was brown, there was a white ring surrounding it. We think that these structures are improving microulceration. However, the newly developed microulcerations were 3.3% (n = 5) in this study.

Yellowish-white streaks were present in 20.4% of all patients (31 patients). However, no significant difference was observed when analyzed by sex and age. We think that these structures are scarring secondary to trauma. These structures, which are generally linear, can be multiple and rarely starburst.

Microaneurysm was generally observed in 14.5% (n = 22) of the patients. There was no difference in terms of gender, but it was more significant in Group 2 patients. We believe that this may be due to the more fragile vascular structures in the elderly.

The vessels in the labial mucosa are evaluated according to the direction of the loops and Curri's classification is used. In Curri Type 1, the direction of the loops is parallel to the surface, whereas in Curri Type 2, the surface is perpendicular. Curri Type 3 has both parallel and perpendicular loops.[3]

However, it is not possible to adapt this classification used in *in vivo* capillaroscopy with ×200 to dermoscopy. Nevertheless,

hairpin vessels defined as vascular loop and classified parallel to the surface (Curri Type 1) were evaluated as chain-shaped hairpin vessels (14.5%, n = 22) and grouped hairpin vessels (56.6%, n = 86).

Among these structures, hairpin vessels were significantly seen in males and in Group 2 patients. On the other hand, dot vessels formed by vascular loops extending perpendicularly (Curri Type 2) to the surface were found to be 44.1% (n = 67) in our study, and it was significantly more frequent in Group 2. In our study, matchstick hairpin vessels were defined as the situation where the loop portion of the hairpin vessels were more swollen, darker, and more prominent than the branches. In the current study, it was observed in 11.2% (n = 17) and it was significant that it was seen more frequently in Group 2.

Hyperkeratosis was observed in 14.5% (n = 22) of all patients. White dots and honeycomb appearance are thought to be different variants of hyperkeratosis. Hemorrhagic dot was present 23.7% of all patients (n = 36).

Usually, the clinical diagnosis of oral disease is done by visual examination, tactile evaluation, and invasive biopsy. An endoscopic microscope can help to increase the detectable resolution on the mucosal surface;[14-16] however, it cannot access deeper structures or vessels that contain valuable information about the origin of the disease and how it develops. The recent development of photoacoustic microscopy (PAM) has shown promise in imaging microvascular properties in tissue *in vivo*.[17] However, the applicability of PAM in imaging of the oral mucosa has not yet been established. However, optical coherence tomography-based angiography has been reported to be very successful in imaging the vascular network structure in the oral mucosa.[14]

Conclusion

Although the diameter and density of the vessels cannot be measured in dermoscopy, we think that dermoscopy may help in the future studies of labial mucosa by evaluating the shape and arrangement of the vessels and nonvascular structures. In this study, oral labial mucosa of many healthy individuals was examined dermoscopically. These results will serve as the basis for studies on the effect of systemic diseases on oral labial mucosa and studies on localized mucosal diseases.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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