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Dermatology

ASSESSING THE IMPACT OF MELASMA ON QUALITY OF LIFE. A MELASQOL BASED STUDY FROM NORTH INDIA

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ABSTRACT Melasma is a common and distressing dermatological condition commonly affecting women of reproductive age, while its physical impacts are well documented. The psychological and social burdens of melasma are often overlooked. The study aimed to assess the quality of life (QoL) in patients with melasma using the MELASQoL scale, and also to investigate the correlation between MASI score, duration of disease, melasma distribution pattern and age of onset concerning the MELASQoL scale. It was a cross-sectional questionnaire-based study of 85 patients of melasma. QoL of the patients was assessed using MELASQoL scale. The results showed that MELASQoL revealed that there was a female preponderance of the condition. There was a positive family history in over one third of participants. There was reduction of DLQI and MELASQoL scores of participants, which proved that genetic influence might play a role in etiology of melasma. There was reduction of DLQI and MELASQoL scores of participants with treatment. The results also showed a significant correlation between the severity of melasma and the decrease in quality of life, highlighting the need for effective treatment options and strategies to improve the physical & emotional wellbeing of individuals with melasma.

KEYWORDS : Melasma, Quality of Life, MASI, DLQI, MELASQoL, Questionnaire scale

INTRODUCTION

Melasma is a prevalent hyperpigmentary disorder in India, primarily affecting the facial areas exposed to sunlight, though it can occasionally spread to other body parts like the neck, arms, and shoulders.[1] This condition manifests in three main patterns: malar, mandibular, and Centro-facial, predominantly afflicting women with a gender ratio of 9:1. Its prevalence varies worldwide, but in India, it affects 20-30% of the population, particularly those aged 24-50.[2]

The exact cause of melasma remains unclear, though it is believed to involve multiple factors. Key contributors include excessive sun exposure, genetic predispositions, hormonal imbalances, and the use of specific medications such as anti-seizure drugs, birth control pills, tricyclic antidepressants, tetracyclines, and sulfonylureas. The condition is notably prevalent in individuals with Fitzpatrick Skin Types IV-VI, and it is also associated with pregnancy, with up to 20% of pregnant women developing melasma, known during this period as chloasma or "the mask of pregnancy."

Sun exposure is a significant catalyst for melasma, as ultraviolet radiation promotes melanin production in the deeper skin layers, causing an increase in melanocyte activity. This results in more pronounced pigmentation, especially on the face where melanocytes are more concentrated.[3-7] Preventative measures like sunscreen and protective clothing can significantly mitigate the condition, underscoring the relationship between melasma and sunlight exposure.[8]

Clinically, melasma is identified by bilateral and symmetrical hyperpigmented patches that vary from light to dark brown. These patches are typically found on the cheeks, forehead, Nose Bridge, upper lip, and chin, appearing gradually and causing no symptoms other than cosmetic changes. Diagnosis often involves visual inspection and can be aided by a Wood's lamp, which differentiates between epidermal and dermal melasma based on the visibility of the patches under specific light conditions. This distinction is crucial for choosing the appropriate treatment strategy, as epidermal melasma responds well to topical treatments, whereas dermal melasma may require more intensive interventions like laser therapy. The severity of melasma is assessed using the Melasma Area and Severity Index (MASI), which considers both the area affected and the intensity of hyperpigmentation. The impact of melasma on quality of life is evaluated through tools like the Dermatology Life Quality Index (DLQI) and the Melasma Quality of Life Scale (MELASQoL), which measure the social, emotional, and physical burdens imposed by the condition.

The chronic nature of melasma and its tendency to relapse can be frustrating for both patients and healthcare providers, leading to considerable effects on patients' social and psychological well-being. It affects not only their health but also their personal relationships and professional lives, often prompting them to resort to self-medication and experimentation with over-the-counter products without proper understanding of potential risks.

Therefore, it's crucial to include health-related quality of life assessments in the monitoring and evaluation of patients with melasma. This study aims to evaluate the clinical severity and quality of life of melasma patients, as well as the relationship between quality of life, demographic factors, and treatment response.

MATERIALS AND METHODS

STUDY TYPE AND SETTING: The study was an institution-based prospective questionnaire- based study conducted at the Department of Dermatology, Venereology and Leprosy of a tertiary care Centre in north India

STUDY DURATION: The study was conducted for a period of 12 months

STUDY POPULATION: The study population consisted of patients of either sex, aged ≥18 years who had been clinically diagnosed with treatment naïve as well as treated case of melasma. Melasma involving the centro facial (cheeks, forehead, upper lip, nose), malar (cheeks & nose), mandibular (mandibular area of cheeks) areas, and patients with a MASI score in the range of 10-30 were included in the study.

Patients refusing to provide written informed consent to take part in the present study, those having any other skin, systemic or psychiatric disorder which can impair quality of life, patients having facial melanoses other than melasma, and patients

having systemic causes of pigmentation were excluded from the study.

Sample size: The study considers a 95% confidence interval to estimate the sample size. According to the research conducted by Kavya et al., there is 8 % global prevalence of melasma.

The sample size was estimated as:
$n = (Z)^2 X p X (1-p) / d^2$
Where,
n = sample size
p = estimated prevalence = 0.08
d = allowable error = 0.06
Z = critical value or area under standard normal deviation = 1.96 at 95% CI

The minimum calculated sample size was 78 at 6% allowable error. Considering loss of follow up, sample size was calculated as 85.

METHOD OF SELECTION:
A consecutive sampling technique was used to recruit patients in the study. Patients presenting to the Department of Dermatology Venereology and Leprosy of the study institution during the period of the study and diagnosed with melasma were evaluated for the present study. Those patients who agreed to provide written informed consent to take part in the study were evaluated as per the exclusion criteria, and those not excluded were assessed as a part of the study. Detailed relevant clinical history was taken for each participant and recorded in a preset proforma. Each participant then completed the Hindi or English version of DLQI and MELASQOL in a private waiting area of the department. The investigator scored the questionnaire and recorded the same in an Excel data sheet. Photographs were taken at the time of recruitment, after 3 months of treatment and

again after 6 months. Demographic data was recorded of each participant including age, gender, address and occupation.

Treatment to all patients was initiated with the Triple combination cream (TCC) containing Hydroquinone (HQ) 2%, Tretinoin 0.025% and Flucinolone acetonide 0.01% to be applied once at night. This was continued till clearance is achieved (But for a maximum of 6 weeks to avoid adverse effects). For maintenance, a cream containing the primary ingredients Glycolic acid 30%, Kojic acid 2.5%, arbutin 1.5%, mullberry extract was used. A sunscreen of SPF30 was continued throughout the duration of treatment. Patients were reviewed in the OPD every 4 weeks. MASI, DLQI, and MELASQOL scores were noted at the 12-week and 24-week follow-up. The scores were entered in the appropriate proforma.

DATA MANAGEMENT AND STATISTICAL ANALYSIS
The gathered data underwent verification for consistency and completeness before being inputted into a Microsoft Excel (MS-EXCEL, Microsoft Corp.) spreadsheet. Analysis was conducted using the Statistical Package for the Social Sciences (IBM SPSS, version 22) software. Where analytical statistics were performed, a p-value of <0.05 was considered to be statistically significant for the purpose of the study. For analytical statistics, Chi-square test was used for categorical data and student's t-test was used for continuous data.

ETHICAL CONSIDERATION
The Institutional Ethics Committee of the tertiary care hospital reviewed and approved the project before it was carried out.

RESULTS
A total of 85 patients with melasma were evaluated, of whom 7 were lost to follow-up at 12 weeks of treatment, and 3 more at 24 weeks of treatment. The findings of the present study are discussed henceforth. In the present study, the average age of participants was 35.1±8.8 years, with a male to female ratio of 1:1.9. The educational background of the participants was notably high, with 64.7% having completed at least a graduate degree. Homemakers made up the largest occupational group at 35.3%, followed by service employees at 27.1%. The majority of the study group was married (78.8%) and predominantly from upper middle (30.5%) or upper (27.1%) socioeconomic categories as per the modified Kuppuswamy scale, suggesting a specific demographic profile within the population studied. (Table 1)

Regarding the clinical aspects of melasma, participants had a mean Body Mass Index (BMI) of 22.7±3.3 kg/m^2 and had been experiencing melasma for an average of 3.2±3.6 years. Most participants (77.6%) reported no comorbidities, with the most common being hypothyroidism (11.8%). Prior to the study, 57.6% of the participants had received some form of melasma treatment, and types of melasma were classified under Wood's Lamp as 55.3% epidermal, 27.1% dermal, and 17.6% mixed. Sunscreen usage was relatively low, with only 28.2% using it regularly and 15.3% irregularly. (Table 2)

The study also revealed significant decreases in Melasma Area and Severity Index (MASI) scores from 17.9±5.9 at baseline to 15.7±4.8 at 12 weeks, to 13.1±3.9 at 24 weeks, indicating improvement with treatment (p-value <0.001). Similarly, both Dermatology Life Quality Index (DLQI) and Melasma Quality of Life Scale (MELASQoL) scores improved over the 24-week period, starting from 3.7±1.9 and 34.5±10.6 at baseline respectively and decreasing to 3.3±1.9 and 30.2±10.5 at 12 weeks, and further to 2.3±1.7 and 27.2±9.6 at end of follow-up. (Table 3)

MELASQOL scores were significantly positively correlated with MASI scores (r-value 0.378, p-value <0.001), pointing towards the impact of melasma severity on life quality. while MASI and DLQI were positively correlated, it was not found to be statistically significant (r-value 0.012, p-value 0.913). Similar phenomenon was observed with respect to MELASQoL and DLQI (r-value 0.117, p-value 0.285). (Table 4)

A multivariable linear regression analyses including age, sex, BMI, duration of melasma, education levels, occupation, history of previous treatment for melasma, family history, sunblock use, and Wood's lamp findings as predictors further showed that students tended to have poorer DLQI scores (p-value 0.012), whereas regular sunscreen use correlated with lower DLQI (p-value 0.022) and MELASQoL scores (p-value 0.011) both, highlighting the benefits of sun protection in managing melasma. (Table 5)

DISCUSSION
Melasma, previously referred to as chloasma, is a pigmentary disorder that typically appears on the face. This condition is mainly caused by ultraviolet (UV) exposure and hormonal factors. The diagnosis of melasma is generally clinical, characterized by symmetric reticulated hypermelanosis in three main facial patterns: centrofacial, malar, and mandibular. In the present study, the effect of the condition on the quality of life of a group of patients, it was observed that the mean age of the study participants was delineated as 35.1 ±8.8 years, with the majority of participants being female. Most of the participants were married, and 64.7% were graduates. The most common occupations in the participants were homemakers (35.3%), followed by servicepeople (27.1%). The age and sex distribution of the participants conform to well-established reports regarding the etiopathogenesis of melasma in Indians. The mean age of the patients underline the propensity for melasma to manifest more frequently in the older demographic, linked to factors such as prolonged exposure to ultraviolet radiation, hormonal variances, and genetic inclinations prevalent in this age group.[16] Furthermore, like most research on the topic, the present study also reported a female preponderance of the condition.[17]

The mean duration of melasma among the participants was 3.2±3.6 years, indicating a chronic nature of the condition and the variability in its clinical course among patients. Furthermore, the presence of a positive family history in over one-third of the participants points towards a possible genetic inheritance pattern in the

Epidemiology of melasma. A positive family history being associated with the incidence of melasma has been reported in their studies by Harumi et al. (30%) and Yalamanchili et al. (28%).[18] This observation aligns with existing dermatological research that suggests melanocyte activity and skin pigmentation traits, which are central to melasma's pathogenesis, can be significantly influenced by genetic factors.

It was observed that 57.6% of the study participants had received some treatment for melasma before their presentation, and 28.2% of participants reported to be using sunscreen regularly, while 15.3% reported to using it irregularly. The rest of the participants did not use sunscreen at all. Sunscreen, by mitigating UV exposure, serves as a fundamental preventive strategy against the aggravation of melasma. The observation that a substantial portion of the cohort either used sunscreen irregularly or

not at all indicates a potential gap in patient education or barriers to consistent sunscreen application.

Regarding the quality of life assessment for the participants, three scales were utilized in the present study. The MASI (Melasma Area

and Severity Index) is a quantitative scoring system used to assess the severity of melasma by evaluating the area of involvement and the intensity of hyperpigmentation. It's widely used in clinical research and practice to monitor the progress and treatment response of melasma in patients. The quality of life in patients suffering from melasma are measured using the DLQI and the MELASQOL scores. The DLQI (Dermatology Life Quality Index) is a tool used to measure the impact of skin conditions, including melasma, on patients' quality of life. It assesses how much a patient's life is affected by their skin condition over the previous week, covering aspects such as symptoms, feelings, daily activities, and personal relationships. The MELASQoL (Melasma Quality of Life Scale) is developed to assess the quality of life in individuals suffering from melasma. It evaluates the emotional, social, and physical burdens of melasma on patients, reflecting how the condition affects aspects such as self-esteem, social interactions, and daily activities. It was observed that the mean MASI scores at baseline, 12 weeks of treatment, and 24 weeks of treatment were 17.9±5.9, 15.7±4.8, and 13.1±3.9 respectively. A repeated measures ANOVA test showed that there was a significant decrease of MASI scores over the course of follow-up. A post-hoc Bonferroni analysis showed that the mean MASI score decreased significantly at 12 as well as 24 weeks as compared to baseline. Furthermore, the mean MASI score was significantly lower at 24 weeks as compared to 12 weeks of follow-up. Authors like Harumi et al. and Sarkar et al. also reported a mean baseline MASI score similar to what was observed in the present study.[1,19] The mean MASI score at baseline indicates a relatively high severity of the condition among the participants. On the other hand, the observed significant reduction in MASI scores not only demonstrates the clinical effectiveness of the treatment protocols over a six-month period but also suggests an associated enhancement in the quality of life for patients afflicted with melasma. The progressive improvement underscores the potential for sustained treatment efficacy, providing hope and reassurance to patients seeking to mitigate the physical and psychological burdens imposed by melasma.[1]

It was observed that the mean DLQI scores of the participants at baseline, at 12 weeks of follow-up, and 24 weeks of follow-up were 3.7±1.9, 3.3±1.9, and 2.3±1.7. A repeated measures ANOVA test showed that there was a significant decrease of DLQI scores over the course of follow-up, with a post-hoc Bonferroni analysis revealing that the mean DLQI score experienced a significant decrease both at the 12-week and 24-week marks compared to the baseline values. Moreover, the analysis delineated a significant reduction in the mean DLQI score at the 24-week evaluation relative to the 12-week assessment, highlighting a continuous enhancement in the quality of life with ongoing treatment. Similar observations were also made with respect to the participants' MELASQOL scores (baseline, 12 weeks of follow-up and 24 weeks of follow-up scores of 34.5±10.6, 30.2±10.5, and 27.2±9.6 respectively). The significant decrement in DLQI and MELASQOL scores not only speaks to the efficacy of the treatment modalities employed but also accentuates the importance of addressing the psychological and social dimensions of living with melasma. The observed improvements over time provide a quantitative testament to the potential for recovery and the positive outcomes achievable with appropriate intervention. Similar reduction in the DLQI and MELASQOL scores of participants with continued treatment has been reported by authors such as Sarkar et al., Gupta et al., and Morgaonkar et al.[1,,]

One of the important considerations in the present study was to assess the correlation between the severity of melasma (as measured by MASI) with the patients' quality of life (MELASQOL and DLQI scores). The study found a significant positive correlation between MELASQoL scores and MASI scores ($r = 0.378$, $p < 0.001$), indicating that higher clinical severity of melasma is associated with a greater negative impact on quality of life in the participants, particularly in areas influenced by skin appearance and psychosocial effects. This suggests that as melasma severity increases, so does its adverse impact on patients' quality of life. The research on association between the MASI and MELASQOL scores is conflicting, with some authors like Gupta et al., Coban et al., and Pollo et al., reporting findings similar to the present study, while others not observing any significant correlation between the two.[17,23,,]

In contrast, the non-significant correlation between MASI scores and DLQI scores ($r = 0.012$, $p = 0.913$) and between MELASQoL and DLQI scores ($r = 0.117$, $p = 0.285$) corresponded to a large body of research on the topic, indicating that the DLQI may not fully capture the specific impact of melasma severity on quality of life.[1,24,] A linear regression analysis was employed to investigate the relationships between various sociodemographic factors, lifestyle choices, and the quality-of-life measures as indicated by the Dermatology Life Quality Index (DLQI) and the Melasma Quality of Life scale (MELASQoL). It was observed that there was a significant association between being a student and a poorer quality of life, as measured by the DLQI (p-value of 0.012). This finding indicates that students suffering from melasma, who are young and therefore psychologically vulnerable, may experience heightened psychosocial burdens due to the condition, potentially due to factors such as peer interaction, social acceptance, and academic pressures. Further, the analysis illuminated that having a positive family history of melasma was significantly associated with poorer quality of life outcomes, as reflected in MELASQoL scores, (p-value 0.033). Individuals with a familial history may bear not only the physical manifestations of melasma but also the psychological weight of potential inevitability and chronicity associated with the condition, adversely affecting their quality of life. Conversely, the regular use of sunblock demonstrated a positive impact on the quality of life, with a significant association with lower DLQI scores (p-value 0.022). This suggests that proactive measures in managing sun exposure, a known exacerbating factor for melasma, not only contribute to the clinical management of the condition but also enhance the psychosocial well-being of the patients. Regular sunblock use may represent a tangible action patients can take to control the progression of melasma, thereby reducing its impact on their daily lives and improving their dermatological quality of life. Similar to the findings with DLQI scores, regular sunblock use was associated with significantly lower MELASQoL scores (p-value 0.011), reinforcing the notion that sun protection plays a crucial role in mitigating the quality of life impact of melasma. This association highlights the importance of sun avoidance and protective measures as central components of melasma management strategies, directly contributing to improving patients' perceptions of their condition and their overall quality of life.

CONCLUSION

The observations made in the present study concluded that melasma adversely affects patients' quality of life, as measured by DLQI and MELASQoL scores, which significantly improved with treatment. A significant association was found between melasma severity (MASI) and MELASQoL scores, but not between DLQI and MELASQoL, or MASI and DLQI. This highlights the need for effective treatment options and strategies to improve the physical and emotional well being of individuals with melasma. The findings of this study underscore the importance of considering the impact of melasma on quality of life in clinical practice and emphasizes the need for further research to develop targeted interventions to improve the lives of individuals with melasma

Table 1. Socio demographic characteristics of the participants (n=85)

Parameters	Mean ± SD / n (%)
Mean age	35.1±8.8 years
Female	56 (65.9%)
Mean BMI	22.7±3.3 kg/m^2
Education	
Primary school	7 (8.2%)
Secondary school	11 (12.9%)
Higher secondary school	12 (14.2%)
Graduate and above	55 (64.7%)
Unmarried	18 (21.2%)
Socioeconomic status	
Upper	23 (27.1%)
Upper middle	26 (30.5%)
Middle	17 (20%)
Lower middle	19 (22.4%)
Occupation	
Banker	2 (2.3%)
Clerk	4 (4.7%)
Healthcare worker	6 (7.1%)
Engineer	2 (2.3%)
Farmer	4 (4.7%)
Homemaker	30 (35.2%)
Private service	23 (27.1%)

Student	6 (7.1%)
Tailor	1 (1.2%)
Teacher	6 (7.1%)
Police	1 (1.2%)

*Statistically significant

Table 2. Melasma-related characteristics of the participants (n=85)

Parameters	Mean ± SD / n (%)
Mean age	35.1±8.8 years
Female	56 (65.9%)
Mean BMI	22.7±3.3 kg/m^2
Education	
Primary school	7 (8.2%)
Secondary school	11 (12.9%)
Higher secondary school	12 (14.2%)
Graduate and above	55 (64.7%)
Unmarried	18 (21.2%)
Socioeconomic status	
Upper	23 (27.1%)
Upper middle	26 (30.5%)
Middle	17 (20%)
Lower middle	19 (22.4%)
Occupation	
Banker	2 (2.3%)
Clerk	4 (4.7%)
Healthcare worker	6 (7.1%)
Engineer	2 (2.3%)
Farmer	4 (4.7%)
Homemaker	30 (35.2%)
Private service	23 (27.1%)
Student	6 (7.1%)
Tailor	1 (1.2%)
Teacher	6 (7.1%)
Police	1 (1.2%)

*Statistically significant

Table 3. Melasma-related quality of life in participants (n=85)

Parameters	Mean ± SD	F-value, p-value
MASI score		
At baseline	17.9±5.9	59.163, <0.001*
At 12 weeks	15.7±4.8	
At 24 weeks	13.1±3.9	
DLQI score		
At baseline	3.7±1.9	74.494, <0.001*
At 12 weeks	3.3±1.9	
At 24 weeks	2.3±1.7	
MELASQOL score		
At baseline	34.5±10.6	39.934, <0.001*
At 12 weeks	30.2±10.5	
At 24 weeks	27.2±9.6	

*Statistically significant

Table 4. Association between the MASI, DLQI, and MELASQoL scores of the participants at presentation (n=85)

Scores	r-value (p-value)		
	MASI	DLQI	MELASQoL
MASI	1	0.012 (0.913)	0.378 (<0.001*)
DLQI	0.012 (0.913)	1	0.117 (0.285)
MELASQoL	0.378 (<0.001*)	0.117 (0.285)	1

Table 5. Multivariable linear regression assessing association between sociodemographic parameters and MELASQOL and DLQI score of participants (n=85)

DLQI score		
Parametersa	Unstandardized coefficient	p-value
Occupation		
Banker	0.299	0.886
Clerk	0.195	0.920
Healthcare worker	2.679	0.153
Engineer	-0.547	0.796
Farmer	-0.983	0.616
Homemaker	1.692	0.358
Private service	2.059	0.241
Student	3.170	0.012*
Tailor	0.885	0.707
Teacher	0.915	0.624
Police	0	-
Use of sunblock		
Regularly	-1.085	0.022*
Irregularly	-0.288	0.634
Never	0	-
MELASQOL score		
Family history of melasma positive	5.021	0.033*
Use of sunblock		
Regularly	-4.311	0.011*
Irregularly	-2.184	0.528
Never	0	-

*Statistically significant

a predictors assessed included age, sex, BMI, duration of melasma, education levels, occupation, history of previous treatment for melasma, family history, sunblock use, and Wood's lamp findings

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