

ORIGINAL ARTICLE

Impact of sun exposure on adult patients affected by atopic dermatitis

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ABSTRACT

BACKGROUND: Atopic dermatitis management is challenging and usually requires intermittent or continuous, long-term treatment with topical and/or systemic anti-inflammatory agents and appropriate skin care. Most patients affected by atopic dermatitis improve during sun exposure. It has been reported that the change from a subarctic/temperate to a subtropical climate for 4 weeks improved significantly skin symptoms and quality of life in children, even for 3 months after return. However, until now the effect of sun exposure on adult patients with atopic dermatitis has never been investigated.**METHODS:** We conducted a retrospective study to assess the short-term effect of sun exposure during summer holidays on skin symptoms of adults affected by AD.**RESULTS:** One hundred and fourteen patients were enrolled in the study (62 males; aged 18-72 years, mean age 35.3±12.6). Seventy-three out of 114 patients (64%) spent their holidays at the seaside, and 41/114 (36%) in the mountains; 38/41 (92.7%) subjects from the latter group reported that during their holidays they frequented outdoor swimming pools or solariums almost every day of their vacation. The sunlight effect was considered beneficial by 68/114 (59.6%) of patients. In particular, 38/114 patients (33.3%) reported the improvement of AD and 30/114 (26.3%) the complete resolution of the disease during summer holiday.**CONCLUSIONS:** Our data seem to suggest that sun exposure is beneficial in most patients, but not in all patients. In fact, sun exposure does not appear to improve skin symptoms or even aggravate them in about 4 out of 10 patients. This could be particularly important also considering ongoing climate changes that may affect the clinical history of several skin diseases, among which AD.(Cite this article as: Napolitano M, Monfrecola G, Fabbrocini G, Fattore D, Patri A, Patruno C. Impact of sun exposure on adult patients affected by atopic dermatitis. *Ital J Dermatol Venereol* 2021;156:558-61. DOI: 10.23736/S2784-8671.20.06582-7)**KEY WORDS:** Dermatitis, atopic; Sunstroke; Retrospective studies.

Atopic dermatitis (AD) is a chronic inflammatory skin disease commonly affecting children and clearing up during infancy or childhood.¹ However, AD may persist until adulthood (persistent AD) or may begin later in life (adult-onset AD).¹ Adult AD is accompanied by a high physical, psychological, and socio-economic burden, with significant reduction of quality of life. Its management is challenging and usually requires intermittent or continuous, long-term treatment with topical and/or systemic anti-inflammatory agents and appropriate skin care.² Furthermore, it is well known that some environmental factors

such as changes in season and climate, exposure to irritants or to allergens, and infections, as well as psychological stress may worsen AD and other inflammatory chronic cutaneous diseases.¹⁻⁴ In particular, most patients affected by AD improve during sun exposure; therefore, artificial UV radiation (UVR) is employed for the treatment.^{4,5} Unfortunately, a small percentage of patients exacerbate following UVR.^{4,5} Moreover, a recent study has reported that 74.4% of paediatric patients affected by mild-to-moderate AD had complete resolution of the disease during summer holidays, 16.3% improved, and only 9.3% had no modifi-

cation of AD severity.⁶ Seaside holidays produced a significantly greater improvement than mountains holidays, with complete resolution of the disease in 91% vs. 11% of patients.⁶ However, until now the effect of sun exposure on adult AD patients has never been investigated.

Materials and methods

We conducted a retrospective study to assess the short-term effect of sun exposure during summer holidays on skin symptoms of adult (≥ 18 years old) AD patients who referred to Unit of Dermatology of the University of Naples Federico II from July 2017 to July 2018. Exclusion criterion was a clinical history suggestive for photodermatosis. An open questionnaire was performed to evaluate the effect of sun exposure during summer holidays on AD course. An informed consent was obtained prior to interview. The diagnosis of AD was made according to the Hanifin and Rajka criteria.⁶ The severity of disease was assessed with Eczema Area and Severity Index (EASI)⁷ and SCORing Atopic Dermatitis (SCORAD).⁸ The patients were enrolled at different stages of disease severity, ranged from clear to severe. Patients found to be clear upon assessment were previously confirmed by a dermatologist to have AD based on history and physical exam. The questions addressed age, sex, age at diagnosis of AD, previous and current topical and/or systemic AD treatments, assessment of skin phototype based on the Fitzpatrick classification, sunscreen use, average days per year (d/y) of sun exposure. Furthermore, the following questions were asked:

- did the patient spend their last summer holidays at the seaside or in the mountains?
- Did the patient experience worsening, improvement, or no modification of AD
- Symptoms after sun exposure?
- In patients who had disease improvement or remission, how long did the disease remain in remission after the end of sun exposure?

Statistical analysis

Data were compared statistically by Student's *t*-test and Pearson correlation test. Statistical significance was determined by $P < 0.05$

Results

The results are reported in Table I. One hundred and fourteen patients were enrolled in the study (62 males; aged 18-72 years, mean age 35.3 ± 12.6). Seventy-three

TABLE I.—*Characteristics of study population.*

Feature	Study population, N. (%)	Persistent AD Group, N. (%)	Adult-onset AD group, N. (%)
	114 (100)	70 (61.4)	44 (38.6)
Sex			
Male	62 (54.4)	38 (61.3)	24 (38.7)
Female	52 (45.6)	32 (61.5)	20 (38.5)
Mean age $\pm$ SD	35.3 $\pm$ 12.6	29.2 $\pm$ 10.3	34.6 $\pm$ 11.5
AD Severity			
Mild	29 (25.4)	23 (79.3)	6 (20.7)
Moderate	51 (44.8)	32 (62.7)	19 (37.3)
Severe	34 (29.8)	15 (44.1)	19 (55.9)
Current treatments			
Topical	80 (70.2)	45 (56.2)	35 (43.8)
Corticosteroids	44 (55.0)	23 (52.3)	21 (47.7)
Emollients	25 (31.2)	18 (72.0)	7 (28.0)
Pimecrolimus	4 (5.0)	1 (25.0)	3 (75.0)
Tacrolimus	7 (8.7)	3 (42.8)	4 (57.2)
Systemic	24 (21.1)	11 (45.8)	13 (54.2)
Azathioprine	1 (4.2)	0 (0.0)	1 (100.0)
Corticosteroids	18 (75.0)	10 (55.6)	8 (44.4)
Cyclosporine	4 (16.7)	1 (25.0)	3 (75.0)
Methotrexate	1 (4.2)	0 (0.0)	1 (100.0)
Nb-UVB	10 (8.8)	3 (30.0)	7 (70.0)
Skin type			
I	0 (0.0)	0 (0.0)	0 (0.0)
II	5 (4.4)	3 (60.00)	2 (40.0)
III	90 (78.9)	57 (63.3)	33 (36.7)
IV	19 (16.7)	10 (52.6)	9 (47.4)
V	0 (0.0)	0 (0.0)	0 (0.0)
Sun exposure			
Sun	73 (64.0)	48 (65.8)	25 (34.2)
Mountains	41 (36.0)	22 (53.7)	19 (46.3)
Sunlight exposure			
<15y/d	30 (26.3)	9 (30.0)	21 (70.0)
15-30 y/d	64 (56.1)	45 (54.7)	19 (45.3)
>30y/d	20 (17.6)	16 (80.0)	4 (20.0)
Sunlight effect			
Positive	68 (59.6)	58 (85.3)	10 (14.7)
Negative	20 (17.5)	6 (30.0)	14 (70.0)
No modification	26 (22.8)	6 (23.1%)	20 (76.9)
Sunscreens use			
Yes	89 (78.1)	50 (56.2)	39 (43.8)
No	25 (21.9)	20 (80.0)	5 (20.0)

out of 114 patients (64%) spent their holidays at the seaside, and 41/114 (36%) in the mountains; 38/41 (92.7%) subjects from the latter group reported that during their holidays they frequented outdoor swimming pools or solariums almost every day of their vacation. No statistically significant difference concerning all the variables studied was preliminarily found between the two groups; therefore, statistical analysis was carried out on the total number of patients, regardless of the place of vacation. Seventy out of 144 patients (61.4%) suffered from persistent AD, while in 44/114 (38.6%) AD started in adult

age (≥ 18 years old). Most patients were diagnosed with moderate AD (51/114; 44.8%), with an average EASI score of 11.1 ± 6.9 and SCORAD score of 38.2 ± 18.4 . No significant differences were found regarding AD severity between persistent vs. adult-onset AD groups. At enrollment, 80/114 (70.1%) patients were treated with topical agents alone, 10/114 (8.8%) with narrowband ultraviolet B (nb-UVB), and 24/114 (21.1%) with anti-inflammatory systemic treatments (Table I). Combination therapies were practiced by 25/114 (21.9%) patients. Type III was the most common skin phototype (90/114; 78.9%). Therefore, light exposition was the Regarding the sunlight exposure period, 30/114 (26.3%) of patients referred that their sun exposure duration was <15 d/y, 64/114 (56.1%) between 15-30 d/y, and 20/114 (17.6%) >30 d/y. We found no differences in terms of d/y of sunlight exposure between persistent and adult-onset AD, although patients in whom the disease has appeared in adulthood seem to expose themselves to the sun for fewer days. Eighty-nine out of 114 (78.1%) patients interviewed (50/70, 71.4%, of persistent AD group vs. 39/44, 8.9% of adult-onset AD subjects) applied sunscreens to avoid sunburn. The sunlight effect was considered beneficial by 68/114 (59.6%) of patients. In particular, 38/114 patients (33.3%) reported the improvement of AD and 30/114 (26.3%) the complete resolution of the disease during summer holiday. However, AD worsening was reported by 20/114 (17.5%) of patients with a not significant difference between patients with persistent AD and those with adult-onset AD (6/70, 8.6% vs. 14/44, 31.8%). Twenty-six (22.8%) subjects did not report any modification. Skin lesions reappeared on overage after 4 weeks from the suspension of sun exposure in 21/114 (18.4%) patients who referred improvement or remission of AD.

Discussion

The effect of sunlight on AD is controversial.^{5, 8, 9} Moreover, studies on the effect of the sun on adult patients with AD are missing. It has been reported that the change from a subarctic/temperate to a subtropical climate for 4 weeks improved significantly skin symptoms and quality of life in children, even for 3 months after return.⁸ On the other hand, it is estimated that 1% to 3% of children with AD will experience a paradoxical worsening of their AD after exposure to UV light.⁸ UV light can be beneficial for AD patients due to its immunomodulatory effects through apoptosis of inflammatory cells, inhibition of Langerhans cells, and alteration of cytokine production.⁷ In addition,

UVR reduces the colonization of *Staphylococcus aureus* and improves skin barrier.^{4, 5} In our study, in most patients sun exposure is associated with positive effect on AD severity and improvement of symptoms. However, 17.5% of our patients referred a worsening of AD after sunlight exposure. Interestingly, the worsening of skin symptoms seems to be more frequent in patients with late onset of AD. It is reported that structural proteins of skin barrier could be damaged by sun exposure in patients with preexisting AD and subsequent aggravation of skin symptoms.¹⁰ Furthermore, the low efficacy of solar exposure in controlling eczema does not seem to be associated with specific filaggrin genotypes¹⁰ and it is known that filaggrin mutations are associated with AD that develops during infancy and not with late-onset disease.¹¹ It is also possible that there are differences between the two groups in relation to the habit of sun exposure acquired over time and related to the date of beginning of the disease; for example, the use of sunscreens was more frequent in patients with persistent than in those with the adult-onset AD. It should also be highlighted that there was no significant difference between the patients who spent the holidays at the sea compared to those who did it in the mountains, probably due to the habit of the great majority of the latter to spend a comparable number of vacation days in outdoor pools or solarium.

Conclusions

In conclusion, our data seem to suggest that sun exposure is beneficial in most patients, but not in all patients. In fact, sun exposure does not appear to improve skin symptoms or even aggravate them in about 4 out of 10 patients. This could be particularly important also in light of ongoing climate changes that may affect the clinical history of several skin diseases, among which AD.¹² Therefore, physicians should be aware of the possibility that AD does not always improve with sun exposure and therefore must select patients well to recommend sunbathing, always advising the use of appropriate sunscreens.

References

1. Megna M, Patruno C, Balato A, Rongioletti F, Stingeni L, Balato N; Italian Adult Atopic Dermatitis Study Group. An Italian multicentre study on adult atopic dermatitis: persistent versus adult-onset disease. *Arch Dermatol Res* 2017;309:443–52.
2. Napolitano M, Marasca C, Fabbrocini G, Patruno C. Adult atopic dermatitis: new and emerging therapies. *Expert Rev Clin Pharmacol* 2018;11:867–78.
3. Balato N, Di Costanzo L, Patruno C, Patri A, Ayala F. Effect of weather

and environmental factors on the clinical course of psoriasis. *Occup Environ Med* 2013;70:600.

4. Bonamonte D, Filoni A, Vestita M, Romita P, Foti C, Angelini G. The role of the environmental risk factors in the pathogenesis and clinical outcome of atopic dermatitis. *BioMed Res Int* 2019;2019:2450605.

5. Wollenberg A, Szepietowski J, Taieb A, Ring J. Corrigendum: Consensus-based European guidelines for treatment of atopic eczema (atopic dermatitis) in adults and children: part I. *J Eur Acad Dermatol Venereol* 2019;33:1436.

6. Patrizi A, Savoia F, Giacomini F, Tabanelli M, Gurioli C. The effect of summer holidays and sun exposure on atopic dermatitis. *G Ital Dermatol Venereol* 2009;144:463–6.

7. Gambichler T, Kreuter A, Tomi NS, Othlinghaus N, Altmeyer P, Skrygan M. Gene expression of cytokines in atopic eczema before and after ultraviolet A1 phototherapy. *Br J Dermatol* 2008;158:1117–20.

8. Byremo G, Rød G, Carlsen KH. Effect of climatic change in children with atopic eczema. *Allergy* 2006;61:1403–10.

9. Fieten KB, Weststrate AC, van Zuuren EJ, Bruijnzeel-Koomen CA, Pasmans SG. Alpine climate treatment of atopic dermatitis: a systematic review. *Allergy* 2015;70:12–25.

10. Kim YM, Kim J, Lee JY, Kim M, Kim H, Jung K, *et al.* Impact of solar ultraviolet radiation on atopic dermatitis symptoms in young children: A longitudinal study. *Pediatr Allergy Immunol* 2017;28:551–6.

11. Rupnik H, Rijavec M, Korošec P. Filaggrin loss-of-function mutations are not associated with atopic dermatitis that develops in late childhood or adulthood. *Br J Dermatol* 2015;172:455–61.

12. Balato N, Megna M, Ayala F, Balato A, Napolitano M, Patruno C. Effects of climate changes on skin diseases. *Expert Rev Anti Infect Ther* 2014;12:171–81.

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