

Sunscreen Utilization Behaviors and Factors Associated with Daily use of Sunscreen Among Melasma Patients at A.L.E.R.T Comprehensive Specialized Hospital: A Cross-Sectional Study

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Abstract

Background

Melasma is a common skin disorder of acquired pigmentation disease that commonly occurs on the face and sun-exposed areas. It affects all races and genders but is more prevalent in women. Sunscreen is an essential pharmaceutical product for management and prevention of melasma.

Objectives

To assess the knowledge, practice, and associated factors of sunscreen usage among melasma patients.

Method

A facility-based cross-sectional study was conducted at ALERT Comprehensive Specialized Hospital in Addis Ababa in 2023. Data were collected using a structured questionnaire and analyzed using Statistical Package of Social Sciences (SPSS®) version 25. The data was analyzed using descriptive statistics and a multivariable logistic regression model. A p -value < 0.05 was considered statistically significant.

Results

Data from 363 study subjects were analyzed, and the response rate was 86%. The mean age was 35.2 with $S.D \pm 8.2$ years. Females (96.1%) were the majority of the study participants. Malar-type melasma (40.8%) was the observed case. The mean age of onset of melasma was 31.5 with $S.D \pm 7.3$ years. The majority of the study participants (76.9%) used sunscreen on a daily basis. Patients' overall knowledge and practices toward sunscreen use was (81%) and (67%), respectively. The study found that patients having moderate melasma [AOR=5.5, 95% CI: 2.49 – 12.1] ($P = < 0.001$), severe melasma [AOR=2.9, 95% CI: 1.29 – 5.98] ($P = 0.009$), and duration of melasma ranged from 1-5 years [AOR = 1.97; 95% CI (1.02–3.82)] were factors significantly associated with sunscreen utilization practices.

Conclusion

Melasma patients' overall knowledge and practices towards using sunscreen were good. The severity and duration of melasma were statistically significant factors associated with sunscreen usage. A more structured continuous education program on the appropriate practice of sunscreen use will be needed for melasma patients.

Keywords: Knowledge, Practices, Sunscreen, Melasma, Ethiopia

1. Abstract

1.1. Background

Melasma is a common, chronic skin condition of hyperpigmentation involving the appearance of symmetric and irregular light brown macules and patches on sun-exposed skin. Its pathophysiology is complicated, involving changes to the basement membrane as well as keratinocytes, fibroblasts, endothelial cells, and melanocytes [1,2]. As a result of black spots on their faces, the disease can cause low confidence and psychosocial difficulties [3].

About 50–80% of melasma patients have a centrofacial pattern, and it also appears on the forehead, nose, upper lip, cheeks, and chin [4]. Mandibular melasma is commonly seen in elderly individuals [5]. Extra – facial melasma can appear on areas of the body other than face, such as the neck, sternum, forearms, and upper extremities [6]. All races and genders are affected by melasma, although it is more common in women with darker skin types than in those with lighter skin types, especially those with light brown skin [7-10]. Prevalence of melasma varies greatly throughout the world, and these variances are caused by differences in skin types, ethnic backgrounds, and UV exposure levels in different geographic areas [11,12]. According to reports, the prevalence of melasma varies by population region, apparently ranging from 1 to 33% [8,13,14]. In Ethiopia, the prevalence of melasma was 1.5%, while in Durban, South Africa, dyschromia, which includes melasma, is the third most common dermatological diagnosis [15].

The exact cause of melasma is still unknown. However, a number of factors contribute to the pathogenesis of melasma, including genetic predisposition, cosmetics selection, chronic exposure to ultraviolet (UV) radiation, hormonal influences (such as estrogen exposure in menstruating, pregnant, or oral contraceptive women), and aberrant vasodilation and angiogenesis [3,16,17].

The corner stone of melasma treatment is photoprotection. These photoprotective methods include avoiding direct sunlight, especially during midday, using wide-brimmed hats, photoprotective clothes, sunglasses, sunscreen with SPF of at least 30, and reapplying it every one to two hours when you're outside [18,19]. Studies show that effective use of sunscreen combined with extra visible light protection greatly reduces both the occurrence and severity of melasma, particularly in tropical regions where there is extensive UV exposure [20, 21]. Nevertheless, the importance of sunscreen depends on the melasma patients' proper application and good awareness towards the sunscreen products [22,23].

Appropriate use of sunscreen protects against sunburn, photoaging and preventing flare-ups of melasma and reducing the prevalence of melasma symptoms, particularly in individuals with skin types susceptible to hyperpigmentation [21]. Despite the importance of this practice, poor knowledge and practices towards the sunscreen is common around the world. In Ethiopia, there are no studies on this matter. Thus, more is needed to know about melasma patients' knowledge, practices, and associated factors for daily use of sunscreen.

The findings of this study are supportive of a government, hospitals, melasma patients, local policy implementers, stakeholders, and researchers to design effective interventions associated with melasma and sunscreen use. Thus, this study investigated the knowledge, practices, and associated factors of sunscreen use among melasma patients at ALERT Comprehensive Specialized Hospital.

2. Methods

2.1. Study Setting

This study was conducted in the All-Africa Leprosy, Tuberculosis and Rehabilitation Training Centre (ALERT) dermatology clinic located in Addis Ababa, Ethiopia. ALERT is one of the country's leading specialized dermatology, ophthalmology, and plastic and reconstructive surgery hospitals. Established in 1934, it is the country's main referral centre for skin-related cases. The hospital currently offers a diverse array of clinical services across different departments [24].

2.2. Study Design and Periods

A facility-based cross-sectional study was conducted in ALERT comprehensive specialized hospital, Addis Ababa, Ethiopia, from March 1 to August 30, 2023.

2.3. Source and Study Population

The source population of this study participant was all melasma patients at ALERT Comprehensive Specialized Hospital. The study population was melasma patients who attended their treatment during the study period and were recruited to fulfill the inclusion criteria.

2.4. Eligibility Criteria

All patients treated for melasma at ALERT Comprehensive Specialized Hospital Dermatovenerology unit during the study period were patients aged >18 years old who had been on active follow-up and using sunscreen for the past 1 month.

2.5. Sample Size Determination and Sampling Technique

The sample size was determined using a single-population proportion formula [25]. Hence, a study has not been conducted on KP towards sunscreen among Melasma patients; we used a prevalence of 50% to obtain the largest possible sample size. Considering a 95% confidence interval and a 5% margin of error, the total sample size became 384. By adding a 10% non-response rate, the final sample size was 422.

The distribution of samples was determined by the probability proportional to their size. A systematic random sampling technique was employed to select the calculated sample size. Then, at every k th interval ($K=N/n$) where N =total Melasma patients who have received sunscreen treatment within the study period, n =required sample size, thus $K=650/422=2$. Then, the first patient was randomly identified from 2 by lottery method. Then, every 2nd patient was taken into the study until the required number of study participants was reached.

3. Data Collection Tool

The data were collected using a structured interviewer-

administered questionnaire. The questionnaire was designed after reviewing different literature [26-29]. A structured interview-based questionnaire was used to obtain sociodemographic characteristics, clinical characteristics, knowledge, and practices toward sunscreen information. The total knowledge score ranged from 0 to 10 using Bloom's cutoff point, and those having correct answers scored \geq mean by categorizing the patients as having good knowledge. Those who scored less than the mean were classified as having poor knowledge. In the same way, the practices of participants toward sunscreen use were assessed by ten questions, and the total sunscreen practices score ranged from 0 to 10 using Bloom's cutoff point. Those having correct answers scored \geq mean by categorizing the patients as having good sunscreen use practices. Those who scored less than the mean were classified as having poor sunscreen use practice.

The melasma area and severity index (MASI) were applied to patients to assess the severity of melasma. Accordingly, the ratio of the area to be kept (F), right malar region (MR), left malar region (ML), and area held in the jaw (C) (A, 0-6), the darkness of melasma (D, 0-4), homogeneity (H, 0-4) evaluated. $MASI = 0.3 (DF + HF) AF + 0.3 (DMR + HMR) AMR + 0.3 (DML + HML)$ calculated according to the $AML + 0.1 (DC + HC) AC$ formula. The MASI scores ranged from 0 to 48, with 0-16.9, 17-32.9, and 33-48 defined as mild, moderate, and severe symptoms, respectively [30].

3.1. Data Collectors and Quality Assurances

Data were collected by two clinical pharmacist graduate students under the supervision of the principal investigator. Data collectors were trained on the study's purpose, patient approach, interview techniques, and data handling. A pre-test was done at the St. Paul's Hospital Millennium Medical College dermatology unit on 5% (n=13) of melasma patients before 2 weeks of actual periods for data collection to check uniformity and understandability of the data collection tool, and necessary modifications were made to the data collection tool. The pre-tested patients were excluded from the analysis. The collected data were checked manually every day to check the completeness and consistency of the principal investigator daily.

3.2. Data Analysis

Data were analyzed using a statistical package for social sciences version 25 (SPSS 25). Descriptive statistics were used to analyze socio-demographic characteristics, clinical characteristics, knowledge, and practices toward sunscreen usage. Frequencies and percentages described categorical variables, and continuous variables were expressed by means and standard deviations. The association between each independent variable and the outcome variable was assessed using binary logistic regression. All variables with $p \leq 0.25$ in the binary logistic regression analysis were further taken to multiple logistic regression analysis to control all possible confounders. Adjusted odds ratio along with 95% CI and p-value < 0.05 were considered to declare factors that have a statistically significant association with patients' knowledge and practice towards sunscreen.

4. Results

4.1. Sociodemographic Characteristics of Respondents

Out of the calculated 422 sample size, 363 have participated, yielding a response rate of 86%. Most of the study participants (96.1%, 349) were female. The mean (\pm SD) age of study subjects was 35.2+8.2 years. More than half of the study subjects (57 %, 207) were married (Table 1).

Regarding educational status, more than half (52.7 %, 191) of the study subjects had completed college. More than three-quarters (75.5%, 274) of the study subjects were from Urban residents. The majority of the study subjects (70.5%, 256) and (73.6%, 267) worked at private companies and earned ETB \geq 3000 per month, respectively.

Regarding the sources of sunscreen information, all of the study subjects (100%,363) obtained information from various sources. Nearly one-third (31.4%, 114) of the study subjects have received information from health care professionals (HCPs). Concerning sun protection methods, almost half of all (46.3%, 168) the study participants used alternatives to sunscreen as a form of sun protection.

Variable	Category	n (%)
Sex	Female	349(96.1)
	Male	14 (3.9)
Age (Years)	18-25	49(13.5)
	26-35	139(38.3)
	36-45	141(38.8)
	46-55	30(8.3)
	>55	05(1.1)
	Mean \pm SD	35.2 (+8.2)
Marital statuses	Married	207(57)
	Widowed	7(1.9)
	Divorced	3(0.9)
	Single	146(40.2)

Educational Level	No formal education	31(8.5)
	Primary school	53(14.6)
	Secondary school	88(24.2)
	College completed	191(52.7)
Residency	Urban	274(75.5)
	Rural	89(24.5)
Occupation	Private	256(70.5)
	Government	107(29.5)
Income	≥ 3000 birrs	267(73.6)
	≤ 3000 birrs	96(26.4)
Source of sunscreen information	Social media	91(25.1)
	Family and friends	70(19.3)
	HCPs	114(31.4)
	Cosmetic seller	88(24.2)
Are you using other than sunscreen sun protection methods	Yes	168(46.3)
	No	195(53.7)

Table 1: Sociodemographic characteristics of Melasma patients attending Follow-up clinic at ALERT comprehensive specialized from March to May 2023 (n=363).

4.2. Clinical Characteristics of Respondents

Based on the distribution of melasma pattern, one hundred forty-eight (40.8%) study subjects had a malar type. The mean ± SD MASI score was 17.2 ± 10.5. The mean age at onset and duration

of melasma was 31.5 +7.3 and 3.6 +2.8 years, respectively. A positive family history of melasma was observed in (8% of 29) study subjects Table 2.

Variable	Category	n (%)
Distribution of melasma	Frontal	47(12.9)
	Malar	148(40.8)
	Frontal Malar	112(30.9)
	Malar Mandibular	56(15.4)
Melasma area severity index intensity (MASI)	Mild (0-16.9)	223(61.4)
	Moderate (17-32.9)	89(24.5)
	Sever (33-48)	51(14.1)
	Mean (± SD)	17.2 ± 10.5
Duration of melasma	<1 year	116(32.0)
	1- 5 Year	135(37.2)
	>5 Year	112(30.8)
	Mean (± SD) years	3.6 +2.8
Onset of Melasma	Mean (± SD) years	31.5 +7.3
Family History of Melasma	Yes	29(8.0)
	No	334(92)

Table 2: Clinical characteristics of Melasma patients attending Follow-up clinic at ALERT comprehensive specialized from March-May, 2023 (n=363)

4.3. Knowledge of Melasma Patients Towards Sunscreen

In this study, only (44%, 160) and (33.3%, 121) of the study subjects knew that sunscreen must always be applied even when indoors and ≥15 minutes before sun exposure, respectively. Most study subjects (82.1%, 298) knew that broad-spectrum sunscreen was better for daily use. Regarding the dose of sunscreen, more

than one-fourth (27.8%, 101) of the study subjects knew that sunscreen must be applied in 1 teaspoonful (5ml) to cover the entire face. Concerning reapplication of sunscreen (43.3 %, 157), the study subjects know that sunscreen has to be reapplied every 2 hours.

Concerning the sunscreen effects on ultra-violet rays, less than one-third (30.6%, 111) of the study participants knew that sunscreen with more excellent SPF value would protect skin from ultraviolet-B (UVB) radiation. In this study, more than half (59.8%, 217) of the study subjects knew that sunscreen must be applied on sunny and cloudy days. Concerning sunscreen

layering time, less than half (46.8%, 170) of the study subjects knew that sunscreen must be layer with other skin care products within 10-minute intervals. Surprisingly, only (10.5% 38) of the study subjects knew that sunscreen has to be stored in cool, dry, and dark places. Most participants (81%, 293) had good knowledge of sunscreen Table 3.

Variable	Category	n (%)
How often someone should be using sunscreen	Always, even when in indoors, CA	160(44)
	Every time, even in outdoor activities	203(56)
	No need to use sunscreen	0(0)
When should someone apply sunscreen?	Immediately before sun exposure	144(39.7)
	5 minutes before sun exposure	98(27)
	≥15 minutes before sun exposure CA	121(33.3)
What type of sunscreen is better for daily use?	Broad spectrum CA	298(82.1)
	No-broad spectrum	65(17.9)
How much sunscreen is needed to cover the entire average adult's face?	1 Spoonful (5ml) CA	101(27.8)
	I apply what I think is enough	262(72.2)
Does sunscreen need to be reapplied during outdoor activities?	Yes, every 2 hours, CA	157(43.3)
	Yes, every less than 2 hours	0(0)
	No need to be reapplied	206(56.7)
Product A has an SPF of 30. Product B has an SPF of 15. Which product is more effective at protecting against UVB radiation?	Product A CA	111(30.6)
	Product B	114(31.4)
	Not enough information	138(38.0)
Product A has an SPF of 30. Product B has an SPF of 15. Which product is more effective at protecting against UVA radiation?	Product A CA	108(29.8)
	Product B	106(29.2)
	Not enough information	149(41)
In which weather conditions should you use sunscreen?	On both sunny and cloudy days CA	217(59.8)
	Only on sunny days	146(40.2)
What is the recommended minute to layer sunscreen with other skin care products?	10 minutes CA	170(46.8)
	15 minutes	45(12.4)
	30 minutes	148(40.8)
what is the appropriate storage condition for sunscreen	Cool, dry, and dark places in CA	38(10.5)
	Bag, shelves, and cupboard	131(36.1)
	No information	194(53.4)
Overall knowledge of sunscreen utilization	293(81)	

Table 3: Knowledge of Melasma patients towards sunscreen attending Follow-up clinic at ALERT comprehensive specialized from March 12 – May 12, 2023 (n=363)

4.4. Practices of Melasma Patients Towards Sunscreen

Regarding sunscreen utilization practices, Table 4 shows that two-thirds (76.9 %, 279) of study subjects and (79.6%, 289) used sunscreen in an everyday manner and broad-spectrum sunscreen, respectively. Concerning sunscreen application time, nearly one-third (31.1%, 113) of study participants applied sunscreen > 15 minutes before sun exposure, and (37.5%, 136)

of study subjects applied sunscreen one teaspoonful (5ml) for the entire face. Most of the (81.36 %, 214) of the study subjects applied sunscreen only on their face, ears, and neck. All the study participants (100%, 363) used an SPF value of > 30. The majority (67%, 245) of participants had good practices towards sunscreen.

Variable	Category	n (%)
How often do you use sunscreen?	Every day CA	279(76.9)
	Some times	84(23.1)
	Never	0(0)
What type of sunscreen do you use?	Broad spectrum CA	289(79.6)
	No-broad spectrum	74(20.4)
When do you use sunscreen?	< 15 minutes before sun exposure	250(68.9)
	> 15 minutes before sun exposure CA	113(31.1)
How much sunscreen do you use to cover your face?	1 Spoonful (5ml) CA	136(37.5)
	I apply what I think is enough	227 (62.5)
which part of your face applying sunscreen	Face, ears, and neck CA	214(81.36)
	Only face	31(11.78)
	Face and ear	18(6.8)
	All body	0(0)
How often do you reapply sunscreen during outdoor activities	Every 2 hours CA	172(47.4)
	More than 2 hours	30(8.3)
	Never re-apply	161(44.3)
How much SPF value do you use?	SPF 15	0(0)
	SPF 15- 29	0(0)
	> SPF 30CA	363(100)
How do You layer sunscreen and facial makeup?	First, Sunscreens, then moisturizer	29(8.0)
	First, Moisturizer, then sunscreen CA	230(63.4)
	I never layer	104(28.7)
How often do you wait while layering sunscreen with facial makeup?	10 minutes CA	207(57.0)
	>10 minutes	156(43.0)
Where do you store your sunscreen?	Cool, dry, and dark places in CA.	14 (3.8)
	Bag and /or shelves/cupboard	287(79.1)
	Every place	62(17.1)
Overall practices of sunscreen utilization	245(67)	

Table 4: Practices of Melasma patients towards sunscreen use attending Follow-up clinic at ALERT comprehensive specialized from March-May, 2023 (n=363)

4.5. Factors Associated with Daily Practices of Sunscreen Use Among Respondents

In the bivariate analysis, six variables, including occupation, residency, and other sun protection methods, melasma intensity, family history of melasma, and duration of melasma, were expressively factors affecting the use of sunscreen with a p-value < 0.25. Followed by the multivariable logistic regression model revealed that only two variables, including melasma intensity and duration of melasma, were found to be statistically significant

factors affecting sunscreen usage at p-values < 0.05. Participants who have moderate and severe melasma were almost six and three times more likely to use sunscreen than participants having mild melasma [AOR=5.5, 95% CI: 2.49 – 12.1, P= <0.001 and [AOR=2.9, 95% CI: 1.29 – 5.98] (P= 0.009), respectively. Moreover, study participants with a range of 1- 5 years of melasma duration were almost twice as likelier to use sunscreen than those with less than 1-year melasma duration [AOR = 1.97; 95% CI (1.02–3.82)] Table 5.

Variable	Sunscreen use n (%)		Bivariate analysis		Multivariate analysis	
	Yes	No	OR (95% CI)			
			Crud	P	Adjusted OR	P
Occupation						
Private	203(79.3)	53(20.7)	1.00 (Ref.)			
Government	76(71)	31(29)	1.56(0.93,2.62)	0.09	1.36(0.78,2.38)	0.28
Residency						
Urban	216(78.8)	58(21.2)	1.00 (Ref.)			
Rural	63(70.7)	26(29.3)	1.54(0.89,2.64)	0.11	1.25(0.69,2.245)	0.46
Other sun protection						
Yes	163(58.4)	116(41.6)	1.00 (Ref.)			
No	32(38.1)	52(61.9)	2.28(1.38,3.77)	0.001	0.91(0.45,1.81)	0.77
Melasma severity						
Mild	194(86.9)	29(13.1)	1.00 (Ref.)			
Moderate	50(56.2)	39(43.8)	5.22(2.94,9.25)	0.000	5.5 (2.49,0.12.1)	<0.001*
Severe	35(68.6)	16(31.4)	3.05(1.51,6.211)	0.002	2.9 (1.29,5.98)	0.009*
Family history of melasma						
Yes	18(6.5)	261(93.5)	1.00 (Ref.)			
No	11(13.1)	73(86.9)	0.46(0.21,1.01)	0.05	0.53(0.22,1.27)	0.15
Duration of melasma						
<1year	94(81)	22(19)	1.00 (Ref.)			
1-5 years	97(71.9)	38(28.1)	1.67(0.92,3.04)	0.09	1.97(1.02,3.82)	0.04*
>5 years	88(78.6)	24(21.4)	1.17(0.61,2.23)	0.64	1.68(0.80,3.52)	0.17

*: Statistically significant at P<0.05

Table 5: Bivariable and multivariable logistic regression analysis of factors associated with daily use of sunscreen among Melasma patients attending Follow-up clinic at ALERT Comprehensive Specialized Hospital, Addis Ababa, Ethiopia (n=363)

5. Discussion

The study was a first-of-a-kind cross-sectional study in Ethiopia that evaluated knowledge and practices regarding sunscreen among melasma patients and the associated factors affecting their practices. The present study's findings have shown that two-thirds (76.9%) of study subjects used sunscreen regularly. This finding is somewhat in agreement with the study that had been conducted in India 73.58%, Saudi Arabia 75%, and Nepal 75.76% [28,31,32]. However, this result is higher than in the study conducted in Beirut, 52.78%, among diverse dermatology patients and in Jordan, 58.6% of melasma patients [33,34]. It could be postulated that the widespread usage of other sun protective measures like face cover (Hijab) in Beirut and Jordan might decrease the regular use of sunscreen.

The finding of the present study revealed that (81%) of the study subjects have good knowledge of sunscreen, which resembles the study done in India 80% [29]. However, it was lower than the study conducted in Malaysia and Saudi Arabia, in which 88% and 93.4% of the study participants had good knowledge of sunscreen use, respectively [22,35]. This variation could be due to the following reasons: first, there are variations in socio-cultural aspects among the study sites. Secondly, variations in skin type among study participants. Thirdly, Pigmentary disorders

are the most common skin diseases in Saudi Arabia, which are associated with high levels of solar radiation exposure. This helps the participants become well-informed about pigmentary disorder preventive measures such as sunscreen [36,37].

Intensive use of sunscreens can prevent melasma in high-risk individuals, improve melasma severity, and reduce relapses [38-40]. Moreover, it substantially improved the quality of life of melasma patients [41]. In the present study (82.1%), participants stated that broad-spectrum sunscreen needs to be applied every day, even if you're mostly indoors. This outcome resembles the study done in Indonesia, in which 83.02% of study subjects considered broad-spectrum sunscreen as an essential feature when applying it in an everyday manner; even indoor activities have to be used [42]. This is because study participants who received sunscreen-related information from dermatologists and healthcare institutions are crucial in promoting knowledge about the importance of broad-spectrum sunscreen use [22, 43]. In contrast to our findings, reports from the studies conducted in India and the USA showed that 51.88 % and 66.3% of study subjects considered broad-spectrum sunscreen important, respectively [29,44]. The possible explanation for this inconsistency could be that the study participants in the current study were evaluated and received sunscreen-related

information from a dermatologist.

An international health authority recommends applying sunscreen at least 15 -30 minutes before sun exposure to allow the skin to absorb adequately and re-applying an amount of 1 teaspoon(5ml) every 2 hours to achieve maximum benefit for face, head, and neck[45-48]. The finding of this study showed that (33.3%) of study subjects replied that sunscreen has to be applied before 15 minutes of sun exposure. This finding is in line with a study done in Michigan and Saudi Arabia, which is 33.4% and 34%, respectively [22,43]. However, it is lower than the study done in Germany and Nigeria, which is 78.4% and 44.4% [48,49], respectively. Concerning the dose and frequency of sunscreen, (28 %) and (43.3 %) of study subjects stated that sunscreen has to be applied one teaspoon (5ml) and re-apply every 2 hours to cover the entire face, ears, and neck, respectively. This result is lower than that of an Indonesian study, which is 73.59% and 60.38%, respectively [42]. This variation may be due to socio-cultural differences between the study sites.

According to the present study, 67% of study subjects had good practices towards the use of sunscreen, which is in agreement with the study done in Saudi Arabian and Iran, which is 71.1% and 75%, respectively and higher than that in the Peruvian and Nepalese studies, which are 29.13% and 47.4%, respectively [50-53]. The first reason for this variation might be due to socioeconomic status and differences in sample size (127 and 122) since this study enrolled more participants, which may result in such deviations. On top of that, the current study finding is also lower than that of a study done in Pakistan, which is 91.6% [54]. This is because the hot climate in Pakistan likely influences the high use of sunscreen.

Concerning the SPF value of sunscreen, all study subjects (100%) used sunscreen with an SPF value of >30. This is the fact that using a broad-spectrum UVA/UVB sunscreen with SPF 30+ is recommended for all melasma patients [55]. On the contrary, the result of this study is higher than in the studies conducted in Canada, 75% (53), Saudi Arabia, 59% (54), and the Philippines, 46.1% [56]. The possible explanation for this finding could be that all the dermatologists recommended/prescribed SPF > 30 sunscreen for melasma patients, and it is the most widely accessible sunscreen at local pharmacies in Ethiopia.

When applying sunscreen and makeup, allowing a sufficient time interval between the two is essential to enhance the overall sun protection factor (SPF), compensating for any insufficient sunscreen application. Dermatologists and skin care experts agree that sunscreen should be applied before makeup, with a waiting period of at least 10 minutes [57]. The finding of this study showed that 63.4% of study subjects were layering sunscreen and facial makeup. This result is higher than that of a study done in the USA, which is 36% [58]. The possible explanation for this discrepancy is that melasma patients may feel self-conscious about the appearance of these lesions. Thus, using makeup as a cosmetic camouflage for the affected areas can temporarily help individuals feel more confident and

comfortable in their own skin.

Identifying possible factors that affect sunscreen use is essential to obtain complete pictures of melasma patients. In this study, the multivariable analysis proved that participants with moderate and severe melasma were almost six and three times more likely to use sunscreen than mild melasma, respectively. There is a relationship between the use of sunscreen and the severity of melasma, which is supported by other study [59]. Moreover, study participants with 1-5 years of melasma were almost twice as likely to use sunscreen than those with less than 1-year duration. This finding is in line with a study done in USA.

Overall, most melasma patients use sunscreen daily. In addition, most of the study participants had good knowledge and practices regarding sunscreen use. Melasma intensity and duration were statistically significant factors affecting sunscreen usage. Further study is needed to evaluate factors contributing to sunscreen knowledge among melasma patients.

6. Limitations

This study has some limitations. One of the limitations was that the findings of this study pertain only to a single hospital and individuals with melasma who used sunscreen, making it not applicable to other hospitals or patients with hyperpigmentation who used sunscreen. The other limitation was that we utilized interview data collection methods for our data collection. Therefore, we cannot rule out a recall bias. Finally, the study's cross-sectional nature did not allow us to show the cause-effect relationship. Different mechanisms were used to reduce this potential bias.

7. Recommendation

This study focused on understanding the knowledge and practices of sunscreen use among melasma patients. Hence, conducting research on patients with melasma disorders at various dermatology clinics is advised. Further research is recommended to investigate misconceptions, barriers to sunscreen use, and the effectiveness of sunscreen in melasma patients. We recommend establishing a structured continuous education program for patients with melasma to enhance the proper use of sunscreen.

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