Dermatology Practical & Conceptual

Melasma and Its Effect on Quality of Life: A Cross-Sectional Perspective

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ABSTRACT

Introduction: Melasma is a skin disorder that causes brown spots on the face, especially in females and people with dark skin. This situation can have a significant impact on the patient's quality of life, including issues with self-confidence, mental strain, and difficulty in social and familial relationships.

Objectives: This study aimed to evaluate the quality of life of patients with melasma.

Methods: We conducted a study analyzing the relationship between the severity of melasma and quality of life using the Dermatology Life Quality Index (DLQI) questionnaire.

Results: The study found that severity of melasma, which was measured by the Melasma Area and Severity Index (MASI), was closely related to the degree of maximum darkness in the affected area. The researchers also found a modest impact on quality of life related to the condition, with DLQI scores averaging 6.16, and a strong correlation between MASI scores and quality of life.

Conclusions: Healthcare professionals should also consider the emotional and societal consequences of skin pigmentation conditions in addition to providing medical and therapeutic interventions. Further research is needed to better understand the complex relationships between different factors and their impact on skin health.

Introduction

Human melanogenesis dysfunction commonly gives rise to melasma, which is defined by irregular boundaries and light-to-dark brown skin patches on the forehead, cheeks, upper lip, and jawline [1]. Medical professionals often use the Melasma Area and Severity Index (MASI) to measure the area affected by melasma and to assess its severity [2]. The disease is often connected with various factors such as pregnancy, oral contraceptives, inadequate sun protection, pollution, stress, genetic predisposition, hormonal changes, certain cosmetic ingredients, phototoxic medications, and hypothyroidism, which is more prevalent among individuals of Hispanic, African, and Asian descent [3, 4]. The treatment of melasma is challenging, though [5]. Researchers have developed several treatment procedures to treat melanogenesis like depigmentation therapy, separately or in combination with other treatments, including lasers and tranexamic acid [6, 7]. While melasma is not life-threatening, it can significantly impact an individual's quality of life in several ways, such as itching, mental pressure, lack of self-confidence, and confusion [8-10]. More studies are needed to investigate how melasma influences societies. Hence, it is essential to analyze the psychological impacts of melasma on patients. The Dermatology Life Quality Index (DLQI) was published for the first time in 1994 by the Dermatology Clinic of the University of Wales Hospital, England. The designed questionnaire is useful for busy clinics as it enables the evaluation of the quality of life in patients with different types of skin diseases [11].

Objective

This study aimed to analyze the quality of life of patients with melasma referred to the dermatology clinic at Razi Hospital of Tehran. In this study, we assessed the link between the severity of the disease and the quality of life using the DLQI questionnaire, which can be used as the basis for improving the health and treatment of patients with melasma conditions.

Methods

Research Strategy

The present was cross-sectional study, which is primarily based on a questionnaire approach to collect data from participants, including information on their demographic characteristics, medical history, lifestyle factors, and other relevant factors that may be associated with skin diseases. The main objective of the study was to investigate the relationship between different factors and their impact on the quality of life of patients with melasma. This study was approved by the Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.MEDICINE.REC.1396.4267).

Inclusion and Exclusion Criteria

In this study, 111 patients who visited the skin clinic of Razi Hospital in Tehran and were diagnosed with melasma by a skin specialist entered this study. Patients who met the inclusion criteria were invited to participate in the study. After receiving a full explanation of the treatment options and potential side effects, they were asked to provide informed consent and to complete a questionnaire. Patients who did not meet the inclusion criteria were excluded from the study; the study period lasted nine months, from March 2017 to January 2018, when patients completed the questionnaire.

Structure and Scoring

The severity of melasma in this study was evaluated using the MASI index, a widely used measure to evaluate the severity of melasma which is based on the size and darkness of the affected areas on the face. In addition to MASI, the patient's quality of life was evaluated using a standard Persian questionnaire known as the DLQI index. To calculate the DLQI score, a score from 0 to 3 was assigned to the patient's answers based on the impact on the quality of life. A score of 0 indicated no impact, while a score of 3 demonstrated a significant impact. The recorded scores for each question ranged from 0 to 3, with higher scores representing a greater impact on the patient's quality of life. To assess the severity of melasma, the dermatologist used a Visioface® device in the skin clinic to capture a standard face photo and two side-view photos of the patient's face. Using these photos, the dermatologist determined the size and darkness of the affected facial areas and calculated the MASI score.

Data Collection Methods and Tools

The data were collected using the checklist including patients' demographic information (Table 1). The standard and global DLQI questionnaire consisted of 11 questions, divided into six parts, and is available in 87 languages, including Persian. By collecting the score of each question, the quality-of-life score was determined. To assess the severity

Table 1. Basic Information about Patients with Melasma Disease.

Characteristics	Subclass	Value, number (%)
Age, mean ± SD		38.18 ± 10.451
Sex	Male	4 (4%)
	Female	96 (96%)
Occupational status	Not working	52 (52%)
	Working	48 (48%)
Marital status	Married	95 (95%)
	Single	5 (5%)
Education level	No education	1 (1%)
	Elementary	23 (23%)
	Middle school	11 (11%)
	High school	39 (39%)
	Bachelor's degree	24 (24%)
	Master's degree	2 (2%)
Family history of melasma	No family history	50 (50%)
	One first-degree family member	42 (42%)
	Two first-degree family members	8 (8%)
Family history of other diseases	No family history of other diseases	75 (75%)
	Hypertension	2 (2%)
	1 and 2	2 (2%)
	1, 2, and 3	1 (1%)
	1, 2, and 6	1 (1%)
	1 and 6	1 (1%)
	Diabetes mellitus	9 (9%)
	2 and 2	1 (1%)
	UC	1 (1%)
	4 and 5	1 (1%)
	4 and 6	1 (1%)
	Ischemic heart disease	3 (3%)
	6 and 6	2 (2%)
Duration of melasma	Symptoms	107.22 ± 98.48
	Duration of melasma medication	17.19 ± 17.93
	Onset age of melasma	29.24 ± 6.95
Dermatology Life Quality Index (DLQI)	Symptoms and feelings	1.37 ± 0.81
	Daily activities	0.76 ± 0.99
	Leisure	1.18 ± 1.03
	Personal relationships	1.41 ± 1.21
	Work and school	0.45 ± 0.70
	Treatment	0.99 ± 0.61
	Total DLQI score	6.16 ± 3.97
Melasma Area and Severity Index (MASI)	Frontal area	1.90 ± 1.02
	Frontal darkness	1.21 ± 0.47
	Frontal homogeneity	1.20 ± 0.51
	Right malar area	2.47 ± 0.84
	Right malar darkness	1.74 ± 0.73
	Right malar homogeneity	1.45 ± 0.59
	Left malar area	2.36 ± 0.84
	Left malar darkness	1.80 ± 0.88
	Left malar homogeneity	1.45 ± 0.60
	Mental area	1.43 ± 0.85
	Mental darkness	1.05 ± 0.55
	Mental homogeneity	1.00 ± 0.53
	MASI score	6.73 ± 2.74
Maximum darkness of melasma (0 to 4)		2.02 ± 0.85

Abbreviation: SD: standard deviation.

of disease, the MASI index was calculated [2] using the following simplified formula:

MASI score = 0.3 × A(F) × (P(F) + H(F)) + 0.3 × A(RMR) × (P(RMR) + H(RMR)) + 0.3 × A(LMR) × (P(LMR) + H(LMR)) + 0.1 × A(M) × (P(M) + H(M))

Where:
F = Forehead (30% of the score)
RMR = Right malar region (30% of the score)
LMR = Left malar region (30% of the score)
M = Chin (10% of the score)
A = Area involved (0-6)
P = Pigmentation (0-4)
H = Homogeneity (0-4)
The amount of pigmentation (P) and homogeneity (H) graded from 0 to 4:
0 = absent
1= slight
2 = mild
3 = marked
4 = maximum

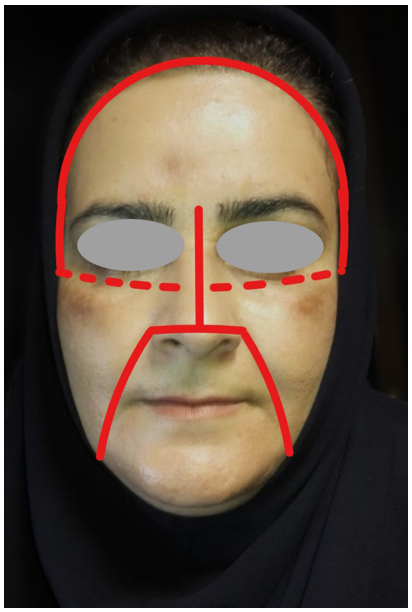

Figure 1. Sample melasma patient for MASI score calculation During the preparation of this figure, the authors used copilot artificial intelligence tool (https://copilot.microsoft.com/images/create) to adjust the image for better MASI calculation in our studied individuals.

For example, the face segmentation for MASI calculation is shown in Figure 1 as previously described in the methodology and interpretation section. For instance, in the selected patient, performing calculations based on the severity and extent of melasma lesions resulted in a MASI score of 9.6 according to the following calculation:

$$(0.3 \times 2 \times (2 + 2)) + (0.3 \times 2 \times (3 + 3)) + (0.3 \times 2 \times (3 + 3)) + (0 \times 0 \times (0 + 0))$$

Results

The current study used descriptive and non-statistical methods to convey meaning to the data and to understand them more deeply.

Basic Information About Patients with Melasma Disease

Descriptive statistics were used to analyze the distribution of demographic information of patients. MASI and maximum darkness of melasma/ melanin density (MD) of participants were 0 to 4 (Table 1). The patients' average age was 38 years, 2 months and 5 days (SD= 10.451). The average duration of melasma symptoms was 107 months and 6 days (SD. = 98.48). The average duration of treatment was 17 months and 6 days (SD = 17.93). The average age at onset of disease was 29 years and 4 months (SD. = 6.95). The DLQI and index analyses showed that the average final score for quality of life of patients with melasma was 6.16 (SD. = 3.97), the average MASI score was 6.73 (SD. = 2.74), and the average darkness score was 2.02 (SD. = 0.85) (Table 1).

Investigating the Associations Between DLQI Dimension Scores and Basic Characteristics in Patients with Melasma Disease

Non-parametric methods, including Mann-Whitney (comparing two groups of data) and Kruskal-Wallis (comparing three or more groups of data) tests, were used to examine the effect of characteristics of patients on the quality-of-life indicators (DLQI). The results of these tests are represented in Table 2. Two hypotheses were considered to investigate these issues: H0: characteristic does not affect DLQI indices, and H1: characteristic affects DLQI indexes (11). The results showed that sex (P <0.05), personal relationships (P < 0.034), and treatment (P <0.011) affected DLQI score (P <0.036). As a result, the H1 hypothesis of the current research was confirmed and accepted. Also, occupational status for symptoms and feelings, work and school, and DLQI score showed significant p-values of 0.006, 0.004, and 0.039. Marital status had no considerable effect on any DLQI index (P >0.05), except for the treatment index, where the p-value was equal to 0.017. For education, the significance level for most DLQI indicators was greater than 0.05. However, the p-value for daily activities and work and school indexes were found to be 0.047 and 0.013, respectively. Family history of melasma disease and other diseases did not show any significant effect on DLQI indexes (P >0.05) (Figures 3 and 4).

Investigating the Correlation Between MASI and Maximum Darkness Intensity of Melasma with DLQI Indexes

Spearman's correlation coefficient is a parameter used for data with a normal distribution or a large amount of data. The results regarding the correlation of MD, MASI, and DLQI indexes showed that both MASI and md significantly affect DLQI indices (P-value < 0.05). However, the DLQI score indicated that the impact of MD was greater than that of MASI because the Pearson coefficient of MD was 0.57, higher than that of MASI (0.51). In addition, this section showed that all DLQI indicators were significantly influenced by MASI (P <0.05) (Table 3).

Examination of The Correlation Between Maximum Darkness With MASI, Family History, and Onset of Symptoms

This study investigated the association between MD and other factors such as MASI, family history and symptom onset. The results indicate only a significant correlation between MASI and MD (P <0.05) (Figure 2). At the same time, there was no significant correlation between MD and other factors (P > 0.05) (Table 4).

Table 2. Associations between DLQI Dimension Scores and Total Scores and Basic Characteristics in Patients with Melasma Disease*.

		Symptoms and Feelings	Daily Activities	Leisure	Personal Relationships	Work and School	Treatment	DLQI Score
Sex	Male	38.50	26.50	50.00	21.50	44.25	20.00	20.00
	Female	51.00	51.50	50.52	51.71	50.76	51.77	51.77
	p-value	0.33	0.06	0.97	***0.034***	0.60	***0.011***	***0.036***
Occupational status	Not Working	43.82	45.68	47.02	51.26	43.72	47.41	44.79
	Working	57.74	55.72	54.27	49.68	57.84	53.84	56.69
	p-value	***0.006***	0.059	0.17	0.77	***0.004***	0.18	***0.039***
Marital status	Married	49.72	49.82	49.42	51.25	49.47	49.17	49.55
	Single	65.40	63.40	71.10	36.30	70.10	75.80	68.50
	p-value	0.18	0.26	0.07	0.24	0.06	***0.017***	0.15
Education level	No education	4.50	26.50	50.00	68.50	32.50	9.50	23.50
	Elementary	46.20	36.85	47.83	48.78	36.50	45.43	42.54
	Middle school	48.32	51.09	47.27	50.18	45.05	53.82	49.59
	High school	50.81	51.40	48.05	47.97	52.72	49.18	48.79
	Bachelor's degree	52.96	58.77	54.46	51.56	59.48	53.60	58.35
	p-value	0.36	***0.047***	0.88	0.94	***0.013***	0.34	0.32
Family history of melasma	No family history	47.08	52.72	52.15	56.71	51.08	51.33	53.29
	One first-degree family member	54.60	48.57	49.67	44.21	51.00	50.36	48.30
	Two first-degree family members	50.38	46.75	44.56	44.69	44.25	46.06	44.63
	p-value	0.37	0.69	0.73	0.08	0.75	0.85	0.59
Family history of other diseases	No family history	49.84	51.04	50.04	50.69	50.79	51.93	50.85
	Hypertension	53.90	38.80	35.00	36.30	41.90	26.30	36.00
	Diabetes mellitus	63.05	60.10	69.80	64.90	59.60	59.45	67.35
	UC	38.50	26.50	50.00	15.00	32.50	9.50	12.50
	Breast cancer	66.25	57.25	12.50	28.00	32.50	50.75	42.00
	Ischemic heart disease	34.43	40.86	49.86	49.50	48.29	45.50	40.93
	p-value	0.27	0.52	0.053	0.22	0.59	0.08	0.19

*The statistically significant p-values are provided in italics.

Table 3. Correlation between MASI and Maximum Darkness Intensity of Melasma with DLQI Indexes.

		Symptoms and Feelings	Daily Activities	Leisure	Personal Relationship	Work and School	Treatment	DLQI SCORE
MASI Score	Pearson correlation	0.343**	0.424**	0.501**	0.307**	0.369**	0.282**	0.510**
	Sig. (2-tailed)	0.000	0.000	0.000	0.002	0.000	0.004	0.000
Maximum darkness intensity of melasma (MDIM)	Pearson correlation	0.339**	0.434**	0.498**	0.518**	0.407**	0.252*	0.577**
Sig. (2-tailed)	0.001	0.000	0.000	0.000	0.000	0.011	0.000	

*Correlation is significant at the 0.05 p-value level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).
Abbreviations: DLQI: Dermatology Quality of Life Index; MASI: Melasma Area and Severity Index; Sig: significant.

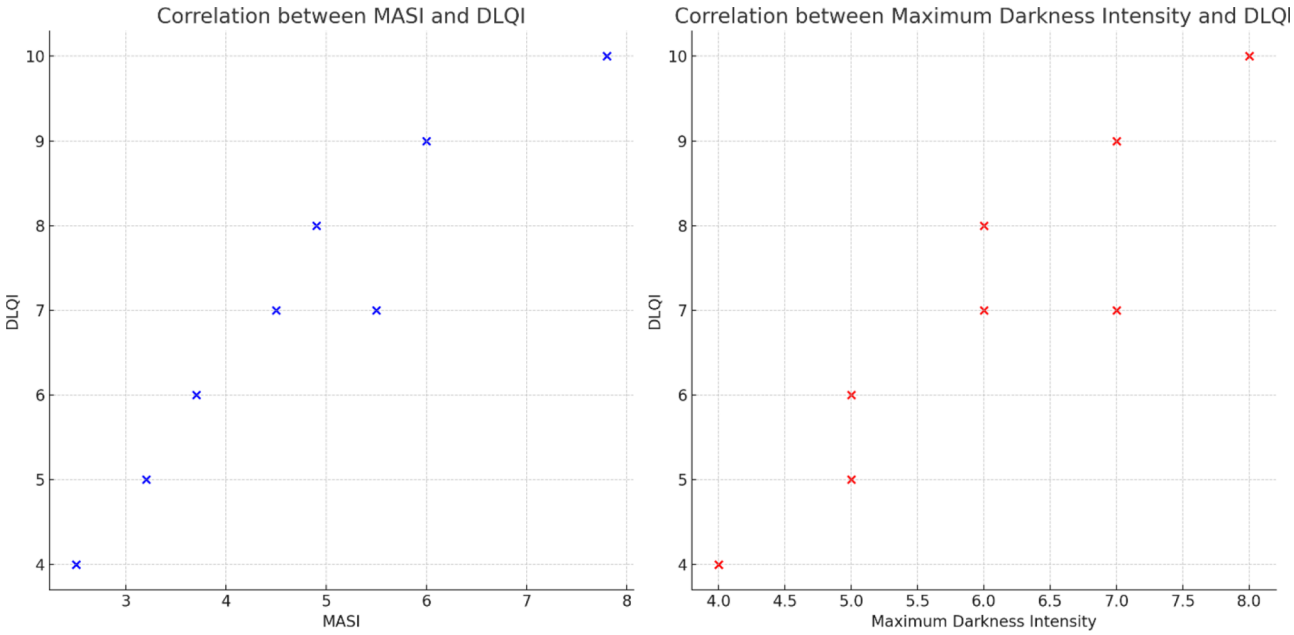

Figure 2. Correlation Between MASI and MD with DLQI Scores.

Examining the Correlation Between MASI and Other Indicators

The study aimed to investigate whether specific demographic indicators such as sex, age, or education were correlated with MASI, a commonly used index for measuring the severity of skin conditions. The results revealed no significant correlation between MASI and any of these indicators (Table 5).

Discussion

This study showed that people with melasma, especially females, have a lower quality of life. The higher number of married people compared to single people suggests that marriage may play a role in the likelihood of developing melasma due to hormonal factors and pregnancy. More than 50% of the participants had a significant impact on their quality of life based on the questionnaire scores and the average DLQI score of 6.11. The severity of melasma, as indicated by the MASI score, was relatively consistent across patients, with an average score of 6.73 and a low standard deviation of 2.74. These findings align with previous studies that also reported a low quality of life for people with melasma, such as two Brazilian studies where the average quality of life score was 44.4 in Florianopolis [12] and 37.5 in the South of Brazil [13]. In studies conducted in Turkey and France, the average quality of life score was 29.9 [14] and 20.9 [15], representing a better quality of life in patients. The studied population and their number may be the cause of these differences. Higher average darkness scores (2.02) represented more severe pigmentation, and low standard deviation (0.85) suggested that the degree

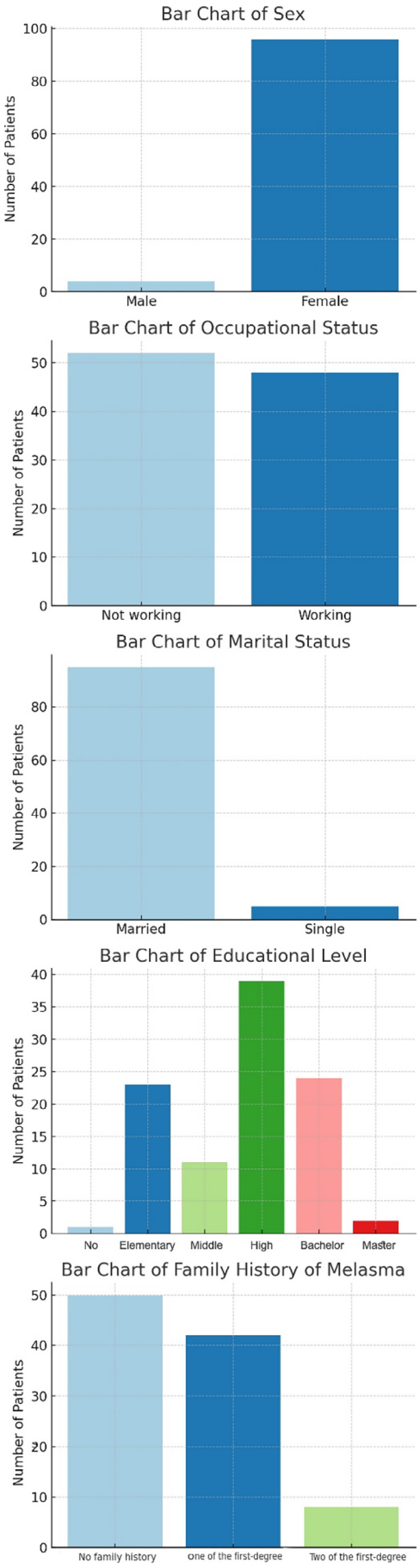

Figure 3. Bar Charts Depicting Sex, Occupational Status, Marital Status, Education Level, and Family History of Melasma in Studied Patients.

of pigmentation was relatively consistent among the studied population. Overall, these descriptive results provide a valuable overview of the severity of melasma and its impact on the quality of life of affected individuals in the study population. It is important to note that these results might only be representative of some populations or skin conditions, and further research is needed to better understand the complex relationships between different factors and their impact on skin health. It has been previously reported that occupational exposures, such as exposure to sunlight [16] or certain chemicals [17], might exacerbate the symptoms of melasma and impact the overall quality of life of affected individuals [18]. Marriage had no significant effect on the appearance of melasma, except for the behavioral index. Education only affected daily activities, work, and school indicators. Family history of melasma and other diseases did not significantly affect quality of life, which is consistent with previous research [19]. The severity of melasma, as measured by the MASI, was closely related to the degree of MD in the affected area. Our results demonstrated a significant correlation between MASI and MD (P <0.05), indicating that higher MASI scores, which reflect greater severity of melasma, are associated with increased melanin density in the affected regions (Figure 5). Moreover, the correlation coefficient for MD (0.57) was higher than that for MASI (0.51) when analyzing their impact on quality of life (DLQI indexes), suggesting that MD has a slightly greater influence on a patient's quality of life compared to MASI. Other factors, such as family history and onset of symptoms, may have little to do with severity. However, more research is needed to determine the underlying causes and mechanisms behind this correlation. Overall, the MASI seems to be a reliable measure of melasma severity in different populations [20], although weak in another study [18]. However, in a separate study by Freitag and colleagues in Brazil, no correlation was discovered [13]. The existence of a relationship between the quality of life score calculated using MASI and the severity of melasma confirms that there is a significant decrease in the quality of life as the severity of melasma increases. It is clear from the participants' responses to the DLQI questionnaire that melasma had affected many aspects of their lives, particularly in terms of their emotions and relationships with others. These observations are consistent with the findings of Dominguez et al., although their review was not used in our current study [21]. The emotional effects of melasma are significant and cause nervousness, negative changes in appearance, darkening of family relationships, and feelings of hopelessness. These issues greatly affected the well-being of individuals with melasma. A study in Brazil found that skin condition, despair, anxiety, annoyance, and impact on social connections had the most significant negative impact on quality of life [13]. The limitations of our study were the lack of a sufficient sample size and the presence of non-cooperative patients.

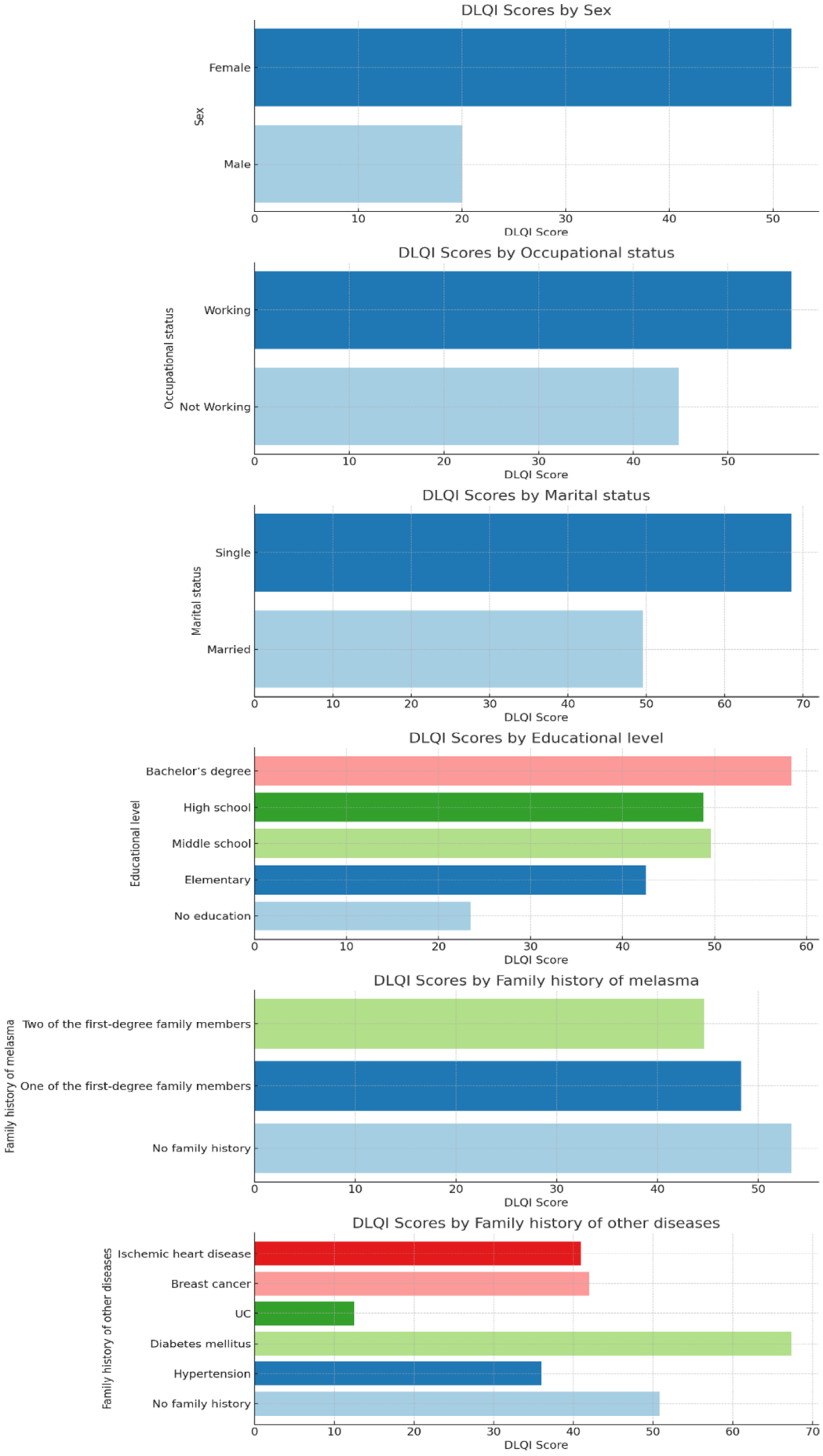

Figure 4. DLQI Scores regarding Sex, Occupational Status, Marital Status, Education Level, Family History of Melasma and Other Diseases in the Studied Patients.

Table 4. Results of Examination of Maximum Darkness with MASI, Family History, and Symptom Onset.

		MASI Score	Family History of Melasma	Age at Onset of Melasma
Maximum darkness intensity of melasma	Pearson correlation	0.52**	0.01	-0.15
Sig. (2-tailed)	0.00	0.87	0.12	

**. Correlation is significant at the 0.01 p-value (2-tailed). Abbreviations: MASI: Melasma Area Severity Index; Sig: significant.

Table 5. Correlation Results of the Influence of the MASI on the Other Indicators.

	MASI Score		
	Pearson Correlation	Sig. (2-tailed)	N
Sex	0.034	0.737	100
Age	-0.074	0.465	100
Occupational status	-0.053	0.598	100
Education level	-0.069	0.493	100
Marriage status	-0.065	0.523	100
Family history of melasma	0.153	0.128	100
Family history of other diseases	0.014	0.893	100
Patient history of other diseases	-0.089	0.380	100
Duration of melasma symptoms	0.049	0.627	100
Duration of melasma medication	0.121	0.231	100
Age at onset of melasma	-0.169	0.093	100

Abbreviations: MASI: Melasma Area and Severity Index; Sig: significant.

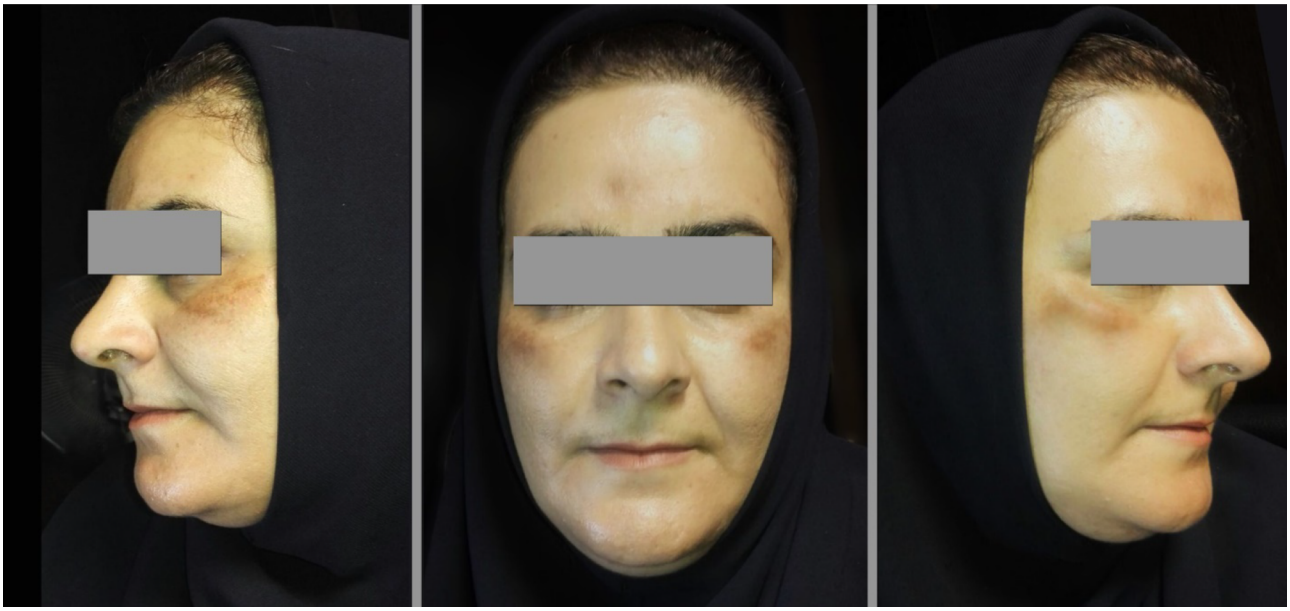

Figure 5. Clinical Images Demonstrating MASI Calculation in Patients with Varying Degrees of Melasma Severity.

Conclusion

In summary, people with melasma experienced a negative impact on their quality of life. Consequently, in addition to providing medical and therapeutic interventions, clinicians must also consider the emotional and social consequences of pigmentary disorders. The results of the present study suggest further research on the effect of melasma on psychological aspects of the well-being in these patients, along with examining the effect of residential location on various health center outcomes. In addition, future studies should include pharmacological treatment.

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