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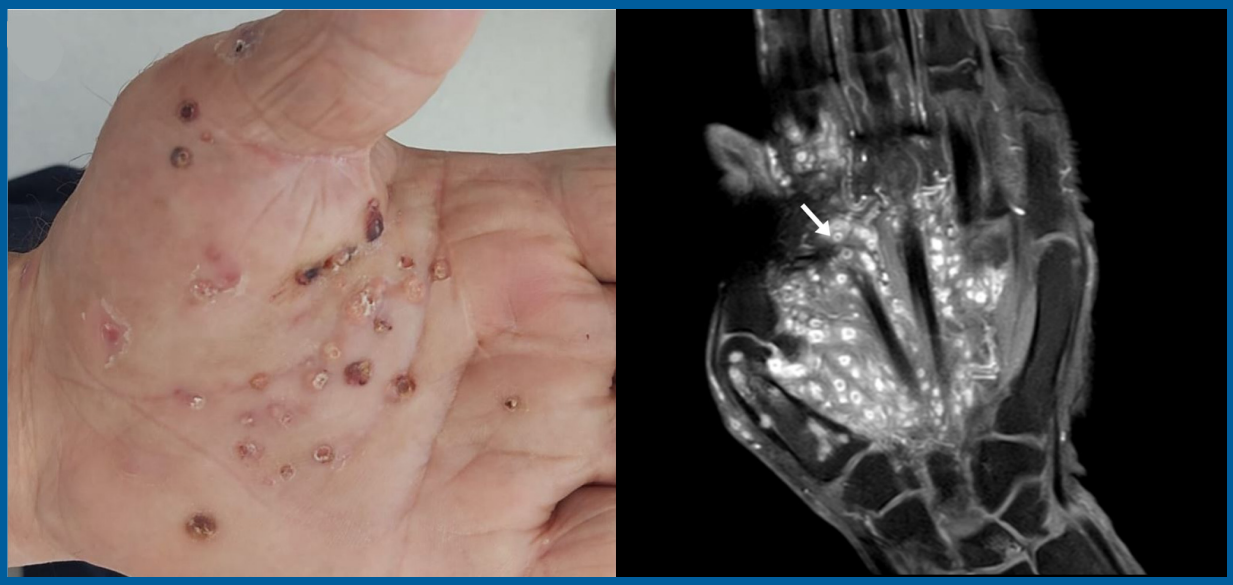

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Orginal Article

Preventing Possible Parasitic Skin Infections After an Earthquake: A Practical Recommendation

Ceyda Tetik Aydoğdu[1], Dilek Daşgın[2], Aslan Yürekli[3], Baran Abul[4], Tuğçe Akça Karaşahin[1], Suzan Demir Pektaş[1], Emine Tuğba Alataş[1], Büşra Fışkın[5], Furkan Dinç[5], Alkan Kıran[5], Emine Neşe Yeniçeri[5]

[1]Department of Dermatology, Muğla Sıtkı Koçman University Faculty of Medicine, Muğla, Türkiye
[2]Clinic of Dermatology, Muğla Training and Research Hospital, Muğla, Türkiye
[3]Department of Dermatology, University of Health Sciences Türkiye, Gülhane Faculty of Medicine, Ankara, Türkiye
[4]Clinic of Dermatology, Çorlu State Haspital, Tekirdağ, Türkiye
[5]Department of Family Medicine, Muğla Sıtkı Koçman University Faculty of Medicine, Muğla, Türkiye

Abstract

Aim: Two major earthquakes occurred in Türkiye on sixth February, 2023. Tens of thousands of homeless earthquake victims settled in dormitories across the country. Because this increases the risk of parasitic skin infections, we screened the earthquake victims who were placed in the student dormitory just in case of scabies and the pediculosis capitis epidemic. Here, we describe our screening and prevention strategies for parasitic skin epidemics.

Materials and Methods: We visited all rooms in the student dormitory and performed scabies and pediculosis capitis screening on February 15th to 24th, 2023. All the earthquake victims were questioned regarding signs and symptoms of scabies and pediculosis. If a person had symptoms such as night itching, he/she was examined with a dermoscope to evaluate burrows and lice. When the diagnosis was confirmed, treatment was given to those who were in the room and had contact with the people in the room. The prevalence of scabies and pediculosis was assessed at 5 months after screening.

Results: A total of 1,580 earthquake victims were screened, of which 167 (10.5%) cases of scabies and 67 (4.2%) cases of pediculosis capitis were detected during the screening. Only 42 new cases of scabies and 1 new case of pediculosis were detected among earthquake victims within 5 months after screening. There was a significant decrease in the percentage of parasitic skin infections, ranging from 10.5% to 2.8% for scabies and from 4.2% to 0.06%; respectively.

Conclusion: We believe that screening and detecting cases of scabies and pediculosis capitis and their contacts at an early stage prevented a possible epidemic in our city.

Keywords: Earthquake, scabies, pediculosis capitis

Introduction

Two devastating earthquakes with magnitudes of Mw 7.7 and Mw 7.6 centered in Kahramanmaraş occurred, affecting 11 provinces in the Eastern and Southeastern Anatolia regions of Türkiye on February 6th, 2023. A total of 14 million people living in Türkiye were affected by this disaster, and more than 50,000 people died. Additionally, 1.5 million people had to leave their homes and migrate to places outside the earthquake zone.[1]

Earthquakes are one of the deadliest natural events because they cause devastating consequences, such as loss of life and migration. Besides, earthquakes can create adverse conditions favorable to the emergence of infectious diseases. Oztaş et al.[2] examined the skin of 1,200 survivors, and the most common disease group was reported as parasitic infestations such as pediculosis capitis and scabies, with a rate of 6.5% in this

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Adress for correspondence: Ceyda Tetik Aydoğdu, MD, Department of Dermatology, Muğla Sıtkı Koçman University Faculty of Medicine, Muğla, Türkiye
Email: drctetikaydogdu@gmail.com
ORCID ID: 0000-0002-7192-9066

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population after the 1999 earthquake in Türkiye. Moreover, it has been observed that the prevalence of scabies has been increasing in Türkiye since the coronavirus disease-2019 (COVID-19) outbreak.[3]

We performed a scan for scabies and pediculosis capitis to prevent a possible epidemic among earthquake victims who were placed in student dormitories in our province after the disaster, predicting that an earthquake may cause an increase in parasitic diseases of the skin. In addition, it has been reported that early diagnosis, contact tracing, and early treatment are very important to prevent scabies during the earthquake period.[4] We quickly organized treatment and isolation conditions after screening for this reason. The aim of this study was to evaluate the success of our screening and to provide a guide recommendation for health professionals to prevent parasitic skin diseases.

Materials and Methods

We applied to start a screening program for parasitic diseases of the skin as a group of doctors to the Muğla Training and Research Hospital administration voluntarily to prevent contagious parasitic diseases after the earthquake. We performed scabies and pediculosis capitis screening among earthquake victims who were placed in the student dormitory in our city with a team of three dermatology specialists, two dermatology residents, and three family medicine residents on February 15th to 24th, 2023, after our application was accepted. Ethics committee approval was obtained from the Muğla Sıtkı Koçman University Local Ethics Committee for publishing the results of the scan (approval number: 77, date: 14.08.2023).

A team consisting of a dermatology specialist, a dermatology resident, and a family medicine resident visited all rooms in the dormitory one by one, questioning and examining the individuals staying in each room regarding their signs and symptoms every day for 10 days. People with positive complaints, such as night itching, and all contact points were examined with dermoscopy by a dermatology specialist who was the only person who performed dermoscopy on the team. Only cases in which the parasite was definitively detected by dermoscopy were confirmed to be positive for scabies and pediculosis capitis. When the people staying in the room could not be found, an announcement was made, or the room was re-visited, and the screening was later completed to include as many earthquake victims as possible in the dormitory.

Data such as room number, number of people in the room, and presence of scabies and/or pediculosis capitis were documented. The rooms in which positive cases and their contacts were detected were isolated from other rooms for 10 days. Patients with scabies or pediculosis capitis were informed in their rooms upon diagnosis, and the precautions and treatments to be taken were explained in detail. The scabies information forms that we had prepared were also given to the patients during this period. Appropriate medical treatments were delivered to the detected cases on the same day. An information form was given to the cleaning staff of each block in the dormitory to explain special considerations when washing the laundry. The screening was completed in 10 days, taking into account the average maturation time of scabies and lice mites.

The number of earthquake victim who applied to dermatology outpatient clinics and their reasons were examined retrospectively after they left the dormitory in August, 2023.

Statistical analysis

Data were analyzed using SPSS version 20.0 (IBM® Inc, Chicago, USA). Descriptive statistics were summarized as number, percentage, mean and standard deviation, and median and interquartile range.

Results

A total of 1,580 earthquake victims were screened in the student dormitory in our city on February 15th to 24th, 2023. Of these, 564 (35.6%) were women, 526 (33.2%) were men, and 490 (31%) were children (under 18 years old). A total of 167 (10.5%) scabies and 67 (4.2%) pediculosis capitis cases were detected in 10 days.

The treatment of detected cases and with their contacts was arranged in the dermatology outpatient clinic that was opened in the dormitory and was delivered to the patients on the same day. Treatment was delivered free of charge and quickly to a total of 416 people, including their contacts, and the participants were enabled to apply the treatment on the same days and repeat it within 10 days.

Three hundred and five earthquake victims were evaluated for various dermatological reasons in the dermatology outpatient clinic of our hospital within the following 5 months after screening. It was learned that a total of 1,665 earthquake victims stayed in dormitories. The number of earthquake victims identified as new cases in the post-screening period was 42 for scabies and 1 for pediculosis capitis. Therefore; the frequency of scabies and pediculosis capitis was calculated as 2.8% and 0.06%, respectively, in the 5-month period after the screening (Table 1).

Table 1. Results and epidemiological impact of parasite screening programs

	Scabies	Pediculosis capitis
Patient February 2023	167	67
New cases	42	1
Prevalence (February 2023)	10.5%	4.2%
Incidence (February to July 2023)	2.8%	0.06%

Discussion

Epidemics of parasitic infectious diseases may occur due to homelessness, overcrowding, poor living conditions, inadequate hygiene, difficulties accessing clean water and food, and problems accessing health care after an earthquake.[5] Bayramgürler et al.[6] found the incidence of infection and infestation to be high in the first three months after the earthquake due to damaged infrastructure and unhygienic living conditions. Many earthquake victims were hosted in our city, and some of them were placed in a student dormitory near our hospital after the February 6th, 2023, earthquake in Türkiye. We planned a screening program that started when the students first settled in the dormitories and lasted for 10 days. Almost everyone who resettled in dormitories was reached, and a total of 1,580 earthquake victims were screened in our scabies and pediculosis capitis screening program. In addition, earthquake survivors who arrived later were asked at the entrance of the dormitory whether they had hair or body itching, and if they did, the itchy person and all contacts were directed to the clinic established in the dormitory for treatment. Thus, we attempted to prevent the epidemic of parasitic skin infections reported in previous studies. We found that our screening program for the early detection and treatment of parasitic skin infestations reduced the incidence of this disease after 5 months.

Human scabies is a parasitic skin disease with severe itching caused by the mite *Sarcoptes scabiei var. hominis*. Clinically, itchy skin rash consisting of papules, vesicles, and sometimes nodules located in typical distribution areas, with increased itchiness at night, is typical. Detection of burrows formed in the epidermis by adult female mites is pathognomonic and sufficient for diagnosis.[7] Besides, human pediculosis, an infestation of the skin by lice, is a global public health problem. Pediculosis capitis is the most common lice infestation, and the most common clinical presentation is scalp itching. The diagnosis can be made by observing lice and nits on the scalp with the naked eye.[8] We used clinical findings and UV dermoscopes, which we used as "ball sign" to make an exact diagnosis of scabies and pediculosis capitis.[9]

Scabies can be seen in every country, however it is especially common in tropical countries with limited resources and in areas with high population density. It has been shown that the frequency of scabies increased by almost 3% between 2018 and 2019, and it has been stated that the tendency for outbreaks increased before the COVID-19 pandemic.[3] However, another study reported that the incidence of scabies and pediculosis increased more than two-fold compared with the previous year, in another study.[10] The frequency of scabies was found to be 10.5% and the frequency of pediculosis 4.2% was detected in our screening program. Although this rate is considerably higher than that reported before 2018, it supports the increase reported after the COVID-19 outbreak. However, after the screening, the incidence of scabies decreased to 2.8% and that of pediculosis capitis decreased to 0.06%, close to the general rates before the COVID-19 epidemic, indicating the success of screening.

Four hundred and sixteen earthquake victims were treated for scabies during our screening program. The positive cases were informed in detail about the disease, treatments, and precautions to be taken at the time of diagnosis, while they were still in the room. Individual-based treatment was arranged and delivered to the patients on the same day. 5% permethrin lotion, a ready-to-use lotion containing peru balm-sulfur-benzyl benzoate, and 200 µg/kg ivermectin tablets were used for the treatment of scabies, in accordance with the personal factors of the patients (age, pregnancy, breastfeeding, etc.). Because scabies in children are often not detected early or treated thoroughly, and children have close physical contact with other people, they can be a source of infection.[11] Thus, we preferred ivermectin tablets in the treatment of pediatric cases (>15 kg) to effectively use limited resources and control the disease in the more contagious group. We used fewer tablets than would be needed for adults and avoided the problem of applying too little topical treatment among children; we used our resources effectively to control the disease in this way. 1% permethrin shampoo was also used for the treatment of pediculosis capitis cases. Detailed information about how to apply the treatments was provided to the patients. Positive cases were detected and treated quickly, thus preventing a possible epidemic by limiting transmission with these benefits.

It was observed that some of the earthquake survivors living in dormitories had kinship relationships. Therefore, there could be more frequent contact between them, and they were more likely to come together in shared social environments. Informing relatives about our screening increased their awareness of the existence and transmission of parasitic diseases. Thus, we observed that screening provided benefits not only for detection and treatment but also for prevention.

Study limitations

One of the limitations of this study was the absence of recent studies on the prevalence rates of national scabies and

pediculosis. The decrease in incidence after screening could not be objectively compared with regional or national values for this reason. In addition, the rapid changes in the earthquake victim population in dormitories affected our assessments of incidence rates. This study could have been conducted more objectively with a larger and more stable population, taking into account the attack periods of the disease.

Conclusion

As a result, we conclude that our screening method was effective in controlling the disease quickly and preventing a possible parasitic epidemic. We believe that our findings can guide other health professionals in preventing possible outbreaks of parasitic skin infections during earthquakes.

Footnote

Ethics Committee Approval: Ethics committee approval was obtained from the Muğla Sıtkı Koçman University Local Ethics Committee for publishing the results of the scan (approval number: 77, date: 14.08.2023).

Informed Consent: Retrospective study.

Authorship Contributions

Concept: C.T.A., D.D., A.Y., B.A., T.A.K., S.D.P., E.T.A., B.F., F.D., A.K., E.N.Y., Design: C.T.A., D.D., A.Y., B.A., T.A.K., S.D.P., E.T.A., B.F., F.D., A.K., E.N.Y., Data Collection or Processing: C.T.A., D.D., A.Y., B.A., T.A.K., S.D.P., E.T.A., B.F., F.D., A.K., E.N.Y., Analysis or Interpretation: C.T.A., D.D., A.Y., B.A., T.A.K., S.D.P., E.T.A., B.F., F.D., A.K., E.N.Y., Literature Search: C.T.A., D.D., A.Y., B.A., T.A.K., S.D.P., E.T.A., B.F., F.D., A.K., E.N.Y., Writing: C.T.A., D.D., A.Y., B.A., T.A.K., S.D.P., E.T.A., B.F., F.D., A.K., E.N.Y.

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Orginal Article

Improvement in Skin Hydration Status Following 8% Ajwa Date (*Phoenix dactylifera L.*) Extract Lotion Application: A Clinical Trial on Xerosis Cutis Patients in an Elderly Population

Falensia Dwita Lestari[1], Nurelly N. Waspodo[1], Airin R. Nurdin[1], Farida Tabri[1], Widya Widita[1], Andi Alfian Zainuddin[2]

[1]Department of Dermatology, Hasanuddin University, Wahidin Sudirohusodo Hospital, Makassar, Indonesia

[2]Department of Community Medicine Health, Hasanuddin University Faculty of Medicine, Makassar, Indonesia

Abstract

Aim: Xerosis cutis is expected in the elderly population, which tends to increase. Improving hydration is vital for treating xerosis cutis, including the use of *Phoenix dactylifera L.* or Ajwa dates. In a previous study, a significant increase in skin hydration was observed in participants who received the *Phoenix dactylifera L.* extract. This study aimed to analyze the efficacy of *Phoenix dactylifera L.* lotion 8% to repair the hydration status of patients with xerosis cutis in the elderly population.

Materials and Methods: A comprehensive true experimental study was conducted on eligible individuals with xerosis cutis at our hospital from January to February 2024. Participants received both types of lotion, namely 8% Ajwa dates and base lotion, on the right and left arms twice daily for four consecutive weeks. Before treatment and during the second and fourth weeks, skin hydration status was examined using a corneometer, tewameter, and overall dry skin (ODS) score.

Results: Among the 30 participants, both treatments had the same baseline skin hydration status. Both treatments showed their effect on hydration status through increased corneometer values (both had; $P = 0.001$), decreased tewameter values (both had; $P = 0.001$), and decreased ODS scores (both had; $P = 0.001$). Moreover, a significant difference was observed between the two treatments at each observation time point for the assessed parameters.

Conclusion: Applying *Phoenix dactylifera L.* 8% extract lotion twice daily for 4 weeks can improve hydration in elderly individuals with xerosis cutis.

Keywords: Aged, antioxidant, ichtyosis, phoeniceae, skin diseases

Introduction

Xerosis cutis is clinically characterized by a diminution or impairment in the moisture retention capacity of the stratum corneum, which is a critical component of skin barrier function. The stratum corneum serves as the first line of defense against external insults and is instrumental in minimizing transepidermal water loss (TEWL).[1,2] Epidemiological studies have established a global prevalence rate ranging from 29% to 85%, underscoring its widespread nature.[3] Clinically, xerosis cutis predominantly manifests in the upper extremities and trunk, with a higher frequency in the arms.[4] The foundational management of xerosis cutis involves enhancing cutaneous hydration, rectifying deficiencies in the lipid barrier, and augmenting the overall barrier integrity of the skin. To this end, a regimen encompassing both hydrophilic and lipophilic components is advocated to effectively address the multifactorial pathophysiology of xerosis cutis.[5]

Phoenix dactylifera L., commonly known as Ajwa dates, contains antioxidant compounds that attenuate oxidative stress by reducing free radicals.[6] The lipid content of Ajwa dates ranges from approximately 5-13%, encompassing both saturated and unsaturated fatty acids. Notably,

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Adress for correspondence: Falensia Dwita Lestari, MD, Department of Dermatology, Faculty of Medicine, Hasanuddin University, Wahidin Sudirohusodo Hospital, Makassar, Indonesia

Email: Falensiadwita@gmail.com

ORCID ID: 0009-0005-9235-3616

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lauric and oleic acids are the predominant fatty acids. Additionally, Ajwa dates exhibit a notable presence of tocopherols, tocotrienol, phytosterols, and an array of phenolic constituents, enhancing their nutritional profile.[7] The bioactive components within Ajwa dates, including flavonols, flavones, hydroxycyanidin, polysianidin, phenolates, and diverse phenolic acids, play a pivotal role in the inhibition of free radical production, thereby mitigating cellular damage within the skin matrix.[8] Despite the promising phytochemical profile of Ajwa dates, research exploring their potential therapeutic effects on xerosis cutis, particularly within the geriatric demographic, remains sparse. This investigation aimed to delineate the efficacy of a topical formulation derived from *Phoenix dactylifera L.* in ameliorating skin hydration and improving the clinical manifestations of xerosis cutis in elderly patients.

Materials and Methods

Study Design

In this study, a true experimental with a pre-test and post-test control group was designed to determine the hydration status of the elderly xerosis cutis group who were routinely given 8% Ajwa date extract lotion, compared with those who were given base lotion as the control group. The research was conducted in Makassar City, South Sulawesi, on several elderly individuals from January 2024 to February 2024.

Study Participants

A total of 30 subjects, comprising 19 female and 11 male participants aged 60-65 years with xerosis cutis, were included in the study. The exclusion criteria were patients with systemic diseases, those who had received topical, hormonal, and retinoids, and those with a history of hypersensitivity to Ajwa dates. Furthermore, patients with a documented history of hypersensitivity reactions to Ajwa dates were considered ineligible. Participants were considered to have withdrawn from the study if they failed to consistently apply a 4% formulation of Ajwa date extract lotion (or a base lotion as control) as prescribed or if adverse effects emerged at any point during the investigation.

Ajwa Dates and Base-Lotion Preparation

Prepared 8 kg of round and blackish Ajwa dates and separated between the flesh and seeds. The date flesh is cut and then dried. Next, the data extract is made by maceration using a 96% ethanol solvent at a ratio of 1:2 (1 kg of Ajwa dates in 2 liters of solvent); the solution is left for 3x24 hours, then separated to obtain the filtrate and residue. The obtained ethanol filtrate was evaporated using a rotary vacuum evaporator, thickening the extract in a water bath.

Preparing an Ajwa dates-infused lotion involves a meticulous process that adheres to stringent scientific principles to ensure the compound's stability and efficacy. Initially, precise quantification of the ingredients is essential. These components are segregated into two distinct phases based on their solubility properties and are subjected to controlled heating. The operation occurs in a beaker glass placed over a water bath to maintain a temperature range between 68 °C and 75 °C, facilitating melting. The composition comprises a water phase comprising TEA, glycerin, methylparaben, distilled water, and an oil phase comprising stearic acid, cetyl alcohol, liquid paraffin, and propylparaben. After melting, the oil is transferred to a mortar. Using a swift and consistent stirring technique, the mixture is mixed until homogeneity is achieved. Consequently, the aqueous phase is incrementally incorporated under vigorous stirring to achieve emulsification, which results in a uniform lotion base. The addition of the Ajwa date extract is the final step. This ingredient is meticulously blended into the emulsion to ensure continuous stirring and the formation of a homogenous and stable formulation.

The formulation of 8% Ajwa dates extract lotion is meticulously designed by combining a precise quantity of active and excipient ingredients to create a total batch size of 150 g. The active component, Ajwa date extract, was incorporated at a concentration of 8% w/w, resulting in 12 g of the extract. The excipient framework consisted of 2.5% w/w stearic acid (3.75 grams), serving as the primary emulsifying agent. Cetyl alcohol, included at 0.5% w/w (0.75 grams), functions as a co-emulsifier and stabilizing agent. Triethanolamine (TEA) at a 1% w/w concentration (1.5 grams), is used to adjust the pH and emulsify the lotion. Glycerin, a potent humectant, was added at a 5% w/w concentration (7.5 grams) to enhance skin hydration. Including Nipagin and Nipasol ensures preservation of the formulation, each at a 0.1% w/w concentration (0.15 grams), acting as antimicrobial preservatives. At a 7% w/w concentration (10.5 grams), liquid paraffin served as an occlusive agent, promoting skin barrier function. The vehicle of the lotion was completed with 121.7 grams of distilled water. For control purposes, a base lotion was formulated identically without Ajwa date extract, serving as a comparative standard for evaluating the therapeutic efficacy of the active ingredient. This meticulous formulation ensures a stable and efficacious product suitable for clinical evaluation.

Intervention Procedure

The subjects in the research were interviewed directly using a prepared questionnaire to collect data on the identity, characteristics, and history of the subjects who signed the

informed consent form. Patients were assessed for epidermal moisture and TEWL using a Corneometer CM 825 (Courage + Khazaka, Cologne, Germany) and a Tewameter TM300 (Courage + Khazaka, Cologne, Germany) at a predetermined location. The examination room was initially prepared with a temperature of approximately 200 °C, relative humidity of 40-60%, and adequate lighting. After that, participants were asked to rest for 10-20 minutes before being examined by leaving the anterior side of the forearm to be examined open. Measurements were also performed on rinsed skin approximately 2 h after the application of Ajwa dates 8% cream. Measurements were taken three times in a row at 5 second intervals under the same pressure. These values were calculated as mean and were recorded as skin hydration and TEWL values. The hydration levels of the skin can be categorized based on their corneometer readings: Values less than 35 indicate a dehydrated skin condition; values ranging from 35 to 50 denote dry skin; and values greater than 50 suggest the skin falls within the normal hydration range. TEWL can be accurately measured using a tewameter. A value less than 8 g/h/m^2 indicates decreased TEWL, reflecting potentially impaired barrier function or underactive transepidermal water movement. Values maintained between 8 and 15 g/h/m^2 are considered normal, indicating a healthy equilibrium of water loss and an effective barrier function. Conversely, TEWL values greater than 15 g/h/m^2 denote increased TEWL, indicating excessive water loss likely due to compromised barrier integrity or heightened transepidermal water migration.

The degree of xerosis cutis was also assessed using the overall dry skin (ODS) score. The parameters that will be evaluated are 0 when there is no dry skin (xerosis), 1 when fine scales, minimal dry and dull skin, 2 when fine-medium scales, light rough skin, and whitish skin color appearance, 3 when fine-rough scales are uniformly distributed, rough skin is visible, mild redness, and some superficial cracks, 4 when dominated by rough scales, rough skin is visible, redness, eczematous changes, and cracks.

The patients were given two types of lotion; the right arm was treated with topical 8% Ajwa date extract lotion, and the left arm was treated with topical base lotion. The patients were instructed to apply the right arm and base lotion to the left arm twice daily for four consecutive weeks. Patients were re-examined at week two and week 4, using a Corneometer CM 825 and Tewameter TM300 at the predetermined location (using mica paper). In addition, the ODS was measured for comprehensive analysis.

Ethical Consideration

Each respondent who met the inclusion criteria had their identity recorded and received information, as well as a detailed explanation of what would be done during the study. Furthermore, the participants were asked for their willingness to be involved in the study by signing an informed consent letter. The Health Research Ethics Committee of Hasanuddin University Faculty of Medicine (approval number: 64/UN4.6.4.5.31/PP36/2024; protocol number: UH23120891, date: 25.01.2024) evaluated and approved the entire research protocol. No personal data were obtained, and confidentiality was ensured.

Statistical analysis

The initial examination involved a comprehensive analysis of the frequency distribution, mean, standard deviation, and range. To substantiate the normality of the sample, the Kolmogorov-Smirnov test was applied meticulously, ensuring robust assessment of distribution characteristics. Given the deviation from the normal distribution observed within the data, our statistical methodology was carefully curated to address non-parametric conditions. The Friedman test was strategically employed to analyze more than two related samples, providing a powerful alternative to parametric equivalents by not assuming a normal distribution. Comparative analysis between two related samples necessitated the application of the Wilcoxon signed-rank test, which is recognized for its efficacy in handling non-parametric data. In scenarios necessitating the comparison of two independent samples, the selection of statistical tests was predicated on the data distribution characteristics. The independent samples t-test was deemed appropriate for datasets adhering to normality, providing precise metrics for evaluating mean differences between groups. Conversely, the Mann-Whitney U test was utilized for datasets that deviated from the normal distribution, facilitating a robust comparison that did not hinge on distributional assumptions. Statistical significance was determined using a threshold P value of ≤ 0.05, underscoring the rigorous criteria for assessing the reliability of findings. All statistical procedures were executed within the SPSS version 23.0 (IBM Software, USA).

Results

The total number of subjects included in this study was 30 samples. No participants who experienced side effects or did not complete the entire lotion application schedule were excluded from the study. The baseline characteristics of the participants are presented in Table 1. The mean age of the subjects was 62.03±1.59 years, and the majority were female 63.33% of the sample.

Table 2 compares the chronometer values at all measurement times and intervention groups. At weeks 2 and 4, the arm

treated with 8% Ajwa date extract lotion had a significantly higher corneometer score than the arm treated with base lotion ($P < 0.05$). The results of the Friedman test showed a significant difference in the average corneometer scores at weeks 0, 2, and 4 for arms treated with 8% Ajwa date extract lotion and base lotion ($P < 0.05$).

Table 3 compares the tewameter values at all measurement times and intervention groups. In weeks 2 and 4, the results showed that the arm treated with 8% Ajwa date extract lotion had a significantly lower tewameter score than the arm treated with base lotion ($P < 0.05$). The results of the Friedman test showed a significant difference in the average tewameter scores at weeks 0, 2, and 4 for arms treated with 8% Ajwa date extract lotion and base lotion ($P < 0.05$).

Table 1. Baseline characteristics of study participants

Characteristics	Mean ± SD/n(%)
Age (years)	62.03±1.59
Gender	
Male	11 (36.67%)
Female	19 (63.33%)

SD: Standard deviation

Table 4 compares the ODS scores at all measurement times and intervention groups. In weeks 2 and 4, the results showed that the arm treated with 8% Ajwa date extract lotion had significantly lower ODS scores than the arm treated with base lotion ($P < 0.05$). The results of the Friedman test showed a significant difference in the average ODS scores at weeks 0, 2, and 4 for arms treated with 8% Ajwa date extract lotion and base lotion ($P < 0.05$).

Discussion

Aging induces numerous physiological alterations in cutaneous structures that significantly impact the dermatological health of individuals aged > 60 years. One of the most prevalent outcomes of aging is xerosis, which has profound implications for skin integrity and function. Central to this process is the role of the stratum corneum, predominantly composed of differentiated keratinocytes, which function as a critical barrier against environmental insults and water loss.[9] The deterioration in barrier function observed with advancing age can be attributed to several fundamental changes: a reduction in the lipid content on the skin surface, a decline in the rate of keratinocyte proliferation, and alterations in the composition

Table 2. Comparison of corneometer results according to time and intervention

Time of measurement	8% Ajwa date extract lotion	Base lotion	p[b]
	Mean ± SD	Mean ± SD	
Week-0	44.03±6.44	43.39±6.06	0.311
Week-2	71.61±14.01	62.88±6.65	0.007*
Week-4	104.84±12.30	86.94±7.19	0.001*
p[a]	0.001*	0.001*	

[a]Friedman test, [b]Mann Whitney test, *significantly different at $P < 0.05$. SD: Standard deviation

Table 3. Comparison of tewameter scores according to time and intervention

Time of measurement	8% Ajwa date extract lotion	Base lotion	p[b]
	Mean ± SD	Mean ± SD	
Week-0	13.59±1.11	14.14±1.12	0.060
Week-2	10.93±1.13	12.11±1.11	0.001*
Week-4	8.59±0.72	10.43±0.93	0.001*
p[a]	0.001*	0.001*	

[a]Friedman test, [b]Mann Whitney test, *significantly different at $P < 0.05$. SD: Standard deviation

Table 4. Comparison of ODS results according to time and intervention

Time of measurement	8% Ajwa date extract lotion	Base lotion	p[b]
	Mean ± SD	Mean ± SD	
Week-0	2.00±0.79	2.03±0.81	0.869
Week-2	1.10±0.61	1.50±0.68	0.027
Week-4	0.30±0.47	1.00±0.53	0.001*
p[a]	0.001*	0.001*	

[a]Friedman test, [b]Mann-Whitney U test, *significantly different at $P < 0.05$. SD: Standard deviation, ODS: Overall dry skin

of the stratum corneum. These changes lead to enhanced TEWL and compromised skin moisture retention.[3]

Most patients with xerosis cutis in this study were female, accounting for 63.33%. These results are consistent with a previous study, which found that 15.49% of men and 84.51% of women had xerosis cutis. Similar findings were reported in another study, which showed that 99.1% of geriatric patients suffered from xerosis cutis, of whom 67.7% were women. This gender difference is attributed to higher and more stable sebum production in men than in women. Additionally, it has been reported that men's hand skin has a thicker dermis, whereas women's skin has a thinner hypodermi.[3,10] Ceramide decreases with age and vary based on sex and endocrine factors, such as hormones in women.[5] The number of estrogen receptors is higher in women than in men. Estrogen increases dermal hyaluronic acid levels, resulting in increased water content in the dermis. Estrogen deficiency accelerates xerosis. These changes are caused by structural alterations in the skin, such as decreased collagen content, dermal thickness, and elastin fibers.[11] Estrogen deficiency also contributes to skin dryness.[12]

Xerosis cutis is characterized by diminished hydration within the stratum corneum, leading to an inability of the stratum corneum to maintain an optimal water concentration gradient between the viable epidermal cells and the skin surface. This condition is characterized by a series of physiological changes, including reduced sebum and sweat production, inadequate cellular turnover, compromised functionality of the skin barrier, and escalation in TEWL.[13] The fundamental strategies for the topical management of xerosis cutis include enhancing skin hydration, addressing deficits in the lipid barrier, and fortifying the integrity of the skin barrier. Effective skin care regimens should focus on restoring the stratum corneum, leveraging natural moisturizing factors (NMF) present in corneocyte, and improving the functionality of the associated intercellular lipid matrix. The goal of optimal topical management for xerosis cutis is to closely replicate or rehabilitate the diverse constituents of the skin's protective barrier, thereby reinstating its protective function.[5]

Xerosis cutis, or dryness of the epidermal layer of the skin, caused by the stratum corneum, is characterized by a decrease in the quality and quantity of hydrophilic substances and lipids. Reduced hydration in the skin layers disrupts the normal regulation of skin homeostasis. Although normal in small amounts, water molecules lost from the stratum corneum can be dangerous if the amount exceeds the limit. This can result in NMF dysfunction in the stratum corneum, leading to skin moisture loss. NMF plays a crucial role in maintaining hydrated structures under conditions of disrupted hydration. The lipid matrix of the stratum corneum enclosing the corneocyte layer periodically desquamates to maintain a healthy skin texture. Skin-barrier dysfunction causes the skin to experience dryness beyond normal limits and cannot prevent excessive moisture loss due to the stratum corneum.[11]

Effective management of xerosis, which is characterized by dry, rough, and scaly skin, focuses on enhancing barrier function and augmenting stratum corneum hydration. Within the stratum corneum, lipids-comprising ceramides, fatty acids, and cholesterol in roughly equal molar ratios-are vital in maintaining cutaneous barrier permeability and in various physiological and pathological states. These lipids form orderly, dense, flattened arrays within the stratum corneum, which contribute to its barrier properties.[14] The physiology of skin lipids and NMF undergo changes associated with aging, potentially leading to xerosis, even in the absence of overt dermatologic conditions among the elderly population. In this context, moisturizers that incorporate lipids and NMF are recognized for their efficacy in treating xerosis, thereby beneficial for aging and pathologically affected skin.[15] These formulations act by depositing a lipophilic layer over the skin surface and replenishing the intercellular lipid matrix, thus enhancing the skin barrier function.[5] In light of these findings, formulations such as lotions infused with Ajwa date extract, which is rich in beneficial lipids, are promising therapeutic approaches. By replenishing the intercellular lipid matrix, these lotions may facilitate the improvement of skin-barrier functionality, providing a novel intervention for effectively managing xerosis.

Ajwa dates are reported to contain bioactive compounds, including flavonoids, such as flavanols, flavonols, flavones, hydroxycinnamates, polysianidins, phenolates, and phenolic acids, that inhibit the production of free radicals that cause cell damage to the skin.[5,16] The types of polyphenols in Ajwa dates include phenolic acids, flavonoid glycosides, hydroxycinnamates, and proanthocyanidin oligomers. There was a strong relationship between the total phenol content and the antioxidant activity of Ajwa dates. Phenolic content can significantly reduce intracellular ROS content.[17,18]

The polyphenol content has a high level of polymerization, thus providing an antilipidemic effect, which is the basis for xerosis cutis due to reduced natural barrier function or a lack of moisturizing factors in the skin. Polyphenols, such as flavonoids, can also prevent skin fibroblasts from aging by targeting cellular pathways that are important for modulating cellular aging and the secretion of senescence-associated secretory phenotypes. The efficacy of polyphenols on dry and aging skin fibroblasts is primarily attributed to Ajwa dates, which can reduce ROS and inflammation. Topical administration of flavonoids has been shown to increase skin hydration by increasing aquaporin expression.[16]

Ajwa dates comprise a notable concentration of tocopherol, averaging 70.75 mg per 100 g, with a distribution of isomers where α-tocotrienol predominates at 30.19%, followed by γ-tocopherol at 23.61%, γ-tocotrienol at 19.07%, and α-tocopherol at 17.52%. These dates are also rich in phenolic compounds and tocopherols, and they are recognized for their potent antioxidant properties. These bioactive components are critical for modulating several physiological processes, including the maintenance of skin barrier homeostasis, modulation of inflammatory responses, and facilitation of wound repair mechanisms. Of particular interest is the role of γ-tocopherol, found in higher concentrations in Ajwa dates than in other sources. This isomer exhibits superior efficacy over α-tocopherol in the human epidermis by inhibiting the synthesis of prostaglandin E2 and nitric oxide. Moreover, it provides protective measures against water loss, UVB-induced lipid peroxidation, and oxidative stress, thereby contributing to the epidermis's integrity and protective barrier function.[7,18]

Study limitations

Prior research has not explored the impact of topical application of 8% Ajwa date extract lotion on xerosis cutis in elderly individuals, presenting a novel aspect of this investigation. However, the study is subject to certain limitations, including the exclusive use of a single vehicle and the concentration of the intervention. The study did not include a control group comprising healthy subjects for comparison. In addition, further analyses need to be conducted, including emulsion stability tests, antioxidant capacity tests, fatty acid analysis, toxicity testing, formulation development, and patch testing, to ensure the efficacy and safety of this lotion.

Conclusion

Applying 8% Ajwa date extract lotion can improve hydration in elderly patients with xerosis cutis. Similar studies can be conducted using various Ajwa date vehicles and by varying the concentration of Ajwa date extract in the vehicle to optimize the hydration status effects.

Footnote

Ethics Committee Approval: The Health Research Ethics Committee of Hasanuddin University Faculty of Medicine (approval number: 64/UN4.6.4.5.31/PP36/2024; protocol number: UH23120891, date: 25.01.2024) evaluated and approved the entire research protocol.

Informed Consent: The subjects in the research were interviewed directly using a prepared questionnaire to collect data on the identity, characteristics, and history of the subjects who signed the informed consent form.

Authorship Contributions

Concept: F.D.L., N.N.W., A.R.N., F.T., W.W., A.A.Z., Design: F.D.L., N.N.W., A.R.N., F.T., W.W., A.A.Z., Data Collection or Processing: F.D.L., Analysis or Interpretation: F.D.L., N.N.W., A.R.N., F.T., W.W., A.A.Z., Literature Search: F.D.L., Writing: F.D.L., N.N.W., A.R.N., F.T., W.W., A.A.Z.

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Orginal Article

Investigation of Gait Characteristics and Factors Affecting Gait in Children with Atopic Dermatitis

Furkan Sarıkurt[1], Betül Demir[2], Gürkan Akgol[3], Serkan Kırık[4], Demet Çiçek[2], Yunus Güral[5]

[1]Clinic of Dermatology, Ankara Etlik City Hospital, Ankara, Türkiye
[2]Clinic of Dermatology, Fırat University Hospital, Elazığ, Türkiye
[3]Clinic of Physical Medicine and Rehabilitation, Fırat University Hospital, Elazığ, Türkiye
[4]Clinic of Pediatric Neurology, Elazığ Fethi Sekin City Hospital, Elazığ, Türkiye
[5]Department of Statistics, Fırat University Faculty of Sciences, Elazığ, Türkiye

Abstract

Aim: Atopic dermatitis (AD) is a chronic inflammatory disease. This study aimed to investigate gait characteristics and possible factors affecting gait in children with AD using Win-Track gait analysis.

Materials and Methods: A total of 100 children, including 50 patients with AD, were diagnosed according to Hanifin Rajka criteria and 50 controls aged 7-16 years in this study. The Scoring of Atopic Dermatitis (SCORAD) index was calculated, and the body mass index (BMI) was determined. Serum immunoglobulin E (IgE), vitamin B12, and vitamin D levels were examined, and Win-Track gait analysis was performed.

Results: Among the gait parameters, the median (minimum-maximum) maximum foot pressure on the left was 625.00 (412-872) in patients and 686.50 (466-890) in the controls ($P = 0.006$). The median step length on the right was 527.00 (258-640) in patients and 555.00 (422-672) in the controls ($P = 0.012$). Angle on the right was higher on the right side 7-11 age median 3.67 (1.49-11.31) compared to the 12-16 age median 1.51 (0-3.5) in those with moderate and severe SCORAD index ($P < 0.05$).

Conclusion: Low foot pressure on the non-dominant limb side and short stride length on the dominant limb side were determined in patients with AD a gait characteristic different from those of controls. Gait parameters were found to be affected by increased disease severity, BMI, serum IgE, and vitamin D levels in patients with AD.

Keywords: Atopic dermatitis, gait, SCORAD, win-track

Introduction

Atopic dermatitis (AD) is a chronic inflammatory disease characterized by erythematous, squamous, and itchy skin lesions.[1] AD has been defined not only as a collection of skin manifestations but also as a pattern of reaction to allergens.[2] It has been shown that children and adolescents with AD have longer eyelashes than non-atopic controls and that long eyelashes may be a phenotypic feature of allergic disease.[3] Allergic comorbidities, such as AD asthma and allergic rhinitis, as well as cutaneous bacterial/viral diseases, ichthyosis vulgaris, keratoconjunctivitis, cataract, autoimmune diseases, such as alopecia areata/vitiligo, obesity, metabolic syndrome, cardiovascular and gastrointestinal immune-mediated disorders, anemia and lymphoma. Mental disorders, insomnia, hyperactivity, autism, speech disorders, and anxiety/depression have been reported in patients with AD.[4-6] Decreased bone mineral density has been found in adult patients with moderate to severe AD and has been attributed to the long-term use of topical corticosteroids or the chronic inflammatory nature of the disease.[7] Decreased bone mineral density has also been found in malnourished children

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Adress for correspondence: Betül Demir, MD, Clinic of Dermatology, Fırat University Hospital, Elazığ, Türkiye
Email: drbkaraca@yahoo.com
ORCID ID: 0000-0002-6190-5124

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with AD.[8] Garg et al.[9] also reported that bone fractures and joint injuries were more common in adult AD patients. Especially in children with AD, the risk of accidents is higher. These conditions are believed to be associated with disease severity and uncontrolled disease.[10]

Gait is the most important human skill, and loss of the ability to walk is recognized as a loss of quality of life.[11] Normal gait requires precise control of limb movements, posture, and muscle tone, which is an extraordinarily complex process involving the entire nervous system.[12] Assessment of gait parameters can provide insight into general health or help to identify an underlying pathology.[13] In this study, the demographic, clinical, and laboratory parameters of children with AD, gait characteristics, and possible factors that may affect gait were examined using the Win-Track gait platform.

Materials and Methods

In this study, the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and the Helsinki Declaration. This study was conducted in the clinics of Dermatology, Physical Medicine and Rehabilitation, and Pediatric Neurology after obtaining approval from the Fırat University Local Ethics Committee (approval number: E-97132852-050.01.04-7053, date: 06.01.2021). The parents of all participants were informed, and a consent form was filled out and approval was obtained. Fifty patients between the ages of 7-16 with AD were diagnosed according to Hanifin Rajka criteria and did not have any systemic disease and/or did not use systemic drugs and 50 controls a total of 100 participants were included in the study. Body mass index (BMI) was determined according to pediatric reference of percentile values (< 5 = weak, 5-85 = normal, 86-95 = overweight, > 95 = obese).[14] The Scoring of Atopic Dermatitis (SCORAD) Index was calculated (< 25 = mild, 25-50 = moderate, > 50 = severe).[15] Participants with lower extremity anomalies or dermatologic lesions such as viral warts, calluses, and ulcers on the soles of the feet and pes planus, patients with a diagnosis of neurological disease or rheumatologic diseases, and patients using any systemic medication that may affect gait were excluded from the study.

Gait analysis of all participants was performed on the Win-Track gait platform (MEDICAPTEURS Technology, France).[16] During the study, participants were asked to take 3 steps forward outside the platform by following the 3-step protocol. At the end of these steps, the point at which the third heel touched was marked, and this point was accepted as the starting point. Participants were asked to look forward and gait at a comfortable pace on the platform, be full, and gait after a period of rest to avoid the effects of hunger and fatigue.

Serum immunoglobulin E (IgE), vitamin B12, and vitamin D levels examinated. For serum total IgE (IU/mL) (< 90 = normal for 7-9 years old; < 200 = normal for 10-15 years old; < 100 = normal for 16 years old) and vitamin B12 (pg/mL) (174-878) levels, the reference values classified according to age by the hospital were taken into consideration. The literature was taken into consideration in determining reference intervals for serum vitamin D (µg/L) levels (< 5 is severe deficiency, 5-15 is mild-moderate deficiency, 16-20 is insufficient, 21-100 is sufficient).[17]

Statistical analysis

The Statistical Package for Social Sciences (SPSS Inc., Chicago, IL) 22 package program was used for the analyses. Descriptive data are presented as (n) and (%) values for categorical data and mean ± standard deviation and median (minimum-maximum) values for continuous data. The chi-square test was used to compare categorical variables between groups. The Shapiro-Wilk Goodness of Fit test and the Kolmogorow-Smirnov test were used to test whether the data fit the normal distribution. Because the data did not fit the normal distribution, the Mann-Whitney U test was used for the comparison of two groups, and the Kruskal-Wallis test was used for the comparison of more than two groups.

Results

The mean age was 10.80±2.9 years in the patients and 11.08±2.6 years in controls. Demographic characteristics, clinical findings, SCORAD index, BMI, IgE, vitamin D, vitamin B12 categories, dominant extremity characteristics of the patient and control groups are presented in Table 1. Vitamin B12 values were found to be statistically significantly higher in the patient group (388.00±119.52 than in the control group (304.46±92.62) ($P < 0.05$). There was no significant differences BMI, and other laboratory parameters ($P > 0.05$). The odds ratios (OR) were 2.92 for IgE and 1.6 for vitamin D in patients and controls. In the patients, the OR for the SCORAD index and age category were 1.12, for SCORAD index and IgE category was 0.62, and for SCORAD index and vitamin D category was 1.90.

Among the gait parameters, the median (minimum-maximum) maximum foot pressure on the left was 625.00 (412-872) in patients and 686.50 (466-890) in the controls ($P = 0.006$). The median step length on the right was 527.00 (258-640) in patients and 555.00 (422-672) in the controls ($P = 0.012$). The median (minimum-maximum) angle on the right was 3.26 (0-11.31), in the patients with moderate and severe SCORAD index and 6.34 (0-45) in patients with mild SCORAD index ($P < 0.05$). There was no difference between gender and the

gait parameters in the patients ($P > 0.05$). The gait parameters according to age, BMI, and vitamin D categories in the patients are presented in Tables 2-4, respectively. 3rd step mean pressure was lower in the patients with normal IgE [718 (457-1030)] than in the patients with high IgE [798 (524-1016)], and step duration on the right was higher in the patients with normal IgE [600 (450-800)] than in the patients with high IgE [550 (270-690)] ($P < 0.05$). The total and forefoot areas on the right and 2nd step average pressure were lower in those with normal BMI compared with those with overweight and obesity in those with mild SCORAD index ($P < 0.05$).

In patients with mild SCORAD index and high IgE, 3rd step average pressure was higher and step duration on the right side was lower than that in patients with normal IgE ($P < 0.05$). No difference was detected in the IgE category between the groups with moderate and severe SCORAD index ($P > 0.05$). The gait parameters according to the SCORAD and vitamin D categories of the patients are presented in Table 5.

Discussion

The dominant limb was recorded as the right limb in the majority of patients with AD and controls in this study. Among the gait parameters, the maximum foot pressure and stride length were lower on the left and right in patients with AD. It was thought that low foot pressure on the non-dominant limb side and short stride length on the dominant limb side in patients with AD may be gait characteristics that differ from controls. The angle was lower on the right side in patients with moderate and severe SCORAD index. The increased disease severity may have contributed to the decreased angle on the dominant limb side. Moreover, the angle was lower on the right side in patients aged 12 years with moderate and severe SCORAD index. When the SCORAD index and age were evaluated together in the patients, it was thought that the effect of age on the gait parameters was independent of the SCORAD index.

Similar pathophysiologic mechanisms are believed between obesity and AD. Skin-barrier dysfunction and microbiota alterations in AD are also associated with obesity.[18]

Table 1. Demographic characteristics, clinical findings, SCORAD index, BMI, IgE, vitamin D, vitamin B12 categories, dominant extremity characteristics of the patient and control groups

Parameter		Group: Patient (n, %)	Group: Control (n, %)
Gender	Female	24 (48)	17 (34)
	Male	26 (52)	33 (66)
The age category	7-11	29 (58)	29 (58)
	12-16	21 (42)	21 (42)
Localization of dermatological lesions	Head-neck	43 (86)	
	Body	12 (24)	
	Upper extremity	20 (40)	
	Lower extremity	27 (54)	
	Genitalia	1 (2)	
	Nail	13 (26)	
Dermatological findings	Erythema	15 (30)	
	Edema/papule	7 (14)	
	Wet/crust	4 (8)	
	Excoriation	18 (36)	
	Lichenification	8 (16)	
	Xerosis	32 /64)	
	Dennie Morgan's lines	33 (66)	
	Orbital darkening	43 (86)	
SCORAD* index	Light	35 (70)	
	Moderate-severe	15 (30)	
BMI† category	Underweight	6 (3)	4 (8)
	Normal	34 (68)	33 (66)
	Overweight and obese	10 (20)	13 (26)
IgE‡ category	Normal	26 (52)	38 (76)
	High	24 (48)	12 (24)
The vitamin D category	Normal	32 (64)	37 (74)
	Mild/medium low and low	18 (36)	13 (26)
The vitamin B12 category	Normal	46 (92)	44 (88)
	Low	4 (8)	6 (12)
Dominant extremity	Right	46 (92)	45 (90)
	Left	4 (8)	5 (10)

*Scoring of atopic dermatitis, BMI†: Body mass index, IgE‡: Immunoglobulin E, SCORAD: The Scoring of Atopic Dermatitis

Table 2. Gait parameters according to the age group category in the patients

Parameter	Age category (50): 7-11 (29) Median (minimum-maximum)	Age category (50): 12-16 (21) Median (minimum-maximum)	*P* value
Body weight (kg)	32.00 (18-67)	49.00 (26-108)	**0.000**
Body weight distribution right (kg)	16.50 (9-31)	23.50 (14-54)	**0.000**
Body weight distribution left (kg)	16.50 (9-36)	25.50 (12-54)	**0.000**
Gait cycle length to the right (mm)	1015.00 (0-1242)	1046.00 (0-1265)	0.153
Gait cycle length left sol (mm)	1039.00 (765-1242)	1152.00 (0-1265)	**0.002**

Table 2. Continued

Parameter	Age category (50)		*P* value
	7-11 (29)	12-16 (21)	
	Median (minimum-maximum)		
Gait cycle duration at right (ms)	0.00 (0-1440)	0.00 (0-1350)	0.708
Gait cycle duration left (ms)	1010.00 (0-450)	0.00 (0-0)	0.214
Total right area (cm^2)	54.00 (34-102)	71.00 (37-121)	**0.001**
Total area left (cm^2)	57.00 (30-101)	77.00 (35-126)	**0.001**
Forefoot area to the right (cm^2)	25.50 (13-49)	37.00 (15-61)	**0.040**
Left forefoot area (cm^2)	26.00 (12-51)	39.00 (11-60)	**0.005**
Hindfoot area to the right (cm^2)	26.50 (17-53)	37.00 (18-74)	**0.001**
Left hindfoot area (cm^2)	29.00 (12-60)	37.00 (18-74)	**0.006**
1st step area (cm^2)	91.00 (41-130)	114.00 (65-195)	**0.005**
2nd step area (cm^2)	88.50 (54-147)	118.00 (40-197)	**0.000**
3rd step area (cm^2)	89.00 (59-142)	117.00 (68-153)	**0.000**
Maximum right pressure (g/cm^2)	631.50 (412-930)	704.50 (493-1157)	**0.013**
Maximum pressure left (g/cm^2)	634.00 (412-890)	668.50 (475-872)	**0.018**
1st step maximum pressure (g/cm^2)	1453.00 (1110-1962)	1558.00 (1069-2605)	**0.003**
2nd step maximum pressure (g/cm^2)	1364.50 (854-1846)	1534.50 (1143-2239)	**0.002**
3rd step maximum pressure (g/cm^2)	1339.50 (845-1846)	1481.50 (1089-2792)	**0.008**
Average right pressure (g/cm^2)	295.50 (225-419)	33.50 (240-469)	**0.012**
Average pressure left (g/cm^2)	306.50 (206-431)	341.00 (248-454)	**0.006**
1st step average pressure (g/cm^2)	809.00 (528-981)	840.50 (606-1170)	**0.024**
2nd step average pressure (g/cm^2)	758.50 (465-993)	831.50 (653-1098)	**0.003**
3rd step average pressure (g/cm^2)	731.50 (457-953)	779.00 (599-1030)	**0.026**
Step length right (mm)	519.00 (258-640)	578.00 (336-672)	**0.003**
Step length left (mm)	525.00 (320-656)	578.00 (305-640)	**0.001**
Step duration right (ms)	530.00 (270-700)	595.00 (340-800)	**0.017**
Left step duration (ms)	530.00 (220-740)	580.00 (200-790)	**0.001**
Single-stance duration right (ms)	0.00 (0-500)	0.00 (0-450)	0.440
Single-stance duration left (ms)	0.00 (0-450)	0.00 (0-0)	**0.047**
Double-stance duration right (ms)	0.00 (0-320)	0.00 (0-360)	0.581
Double-stance duration left (ms)	200.00 (0-340)	240.00 (0.450)	0.278
Swing duration right (ms)	1165.00 (980-1580)	1280.00 (820-1490)	**0.003**
Swing duration left sol (ms)	1150.00 (890-1470)	1265.00 (970-1750)	**0.000**

Table 3. Gait parameters according to the BMI category in the patients

Parameter	BMI category (50)			*P* value
	Underweight (6)	Normal (34)	Overweight and obese (10)	
	Median (minimum-maximum)			
Body weight (kg)	29.00 (21-50)	37.00 (18-67)	49 (25-108)	0.141
Body weight distribution right (kg)	15.50 (10-23)	19.00 (9-35)	25.00 (12.54)	0.143
Body weight distribution left (kg)	14.00 (10-72)	20.00 (9-36)	25.00 (13.54)	0.164
Gait cycle length to the right (mm)	1027.00 (0-1218)	1015.00 (0-1265)	1015.00 (0-1242)	0.171
Gait cycle length left sol (mm)	1054.00 (883-1218)	1078.00 (0-1265)	1101.00 (867-1242)	0.345
Gait cycle duration at right (ms)	0.00 (0-1160)	0.00 (0-1440)	0.00 (0-1150)	0.553
Gait cycle duration left (ms)	1125.00 (0-1300)	1020.00 (0-1360)	1010.00 (0-1550)	0.580
Total right area (cm^2)	44.50 (35-72)[a]	61.00 (34-101)[a]	71.00 (49-121)[b]	**0.019**
Total area left (cm^2)	42.50 (30-77)	61.00 (34-102)	79.00 (47-126)	0.064

Table 3. Continued

Parameter	BMI category (50)			*P* value
	Underweight (6)	Normal (34)	Overweight and obese (10)	
	Median (minimum-maximum)			
Forefoot area to the right (cm^2)	19.00 (15-44)[a]	29.00 (13-61)[a]	36.00 (18-59)[b]	**0.030**
Left forefoot area (cm^2)	20.50 (11.46)	31.00 (12-59)	34.00 (20-60)	0.183
Hindfoot area to the right (cm^2)	26.00 (17-40)[a,b]	29.00 (18-52)[a]	40.00 (23-77)[b]	**0.042**
Left hindfoot area (cm^2)	27.00 (17-42)[a,b]	32.00 (12-61)[a]	43.00 (27-74)[b]	**0.049**
1st step area (cm^2)	34.50 (63-112)	96.00 (41-149)	112.00 (69-195)	0.070
2nd step area (cm^2)	94. (40-121)50	93.00 (59-138)	113.00 (70-197)	0.131
3rd step area (cm^2)	93.00 (59-117)[a,b]	93.00 (60-145)[a]	113.00 (71-153)[b]	**0.044**
Maximum right pressure (g/cm^2)	669.00 (561-865)	650.00 (412-1001)	719.00 (491-1157)	0.185
Maximum pressure left (g/cm^2)	731.50 (587-848)[a]	633.00 (412-880)[b]	651.00 (509-890)[a,b]	**0.023**
1st step maximum pressure (g/cm^2)	1461.00 (1069-1719)	1501.00 (1110-2605)	1514.00 (1148-2001)	0.507
2nd step maximum pressure (g/cm^2)	1364.50 (11.90-1652)[a,b]	1439.00 (854-2239)[a]	1535.00 (1175-2228)[b]	**0.024**
3rd step maximum pressure (g/cm^2)	1353.00 (1123-1648)	1411.00 (845-2792)	1438.00 (965-1886)	0.288
Average right pressure (g/cm^2)	317.00 (280-375)	300.00 8225-469)	317.00 (240-451)	0.327
Average pressure left (g/cm^2)	340.50 (251-391)	306.00 (206-421)	325.00 (248-454)	0.073
1st step average pressure (g/cm^2)	778.00 (606-980)	819.00 (528-998)	835.00 (594-1107)	0.326
2nd step average pressure (g/cm^2)	774.00 (617-889)[a,b]	773.00 (465-999)[a]	849.00 (661-1098)[b]	**0.041**
3rd step average pressure (g/cm^2)	692.00 (553-885)	749.00 (457-1030)	799.00 (591-1016)	0.167
Step length right (mm)	539.00 (336-617)	539.00 (258-672)	555.00 (437-640)	0.358
Step length left (mm)	554.50 (461-633)	539.00 (305-640)	539.00 (422-656)	0.080
Step duration right (ms)	570.00 (340-670)	560.00 (270-740)	580.00 (430-800)	0.787
Left step duration (ms)	570.00 (500-630)	560.00 (200-740)	540.00 (330-790)	0.732
Single-stance duration right (ms)	0.00 (0-440)	0.00 (0-500)	0.00 (0-390)	0.506
Single-stance duration left (ms)	0.00 (0-0)	0.00 (0-450)	0.00 (0-430)	0.686
Double-stance duration right (ms)	0.00 (0-260)	0.00 (0-360)	0.00 (0-260)	0.420
Double-stance duration left (ms)	215.00 (0-300)	200.00 (0.410)	250.00 (0-450)	0.403
Swing duration right (ms)	1245.00 (820-1370)	1210.00 (990-1580)	1220.00 (980-1360)	0.749
Swing duration left sol (ms)	1255.00 (1000-1430)	1190.00 (890-1550)	1230.00 (940-1750)	0.610

There was a significant difference between groups that did not have the same letter ($p<0.05$). BMI: Body mass index

Table 4. Gait parameters according to the vitamin D category in the patients

Parameter	Vitamin D category (n)		*P* value
	Mild/moderate low and low (18)	Normal (32)	
	Median (minimum-maximum)		
Body weight (kg)	42.00 (25-108)	36.00 (18-67)	**0.019**
Body weight distribution right (kg)	21.50 (13-54)	17.00 (9-31)	**0.012**
Body weight distribution left (kg)	21.00 (11-54)	18.00 (9-36)	**0.044**
Gait cycle length to the right (mm)	1027.00 (0-1218)	1023.00 (0-1211)	0.976
Gait cycle length left sol (mm)	1039.00 (0-1218)	1070.00 (765-1203)	0.848
Gait cycle duration at right (ms)	420.00 (0-1250)	0.00 (0-1440)	0.636
Gait cycle duration left (ms)	1030.00 (0-1550)	1020.00 (0-1300)	0.660
Total right area (cm^2)	71.00 (37-121)	58.00 (34-104)	**0.033**
Total area left (cm^2)	70.50 (35-126)	59.50 (34-102)	**0.049**
Forefoot area to the right (cm^2)	37.00 (14-61)	28.50 (13-59)	0.182
Left forefoot area (cm^2)	35.00 (12-57)	30.00 (11-60)	**0.047**
Hindfoot area to the right (cm^2)	35.00 (21-77)	27.00 (20-53)	**0.027**

Table 4. Continued

Parameter	Vitamin D category (n)		
	Mild/moderate low and low (18)	Normal (32)	
	Median (minimum-maximum)		*P* value
Left hindfoot area (cm^2)	37.00 (18-74)	29.50 (12-61)	0.108
1st step area (cm^2)	105.50 (41-195)	95.50 (61-139)	0.179
2nd step area (cm^2)	112.50 (40-197)	96.00 (65-147)	0.066
3rd step area (cm^2)	107.50 (60-153)	92.50 (60-137)	0.195
Maximum right pressure (g/cm^2)	706.50 (533-1157)	615.00 (412-897)	**0.024**
Maximum pressure left (g/cm^2)	644.00 (452-872)	613.00 (412-869)	0.599
1st step maximum pressure (g/cm^2)	1525.00 (1069-2120)	1434.00 (1110-1861)	0.157
2nd step maximum pressure (g/cm^2)	1530.00 (1186-2228)	1392.00 (854-1731)	0.020
3rd step maximum pressure (g/cm^2)	1477.50 (1089-1886)	1379.00 (845-1846)	0.115
Average right pressure (g/cm^2)	332.50 (237-469)	286.50 (240-435)	**0.046**
Average pressure left (g/cm^2)	313.00 (255-426)	301.50 (206-454)	0.182
1st step average pressure (g/cm^2)	828.50 (606-1107)	791.50 (528-992)	0.051
2nd step average pressure (g/cm^2)	786.50 (681-1098)	744.00 (465-957)	**0.010**
3rd step average pressure (g/cm^2)	785.00 (633-1030)	718.00 (457-906)	**0.010**
Step length right (mm)	519.00 (258-640)	535.00 (398-617)	0.895
Step length left (mm)	554.50 (390-633)	535.00 (320-633)	0.992
Step duration right (ms)	575.00 (270-800)	570.00 (370-700)	0.472
Left step duration (ms)	570.00 (220-750)	540.00 (420-740)	0.054
Single-stance duration right (ms)	0.00 (0-360)	0.00 (0-500)	0.591
Single-stance duration left (ms)	0.00 (0-450)	0.00 (0-430)	0.244
Double-stance duration right (ms)	0.00 (0-300)	0.00 (0-320)	0.747
Double-stance duration left (ms)	230.00 (0-450)	210.00 (0-340)	0.273
Swing duration right (ms)	1255.00 (820-1330)	1230.00 (1000-1580)	0.856
Swing duration left sol (ms)	1210.00 (890-1750)	1190.00 (1000-1470)	0.332

Table 5. Gait parameters according to the SCORAD and vitamin D categories in the patients

	SCORAD categories (n)					
	Mild (35)			Moderate-severe (15)		
Vitamin D category (n)	Mild/moderate low and low (11)	Normal (24)		Mild/moderate low and low (7)	Normal (8)	
Parameter	Median (minimum-maximum)		*P* value	Median (minimum-maximum)		*P* value
Body weight (kg)	43.00 (26-108)	38.00 (22-67)	0.061	41.00 (25-87)	31.00 (18-45)	0152
Body weight distribution right (kg)	23.00 (14-54)	17.00 (9-31)	**0.022**	20.00 (13-45)	17.50 (9-23)	0.232
Body weight distribution left (kg)	21.00 (12-54)	20.50 (10-36)	0.224	21.00 (11-42)	13.50 (9-22)	0.072
Gait cycle length to the right (mm)	1007.00 (0-1218)	1027.00 (0-1211)	0.903	1054.00 (789-1078)	949.00 (0-1195)	0.955
Gait cycle length left sol (mm)	1039.00 (883-1218)	1082.00 (804-1203)	0.875	1039.00 (0-1218)	1035.00 (765-1164)	0.867
Gait cycle duration at right (ms)	840.00 (0-1190)	0.00 (0-1440)	0.563	0.00 (0-1250)	485.00 (0-1290)	1.000
Gait cycle duration left (ms)	960.00 (0-1550)	1015.00 (0-1330)	0.958	1090.00 (0-1360)	1105.00 (0-1290)	0.613
Total right area (cm^2)	71.00 (37-121)	60.00 (34-104)	0.092	71.00 (40-109)	53.50 (36-85)	0.232
Total area left (cm^2)	68.00 (35-126)	61.00 (38-102)	0.163	71.00 (37-113)	54.50 (34-76)	0.121
Forefoot area to the right (cm^2)	30.00 (16-61)	28.00 (13-59)	0.316	37.00 (14-52)	31.00 (16-46)	0.463
Left forefoot area (cm^2)	36.00 (16-57)	30.00 (13-60)	0.163	34.00 (12-55)	28.50 (11-39)	0.121
Hindfoot area to the right (cm^2)	40.00 (21-77)	27.50 (21-53)	0.052	35.00 (24-67)	26.50 (20-41)	0.232
Left hindfoot area (cm^2)	37.00 (18-74)	31.50 (20-61)	0.451	37.00 (25-60)	26.50 (12-37)	**0.029**
1st step area (cm^2)	104.00 (41-195)	101.00 (66-139)	0.875	120.00 (68-177)	88.00 (61-99)	**0.040**

Table 5. Continued

	SCORAD categories (n)					
	Mild (35)			Moderate-severe (15)		
Vitamin D category (n)	Mild/moderate low and low (11)	Normal (24)		Mild/moderate low and low (7)	Normal (8)	
Parameter	Median (minimum-maximum)		*P* value	Median (minimum-maximum)		*P* value
2nd step area (cm^2)	119.00 (40-197)	103.50 (70-147)	0.107	97.00 (72-164)	89.50 (65-115)	0.336
3rd step area (cm^2)	115.00 (68-153)	96.50 (63-137)	0.211	93.00 (60-132)	89.00 (60-110)	0.397
Maximum right pressure (g/cm^2)	725.00 (562-1157)	615.00 (491-897)	**0.012**	611.00 (533-1022)	629.50 (412-865)	0.613
Maximum pressure left (g/cm^2)	662.00 (452-872)	630.50 (509-869)	0.430	562.00 (489-802)	569.50 (412-841)	0.867
1st step maximum pressure (g/cm^2)	1501.00 (1069-1974)	1420.50 (1110-1861)	0.334	1570.00 (1250-2120)	1591.50 (1111-1718)	0.613
2nd step maximum pressure (g/cm^2)	1526.00 (1298-2030)	1402.00 (1025-1731)	0.072	1592.00 (1186-2228)	1382.00 (854-1650)	0.281
3rd step maximum pressure (g/cm^2)	1491.00 (1089-1886)	1330.00 (901-1648)	0.123	1452.00 (1219-1721)	1449.00 (845-1846)	0.779
Average right pressure (g/cm^2)	333.00 (237-469)	287.00 (240-435)	0.047	318.00 (247-417)	279.00 (240-368)	0.463
Average pressure left (g/cm^2)	341.00 (255-426)	306.50 (248-454)	0.186	299.00 (259-415)	286.00 (206-386)	0.463
1st step average pressure (g/cm^2)	817.00 (606-1107)	771.50 (594-992)	0.115	835.00 (724-970)	818.00 (528-951)	0.463
2nd step average pressure (g/cm^2)	778.00 (734-1098)	756.50 (583-957)	0.056	790.00 (681-971)	717.00 (465-838)	0.072
3rd step average pressure (g/cm^2)	799.00 (633-1016)	718.00 (524-906)	**0.040**	771.00 (644-1030)	696.00 (457-810)	0.152
Step length right (mm)	531.00 (258-601)	539.00 (398-617)	0.766	508.00 (398-640)	500.00 (406-562)	0.779
Step length left (mm)	547.00 (422-633)	535.00 (461-633)	1.000	562.00 (390-578)	535.00 (320-633)	0.613
Step duration right (ms)	560.00 (270-800)	575.00 (370-700)	0.875	610.00 (490-690)	545.00 (450-660)	0.232
Left step duration (ms)	570.00 (220-750)	540.00 (420-740)	0.099	580.00 (520-700)	585.00 (490-630)	0.281
Single-stance duration right (ms)	0.00 (0-360)	0.00 (0-380)	0.847	0.00 (0-0)	0.00 (0-500)	0.463
Single-stance duration left (ms)	0.00 (0-450)	0.00 (0-430)	0.636	0.00 (0-420)	0.00 (0-0)	0.694
Double-stance duration right (ms)	0.00 (0-300)	0.00 (0-320)	0.766	0.00 (0-260)	80.00 (0-250)	0.867
Double-stance duration left (ms)	230.00 (0-450)	200.00 (0-300)	0.472	230.00 (0-410)	210.00 (0-340)	0.613
Swing duration right (ms)	1230.00 (820-1300)	1235.00 (1000-1580)	0.563	1270.00 (1110-1330)	1190.00 (1070-1360)	0.463
Swing duration left sol (ms)	1210.00 (890-1750)	1175.00 (1000-1430)	0.662	1210.00 (1110-1550)	1240.00 (1070-1470)	0.336

SCORAD: The Scoring of Atopic Dermatitis

In a meta-analysis, obesity and AD were found to be related in most studies. A positive association has been reported between AD and obesity in childhood.[19] Among the factors affecting gait characteristics, BMI and weight have been reported to be effective in addition to physical diseases[20] and obese individuals have higher risks in terms of gait.[21] A previous study showed a positive correlation between BMI and foot pressure distribution.[22] In another study, gait parameters such as foot area and maximum pressure were higher in overweight and obese children, and it was reported that obesity in childhood could not be compensated by the musculoskeletal system.[23] In this study, some of the gait parameters of patients with AD were affected by changes in BMI. Some of the gait parameters of patients with mild SCORAD index and normal BMI changed. Gait parameters and BMI could not be evaluated in the patients with moderate and severe SCORAD index because there was one underweight and one overweight and obese patient each. Therefore, it could not be clearly interpreted whether BMI would have a synergistic effect on gait parameters increases with disease severity.

In a meta-analysis, serum vitamin D levels in patients with AD in all age groups, but especially in pediatric patients with AD, were found to be lower than in the controls.[24] In another study, the relationship between vitamin D deficiency and disease severity scores such as SCORAD index and eczema area and severity index, in patients with AD was examined, and it was reported that low serum vitamin D level is a risk factor for disease severity, especially in children, and vitamin D supplementation provides a significant reduction in AD severity.[25] In this study, there was no difference in serum vitamin D levels between patients with AD and controls, and vitamin D was categorically low in 36% of patients with AD and 26% of controls. However, according to the OR values, low vitamin D levels appeared to increase both the likelihood and severity of the disease.

Morphological changes such as type 2 muscle fiber atrophy, gap formation between fibers, fat and glycogen infiltration, and fibrosis have been reported in vitamin D deficiency.[26] It has also been found to interact in a non-genomic manner with vitamin D receptors in muscle cells, thereby improving muscle

contraction function.[27] In a case report on the relationship between gait and vitamin D in patients with AD, osteomalacia was detected in a 34-year-old female patient who had avoided ultraviolet exposure and dietary restriction for 8 years because of AD, upon the appearance of bone pain, muscle weakness, and gait disturbance.[28] In the present case, gait disturbance appeared to have occurred as a complication of the behavior and eating habits of the patient with AD. The findings of this study suggest that serum vitamin D levels alter gait parameters in patients with AD.

In this study, there was no significant difference in serum IgE levels between patients with AD and controls. However, categorically, serum IgE levels were found to be elevated in 48% of patients with AD, and according to the calculated OR, elevated serum IgE levels were interpreted as increasing the risk of AD. These findings do not seem to increase the SCORAD index. Therefore, serum IgE levels may affect gait parameters independently of disease severity.

Vitamin B12 deficiency or excess is associated with many dermatologic diseases, such as vitiligo, aphthous stomatitis, AD, and acne. Cobalt is a component of vitamin B12 that can cause cobalt sensitization. Allergic reactions due to vitamin B12 injections have been reported.[29] A previous study reported an increased prevalence of AD in infants born to mothers with high folate and vitamin B12 levels during pregnancy.[30] In a patient with AD, vitamin B12 levels were found to be associated with AD severity over a 3-year follow-up period, and a decrease in disease severity was observed with vitamin B12 supplementation.[31] In another study, growth and development were slowed in pediatric patients with AD who underwent food restriction, including vitamin B12, but this did not affect disease severity.[32] In this study, vitamin B12 levels were higher in patients with AD. The findings indicated that there is a conflicting relationship between AD and vitamin B12 levels.

Study limitations

Since the study participants were not asked about their intake of food supplements containing vitamin B12, a clear interpretation could not be made. This is a limitation of the study.

Conclusion

In this study, low foot pressure on the non-dominant limb side and short stride length on the dominant limb side in children with AD may be gait characteristics that differ from controls. The increased disease severity may have contributed to the decreased angle on the dominant limb side. Gait parameters were found to be affected by increased BMI, serum IgE levels, and serum vitamin D levels in children with AD.

Footnote

Ethics Committee Approval: This study was conducted in the clinics of Dermatology, Physical Medicine and Rehabilitation, and Pediatric Neurology after obtaining approval from the Fırat University Local Ethics Committee (approval number: E-97132852-050.01.04-7053, date: 06.01.2021).

Informed Consent: The parents of all participants were informed, and a consent form was filled out and approval was obtained.

Authorship Contributions

Concept: B.D., G.A., S.K., D.Ç., Design: B.D., G.A., S.K., D.Ç., Data Collection or Processing: F.S., G.A., S.K., Analysis or Interpretation: B.D., G.A., S.K., Y.G., Writing: F.S., B.D.

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Orginal Article

Bibliometric Analysis of Dermatology and Venereology Residency Dissertations in Türkiye between 1968 and 2023: A Cross-Sectional Retrospective Study

Ecem Bostan[1], Mahmut Talha Uçar[2], Muhammet Yunus Tunca[3]
[1]Clinic of Dermatology, Cihanbeyli State Hospital, Konya, Türkiye
[2]Department of Public Health, University of Health Sciences Türkiye, Hamidiye Faculty of Medicine, İstanbul, Türkiye
[3]Department of Public Health, Atatürk University Institute of Health Sciences, Erzurum, Türkiye

Abstract

Aim: Bibliometric analysis is a useful technique that is used to analyze and categorize scientific data according to different parameters, such as years, main subjects and associated affiliations. Bibliometric analysis of residency dissertations and theses allows scholars to analyze pre-existing data and create innovative research topics and designs in specific fields. In the present study, we aimed to conduct a bibliometric analysis of dermatology residency dissertations and master theses in Türkiye from 1968 to 2023.

Materials and Methods: The current study was designed as a cross-sectional, descriptive study. Medical specialty theses in the field of dermatology and venereology, which were published between 1968 and 2023 and indexed in the Higher Education Council Thesis Center, were evaluated.

Results: One thousand six hundred forty theses related to dermatology and venereology were obtained. The majority of the theses (n = 90) were published in 2022, followed by 2009 (n = 89). The number of dissertations and theses showed a statistically significant rise over the 55 years. The most frequently mentioned topics were "papulosquamous and eczematous dermatoses" (n = 449) followed by "medical treatments" (n = 291), "diagnostic methods in dermatology" (n = 212), "adnexal diseases" (n = 197) and "skin neoplasms" (n = 174).

Conclusion: The present study summarizes the bibliometric analysis of residency and master theses produced in dermatology and venereology specialty. We believe that the findings will be an excellent guide for dermatologists to analyze prior studies and create novel research designs.

Keywords: Academic dissertation, bibliometrics, dermatology

Introduction

Dermatology and venereology residency is one of the most competitive and challenging specialty programs in Türkiye. Specializing in dermatology requires robust clinical experience and knowledge to obtain the right diagnosis and manage treatment. Therefore, developing diagnostic skills and performing the appropriate auxiliary diagnostic tests are essential to cure specific skin diseases.

In Türkiye, completion of a residency dissertation is a prerequisite to graduate from a residency program. Selection of a novel and creative dissertation topic is substantial for making a substantial contribution to the literature. Since scientific data and experience are transferred through scientific research publications worldwide, conducting an innovative investigation and generating a well-described, elucidatory report are crucial. A study that was conducted in 2019 and investigated scientific publications related to dermatology revealed that dermatology-related research output has increased in recent years.[1] At that time, psoriasis and Behçet's disease were the two most common conditions on which dermatological research publications concentrated.[1]

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Adress for correspondence: Ecem Bostan, MD
Clinic of Dermatology, Cihanbeyli State Hospital, Konya, Türkiye
Email: bostanecem@gmail.com
ORCID ID: 0000-0002-8296-4836

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Bibliometric analysis is a quantitative technique that is used to analyze the scientific outcomes of variable scientific components (author, subjects, year etc.).[2] Bibliometric analysis is performed to evaluate and categorize scientific data focused on a specific area in relation to the topics, years, institutions.[2] By that way, it enables scientists to decipher patterns, trend subjects, impacts, and knowledge gaps within a particular field.[3] Accordingly, in this study, we aimed to perform a bibliometric analysis of residency dissertations in dermatology and venereology in Türkiye between 1968 and 2023.

Materials and Methods

Study Design and Data Extent

This was a descriptive research study with a cross-sectional design. Medical specialty dissertations belonging to the department of dermatology, published between 1968-2023 and indexed in the Higher Education Council (YOK) Thesis Center, were examined (n = 1640). In the detailed search section, 1644 theses obtained by selecting dermatology department, were evaluated. Two theses belonging to the departments of deontology, ethics, and general surgery, which were uploaded under the dermatology category, and two theses uploaded repeatedly in the YOK Thesis system were excluded. Theses not included in the YOK Thesis Center were not evaluated. When evaluating page numbers, 11 extreme values such as 0, 930, and 1049, were excluded because relevant data could not be accessed directly.

The data in the YOK Thesis Center are open data and include title, abstract, number of pages, advisor, author, thesis type, university, and year of publication. Since these open data are evaluated, ethics committee approval is not required.

By using major reference textbooks and sources of dermatology[4,5], the basic dermatological subjects (e.g. adnexal diseases, skin neoplasias, etc.) were determined. Using these subject headings, the subject area in which each thesis was conducted was evaluated. In the pilot application of the study, some theses were written on a single subject, while others were written on more than one subject. For this reason, 1640 theses were tagged by researchers with at least 1 and at most 4 topic tags. As a result, a total of 2382 topic tags were obtained.

Statistical analysis

The total, average, minimum-maximum numbers, percentages, common topic analysis, frequency table, and interactive visualizations based on these tables were used in the data analysis; thus, dermatology residency dissertations conducted in Türkiye from 1968 to 2023 were mapped.

While determining the foundation dates of universities and faculties, declarations of the Council of Ministers were taken as the basis. When comparing the foundation dates of the universities and faculties with the date of the first thesis, the Ministry of Health was excluded because the foundation dates of the research and training hospitals were incompatible.

Results

Of the 1640 theses, 1639 were residency dissertations, and only 1 as a doctoral thesis titled as "Sources of Transmission and Status of Veneral Diseases Today", conducted at İstanbul University, İstanbul Faculty of Medicine and published in 1985. One thousand four hundred eighty-five (90.5%) dissertations were from a state university, 22 (1.3%) from a foundation university, 91 (5.6%) from 15 research and training hospitals affiliated with the Ministry of Health, and 42 (2.6%) were conducted at Gülhane Military Medical Academy, which is not actively continuing education at present.

The universities with the highest number of these were as follows: University of Health Sciences Türkiye (n = 125), İstanbul University (n = 124), Ministry of Health (n = 91) (not university), Ankara University (n = 72), Atatürk University (n = 62) and Ege University (n = 62) (Supplementary File 1). When comparing the number of theses according to universities, all 15 research and training hospitals affiliated with the Ministry of Health were evaluated together, and there were 91 theses, and University of Health Sciences Türkiye, Şişli Hamidiye Etfal Training and Research Hospital had the highest number of theses (n = 24).

When the number of theses published by year was evaluated, it was found that most theses (n = 90) were published in 2022, followed by 2009 with 89 theses. It was observed that the number of theses increased over 55 years, and Spearman's correlation test showed that there was a very strong positive relationship, and this increase was statistically significant ($P < 0.001$, $r = 0.933$) (Figure 1). When the distribution of the page counts of these was analyzed, it was found that the data did not follow a normal distribution, with a median value of 72 pages (interquartile range: 56-91). A moderate positive correlation was observed between page count and year of publication, with the increase being statistically significant ($P < 0.001$, $r = 0.525$).

Table 1 presents the core study areas in dermatology. Methodological topics, including medical treatments, diagnostic methods in dermatology, physical treatment modalities, cosmetic surgery, and surgery, were grouped accordingly. The remaining 21 topics were categorized as the main topics. Although no studies have been conducted on two of these topics, they were still included in the table because

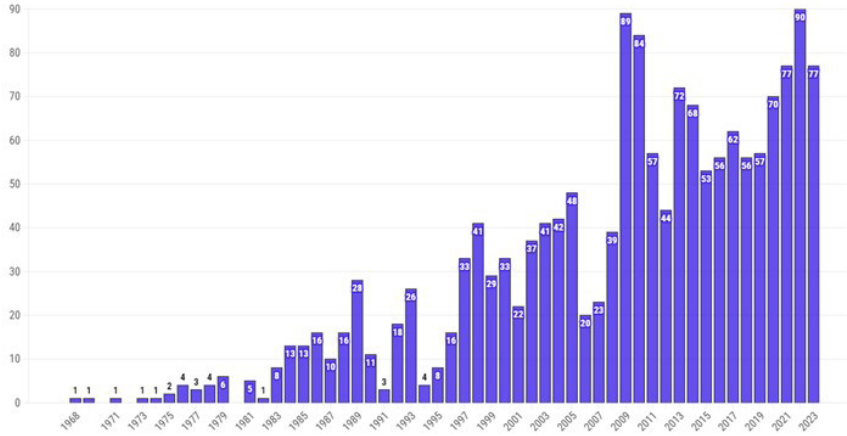

Figure 1. Distribution of all dermatology thesis conducted in Türkiye approximately 1968-2023 according to year (n = 1640)

they represent fundamental areas of dermatology. Over the span of 55 years, the evaluation of all theses revealed that "papulosquamous and eczematous dermatoses" was the most frequently studied topic, with 449 theses. This was followed by "medical treatments" (n = 291), "diagnostic methods in dermatology" (n = 212), "adnexal diseases" (n = 197), and "skin neoplasms" (n = 174), in descending order. When theses published in universities and the Ministry of Health hospitals were evaluated according to the frequency of the topics, the first five topics most frequently covered in theses from the universities were scaly diseases (n = 431, 19.1%), medical treatment (n = 282, 12.5%), diagnostic methods (n = 205, 9.1%), adnexal diseases (n = 184, 8.1%), and neoplasms (n = 169, 7.5%). On the other hand, the first five subjects most frequently examined in the Ministry of Health hospitals were scaly diseases (n = 18, 16.8%), hair and nail diseases (n = 16, 15%), adnexal diseases (n = 13, 12.1%), medical treatment (n = 9, 8.4%), and diagnostic methods (n = 7, 6.6%). Rankings of "medical treatment" and "diagnostic methods" subjects in the Ministry of Health hospitals have fallen behind, whereas "hair and nail diseases" has emerged. The frequencies of the topics in all institutions are detailed in Table 2, and the frequencies of all themes from 1968 to 2023 are shown in a competitive manner in Figure 2 (https://public.flourish.studio/visualisation/18819398/). The changes in the subjects of the dermatology residency dissertations over the years, along with detailed trends for each subject in 10-year intervals, are depicted in Figure 3 (https://public.flourish.studio/visualisation/18820622/). The frequencies of interactions between the methodologic topics and main topics are shown in Figure 4 (https://public.flourish.studio/visualisation/19173546/).

Table 1. Main topic categories used in reference works in the field of dermatology

Group	Subject categories in dermatology
Main	Papulosquamous and eczematous dermatoses
	Adnexal diseases
	Skin neoplasms
	Hair, nail, and mucous membrane diseases
	Infection, infestation, and bite
	Rheumatologic dermatology
	Urticaria, erythema, and purpura
	Pigmentary disorders
	Vesiculobullous diseases
	Psychological effects of dermatological diseases
	Dermatologic findings of metabolic and systemic diseases
	Pruritus
	Disorders caused by physical agents
	Drug eruptions
	Vascular disorders
	Basic principles of dermatology
	Psychocutaneous diseases
	Subcutaneous tissue diseases
	Genodermatoses
	Atrophy and dermal connective tissue diseases
	Langerhans cell and macrophage disorders
Methodologic	Medical treatments
	Diagnostic methods for dermatology
	Physical treatment modalities
	Cosmetic surgery
	Surgery

Table 2. Distribution of all dermatology theses conducted in Türkiye between 1968 and 2023 according to topic frequency

Topics	Frequency
Papulosquamous and eczematous dermatoses	449
Medical treatments	291
Diagnostic methods for dermatology	212
Adnexal diseases	197
Skin neoplasms	174

Table 2. Continued

Topics	Frequency
Hair, nail, and mucous membrane diseases	168
Infection, infestation, and bite	153
Physical treatment modalities	122
Rheumatologic dermatology	119
Urticaria, erythema, and purpura	119
Pigmentary disorders	97
Vesiculobullous diseases	53
Psychological effects of dermatological diseases	50
Dermatologic findings of metabolic and systemic diseases	45
Other	23
Cosmetic surgery	29
Pruritus	19
Disorders caused by physical agents	15
Drug eruptions	13
Surgery	11
Vascular disorders	10
Basic principles of dermatology	6
Psychocutaneous diseases	4
Subcutaneous tissue diseases	2
Genodermatoses	1

Discussion

Bibliometric analysis related to theses and dissertations in medical fields has rarely been performed in Türkiye; however, there are several reports in the literature that analyzed theses about public health, sports medicine, orthopedics, and medical parasitology.[6-9] To our knowledge, the present study is the first bibliometric analysis study of dermatology and venerology residency dissertations recorded between 1968 and 2023 in Türkiye. Our study's results show that the number of dermatology and venereology theses and dissertations has substantially increased over the last 55 years as the number of dermatology clinics offering dermatology specialization and quotas for dermatology residency training has also gradually escalated during this period.

Chronic dermatological diseases such as eczema, psoriasis, and hidradenitis suppurativa generally have a great impact on the physical and psychological well-being of patients. Therefore, early and correct diagnosis of skin disorders, along with convenient management, is important. To acquire the required knowledge and skills, a rigorous, well-disciplined theoretical and practical education is necessary. In Türkiye, the dermatology residency program encompasses

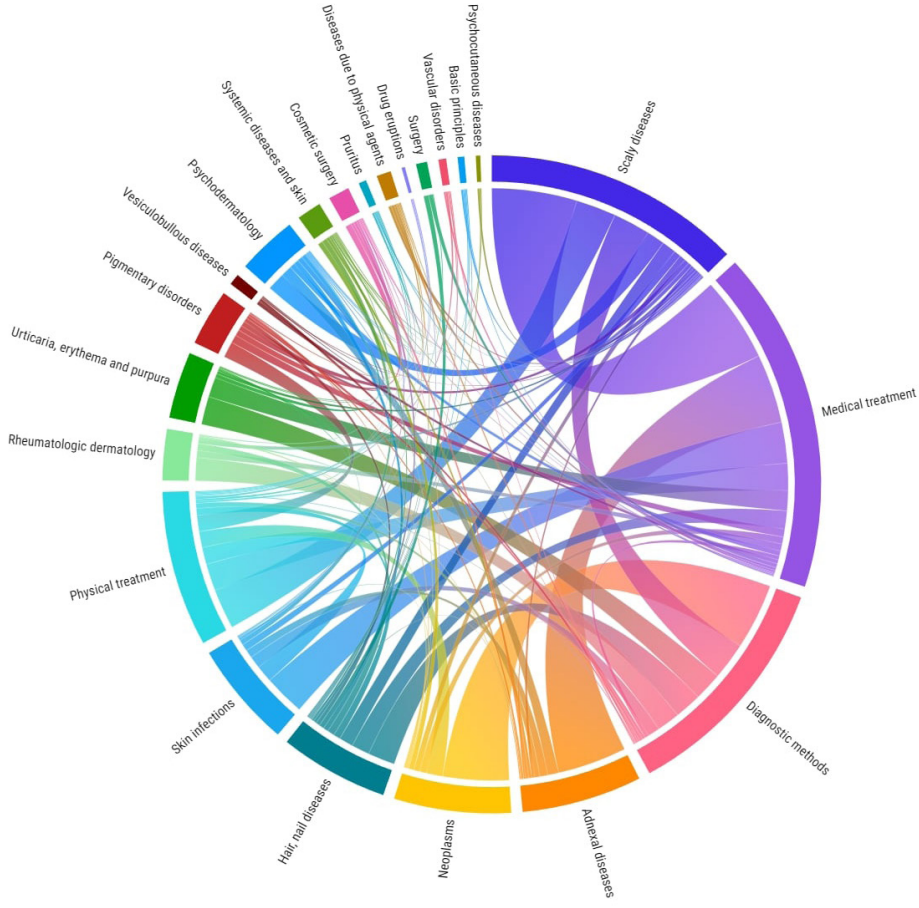

Figure 2. The number of dissertation subjects from 1968 to 2023 is competitively represented

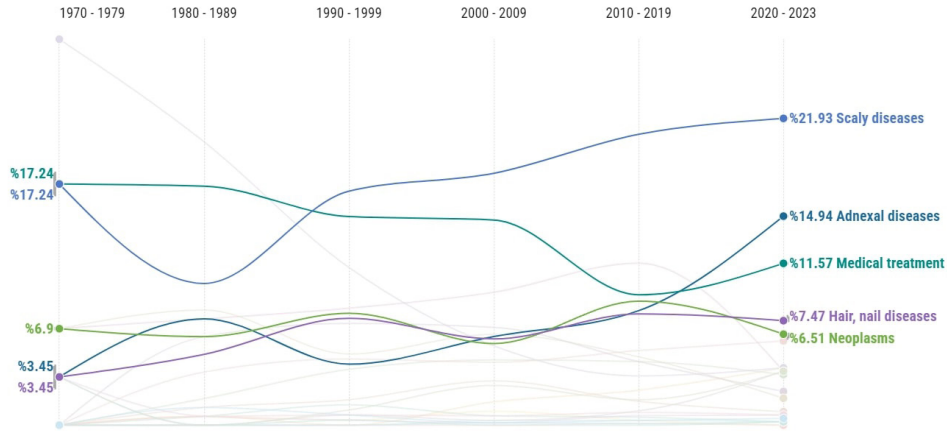

Figure 3. Fluctuations in the themes of dermatology residency theses over the years, along with detailed trends for each topic at 10-year intervals

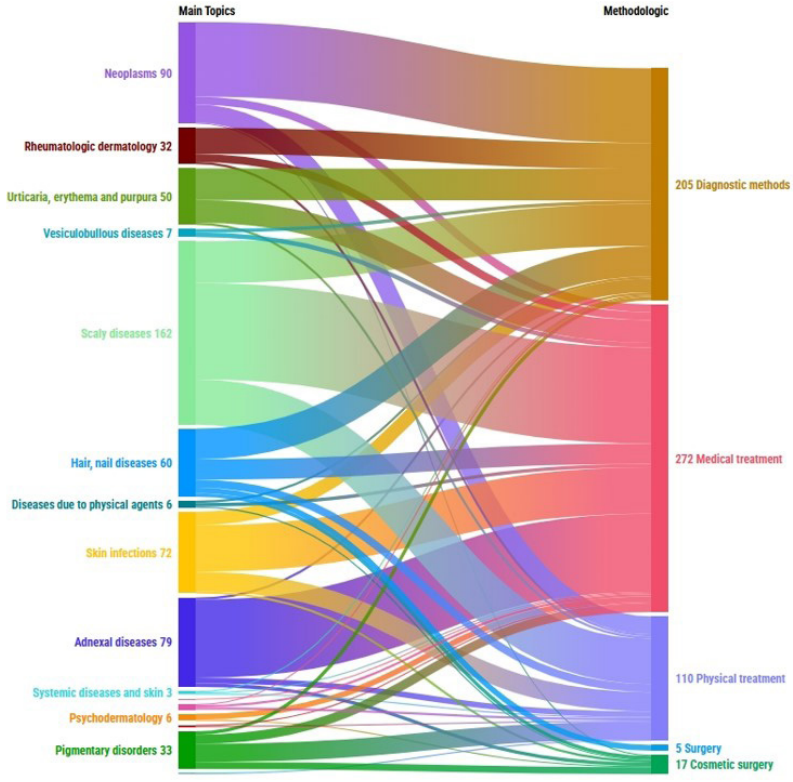

Figure 4. Distribution of interactions between methodological topics and main topics

four years, during which candidates are assigned to dermatology outpatient clinics, inpatient care units, and interventional procedures such as skin biopsy, surgery, and electrodesiccation. During the fourth year of residency training, research assistants are required to complete their dissertations. Residency dissertations enable individuals to develop research skills and contribute new knowledge to the pre-existing literature.

In a bibliometric analysis study that investigated global productivity for dermatologic literature between 1985 and 2014, the articles were the most frequent document type among other types (letters, reviews, notes, editorials etc.).[10] In the same study, it was found that the USA, UK, Germany, and France were the top four countries when ranked according to the H-index over three decades.[10] Unfortunately, Türkiye was not on the top 20 countries' lists when ranked according to the H-index.[10]

In 2019, Gülkesen[1] published a report related to the analysis of scientific publications in dermatology field; 3319 articles were found from 1998 to 2017, when Science Citation Index-Expanded journals were selected from Web of Science (WoS) under "dermatology" classification. In this study,

an increscent percentage of articles published under the "dermatology" class of WoS was observed until 2006, after which the percentage of dermatology publications seemed to become stable.[1] The publications focused mainly on psoriasis and Behçet's disease.[1] In our study, we also found that residency dissertations concentrated on papulosquamous and eczematous skin disorders (fundamentally psoriasis). In another study by Salman[11], which evaluated scientific publications from Türkiye between 2012 and 2016, 1602 scientific publications (746 original research; 856 letter to editor, case report and review) were examined. Original research articles mainly focused on psoriasis, followed by acne vulgaris, Behçet's disease, infectious skin disorders, hair diseases, and isotretinoin treatment.[11] In the same study, it was revealed that the total number of research publications related to dermatology and venerology in Türkiye seemed to escalate between 2012 and 2016, even though the count of publications which were published in high impact journals did not show an increase.[11] Our results showed that the number of residency dissertations has statistically increased significantly since 1968, even though there have been fluctuations over the years. The highest number of dissertations was observed in 2022 (90 dissertations), followed by 2009 (89 dissertations) and 2010 (84 dissertations). In parallel, an important rise has recently been observed in the number of dermatology residency quotas when dermatology residency quotas are compared between 2016 September "Examination for Specialty in Medicine" (n = 35)[12] and 2023 September "Examination for Specialty in Medicine" (n = 355).[13] We believe that the gradual rise in the determined quotas for dermatology research assistants in universities and training and research hospitals in Türkiye might account for the increase in the number of dermatology theses within the last decades.

We believe that because psoriasis is a relatively common skin disease which affects 1-3% of the general population and has a significant impact on quality of life,[14] most dissertations were related to this chronic inflammatory skin disorder. In a recent study from Romania, in which trend research topics related to psoriasis is investigated, it was revealed that etiopathogenesis, epidemiology, and immune mechanisms were the most outstanding and popular topics according to WoS database.[15] Additionally, in the last decade, publications mainly concentrated on biologic agent treatment for psoriasis.[15] Similarly, another study from China which analyzed publications indexed within the Medical Subject Headings word "psoriasis" from PubMed showed that disease severity, therapy outcome, dermatologic treatment modalities, clinical trials and molecular etiopathogenesis were the most frequent topics between the years 2003-2022.[16] In the present bibliometrics analysis, "papulosquamous and eczematous diseases" subject category, mainly psoriasis, was the most frequently addressed topic, whereas there seemed to be a decreasing trend in the number of dissertations related to "infectious skin diseases" category. The high prevalence of psoriasis in the Turkish population,[17] along with longer follow-up periods and regular data recording/preservation related to clinical features, associated comorbidities, and clinical response to treatment for this chronic inflammatory disorder, may account for the popularity of "papulosquamous and eczematous diseases" and "medical treatment" subject categories.

Our study sheds light on the 55 years of the dermatology specialty in Türkiye by analyzing the topics that have been studied the most and the least, the rates at which these topics were covered in 10-year decades, the trends and tendencies that have changed over the years, and the relationships between the individual topics and the methodological research subjects that were most frequently studied together. By highlighting the less studied, orphan subjects of dermatology; we have aimed to emphasize that these areas should not be neglected.

Study limitations

Our study has some limitations. We were not able to investigate the increase in the number of clinics offering dermatology specialization and the number of dermatologists who graduated annually. Our study is based on only open data related to residency dissertations from "YOK Thesis Center", and we were not able to find any other reliable open data, or another prior investigation which includes the present investigation's study period and is related to the number of centers offering dermatology specialization and the number of dermatologists graduated per year.

Conclusion

We believe that the interactive visuals we have presented will guide researchers who are conducting new studies in the field of dermatology, similar to navigation. We believe that by presenting the general framework of all years, this will help close the scientific gaps in the field of dermatology.

Original research publications derived from residency dissertations, along with their acceptance rates and types of journals in which the articles are published, remain another significant issue to be scrutinized.

Footnote

Ethics Committee Approval: Since these open data are evaluated, ethics committee approval is not required.

Informed Consent: Retrospective study.

Authorship Contributions

Concept: E.B., M.T.U., M.Y.T., Design: E.B., M.T.U., M.Y.T., Data Collection or Processing: E.B., M.T.U., M.Y.T., Analysis or Interpretation: E.B., M.T.U., Literature Search: E.B., Writing: E.B., M.T.U.

Conflict of Interest: The authors declared that they have no conflict of interest.

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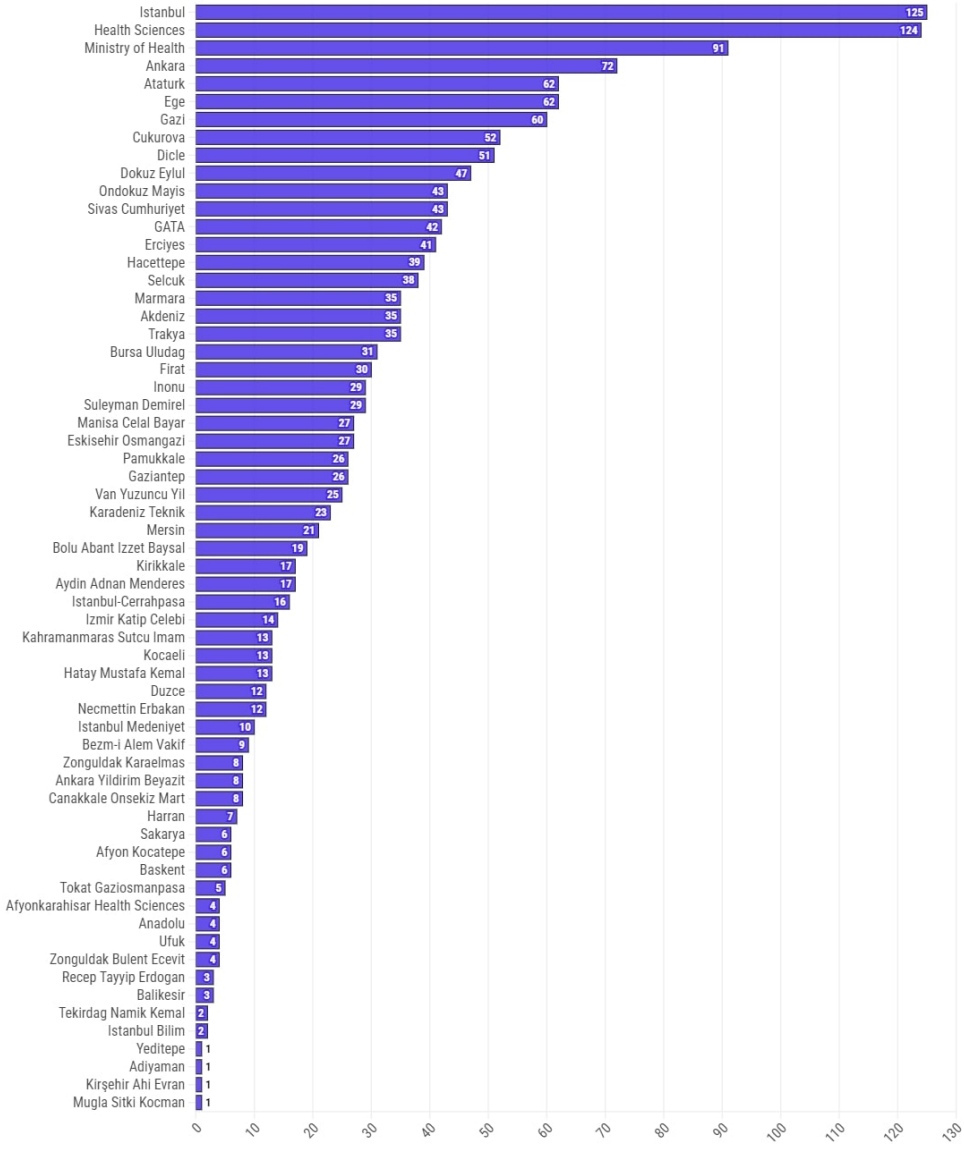

Supplementary File 1. Distribution of dermatology procedures conducted in Türkiye between 1968 and 2023 according to university (n = 1640)

Case Report

A Case of Cutaneous and Musculoskeletal Nocardiosis of the Hand in an Immunocompetent Patient

Esin Diremsizoğlu[1], Nilgün Sayman[1], Sema Aşkın Keçeli[2], Murat Üzel[3], Emel Azak[4], Gür Akansel[5], Najiba Ahmadova[5], Ahmet Tuğrul Eruyar[6]

[1]Department of Dermatology, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye
[2]Department of Medical Microbiology, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye
[3]Department of Orthopedics and Traumatology, Division of Hand Surgery, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye
[4]Department of Infectious Diseases and Clinical Microbiology, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye
[5]Department of Radiology, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye
[6]Department of Medical Pathology, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye

Abstract

A 77-year-old immunocompetent male agricultural worker presented with a 9-year history of hand stiffness, edema, and draining wounds. Despite two surgeries and antibiotic use many times, his condition persisted. Initially treated for a deep fungal infection with Itraconazole for 9 months without improvement, *Nocardia* spp. were later identified in deep tissue culture via microbiological examination by Gram-staining and isolation in culture media. He was treated with trimethoprim-sulfamethoxazole (TMP-SMX) 160/800 mg for six months, leading to regression of the cutaneous lesions. However, magnetic resonance imaging revealed osteomyelitis and tenosynovitis, prompting an extended 12-month treatment with increased doses of TMP-SMX and a month of ceftriaxone. Complete recovery was achieved after 12 months. This case highlights the rarity and diagnostic challenges of nocardiosis, emphasizing the need for thorough microbiological evaluation, extended antibiotic treatment, and imaging follow-up for persistent, deep localized infections. Primary cutaneous nocardiosis should be considered, particularly in patients with non-healing skin lesions and a history of soil exposure.

Keywords: Primary cutaneous nocardiosis, soil microbiology, trimethoprim-sulfamethoxazole, anti-bacterial agents, osteomyelitis

Introduction

Nocardia is an aerobic, gram-positive, partially acid-fast filamentous bacterium found in soil.[1] It can cause localized suppurative disease in humans and animals and is considered an opportunistic pathogen, although approximately one-third of infections occur in immunocompetent individuals.[2] Primary cutaneous nocardiosis is very rare and may occur due to skin-wound contamination or a thorn prick.[3] We present a male patient with progressive cutaneous nocardiosis complicated by osteomyelitis and tenosynovitis, emphasizing the rarity of this condition and the diagnostic and therapeutic challenges it presents.

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Case Report

A 77-year-old immunocompetent male patient presented with a 9-year history of stiffness, edema, and draining wounds on his left palm, which led to difficulty in making a fist and moving fingers. He underwent antibiotherapy many times and two surgical operations, with worsening symptoms in the last two years. He had no comorbidities or medication use and had a long history of agricultural work.

Dermatologic examination revealed hard edema covering the entire left palm and dorsolateral thumb, with numerous

Adress for correspondence: Esin Diremsizoğlu, MD, Department of Dermatology, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye
Email: mdesinarslan@gmail.com
ORCID ID: 0000-0001-9824-481X

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inflamed nodules, papules, pustules, ulcerations, hemorrhagic crusts, and sinus openings (Figure 1a). No lymphadenopathy was present. Routine blood tests were normal, and serologic tests for hepatitis, human immunodeficiency virus, syphilis, and the Brucella Coombs test and typical and atypical mycobacteria polymerase chain reaction (PCR) tests were negative. Anaerobic, fungal, and mycobacterial cultures from the inflamed tissue showed no growth, and angiotensin receptor blocker staining revealed no acid-fast bacilli. Chest X-ray was normal. Magnetic resonance imaging (MRI) of the hand showed a 19x39 mm heterogeneous lesion near the flexor tendon of the left hand's second finger, hypointense on T1-weighted images and hyperintense on T2-weighted images, with intense contrast enhancement.

Figure 1. (a) On the palmar surface of the left hand, hard viscous edema, inflamed nodules, papules, and pustules, some with ulcerated scattered lesions, and hemorrhagic crusts and sinus mouths. (b) Improvement in cutaneous lesions at the end of the 12th month of TMP-SMX treatment
TMP-SMX: Trimethoprim-sulfamethoxazole

Histopathologic findings from the patient's previous surgeries revealed active chronic inflammatory granulation tissue. A punch biopsy was performed from the inflamed nodule on the hand. The preliminary diagnoses were deep fungal infection, actinomycosis, and cutaneous nocardiosis. The biopsy revealed lymphocyte-rich mononuclear inflammatory cell infiltration in the papillary dermis of an orthokeratotic and hyperplastic epidermis. Gomori methenamine silver staining revealed a few fungal spore structures within the keratin layer.

Itraconazole 200 mg/day, teicoplanin i.v. for 7 days, and trimethoprim-sulfamethoxazole (TMP-SMX) for 10 days were initiated with a presumptive diagnosis of mycetoma based on clinical and histopathologic findings. Despite nine months of treatment with itraconazole, the lesions did not regress, and new lesions appeared on the thumb, prompting repeated examinations, and the diagnosis was revised. Repeated skin biopsy showed diffuse lymphocyte-dominant mononuclear inflammatory cell infiltration in the papillary dermis, consistent with diffuse dermatitis. Cultures revealed gram-positive filamentous bacteria identified as *Nocardia* spp. (Figure 2), presumed to be *N. brasiliensis* due to its common association with skin infections; however, subtyping could not be performed. Itraconazole was discontinued, and TMP-SMX was started. After 3 months of treatment with TMP-SMX 160/800 mg per day without clinical improvement, the dosage was increased to twice daily TMP-SMX 160/800 mg. After a

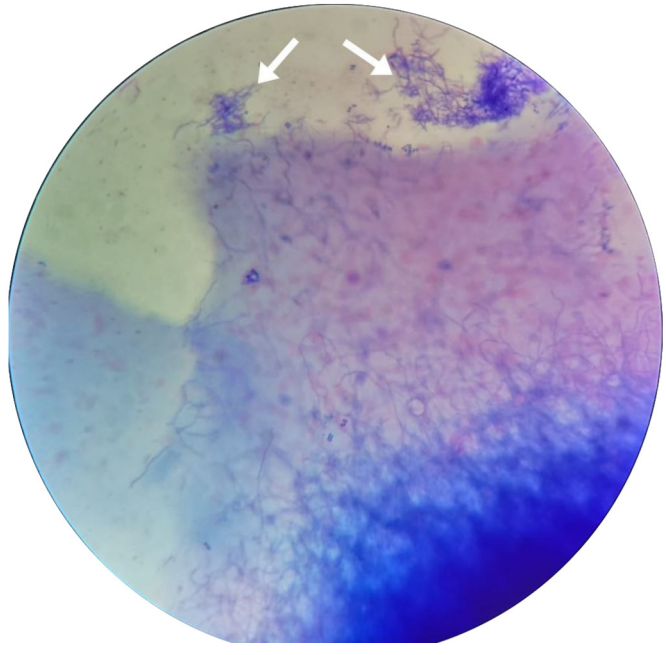

Figure 2. Modified acid fast staining: Filamentous colonies consistent with *Nocardia* spp.

total of six months of treatment, the existing draining fistulas and nodular lesions regressed almost completely.

A control X-ray of the left hand after 9 months of treatment showed mild soft-tissue swelling, cortical irregularity, and coarsening of the trabecular system along the metacarpal body of the thumb. Control MRI revealed increased lesion size near the flexor tendon of the 2nd finger and enlargement involving the palmar region, flexor tendons, and skin. Post-contrast T1-weighted images showed hyperintense lesions surrounded by a hypointense ring, with a central hypointense dot (dot in the circle sign), indicating tenosynovitis affecting the flexor tendons of all fingers, myositis in the thenar and hypothenar muscles, and osteomyelitis in the first metacarpal shaft (Figure 3a).

After 9 months of TMP-SMX therapy, the cutaneous lesions improved, but tenosynovitis and osteomyelitis were detected. Ceftriaxone 2 g/day was added to TMP-SMX for 4 weeks. Three months later, control MRI showed disappearance of the nodules extending proximal to the carpal tunnel and regression of the musculoskeletal infection in the thenar region (Figure 3b). After achieving complete clinical and MRI response, TMP-SMX was discontinued after 12 months (Figure 1b). At the six-month follow-up, improvement persisted. Informed consent was obtained.

Discussion

Primary cutaneous nocardiosis is rare and can occur through pulmonary infection from inhaled dust, cutaneous infection from contaminated wounds, or subcutaneous infection from thorn penetration.[3] Despite no history of trauma, long-term agricultural work and skin injuries from gardening with bare hands suggest soil transmission in our patient. Our case is notable for its unique features: The lesion's location on the palm, absence of a clear trauma history, and association with osteomyelitis. This case contributes to the literature by highlighting the diagnostic and therapeutic challenges of primary cutaneous nocardiosis, particularly in cases involving osteomyelitis and tenosynovitis, while emphasizing the importance of extended treatment duration and the use of MRI for both diagnosis and follow-up to ensure radiologic improvement.

Primary cutaneous nocardial infections can present as cellulitic, sporotrichoid, disseminated disease (often secondary to pulmonary involvement), or actinomycetoma.[4] Our patient had multiple draining sinuses and hard edema, consistent with mycetoma, which is the most commonly reported form. Deep inoculation leads to mycetoma, whereas superficial inoculation leads to pustules or abscesses.[3] Our patient had no history of immunosuppression, and chest

Figure 3. (a) Left hand magnetic resonance imaging (MRI) at 9 months of treatment: The lesion adjacent to the 2nd finger flexor tendon increases in size and appears enlarged involving the palmar region, flexor tendons, and skin (circle in a dot sign shown with arrows). (b) Left hand MRI at 12 months of treatment: Nodules extending proximal to the carpal tunnel had disappeared, and the infection findings in the thenar region had regressed

radiography showed no pulmonary involvement. Nocardiosis is typically opportunistic, but one-third of cases occur in immunocompetent individuals like ours.[2] Culturing *Nocardia* is challenging, as it is slow growing; Gram-staining provides an earlier diagnosis. It takes 5-7 days for *Nocardia* to grow in culture, and Ziehl-Neelsen staining with 1% sulfuric acid is used for identification.[2] Newer diagnostic methods, such as *PCR* and *16S rRNA* gene sequencing, have improved the speed and accuracy of detecting *Nocardia* infections, complementing traditional culture techniques; however, due to technical limitations, these methods could not be applied in this case.[5]

Radiological imaging plays a key role in the diagnosis of nocardiosis, particularly in deep tissue and bone involvement. MRI is the most sensitive method for detecting complications such as osteomyelitis and tenosynovitis. In mycetoma cases, T2-weighted images show the characteristic "dot in a circle" sign, showing small circular areas of high signal intensity surrounding a central low signal "dot". MRI is important for both the diagnosis and follow-up of nocardial infections.[6]

Treatment for primary cutaneous nocardiosis typically requires long-term antibiotics, with cotrimoxazole as the mainstay. Superficial infections need 1-4 months of treatment, whereas mycetoma requires longer. Resistant cases may need additional antibiotics like amikacin, imipenem, and third-generation cephalosporins.[5] In our case, despite significant regression after 6 months, treatment was extended to 12 months with the addition of ceftriaxone for 1 month because of bone involvement. Surgical intervention may be necessary for extensive infections.[3]

N. brasiliensis is the most common species found in cutaneous nocardiosis, accounting for 80% of all cases. In our country, *N. farcinica* has been isolated in case reports from three different cities, whereas *N. brasiliensis* has been reported in one case.[7-10] Primary cutaneous nocardiosis is rare in our country, and the reported cases have mostly been associated with post-traumatic inoculation. After total knee arthroplasty surgery, *Nocardia* infection showed limited clinical improvement at the 20th month despite treatment with amikacin, linezolid, and imipenem.[7] In another case, a subcutaneous abscess in the forearm following minor trauma showed improvement after 7 months of TMP/SMX treatment and 5 surgeries.[8] A patient with multiple nodules and draining sinuses in the foot achieved complete remission by the 10th month of TMP-SMX treatment.[9] Another case involved a Nocardia infection associated with intra-articular corticosteroid injection on the hand, which responded dramatically to a 3-week course of TMP-SMX.[10]

Previous reports in the literature included patients with a history of minor trauma treated with combinations of antibiotics and surgery, often requiring extended treatment periods to achieve remission. Our case was distinguished by the lesion's location on the palm, the absence of a clear trauma history, and the rarity of primary cutaneous nocardiosis with osteomyelitis. A similar case reported by Tariq et al.[2] in the USA was treated with ceftriaxone and TMP-SMX, but without a specified duration. Our patient improved clinically and radiologically after one year of TMP-SMX and one month of ceftriaxone treatment.

Nocardia infections are challenging to diagnose and require careful, multidisciplinary work. There is no clear consensus regarding the appropriate dosage and duration of antibiotic therapy. We recommend extended treatment for deep localized infections and bone or tendon involvement. MRI is essential for diagnosis and follow-up, and imaging should accompany clinical monitoring to ensure radiological improvement.

Footnote

Informed Consent: Informed consent obtained from the patient.

Authorship Contributions

Surgical and Medical Practices: E.D., N.S., S.A.K., M.Ü., E.A., G.A., N.A., A.T.E., Concept: E.D., N.S., S.A.K., M.Ü., E.A., G.A., N.A., A.T.E., Design: E.D., N.S., S.A.K., M.Ü., E.A., G.A., N.A., A.T.E., Data Collection or Processing: E.D., N.S., S.A.K., M.Ü., E.A., G.A., N.A., A.T.E., Analysis or Interpretation: E.D., N.S., S.A.K., M.Ü., E.A., G.A., N.A., A.T.E., Literature Search: E.D., N.S., S.A.K., M.Ü., E.A., G.A., N.A., A.T.E., Writing: E.D., N.S., S.A.K., M.Ü., E.A., G.A., N.A., A.T.E.

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Case Report

A Rare Case of Sudden Bilateral Eosinophilic Cellulitis Mimicking Scleredema: Case Report and Review of Infantile Cases

Gunel Rasulova[1], Adil Özcanlı[1], Nesimi Büyükbabani[2], Hacer Aktürk[3], Seçil Vural[1]
[1]Department of Dermatology, Koç University School of Medicine, İstanbul, Türkiye
[2]Department of Pathology, Koç University School of Medicine, İstanbul, Türkiye
[3]Department of Pediatric Infectious Diseases, Koç University School of Medicine, İstanbul, Türkiye

Abstract

Eosinophilic cellulitis (EC), also known as Wells syndrome, presents as sudden fever, erythematous and edematous, pruritic plaques, and/or vesiculobullous lesions, and is exceptionally rare in infants. We report a case of a 7-month-old female with bilateral infantile EC resembling scleredema. The condition was characterized by acute fever, edema, and erythema from the wrists to the elbows. Histopathological examination showed spongiosis, intense inflammatory infiltration, numerous eosinophils, and collagen degeneration (flame figures), confirming EC. Treatment with systemic steroids and topical creams resulted in rapid resolution of lesions within a week, with no recurrence during a 1-year follow-up.

Keywords: Eosinophilic cellulitis, inflammatory, infantile

Introduction

Eosinophilic cellulitis (EC), also known as Wells syndrome, is an uncommon inflammatory dermatitis characterized by various clinical presentations that are often marked by a sudden onset of pruritic erythematous tender plaques.[1] Pediatric EC is already recognized as a rare condition, and its onset in infants is exceptional. While the predominant clinical form is characterized by erythematous plaques, rare presentations include vesicle, bulla, and nodule formation.[2] Patients with EC may experience localized symptoms such as burning and itching. In more severe cases, systemic symptoms like fever, lymphadenopathy, and arthralgia may also be present.[3]

The localization of lesions on the extremities, presenting as erythematous plaques, can mimic infectious cellulitis, scleredema, or contact dermatitis, posing diagnostic challenges.[4] The etiology of EC remains frequently unknown, with reported triggers including infections, tattooing, arthropod bites, and vaccinations.[2,5] However, approximately half of pediatric cases lack identifiable triggers.[6] Identifying and addressing the underlying causes is essential for preventing recurrence.

Herein, we present a case of rapid-onset EC mimicking scleredema in a 7-month-old infant and review the literature on infantile EC cases.

Case Report

A 7-month-old female patient was admitted to the emergency department with complaints of sudden-onset fever, bilateral edema, stiffness, and redness extending from the wrists to the elbows. In the emergency room, the fever responded to paracetamol treatment, and it recurred every 4 hours. The

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Adress for correspondence: Adil Özcanlı, MD, Department of Dermatology, Koç University School of Medicine, İstanbul, Türkiye
Email: adil.ozcanli@hotmail.com
ORCID ID: 0000-0003-4298-7942

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patient was hospitalized due to recurrent fever and poor general condition. The patient's medical history was unremarkable; she was an otherwise healthy baby delivered at full term via elective cesarean section. Her previous laboratory evaluations noted eosinophilia and a history of febrile infections, two of which required the administration of systemic antibiotics when she was four and five months old.

Further investigation into the patient's vaccination history revealed that she had received the third dose of the hepatitis B and diphtheria, tetanus, acellular pertussis - inactivated poliovirus - haemophilus influenzae type B vaccines, as well as the first dose of the oral poliovirus vaccine, 5 days prior to admission. The patient had no history of rash following previous vaccination.

Dermatological examination revealed bilateral firmness, erythematous and edematous papules, and plaques extending from the wrists to the elbows (Figure 1). A 3 mm punch biopsy was performed. The lesion showed prominent spongiosis in the epidermis, multiple spongiotic microvesicles containing eosinophils, resulting in a "Swiss cheese" appearance, intense inflammatory infiltration rich in eosinophils extending from the papillary dermis up until the mid-deep dermis, and foci of collagen degeneration, which can be described as "flame figures" (Figure 2).

Figure 1. Firmness, erythematous and edematous papules and plaques extending from the wrist to the elbow

Complete blood count revealed leukocytosis [17.5 (5.5-17 K/uL)], mild eosinophilia [1.3 (0-1.1 K/uL)], and elevated C-reactive protein [8.1 mg/L (<5 mg/L)]. Blood cultures showed no growth. Infection serology negative for influenza A, influenza B, respiratory syncytial virus, adenovirus, and severe acute respiratory syndrome-coronavirus-2.

The patient was started on intravenous methylprednisolone at a dose of 1.6 mg/kg per day, along with topical fusidic acid and hydrocortisone acetate cream. By the second day of treatment, there was notable reduction in erythema and stiffness of the lesions, with complete resolution within a week. Systemic steroids were discontinued on the sixth day. In the 1-year follow-up period, the patient did not experience any recurrence, even after reintroducing the previous vaccinations. Caregivers have given written consent for publication.

Discussion

EC, or Wells syndrome, was described in four patients by Wells as recurrent granulomatous dermatitis with eosinophilia in 1971.[1]

Clinically, the majority of EC cases are typically observed in adults without sex predilection, with sudden onset of tender, erythematous, edematous, and well-circumscribed plaques on the extremities.[5] Caputo et al.[7] described seven clinical variants of EC: Classic plaque-type variant, annular granuloma-like, urticaria-like, bullous, papulonodular, papulovesicular, and

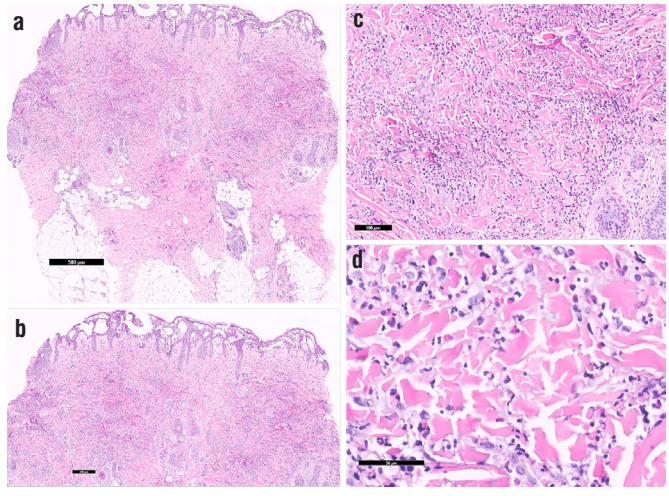

Figure 2. Cutaneous biopsy showing eosinophil polymorphs, prominent spongiosis in the epidermis, intense inflammatory degeneration in the region from the epidermis to the mid-deep dermis, and areas of collagen degeneration defined as flame figures. (a) Panoramic view Hematoxylin and eosin (H&E), (b) Spongiotic vesicles on the surface and flame figures in dermis H&E, (c) A close view of the flame figures H&E, (d) Intense eosinophilic infiltration in the dermis H&E)

fixed drug eruption-like. They also found that the classic plaque type is the most common clinical form in adults, and the annular granuloma-like form is more common in the pediatric population.[7] Around the lesions, prodromal symptoms, such as burning and pruritus, may occur, and some patients may also experience systemic symptoms, such as fever, arthralgia, and lymphadenopathy.[3,5,8]

EC is a rare entity, and it is also rare in the pediatric population. To our knowledge, 17 cases of infantile EC under the age of 2 years have been reported to date (Table 1).[3,5,7,9-20]

Table 1. Eosinophilic cellulitis in infancy: report of a case and literature review

Author	Case	Gender	Location-clinical form	Trigger	Lab abnormalities	Treatment	Recurrence	Follow-up
Afsahi and Kassabian[9]	17-mo	Boy	Bilateral multiple tender, fluctuating, and indurated plaques on the palms, soles, and dorsum of the foot	NR	Eosinophilia (14%)	Systemic prednisone	-	3 weeks
Barreiros et al.[10]	18-mo	Girl	Bilateral, solitary well-demarcated, erythematous plaques on the legs	Parvovirus B19 infection	Normal	Spontaneous remission	-	2 weeks
Caputo et al.[7]	1-yo	Girl	Bilateral multiple papulovesicular lesions in the lower extremities	NR	NR	Topical corticosteroid, Systemic betamethasone	+	2 years
	4-mo	Boy	Papulonodular solitary lesion on the face	NR	Eosinophilia (13%)	Systemic betamethasone	+	3 years
Garty et al.[11]	Newborn	Girl	Multiple subcutaneous nodules in the scalp and trunk Multiple bilateral erythematous vesicular and pustular lesions on the trunk, abdomen, inguinal regions, and wrists Bilateral multiple submandibular, axillary, and inguinal lymph nodes Hepatosplenomegaly	NR	Leukocytosis (15,000/mm^3) Eosinophilia (21%) Increased erythrocyte sedimentation rate (30 mm/h) Anemia (10.5 g/dL)	Treatment with antibiotic ointments, antifungal medications, or steroids was ineffective	+	3 years
Gilliam et al.[5]	1-yo	Girl	Bilateral multiple erythematous, edematous, and bullous plaques on the arms and lower extremities	NR	Leukocytosis (30x10^9 cells per L) Eosinophilia (48%)	Combination of systemic plus topical steroids	-	1 year
Kamani and Lipsitz[3]	7-wk boy	Boy	Multiple bilateral erythematous plaques on the neck and shoulder Unilateral lymph nodes	NR	Leukocytosis (22,600 per mm^3) Eosinophilia (16%) Increased erythrocyte sedimentation rate (60 mm/h)	Systemic prednisone	+	2 years
	3-wk	Boy	Unilateral solitary erythematous plaque in the right thigh	NR	Leukocytosis (29,000 per mm^3) Eosinophilia (32%)	Systemic prednisone	+	6 months
Kuwahara et al.[12]	Newborn	Girl	Unilateral firm hyperpigmented solitary plaque on the wrist	NR	NR	Spontaneous remission	-	2 years
Lindskov et al.[13]	20-mo	Boy	Bilateral multiple herpetiform papulovesicular lesions in all four extremities and the face	NR	Leukocytosis (20,000 per mm^3) Eosinophilia (12.5%) Slight anemia Slightly elevated IgE levels	Topical antiseptics	+	2 years

Table 1. Continued

Author	Case	Gender	Location-clinical form	Trigger	Lab abnormalities	Treatment	Recurrence	Follow-up
Makni et al.[14]	14-mo	Boy	Generalized multiple erythematous papulovesicular lesions on the face, trunk, and all four extremities Multiple bilateral brownish nodular lesions on the thigh and back of the foot	NR	Leukocytosis (12,160 per mm^3) Eosinophilia (10.2%)	Topical corticosteroids	-	NR
Moon et al.[15]	5-mo	Girl	Unilateral reddish, annular plaque on the trunk	Insect bite	Normal	Topical hydrocortisone ointment	-	NR
Moossavi and Mehregan[16]	21-mo	Girl	Bilateral multiple tense blisters on an erythematous base of the arms	NR	Normal	Oral prednisone Triamcinolone 0.1% cream	-	1 year
Shimshak et al.[17]	13-mo	Girl	Generalized multiple pink papules and erythematous plaques on the trunk and extremities	Varicella vaccine	Normal	Oral cetirizine Topical corticosteroid	NR	NR
Simpson et al.[18]	22-mo	Boy	Urticarial patches on the back Bilateral erythematous, edematous papulovesicular lesion on the dorsum of the hand, ankles, and feet	Influenza vaccine	Eosinophilia ($1.4x10^3/\mu L$)	Chlorpheniramine Paracetamol	+	1 year
Weiss et al.[19]	18-mo	Girl	Multiple bilateral erythematous papules and plaques on the buttocks	NR	Elevated eosinophilic cationic protein (85.5µ) Elevated serum IgE (22.0 kIU/L)	Topical clobetasol propionate	-	9 months
Wood et al.[20]	18-mo	Boy	Bilateral multiple infiltrated annular plaques on the legs	NR	Eosinophilia	NR	NR	NR
Current case	7-mo	Girl	Bilateral multiple erythematous, edematous papules and plaques on the arms	NR	NR	Systemic steroid Topical steroids plus antibiotics	-	1 year

NR: Not reported, wk: Week, mo: Month, yo: Year

The age range of infantile cases is 0-22 months. There are 10 girls and 8 boys, including our case. Despite the various anatomical regions affected, the extremities are the most commonly involved body parts. Three cases were triggered by vaccination and one by insect bite. Treatment included systemic corticosteroids in eight cases and topical corticosteroids in an equal number, both leading to rapid responses. Except for five cases, no recurrences were observed during follow-up. Triggering factors include bacterial and viral infections, arthropod bites, drugs, vaccinations, and malignancies. While vaccinations are the most frequently reported triggers, many pediatric cases have no identifiable cause.[2,5,6,18] In our case, although lesions appeared following vaccination, in the absence of recurrence following a subsequent dose, vaccination cannot be incriminated beyond reasonable doubt as a trigger factor. More than half of patients have transient blood eosinophilia in laboratory analysis in EC (11/18). The simultaneous presence of eosinophilia in both tissue and peripheral blood is a common finding in EC.[21]

The proposed mechanism suggests an external trigger that leads to elevated levels of circulating interleukin-2 (IL-2), IL-5, and eosinophil cationic protein, contributing to the activation of CD4+ T-cells and eosinophils.[22] Similarly, in the literature, some studies found an increase in IL-5 and eosinophilic cationic protein in peripheral blood during the active phase of WS.[23]

Histopathological features of EC are typically characterized by dermal edema, dermal infiltration of histiocytes and eosinophils, and eosinophil granules surrounding collagen fibers, which are described as "flame figures".[7] Although the flame figure is a valuable clue to EC, it is not pathognomonic. Other diseases where flame figures may be observed include eczema, arthropod bite, severe prurigo, pemphigoid, and its variants.[8]

The clinical course of EC is generally benign and self-limiting, and lesions may regress spontaneously without scarring.[7] The essentials of treatment are avoiding triggers and treating the underlying causes. Treatment strategies for EC typically

include midpotency topical corticosteroids, either alone or in conjunction with systemic corticosteroids. Notably, the literature also reports the use of alternative medications, such as cyclosporine, dapsone, antimalarial drugs, and azathioprine, in certain cases series.[24]

Diagnosis of EC can be quite challenging for physicians because it requires careful evaluation of the patient's medical history, including medications and vaccinations. It is essential to distinguish EC from bacterial cellulitis, contact dermatitis, granuloma annulare, urticaria, and allergic drug eruptions, which are included in the differential diagnosis.[4,25] Another differential diagnosis to consider is eosinophilic annular erythema (EAE). EAE is often considered a variant of Wells syndrome in the literature; however, there are notable clinical and histopathological differences between these two conditions.[26] Clinicopathologic correlation plays a crucial role in differentiating EC from the abovementioned conditions.

EC is a rare condition in infants, and various triggers have been reported in the literature. Because bacterial cellulitis is a differential diagnosis, EC should be considered in cases that are unresponsive to treatments, such as systemic antibiotic therapy.

Footnote

Informed Consent: Caregivers have given written consent for publication.

Authorship Contributions

Surgical and Medical Practices: G.R., H.A., S.V., Concept: N.B., Design: N.B., Data Collection or Processing: G.R., S.V., Analysis or Interpretation: A.Ö., H.A., Literature Search: G.R., A.Ö., Writing: A.Ö., N.B., S.V.

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Case Report

Clinicopathological and Therapeutic Challenge: A Case Report of a Malignant Peripheral Nerve Sheath Tumor

Abdullah Demirbaş[1], Dilek Bayramgürler[1], Semanur Çakır Serinbaş[1], Ahmet Tuğrul Eruyar[2], Esin Diremsizoğlu[1]
[1]Department of Dermatology, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye
[2]Department of Pathology, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye

Abstract

Malignant peripheral nerve sheath tumors (MPNSTs) are rare sarcomas associated with Schwann cells and neurofibromatosis type 1. The cutaneous subtype of MPNST is diagnosed primarily through histological findings, but immunohistochemistry is limited because of the overlap of markers with other soft tissue tumors. Treatment involves surgical excision followed by radiotherapy. Herein, we report a 37-year-old female patient who presented with a progressive, painless, cutaneous lesion in the left frontal region. Histopathological and immunohistochemical analyses revealed spindle cell neoplastic proliferation with strong S100 and SOX10 positivity, confirming the diagnosis of cutaneous malignant peripheral nerve sheath tumors (C-MPNST). The tumor was excised, and adjuvant radiotherapy at a dose of 64 Gy. Our findings provide valuable insights into the clinical and pathological characteristics, management strategies, and prognostic factors of C-MPNSTs.

Keywords: Malignant peripheral nerve sheath tumors, neurofibromatosis 1, schwann cells, cutaneous neoplasms, radiotherapy, adjuvant, immunohistochemistry

Introduction

Malignant peripheral nerve sheath tumors (MPNSTs) are rare, aggressive soft tissue sarcomas originating from peripheral nerves or their sheaths. The cutaneous malignant peripheral nerve sheath tumors (C-MPNST), a subtype located in the dermis, is more likely to be surgically removed because of its superficial location and is associated with neurofibromatosis type 1 (NF-1). Two types of MPNST have been defined: Type 1, which is associated with NF-1, and type 2, which occurs sporadically. These tumors are particularly rare, with limited literature available on their clinical and pathological characteristics. Diagnosis primarily relies on histopathological examination, which typically reveals spindle cell neoplastic proliferation with varying cell densities and patterns, such as storiform or whorled arrangements. Immunohistochemical markers frequently used to support diagnosis include S100, SOX10, and CD34, although their expression can overlap with that of other soft tissue tumors, thereby complicating the diagnosis. Surgery remains the main treatment for localized MPNSTs, but achieving wide margins can be challenging due to the tumor's invasive nature and anatomical location. Adjuvant therapies, such as radiation and chemotherapy are often required.[1,2] Herein, we report a 37-year-old female patient with C-MPNST, which posed challenges in both clinical and pathological diagnosis. This case report aims to contribute valuable insights into the diagnosis and treatment challenges of this rare tumor, emphasizing the need for more extensive studies to improve patient outcomes.

Case Report

A 37-year-old female patient with no previous medical history was admitted to our clinic because of progressive increase in the size of a red, painless lump in the left frontal region over the past 3 months. This was her initial presentation, and she had not received any previous treatments. A dermatological

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Adress for correspondence: Esin Diremsizoğlu, MD, Department of Dermatology, Kocaeli University Faculty of Medicine, Kocaeli, Türkiye
Email: mdesinarslan@gmail.com
ORCID ID: 0000-0001-9824-481X

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examination revealed a 4x5 cm infiltrating tumoral lesion on the left frontal area (Figure 1a, b). To further evaluate the nature of the lesion, punch biopsy was performed. Histopathological examination revealed a spindle cell neoplastic proliferation throughout the dermis with varying densities (Figure 2a). The tumor had poorly defined margins and was composed of cells forming long fascicles in storiform or whorled patterns. High-magnification imaging revealed Schwann cells with large, hyperchromatic, tapered nuclei and fibroblasts arranged in thick bundles around the nerve tissue (Figure 2b). Nuclear pleomorphism varied from mild to severe, mitotic activity was brisk, and no tumoral necrosis was observed. The Ki-67 index was 14%. Immunohistochemistry revealed nuclear and cytoplasmic S100 protein expression and nuclear SOX10 positivity (Figure 2c, d). There were no expressions of HMB45 and Melan A. Based on histopathological findings, he was diagnosed with a C-MPNST. To identify the extent and boundaries of the tumor, the patient underwent maxillofacial magnetic resonance imaging (MRI) and positron emission tomography/computed tomography (PET/CT). Preauricular lymphadenopathy was detected, but no peripheral metastases or NF-1-related tumors were identified on PET/CT. The complete 4.5 cm lesion and the preauricular lymph node were surgically excised with a 2 cm margin. Following tumor excision, no tumor was observed at the lateral surgical margin; however, since it was adjacent to the basal surgical margin in one area, fascia excision was performed. No tumor was detected in the excised temporal fascia. Pathological examination of the preuricular lymph node revealed reactive lymphoid hyperplasia. The plastic surgeon used an anterolateral thigh perforator free flap to reconstruct the region. The left superficial temporal artery and concomitant vein were used as recipient vessels. Postoperative recovery was uneventful, and the patient was discharged on the fifth postoperative day. Due to the high risk of tumor recurrence, the patient underwent adjuvant radiotherapy (64 Gy/32 fx). She was followed up regularly with clinical examinations and imaging studies. Over the past 2.5 years, there has been no evidence of local recurrence or metastasis. The patient responded well to treatment, showed no signs of residual disease, and provided written informed consent for the publication of this case report. The multidisciplinary team continues to monitor the patient every six months clinically and with MRI to detect any potential recurrence at an early stage.

Figure 1. (a, b) Tumoral lesion in the left frontal area (anterior and lateral aspect)

Discussion

MPNST is a rare malignant sarcoma originating from Schwann cells or neural crest cells, but other tissue types may also be involved. Determining the nature of MPNST is important, with sporadic cases being common; approximately half of the cases are associated with NF-1, which is linked to a more unfavorable prognosis.[1,2] C-MPNST, a subtype located superficially in the dermis and subcutis, is less commonly linked to NF-1 compared with the classical type, yet both exhibit similar rates of recurrence and metastasis.[1] MPNST does not have a specific histochemical marker or imaging method, but relatively typical histological findings, such as spindle cell neoplastic proliferation with varying densities and patterns, are helpful in diagnosis. The role of immunohistochemistry in MPNST is limited by the diverse and inconsistent staining properties of frequently used markers such as S100 protein, CD34, Glial Fibrillary Acid Protein, and Epithelial Membrane Antigen.[1-3] Differential diagnoses include other spindle cell

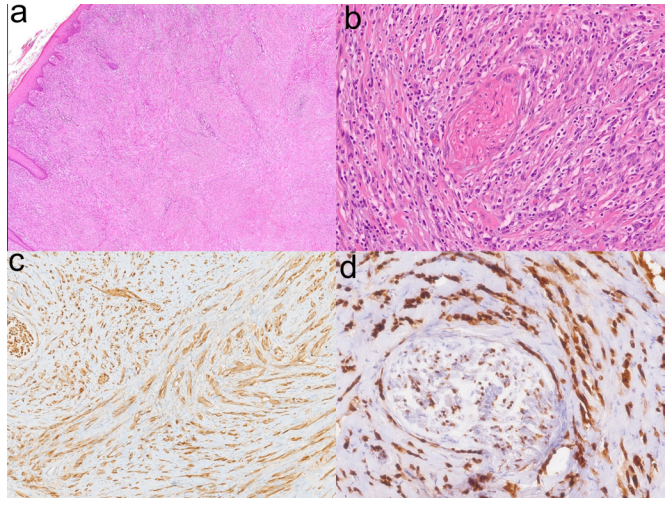

Figure 2. (a) Spindle cell tumoral infiltration consisted of alternating hypocellular and hypercellular areas with the formation of thick fascicles in the dermis hematoxylin and eosin (H&E, x40). (b) Atypical spindle tumor cells with marked pleomorphism form scattered bundles around the peripheral nerve (H&E, x100). (c) Cytoplasmic and nuclear S100 expression in tumor cells determined by immunohistochemistry (S100, x100). (d) Intense nuclear SOX10 expression in tumor cells determined by immunohistochemistry (SOX, x200)

neoplasms such as schwannomas, sarcomas, and malignant melanoma.[1]

In our case, although the NF-1 mutation could not be assessed, the absence of NF-1-related tumors and a negative family history suggested that this was a type 2 sporadic MPNST. Histopathological findings of spindle cell proliferation and immunohistochemical positivity for S100 and SOX10 were crucial for diagnosis. The absence of HMB45 and Melan-A indicated no melanocytic differentiation, which helps exclude melanoma and supports the diagnosis of MPNST by focusing on its neuroectodermal origin.

Factors that determine poor prognosis include large tumor volume, positive surgical margins, increased Ki-67 proliferation index, and head and neck location. PET/CT is recommended to detect possible metastases and differentiate MPNST from neurofibroma, which lacks such aggressive behavior. The main components of MPNST treatment are surgery and adjuvant radiotherapy.[3] Adjuvant radiation therapy should be administered to patients with tumors larger than 5 cm, high grade, or with positive margins. Chemotherapy is recommended for inexcusable tumors and metastatic MPNSTs.[4] In our patient, the tumor, which was localized on the head and measured 4.5 cm in size, had a high Ki-67 proliferation index. Therefore, adjuvant radiotherapy was included in the treatment plan. However, chemotherapy was not recommended due to the absence of metastasis.

Clinical studies targeting RAS and tyrosine kinase receptor pathways have not shown significant positive responses, indicating ongoing limitations in developing targeted therapies for MPNST.[5] The five-year survival rate for MPNST located in the head and neck can be as low as 20%.[3] Comparing our case with the literature, defining the roles of radiation therapy and chemotherapy in the management of C-MPNSTs remains controversial.[5] In accordance with the literature recommending radiation therapy over 60 Gy for MPNST, a dose of 64 Gy radiotherapy was applied to reduce local recurrence and improve long-term outcomes.[5] In the literature, local recurrence rates in MPNST are reported to be more frequent than metastasis, with the highest occurrence of local recurrence observed within the first 2 years after resection. Early detection of local recurrence is crucial for the success of surgical resection.[6] Although there is no consensus in the literature on the follow-up of MPNST, sarcoma guidelines recommend follow-up every 3 to 6 months for the first 2 years.[7] We have been monitoring the patient for every six months clinically and with MRI over the past 2.5 years without signs of recurrence.

Our case report provides insights into the management of C-MPNSTs. This report presents a rare presentation of C-MPNST in the absence of NF-1 and highlights the diagnostic complexities involved due to the tumor's rarity and the overlap of its histological features with other soft tissue neoplasms. We highlight the importance of detailed histopathological and immunohistochemical findings, particularly the roles of S100 and SOX10 markers. The multidisciplinary treatment approach, which included surgical excision and adjuvant radiotherapy, led to positive patient outcomes. Overall, this case highlights the need for further genetic and molecular research to explore additional mutations and develop effective targeted therapies for sporadic C-MPNSTs.

Footnote

Informed Consent: The patient responded well to treatment, showed no signs of residual disease, and provided written informed consent for the publication of this case report.

Authorship Contributions

Surgical and Medical Practices: A.D., D.B., S.Ç.S., A.T.E., E.D., Concept: A.D., D.B., S.Ç.S., A.T.E., E.D., Design: A.D., D.B., S.Ç.S., A.T.E., E.D., Data Collection or Processing: A.D., D.B., S.Ç.S., A.T.E., E.D., Analysis or Interpretation: A.D., D.B., S.Ç.S., A.T.E., E.D., Literature Search: A.D., D.B., S.Ç.S., A.T.E., E.D., Writing: A.D., D.B., S.Ç.S., A.T.E., E.D.

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Case Report

Intralesional 1470 nm Diode Laser for Hidradenitis Suppurativa: A Case Report

Yusuf Can Edek[1], Yağmur Aypek[1], Berkay Temel[2], Sezai Leventoğlu[3], Esra Adışen[1]
[1]Department of Dermatology, Gazi University Faculty of Medicine, Ankara, Türkiye
[2]Clinic of Dermatology, University of Health Sciences Türkiye, Ankara Training and Research Hospital, Ankara, Türkiye
[3]Department of General Surgery, Gazi University Faculty of Medicine, Ankara, Türkiye

Abstract

Hidradenitis suppurativa (HS) is a chronic, inflammatory skin disease characterized by nodules, abscesses, and sinus tracts in intertriginous areas. Laser- and light-based treatments are gaining popularity in HS treatment. Diode lasers act selectively in Hurley stage 1-2 patients, and intralesional laser applications are applied to various areas, such as vascular malformations and dermatological diseases. In this case report, we describe a male patient diagnosed with HS who was treated with 1470 nm intralesional diode laser.

Keywords: Hidradenitis suppurativa, laser, treatment

Introduction

Hidradenitis suppurativa (HS) is a chronic, inflammatory skin disease characterized by nodules, abscesses, and sinus tracts in the intertriginous areas that can significantly affect the patient's quality of life. Various therapeutic approaches are available to treat HS, including topical, systemic, and surgical.[1,2] In addition to these treatments, laser- and light-based treatment options are gaining popularity. Laser and light-based therapies can be used either alone or in combination with other pharmacological and surgical approaches.[3,4] There are data on intralesional laser application in dermatological diseases and vascular malformations, and intralesional application can provide energy to different depths of the skin.[5-7]

In this case report, we describe a male patient diagnosed with HS who was successfully treated using an intralesional 1470 nm diode laser.

Case Report

A 64-year-old male patient presented to our clinic with painful lesions in his left axilla. He described painful, discharging lesions in the axilla that began two years ago and periodically returned. He also had lesions in the glutea. His medical history revealed hypertension and diabetes mellitus. Subcutaneous nodules, sinus tracts in the left axilla, and double comedones in the right axilla were observed on dermatologic examination (Figure 1). Ultrasonography of the axilla revealed anechoic fluid collections, pseudocysts, and fistula structures (Figure 1). Based on clinical and ultrasonographic findings, HS was diagnosed. The patient's Hurley stage was 2, International Hidradenitis Suppurativa Severity Score-4 score was 10, and Dermatology Life Quality Index was 10. After one month of treatment with oral doxycycline when regression of pain and discharge of the lesions was achieved. To reduce disease burden and achieve lesion regression, we applied laser (neoV1470-

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Adress for correspondence: Yusuf Can Edek, MD, Department of Dermatology, Gazi University Faculty of Medicine, Ankara, Türkiye
Email: yusuf-can-35@hotmail.com
ORCID ID: 0000-0002-3877-8681

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diode laser, wavelength 1470 nm, continuous energy of 10W) to the lesions. The procedure was performed under sterile conditions with local anesthesia (lidocaine 20 mg/mL + epinephrine 0.0125 mg/mL). First, external orifices of the lesions were widened, and the laser probe was placed in the nodular lesions and fistula tracts in the axilla, and the laser was applied to each lesion for five seconds. The patient was prescribed topical antibiotics after the procedure and did not require systemic antibiotics. Although the lesions healed in 3 weeks, no recurrence was observed in the six-month follow-up (Figure 2). The patient in this manuscript has given written informed consent to the publication of his case details.

Discussion

The gold standard surgical procedure for HS is surgical excision, but this procedure has several limitations, including procedural complications, high cost, and problems with wound healing after surgery.[1] The laser operates in two distinct modes: ablative and selective. Intense pulsed light, neodymium-doped:yttrium aluminum garnet, and diode lasers act selectively, which reduces hair follicle, sebaceous gland, and bacterial load, and are effective treatment options in Hurley stage 1-2 patients; on the other hand, CO_2 lasers act in an ablative modality and appear to be more beneficial in Hurley stages 2-3.[3-6]

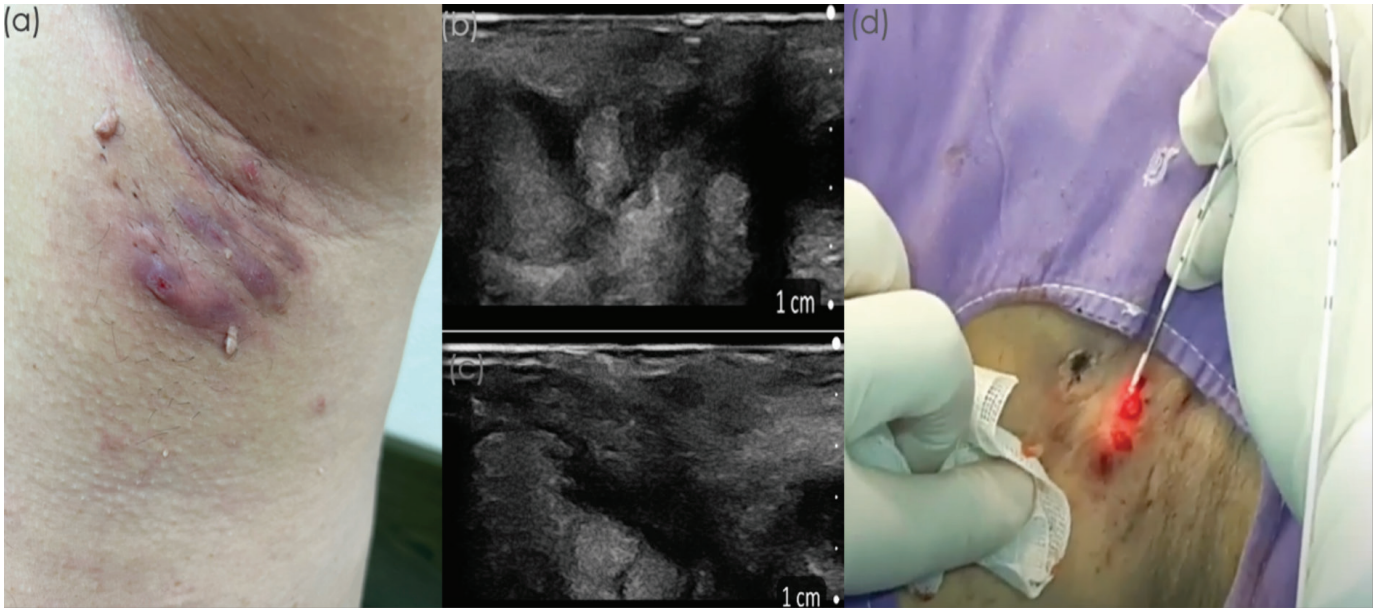

Figure 1. (a) Subcutaneous nodules, sinus tracts, and fistula openings in the left axilla; (b) Anechoic fluid collection in the ultrasonographic examination of the axilla; (c) Pseudocyst and fistula appearance; (d) Use of ablative laser during the procedure

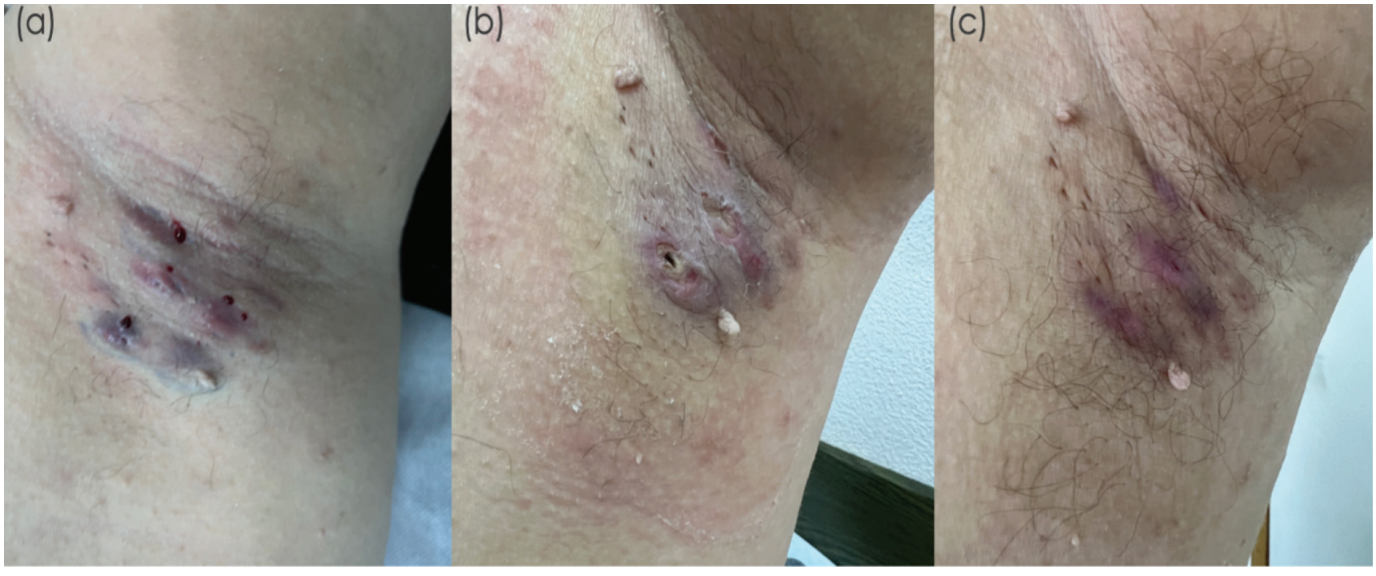

Figure 2. View of the lesions on the patient's left axilla after the procedure (a), 1 week (b), and 4 weeks (c) after the procedure

There are only a limited number of publications on the use of diode lasers in HS treatment. Fabbrocini et al.[5] intralesionally applied a 1064 nm diode laser in 20 patients with HS and achieved good clinical responses, also emphasized the benefit of intralesional application, which allows the reach of the light to different depths of the skin. While they applied four intralesional laser sessions with a 1064 nm diode laser in their study, in our study, one session was intralesional with a 1470 nm diode laser, and it was sufficient to obtain an adequate clinical response. Additionally, Guillem et al.[6] used intralesional 1470 nm diode laser to Hurley stage 2 HS patients and stated that this method could be an effective and easy treatment option for these patients. Intralesional photodynamic therapy applications with diode lasers also stand out as promising treatment options for HS.[8]

A 1470 nm diode laser can reduce bleeding and improve curative rates by absorbing water and hemoglobin at a wavelength of 1470 nm, which promotes good hemostasis and high tissue vaporization. In the literature, 1470 nm diode lasers have been used for hypertrophic scars and keloid management, endovenous laser ablation, and hemorrhoid and pilonidal sinus treatment.[9-11]

In this case, we report a rare 1470 nm intralesional diode laser application for HS in the literature. In reporting our case, we want to highlight that as a minimally invasive procedure, 1470 nm diode lasers can be an effective treatment method for Hurley stage 1-2 HS treatment without significant complications, any restriction in the patient's life quality, and with beneficial post-treatment recovery.

Footnote

Informed Consent: The patient in this manuscript has given written informed consent to the publication of his case details.

Authorship Contributions

Surgical and Medical Practices: Y.C.E., Y.A., B.T., S.L., E.A., Concept: Y.C.E., Y.A., B.T., S.L., E.A., Design: Y.C.E., Y.A., B.T., S.L., E.A., Data Collection or Processing: Y.C.E., Y.A., B.T., S.L., E.A., Analysis or Interpretation: Y.C.E., Y.A., B.T., S.L., E.A., Literature Search: Y.C.E., Y.A., B.T., S.L., E.A., Writing: Y.C.E., Y.A., B.T., S.L., E.A.

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