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ORIGINAL ARTICLE – OPEN ACCESS

The Evaluation of 2D:4D Finger Ratios in Seborrheic Dermatitis Cases

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ABSTRACT

Objective: Seborrheic dermatitis is common in the 14–50 age group, especially the adolescent age group. It was determined that the ratio of finger lengths did not change in the adult period after being determined in the intrauterine period. At the same time, the ratio of the index finger length to the ring finger length (2D:4D) is opposite to that of the serum testosterone. Based on this two basic knowledge, the intrauterine hormonal effect that an individual has been exposed to at any age can be determined. In our study, it was aimed to investigate the relationship between 2D:4D finger length ratio, which is an indicator of intrauterine androgen exposure, and seborrheic dermatitis, in which androgens are accused in etiology.

Materials and Methods: Our study was planned as a descriptive and cross-sectional study among patients who applied to the dermatology outpatient clinic. Seborrheic dermatitis cases and age- and gender-matched healthy volunteers who applied to the dermatology outpatient clinic without seborrheic dermatitis were included in the study.

Results: In the evaluation made separately for both sexes; while it was observed that both females and males with seborrheic dermatitis group had a lower 2D:4D finger length ratio compared to the control group, this was only significant in the left 2D:4D finger length ratio in males.

Conclusion: To the best of our knowledge, there is no study in both sexes that evaluate the relationship between seborrheic dermatitis and 2D:4D finger length ratio in the literature. Our findings support the idea that intrauterine androgen exposure may be effective in the development of seborrheic dermatitis, and larger studies are needed.

Keywords: 2D:4D finger ratio, androgen exposure, seborrheic dermatitis

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INTRODUCTION

Seborrheic dermatitis is a superficial inflammatory skin disease characterized by chronic, recurrent, erythematous, infiltrated, oily yellowish-scaled lesions in the body-rich areas of sebaceous glands (1). This dermatosis, whose etiopathogenesis is not fully elucidated, is more common in men than in women. This is based on the fact that sebaceous gland activity is under androgen activity control (2).

2D:4D finger ratio found by dividing the length of the 2nd finger by the length of the 4th finger; it is considered as an indicator of intrauterine androgen exposure (3). The relationship of this rate, which does not change after the 14th week of intrauterine, with diseases affected by hormonal changes, has been investigated many times until today (4). For the 1st time, Lutchmaya et al. (5) found a negative correlation independent of gender in the study performed by comparing the ratio of testosterone to estrogen in the amniotic fluid, compared to the right and left hand 2nd and 4th finger length ratios (2D:4D). This result was interpreted that the androgen exposed in the fetal period reduced the 2D:4D ratio, and this rate was accepted as a marker of intrauterine androgen exposure (5, 6). Later, in many studies on diseases thought to have androgens in its etiology, this rate was investigated. This rate has also been investigated in many diseases such as psoriasis, heart diseases, autism, schizophrenia, polycystic ovarian syndrome, and breast cancer (3–6).

In this study, it was aimed to investigate the relationship between 2D:4D finger ratio, which is an indicator of intrauterine androgen exposure, and seborrheic dermatitis, in which androgens are accused in etiology.

MATERIALS and METHODS

Our study was planned as a descriptive and cross-sectional study among patients who applied to the dermatology outpatient clinic. The study was approved by the local ethics committee of Necmettin Erbakan University, Meram Medical Faculty (date: 2019, number: 1670). Seborrheic dermatitis cases and age- and gender-matched healthy volunteers who applied to the dermatology outpatient clinic without seborrheic dermatitis were included in the study. The patients included in the study were clinically diagnosed with seborrheic dermatitis. Other diagnoses were

Table 1. Evaluation of 2D/4D finger length ratio in female and male cases

	Female cases (Mean±SD) Median [Q1, Q3]	Male cases (Mean±SD) Median [Q1, Q3]	Test statistics	Z	p
Right hand 2D:4D	0.979±0.023 0.982 [0.966, 0.997]	0.967±0.026 0.972 [0.955, 0.986]	2085.5	Z: -2.73	**0.006**
Left hand 2D:4D	0.978±0.02 0.978 [0.966, 0.994]	0.962±0.025 0.964 [0.946, 0.981]	1786	Z: -3.86	<**0.001**

SD: Standard deviation

Table 2. Evaluation of 2D/4D finger length ratio in seborrheic dermatitis and control group in males

Male	Seborrheic dermatitis group (Mean±SD) Median [Q1, Q3]	Control group (Mean±SD) Median [Q1, Q3]	Test statistics	Z	p
Right hand 2D:4D	0.964±0.029 0.970 [0.942, 0.986]	0.970±0.023 0.972 [0.959, 0.986]	610	Z: -0.99	0.324
Left hand 2D:4D	0.954±0.026 0.959 [0.941, 0.975]	0.969±0.022 0.970 [0.957, 0.984]	448	Z: -2.7	**0.007**

SD: Standard deviation

excluded by additional examinations, histopathology, wood's lamp examination, and native examination in cases that could be confused with only scalp localized psoriasis and tinea capitis. Patients with anatomical hand deformity were taken as exclusion criteria.

In both groups, the length of the 2nd and 4th fingers of both hands was measured with the help of a hand caliper with a measurement sensitivity of 0.05 mm. The 2nd and 4th finger lengths and 2D:4D finger ratios obtained by dividing the 2nd finger length by the 4th finger length were recorded in all volunteers. To eliminate measurement differences, the measurement was done by the same dermatologist. An informed consent form was obtained from all participants in the study.

Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences 16.0 computer program. The suitability of variables to normal distribution was tested with a single sample Kolmogorov–Smirnov test and Shapiro–Wilk test. The finger length ratios showed left-skewed distribution in all groups. Since the data were not distributed normally, the Mann–Whitney U-test was used for statistical analysis. For statistical significance, $p<0.05$ was accepted.

RESULTS

One hundred and fifty participants who applied to the dermatology outpatient clinic between January 2019 and April 2019 were prospectively evaluated. The study consists of 150 participants; 38 men and 37 women were diagnosed with seborrheic dermatitis and 37 men and 38 women without seborrheic dermatitis. The mean age of the cases with seborrheic dermatitis was 37.2±14.32 (mean±SD) years old, and the mean age of the control group was 36.05±11.4 years old. There was no significant difference between the seborrheic dermatitis group and the control group in terms of age and gender ($p>0.05$).

In all our cases, the right hand 2D:4D ratio in women was 0.979±0.023, and the right hand 2D:4D ratio in men was 0.967±0.026 and it was statistically significant ($p=0.006$). For the left hand, the left hand 2D:4D ratio was 0.978±0.02 in women, and the left hand 2D: 4D ratio in men was 0.962±0.025 and statistically different ($p<0.001$). The finger ratios of males and females were significantly different for both hands (Table 1).

In the evaluation made separately for both sexes; while it was observed that seborrheic dermatitis group in both women and men had lower 2D:4D finger ratios than the control group, this low rate was only significant in the ratio of left hand 2D:4D fingers in males ($p=0.007$). Tables 2 and 3 summarize the data between the seborrheic dermatitis group and the control group for both sexes.

DISCUSSION

In dermatology literature, 2D:4D ratio was examined in diseases such as acne and androgenetic alopecia, and this rate was found lower in patients groups than in the control group (7). In these findings supports that intrauterine androgen exposure is effective in the development of the diseases.

Seborrheic dermatitis is a common inflammatory dermatosis and there are multiple factors in its pathogenesis. Pityrosporum ovale, androgen hormones, nutritional factors, atopy, the amount and structure of lipids in the skin, lipase activity, and genetic and mental stress are effective in the pathogenesis of seborrheic dermatitis (1). One of the most important of these factors is the role of androgens on the sebaceous glands. The causes such as higher prevalence in male gender, predilection regions where the sebum production is more intensive, and the disease seen after puberty are indicators that androgens play a role in the etiopathogenesis of seborrheic dermatitis (8). Again, in some patients, seborrheic dermatitis regresses after adrenalectomy or after anti-androgen therapy.

Table 3. Evaluation of 2D/4D finger length ratio in seborrheic dermatitis and control group in females

Female	Seborrheic dermatitis group (Mean±SD) Median [Q1, Q3]	Control group (Mean±SD) Median [Q1, Q3]	Test statistics	Z	p
Right hand 2D:4D	0.979±0.024	0.98±0.023	654.5	Z: -0.51	0.607
	0.978 [0.959, 0.997]	0.984 [0.969, 0.997]			
Left hand 2D:4D	0.974±0.019	0.98±0.021	549.5	Z: -1.63	0.104
	0.975 [0.963, 0.987]	0.985 [0.967, 0.996]			

SD: Standard deviation

Although seborrheic dermatitis is a disease in which the androgen relationship is strong in etiology, there was no previous study in the literature investigating this ratio in both sexes. In our study group, 2D:4D finger ratios were found to be significantly lower in both hands compared to the female hands in male hands. This difference in males and females was anticipated and consistent with the literature (5, 6, 9). In seborrheic dermatitis, known to be predominant in the males, compared to seborrheic dermatitis and control group 2D:4D finger length ratio, this ratio was lower in seborrheic dermatitis group in both sexes.

In the current literature, only one study found that the relationship between seborrheic dermatitis and 2D:4D finger length ratios was evaluated, in the study, only male cases were taken (10). In the study, in male seborrheic dermatitis cases, 2D:4D finger length ratios in the right hand were significantly lower than the control group (10). In our findings, the rate of left hand 2D:4D fingers was found to statistically significantly lower only in patients with male seborrheic dermatitis compared to the control group. These findings suggest that intrauterine androgen exposure increases the risk of developing seborrheic dermatitis in adulthood.

In the literature, it is found that the characteristics that differ between genders are seen as more dominant on the right side of the body, especially in the males (11). Studies evaluating testosterone and sperm counts (12), fetal growth (13), and athletic ability (14) supported statistically significant dominance in the right hand in these features. However, from two studies conducted by measuring 2D:4D finger ratio in patients with androgenetic alopecia, which are mostly seen in men and known to have androgens in their etiopathogenesis; 2D:4D finger ratio in the right hand was found to be significantly low (7), while the rate in the left hand was significantly lower in the other study (15). This difference suggests that studies may not be seen if they are conducted in larger populations. Perhaps, in larger population studies, a statistically significant difference can be seen for both hands. The limitations of our study were that this factor could not be ruled out due to the unknown intrauterine hormone levels of the patients.

CONCLUSION

In the current literature, there is no study in both sexes evaluating seborrheic dermatitis and 2D:4D finger length ratios. In our study, the left hand 2D:4D finger ratio was found lower in patients with male seborrheic dermatitis than the control group. These findings support the idea that intrauterine androgen exposure may be effective in the development of seborrheic dermatitis, especially in the males, and larger studies are needed.

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Informed Consent: Written informed consent was obtained from patients who participated in this study.

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