

# Sun-protection habits and knowledge of patients with vitiligo

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## Abstract

**Introduction:** Vitiligo is a common chronic depigmentation disease. Patients are generally advised to protect themselves from the sun.

**Methods:** One hundred fifty-three patients diagnosed with vitiligo and 106 healthy volunteers with no additional dermatological disease were included in the study. We evaluated the sun-protection habits of patients with vitiligo and controls, and also assessed their knowledge and attitudes toward sun exposure.

**Results:** Rates of sunscreen use, high-factor sunscreen use, and remaining in the shade were significantly higher among patients ( $p = 0.004$ ,  $p = 0.028$ ,  $p = 0.040$ ). We found significantly higher rates of modifying vacation habits, high sun-protection factors (SPF) sunscreen use, and preferring to remain in the shade among patients using phototherapy ( $p = 0.016$ ,  $p = 0.019$ ,  $p = 0.028$ ). We showed higher rates of modification of vacation habits, wearing sunglasses, and remaining in the shade among patients with longer disease durations ( $p = 0.026$ ,  $p = 0.001$ , and  $p = 0.017$ ).

**Conclusions:** We determined higher rates of sunscreen use, high-SPF sunscreen use, and tendencies to remain in the shade in vitiligo patients compared to the general population. We also determined that disease duration and treatment with phototherapy alter sun-protection habits, but the presence of generalized disease and lesions in visible areas such as the face does not alter patients' habits.

**Keywords:** vitiligo, sun protection, sun exposure, knowledge

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## Introduction

Vitiligo is a common chronic depigmentation disease that affects approximately 0.5 to 2% of the population (1, 2). The disease is characterized by autoimmune melanocyte destruction (3). Mechanisms such as genetic, autoimmune, neural, and chemical factors and oxidative damage are particularly implicated in melanocyte destruction. Autoimmune and oxidative stress theories have found the most support in studies (3, 4).

One of the basic treatments for vitiligo is phototherapy. There is no consensus on the optimal duration of narrow-band ultraviolet B (UVB) phototherapy in the treatment of vitiligo (5). An increased risk of skin cancer has been shown with extended psoralen and UVA (PUVA) therapy in psoriasis, but this has not been demonstrated in vitiligo patients. Patients must therefore be aware of the benefits and risks of UV exposure (6, 7).

Melanin deficiency in lesional skin in vitiligo patients has been shown to increase photodamage, and exposure to phototherapy is thought to increase the risk of melanoma and non-melanoma skin cancers (NMSC) (8, 9). However, another hypothesis is that the autoimmune process in patients protects against the development of melanoma. Paradisi et al. (10) and Teuling et al. (9) have both reported a decreased risk of skin cancer in vitiligo patients. In contrast, Hexsel et al. (7) have reported higher rates of NMSC in vitiligo patients. Another study from Germany observed an increased risk of photodamage and NMSC in patients with vitiligo (11).

Vitiligo patients are generally advised to protect themselves from the sun. However, the number of studies on the knowledge, attitudes, and sun-protection habits of vitiligo patients is very limited. The purpose of this study was to evaluate patients' knowledge, beliefs, and sun-protection habits.

## Material and methods

This cross-sectional study was performed between September 2018 and May 2019 at our dermatology clinic. A multiple-choice questionnaire was prepared by the authors to evaluate the sun-protection habits of patients with vitiligo and controls. Inclusion criteria for cases were a diagnosis with vitiligo at least six months prior and consent to complete the questionnaire. Controls were recruited from people without a history of any dermatological or photosensitive diseases, and they consented to complete the questionnaire. We also evaluated patients' clinical demographics, treatments used, type of disease, and disease duration. The sun-protection habits assessed, as suggested previously (12, 13), included the use of sunscreens, wide-brimmed hats, and sunglasses, the types of clothing preferred during the summer, avoiding the sun between 11 am and 4 pm in summer, and length of time spent in the open air in summer. We also evaluated the sun-protection factors (SPF) of sunscreens, reapplication of sunscreens during the day, use of sunscreens when swimming, frequency of reapplication of sunscreens after swimming, and types of clothing preferred when sunbathing or swimming. We also evaluated the history of sunburn in the previous year, family and personal history of skin cancers, sun-avoidance behaviors following diagnosis, and whether patients altered their vacation behaviors.

Patients were asked to respond to six statements in order to assess their knowledge and attitudes toward sun exposure in vitiligo. These were: *sun makes my disease more visible*, *sun exacerbates my disease*, *sun improves my disease*, *I must protect myself from sun because of my disease*, *I have a greater risk of skin cancer because of my disease*, and *I have a lower risk of sunburn because of my disease*.

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Data analysis was performed using SPSS 23.0 software (IBM Corp., Armonk, NY, USA). Basic sociodemographic characteristics of participants were assessed using descriptive statistics as means  $\pm$  standard deviation and percentages. The frequencies of individual responses were also measured by number and percentage. Chi-square analysis was used to compare descriptive data. The level of statistical significance was accepted as  $p < 0.05$ .

## Results

The study included 153 patients diagnosed with vitiligo at our clinic between September 2018 and May 2019 and 106 healthy volunteers with no additional dermatological disease. The patients consisted of 78 women and 75 men, with a mean age of  $30.14 \pm 16.41$  years. The control subjects consisted of 65 women and 41 men, with a mean age of  $30.84 \pm 13.96$  years. In the patient group, 49 people were younger than 18 and 102 were adults. The mean duration of disease was  $7.43 \pm 8.71$  years. Forty-two percent of the patients were receiving active treatment. Focal disease was present in 29% of patients and generalized disease in 56%. We determined that 65% of patients protected themselves against the sun, 69% altered their sun-protection behaviors following diagnosis, and 22% modified their vacation habits. Patients' clinical characteristics and treatments are summarized in Table 1.

Sun-protection behaviors among the patients and controls are summarized in Table 2. The most common method of protection from the sun among our patients was to remain in the shade (67%), followed by sunscreen use (61%), and wearing wide-brimmed hats (47%), sunglasses (42%), and long-sleeved clothing (38%). Rates of sunscreen use, high-factor sunscreen use, and remaining in the shade were significantly higher among patients than controls ( $p = 0.004$ ,  $p = 0.028$ , and  $p = 0.040$ ).

Disease severity and sun-protection behaviors are evaluated in Table 3, but no significant differences were determined. When knowledge of and beliefs concerning the disease were analyzed, we observed a high level of belief that UV makes the disease more evident among patients with generalized disease ( $p = 0.032$ ). Sun-protection behavior was not different in patients with facial involvement compared to other regions ( $p > 0.05$ ).

Analysis of the relation between receiving active treatment and sun-protection behaviors revealed significantly higher use of sunscreen and wide-brimmed hats among subjects receiving active treatment, but no relation with other parameters ( $p = 0.012$  and  $p = 0.046$ ). No significant relation was observed between knowledge of and beliefs concerning the disease and receipt of treatment ( $p > 0.05$ ).

We also wanted to determine the difference in sun-protection behaviors between children (under 18) and adults (18 and older) in the patient group. An analysis of patients' sun-protection behaviors by age groups revealed significantly higher rates of modifying vacation habits following diagnosis, use of SPF 50 sunscreen, and wearing wide-brimmed hats, sunglasses, and long-sleeved clothing among patients aged over 18 ( $p = 0.011$ ,  $p < 0.001$ ,  $p = 0.044$ ,  $p = 0.010$ , and  $p < 0.0001$ , respectively). Sunscreen use was significantly higher among patients under 18 ( $p = 0.019$ ).

An analysis of the relation between treatment with phototherapy and sun-protection behaviors revealed significantly higher rates of modifying vacation habits, SPF 50 sunscreen use, and preferring to remain in the shade among treated subjects, but no relation with other parameters ( $p = 0.016$ ,  $p = 0.019$ , and  $p = 0.028$ , respectively). No significant relation was determined between

knowledge of and beliefs concerning disease severity and treatment status ( $p > 0.05$ ; Table 4).

Analysis of duration of disease and sun-protection behaviors revealed higher rates of modification of vacation habits, use of sunglasses, and remaining in the shade among subjects with longer disease durations ( $p = 0.026$ ,  $p = 0.001$ , and  $p = 0.017$ , respectively). Analysis of information and beliefs concerning the disease showed greater belief that sunlight would make the condition more evi-

**Table 1 | Characteristics of patients and controls and treatments.**

Characteristic	Patients, n (%)	Controls, n (%)
Sex		
Female	78 (51)	65 (61)
Male	75 (49)	41 (39)
Mean age, year $\pm$ SD	$30.14 \pm 16.41$	$30.84 \pm 13.96$
History of skin cancer	1 (0.65)	–
Skin cancer in family	16 (10.5)	8 (8)
Disease duration, year $\pm$ SD	$7.43 \pm 8.71$	–
Type of disease		
Focal	45 (29)	–
Generalized	85 (56)	–
Acrofacial	23 (15)	–
Treatment status of vitiligo		
Still receiving treatment	64 (42)	–
Therapies		
Topical corticosteroid	59 (39)	–
Topical calcineurin inhibitors	99 (65)	–
Phototherapy	62 (41)	–
Use sun protection because of disease	100 (65)	–
Altered sun-protection habits due to vitiligo	105 (69)	–
Altered vacation habits since diagnosis	33 (22)	–

SD = standard deviation.

**Table 2 | Sun-protection behaviors of patients and controls.**

Behavior	Patients, n (%)	Controls, n (%)	p-value
Use sunscreen			
Yes	90 (61)	43 (41)	0.004
No	63 (39)	63 (59)	
Sunscreen factor			
Factor 30	13 (14)	14 (33)	0.028
Factor 50	77 (86)	29 (67)	
Sunscreen reapplication			
I reapply it	28 (31)	9 (21)	0.220
I do not reapply it	62 (69)	34 (79)	
Wear hat on sunny days			
Yes	72 (47)	45 (42)	0.464
No	81 (53)	61 (58)	
Wear sunglasses on sunny days			
Yes	65 (42)	33 (31)	0.064
No	88 (58)	73 (69)	
Hours a day spent in open air			
< 5 hours	98 (64)	70 (66)	0.645
5–10 hours	49 (32)	34 (32)	
>10 hours	6 (4)	2 (2)	
Clothing preferred during summer			
Short-sleeved or sleeveless	95 (62)	65 (61)	0.900
Long-sleeved	58 (38)	41 (39)	
Clothing preferred when swimming			
Swimsuit	88 (89)	55 (79)	0.106
UV filter clothing	11 (11)	15 (21)	
Use sunscreen when swimming			
Yes	58 (59)	43 (61)	0.710
No	41 (41)	27 (39)	
Reapply sunscreen after swimming			
Yes	27 (27)	26 (37)	0.173
No	72 (73)	44 (63)	
Avoid sun 11 am to 4 pm in summer			
Yes	100 (67)	58 (55)	0.004
No	50 (33)	48 (45)	

dent and that sun protection is essential among subjects with a longer duration of disease ( $p < 0.0001$ , and  $p = 0.022$ , respectively).

## Discussion

Our findings showed higher prevalence for sunscreen and high-factor sunscreen usage among patients with vitiligo. Patients are more likely to remain in the shade between 11 am and 4 pm in summer than the general population. Rates of sunscreen and wide-brimmed hat use were higher among patients receiving active treatment.

Two previous studies examined sun-protection habits among vitiligo patients. In one of these, Priska et al. (5) retrospectively examined the sun-protection habits of 94 patients with vitiligo. They reported that 71% of patients used sunscreen and that 36% preferred SPF 50. The general sunscreen use rates in our study were rather lower, at 61%, although SPF 50 sunscreen use was higher,

**Table 3 | Disease severity and sun-protection behaviors.**

Behavior	Focal disease, n (%)	Generalized disease, n (%)	<i>p</i> -value
Use sunscreen			
Yes	41 (60)	49 (58)	0.741
No	27 (40)	36 (42)	
Sunscreen factor			
Factor 30	9 (22)	4 (8)	0.121
Factor 50	32 (78)	45 (92)	
Sunscreen reapplication			
Yes	12 (29)	16 (33)	0.730
No	29 (71)	33 (67)	
Wear hat on sunny days			
Yes	27 (40)	38 (45)	0.534
No	41 (60)	47 (55)	
Wear sunglasses on sunny days			
Yes	27 (40)	45 (53)	0.103
No	41 (60)	40 (47)	
Hours a day spent in open air			
< 5 hours	46 (68)	52 (61)	0.668
5–10 hours	20 (29)	29 (34)	
>10 hours	2 (3)	4 (5)	
Clothing preferred in summer			
Short-sleeved or sleeveless	46 (67)	49 (58)	0.205
Long-sleeved	22 (32)	36 (42)	
Clothing preferred when swimming			
Swimsuit	39 (87)	49 (91)	0.748
UV filter clothing	6 (13)	5 (9)	
Use sunscreen when swimming			
Yes	24 (53)	34 (63)	0.333
No	21 (47)	20 (37)	
Reapply sunblock after swimming			
Yes	12 (27)	15 (28)	0.902
No	33 (73)	39 (72)	
Avoid sun 11 am to 4 pm in summer			
Yes	42 (62)	61 (72)	0.190
No	26 (38)	24 (28)	

**Table 4 | Knowledge and beliefs concerning disease severity and treatment status.**

Belief	Focal disease, n (%)	Generalized disease, n (%)	<i>p</i> -value	Phototherapy received, n (%)	Phototherapy not received, n (%)	<i>p</i> -value
Sun makes my disease more visible	51 (75)	76 (89)	0.032	54 (87)	73 (80)	0.372
Sun exacerbates my disease	40 (59)	57 (67)	0.293	39 (63)	58 (64)	0.916
Sun improves my disease	2 (3)	4 (5)	0.889	4 (7)	2 (2)	0.183
I must protect myself from sun because of my disease	61 (90)	80 (94)	480	59 (95)	82 (90)	0.404
I have a greater risk of skin cancer because of my disease	30 (44)	40 (47)	0.717	31 (50)	39 (43)	0.384
I have a lower risk of sunburn because of my disease	45 (66)	64 (75)	0.216	50 (81)	59 (65)	0.052

at 86%. Bhatia et al. (14) compared the sun-protection habits of 442 vitiligo patients, differentiating those that were members of a support group from those that were not. Rates of generalized disease and of exposure to UV for more than 1 hour a week were lower among patients that were not in a support group. The rate of belief that UV was good for the disease was also lower, although the history of sunburn in the previous year was higher. Sun protection was twice as high among members of a support group, and rates of sunscreen reapplication were also higher. Rates of sunscreen use in both groups (96–94%) were much higher than in our study. Ahmet et al. reported that vitiligo patients experienced difficulties in maintaining good sun protection, such as the application of sunscreen (2).

Nearly half of our patients believed they were at increased risk of skin cancer because of their disease. Bhatia et al. reported a similar conclusion (14). Ahmed et al. reported severe anxiety due to fear of skin cancer among vitiligo patients, and they determined that some patients avoided the sun entirely (2). Unexpectedly, epidemiological studies of the association between vitiligo and skin cancer have determined a reduced cancer risk. Vitiligo is associated with polymorphism of the TYR gene, which codes tyrosinase, an essential enzyme in melanin synthesis. Different allelic connections may protect vitiligo patients from melanoma due to an anti-tyrosinase effect (5, 10, 15). Autoimmunity is also thought to protect vitiligo patients against melanoma, although it has also been suggested that the lack of melanin can increase solar injury, as well as melanoma and NMSC (9, 16). Only one of our patients had a history of skin cancer. Bhatia et al. (15) and Priska et al. (5) also observed no increased incidence of skin cancer in their patients. However, the mean age of the populations in our study and in the study by Priska et al. was markedly lower (5).

The photodamage and photoageing effects of PUVA and narrow-band UVB are thought to be responsible for increases in skin cancers. Teuling et al. (9) determined no increased risk for melanoma and NMSC in patients receiving phototherapy. In a study evaluating the sun-protection behaviors of patients that received phototherapy, Priska et al. (5) did not find any difference in the use of sunscreen, similar to our study, whereas in our study the rate of changing vacation habits and the preference for sunscreen with a high protection factor were higher.

We analyzed sun-protection habits in terms of age in our study; rates of changing vacation habits following diagnosis, using SPF 50 protection, wearing wide-brimmed hats, wearing sunglasses, and wearing long-sleeved clothing were all higher above the age of 18, whereas use of sunscreen was higher among those under 18. Sun-protection habits in terms of age groups have not previously been analyzed in the literature.

Psychological effects such as embarrassment, lack of self-confidence, social anxiety, loss of self-esteem, and impaired quality of life are well known in vitiligo patients (2, 5). One study highlighted

that patients avoid outdoor activities. Patients have been shown to experience significant problems in exposing depigmented skin and therefore to feel a need to cover up, even in hot weather (2). In contrast, wearing short-sleeved and sleeveless clothing and swimsuits when swimming was not different from the general population in our study. In addition, no difference was determined in sun-protection habits when subjects with generalized disease and facial involvement were compared with other patients.

Our study also investigated patients' attitudes and beliefs concerning the effects of the sun on their disease. A significant proportion of our patients thought that sunlight made their disease more evident and exacerbated it. The belief that sunlight improved the disease was less common. Similarly, in Bhatia et al.'s study a significant proportion of patients thought that UV exposure made their disease more evident, although fewer thought that this exacerbated it (14).

The two previous studies had no healthy volunteer groups for comparison purposes. Ours is therefore the first study to compare

sun-protection habits among vitiligo patients with the general population. A principal limitation of our study is the relatively small number of patients, and another is that 42% of patients were receiving active treatment.

## Conclusions

Our findings showed that the most popular means of protection against the sun among vitiligo patients was to remain in the shade, followed by the use of sunscreen, sunglasses, wide-brimmed hats, and long-sleeved clothing. We determined higher rates of sunscreen use, use of high-SPF products, and tendencies to remain in the shade in vitiligo patients compared to the general population. We also determined that the presence of generalized disease and of lesions in visible areas such as the face did not alter sun-protection habits. Although no relationship between vitiligo and skin cancer has been proved in the literature, half of our patients believed that it increased the risk of skin cancer.

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