



# Exploring Melasma Patients' Needs Through Social Media: A Qualitative Study

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**Purpose:** To identify the primary concerns and unmet needs of patients with melasma on social media using qualitative analysis and AI-based keyword extraction.

**Patients and Methods:** We conducted a qualitative study of melasma patient discussions using publicly available posts on Facebook and Baidu. The data were collected between January 2014 and October 2024. ChatGPT-4o was used for keyword extraction and classification.

**Results:** A total of 1106 related posts were analyzed, revealing 284 unique tags and 2434 keywords. Treatment and prevention were the most discussed topics, with patients seeking information on effective, long-term, and affordable treatment. Daily care and mental health accounted for 29.2% of the total, focusing on skincare routines, sun protection, and lifestyle modification. Etiology and clinical features were observed in 14.8% of the posts, whereas 2.4% addressed diagnosis and differentiation.

**Conclusion:** This study identified key concerns of patients with melasma using AI-based keyword extraction and qualitative analysis, highlighting the need for healthcare professionals to engage in digital patient education, clarify misinformation, support patient self-management, and integrate mental health considerations into melasma care. Future research should focus on AI-based interventions to enhance patient engagement and self-management.

**Keywords:** melasma, patient education, social media, artificial intelligence, digital health

## Introduction

Melasma is a common disorder of pigmentation affecting people with darker skin types, particularly Fitzpatrick skin types III–IV. Its prevalence ranges from 8.8% to 40% depending on the population, with over 90% of cases occurring in women.<sup>1,2</sup> Epidemiological data show that 41% of female patients develop melasma during their reproductive years, typically after pregnancy and before menopause.<sup>3</sup>

The etiology and pathogenesis of melasma are not yet fully understood but are thought to involve multiple factors, including ultraviolet (UV) and visible light exposure, genetics, and hormonal influences.<sup>2,4</sup> Clinically, melasma presents as asymmetric, brown, irregular, and reticulated macules on sun-exposed facial areas, following centrofacial, malar, or mandibular patterns.<sup>5,6</sup> The condition is notably persistent, with spontaneous resolution occurring in only 8% of cases.<sup>3</sup>

Beyond its physical impact, melasma also lead to diminished self-confidence, social withdrawal, and reduced work productivity due to its visible facial involvement.<sup>7,8</sup> Despite the strong demand for treatment, melasma remains difficult to manage due to its high recurrence.<sup>9</sup>

Due to the visible and often stigmatizing nature of melasma, patients frequently seek information, emotional support, and reassurance. Social media is the most widely used internet-based communication tool and has an important place in our lives in the field of health.<sup>10</sup> It has become a source of medical information and patient support for pigmented skin

disorders like melasma and vitiligo.<sup>11</sup> The presence of dermatological information on social media has grown fast.<sup>12</sup> However, patients' needs expressed online are often inadequately addressed by dermatologists.<sup>13,14</sup> Although previous studies have investigated the role of social media in dermatology such as rosacea,<sup>15</sup> limited research has systematically analyzed the concerns of melasma patients on social media. Urgently incorporating these insights into clinical practice could help enhance patient-centered dermatologic care.

This study aims to explore the concerns and unmet needs of melasma patients on social media. We selected Baidu and Facebook for their popularity and wide use among Chinese and English-speaking users. Other platforms were excluded either due to limited public access, lower user activity related to melasma, or language constraints. To analyze large volumes of unstructured text, we applied AI-based keyword extraction combined with qualitative analysis. This approach enhances efficiency, reduces subjectivity associated with manual analysis, and offers valuable insights to improve patient education and personalized care.

## Materials and Methods

### Study Design and Data Collection

This qualitative study was conducted using publicly available posts on Facebook and Baidu, two major platforms with active melasma patient communities. Data were systematically collected from January 2014 to October 2024 using the keywords “melasma”, “melasma treatment”, and “whitening and pigmentation”. The study followed the following inclusion criteria: (1) open-access forums, (2) active communities with at least one new post per month, (3) a primary focus on melasma discussions, and (4) Posts in English or Chinese. Posts were excluded if they were advertisements, irrelevant, duplicates, or in other languages. Stratified random sampling was used to ensure balanced representation over the 10-year period, resulting in the selection of 1106 posts for analysis.

### Keywords Extraction and Qualitative Analysis

ChatGPT-4o, a Natural Language Processing model, was used for the AI-based keyword extraction and classification. To minimize language-related variability, all Chinese posts were translated into English before analysis. To ensure consistency, a fixed prompt was applied uniformly across all posts. Each post was processed individually and only once, using the same model version (GPT-4o) under default settings. For each post, ChatGPT-4o was prompted to generate 3–5 keywords that best captured the main concerns or topics expressed by the user. No pre-existing keyword list was provided, allowing the model to identify patient-generated terminology from the data. If a post contained multiple themes, the AI-generated keywords captured all relevant aspects, and all extracted keywords were retained.

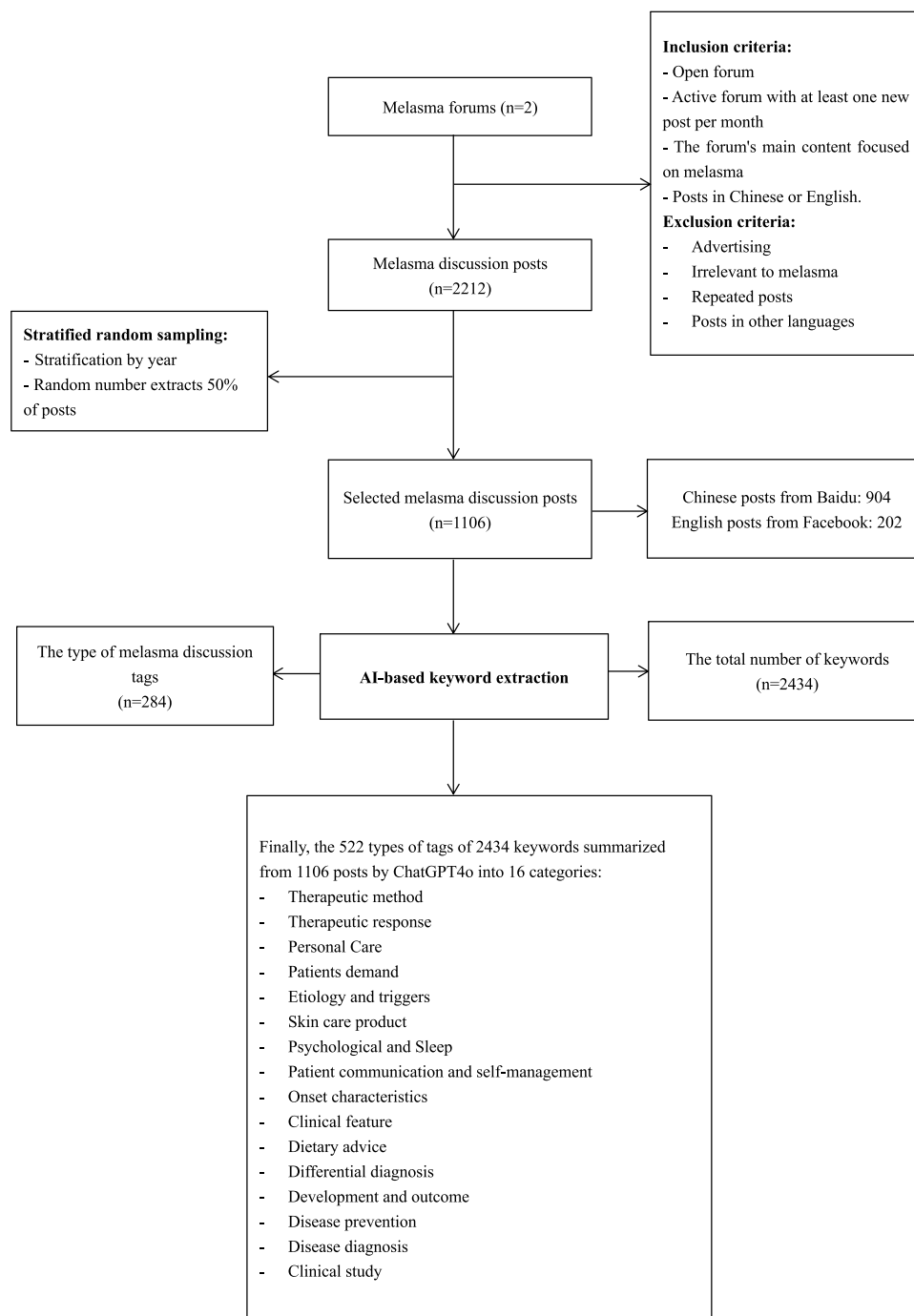
Synonymous or semantically overlapping keywords were grouped into unified categories by two independent researchers through manual coding. This allowed for the preservation of patient language while ensuring consistency in further analysis.

Two researchers independently categorized the AI-generated keywords, and any disagreement was resolved through discussion and consensus to ensure consistency. Keywords were grouped into categories to highlight patient concerns regarding treatment, etiology, daily care, and psychological support. To ensure privacy, all personally identifiable information was removed before the analysis.

## Results

A total of 1106 melasma-related posts were analyzed between January 2014 and October 2024. [Figure 1](#) outlines the research workflow, post distribution across platforms and languages, and the output of AI-based keyword extraction (284 tags and 2434 keywords). The temporal distribution of the melasma-related discussions is shown in [Figure 2](#).

All posts were categorized into four main themes by qualitative analysis: (1) Treatment and Prevention, (2) Daily Care and Mental Health, (3) Etiology and Clinical Features, and (4) Diagnosis and Differentiation. [Table 1](#) details the frequency of each theme along with the 16 most prominent categories identified.

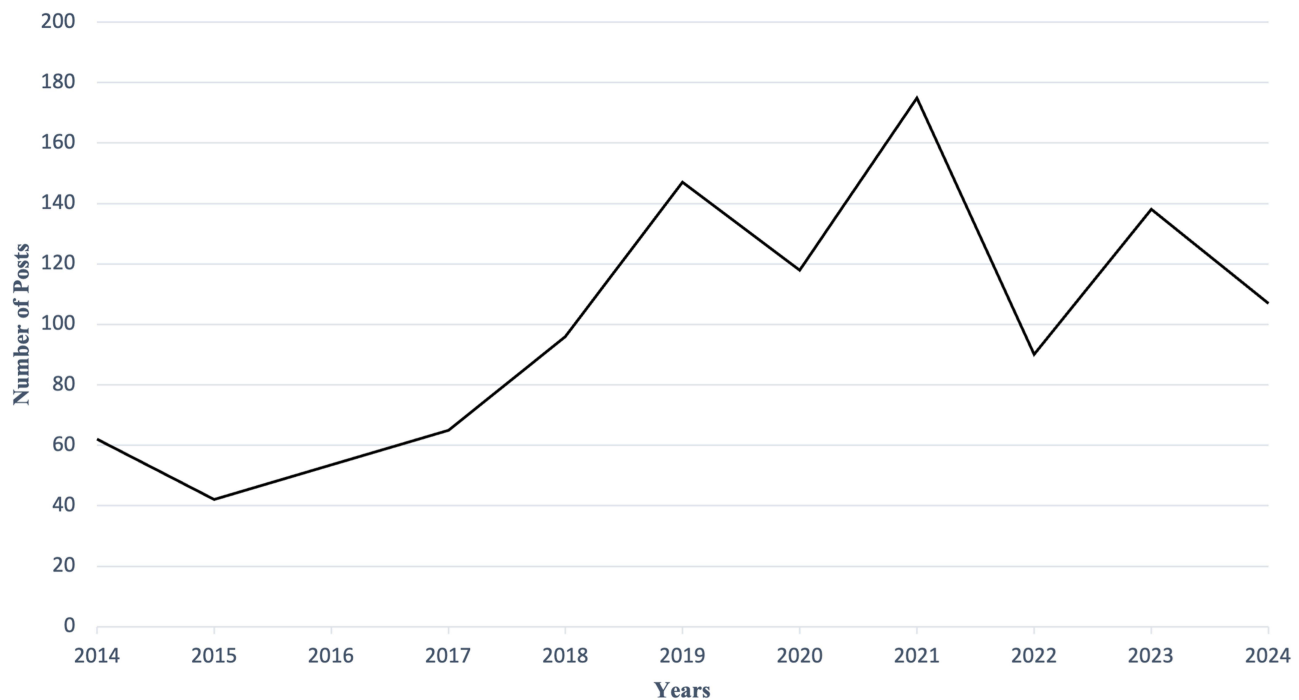


**Figure 1** Research workflow of Exploring Melasma Patients' Needs Through Social Media: A Qualitative Study.

## Treatment and Prevention

Treatment and prevention were the most frequently discussed topics, accounting for 53.6% of all the posts. Within this category, as summarized in [Table 1](#), discussions focused on therapeutic methods (649, 26.64%), treatment responses (369, 15.16%), patients' demands (260, 10.68%), disease prevention (22, 0.90%), and clinical studies (4, 0.16%). Patients sought information on long-term, effective, and affordable treatments.

Topical therapies, including tranexamic acid, hydroquinone, and retinoids, were commonly mentioned, with a growing interest in traditional Chinese medicine. Among treatment-related posts, 29 included keywords referring to



**Figure 2** Time distribution curve of melasma discussion.

Traditional Chinese Medicine (TCM), with common questions such as “Can melasma on the face be treated with TCM?”, indicating a growing interest in TCM therapy. Non-pharmacological treatments such as laser therapy, mesotherapy, and intense pulsed light were also widely discussed.

Many discussions focused on the side effects of medication and disease recurrence, highlighting the need for long-term management strategies. Prevention strategies also attracted attention, indicating that patients not only sought treatment but also ways to prevent melasma progression.

**Table 1** Qualitative Analysis results of Common Needs Among Melasma Patients

Category (N, %)	Word Frequency Analysis (N, %)
Treatment and prevention (1304,53.6%)	Therapeutic method (649,26.64%) Therapeutic response (369,15.16%) Patients demand (260,10.68%) Disease prevention (22,0.90%) Clinical study (4,0.16%)
Daily care and mental health (711,29.2%)	Personal Care (276,11.34%) Skin care product (179,7.35%) Psychological and Sleep (100,4.11%) Dietary advice (61,2.50%) Patient communication and self-management (95, 3.90%)
Etiology and clinical features (361,14.8%)	Etiology and triggers (183,7.52%) Clinical feature (65,2.67%) Onset characteristics (84,3.45%) Development and outcome (29,1.19%)
Diagnosis and differentiation (58,2.4%)	Differential diagnosis (44,1.81%) Disease diagnosis (14,0.58%)

## Daily Care and Mental Health

Daily care and mental health concerns accounted for 29.2% of discussions. As shown in Table 1, patients frequently sought advice on skincare routines (106, 4.35%). A commonly asked question was, “What should be considered in the daily care of melasma?” (Table 2). Sun protection emerged as a recurring topic (23, 0.94%), with peer responses emphasizing that “Sun protection is essential for managing melasma” and “Ultraviolet radiation is a major factor in the development of melasma”. (Table 2).

Product selection was another key concern (95, 3.90%), often guided by peer experiences to assess product effectiveness. As one frequently asked question reflected, “Which skincare products are effective for melasma?” (Table 2). However, responses varied among individuals, making it difficult to make decisions. Dietary strategies were also commonly discussed (61, 2.51%), reflecting an interest in diet as a part of melasma management. A commonly asked question was, “What foods can help lighten melasma?” (Table 2).

Psychological distress was a prominent theme (100, 4.11%), with many participants expressing shame, social anxiety, and diminished self-confidence. Representative quotes include: “Melasma makes me anxious”, “I’m so ashamed of my face”, and “I became more confident after the improvement of my melasma”. (Table 2). Online communities played a crucial role in peer support, sharing of therapy strategies, and emotional encouragement.

**Table 2** High-Frequency Questions Mentioned by Melasma Patients

No.	Questions	Frequency (N,%)
1	How to cure melasma?	(65,2.7%)
2	Which treatment method is most effective for melasma?	(27,1.1%)
3	Where is the best place to seek treatment for melasma?	(26,1.1%)
4	Is my condition diagnosed as melasma?	(19,0.8%)
5	Melasma makes me anxious.	(17,0.7%)
6	Which skincare products are effective for melasma?	(16,0.7%)
7	How can melasma be prevented and treated during pregnancy?	(14,0.6%)
8	How much it costs to treat melasma?	(13,0.5%)
9	What is melasma?	(13,0.5%)
10	What are the causes of melasma?	(12,0.5%)
11	What should be considered in the daily care of melasma?	(12,0.5%)
12	How can melasma be completely removed?	(7,0.3%)
13	What should notice after treatment with picosecond laser?	(10,0.4)
14	Does laser treatment for melasma result in recurrence?	(9,0.4%)
15	I am so ashamed of my face.	(9,0.4%)
16	Sun protection is essential for managing melasma.	(9,0.4%)
17	What foods can help lighten melasma?	(8,0.3%)
18	What are the most effective methods for treating melasma?	(7,0.3%)
19	How long does it take to treat melasma?	(7,0.3%)
20	I became more confident after the improvement of my melasma.	(7,0.3%)
21	It is advisable to avoid staying up late to prevent melasma.	(7,0.3%)
22	How can I prevent melasma?	(6,0.2%)
23	Ultraviolet radiation is a major factor in the development of melasma.	(6,0.2%)
24	What causes the development of my melasma?	(5,0.2%)
25	How effective is laser treatment for melasma?	(5,0.2%)
26	How effective is tranexamic acid in treating melasma?	(5,0.2%)
27	Is laser treatment an option for melasma?	(4,0.2%)
28	What are the potential side effects of picosecond laser treatment?	(4,0.2%)
29	What is the difference between laser treatment and intense pulsed light (IPL) therapy?	(4,0.2%)
30	Can mesotherapy completely cure melasma?	(4,0.2%)
31	Can hydroquinone cream effectively treat melasma?	(4,0.2%)
32	What are the triggering factors for melasma?	(4,0.2%)
33	Can melasma fade naturally?	(4,0.2%)



## Discussion

This study highlights the growing reliance of patients with melasma on social media for information and support, with discussion volumes increasing significantly over the past decade. Notably, a peak in activity in 2021 may reflect increased focus on facial appearance during the COVID-19. Prolonged screen exposure and widespread video conferencing during this period likely amplified self-perception of skin conditions, such as melasma, prompting greater online engagement. The decline in 2024 may reflect user migration to short video platforms, where text-based discussions are less prominent or harder to capture through keyword analysis. These trends reveal the dynamic nature of online patient behavior and highlight the importance of timely, evidence-based interventions on different social media platforms.

Qualitative analysis identified four key themes: Treatment and Prevention, Daily Care and Mental Health, Etiology and Clinical Features, and Diagnosis and Differentiation, revealing patients' diverse concerns. These findings aligned with previous studies, showing that social media plays an important role in dermatological discussions.<sup>13,16</sup> Patients seek for long-term treatment efficacy, access to reliable institutions, and cost-effective therapies to better manage their condition. They also express strong interest in new treatment developments. For example, one user wrote, "I've tried many products, but nothing seems to work. I just want something affordable and reliable".

While social media provides easy access to health information, much of the content comes from patients rather than professionals.<sup>17–19</sup> This raises concerns about the potential spread of misinformation, as content from users may include unverified or inaccurate health advice. Such misinformation can influence patients' treatment decisions, delay professional consultation, and ultimately impact health outcomes. These findings highlight the need for clearer, evidence-based information from dermatologists. Research further supports the potential of social media in dermatology for patient education.<sup>12,14</sup>

Beyond treatment, discussions around skincare and mental health were common, underscoring the emotional burden of melasma. Patients frequently described experiences of social anxiety and depression related to their appearance.<sup>2,7,20,21</sup> For example, a user shared, "I feel embarrassed going out without makeup because of the melasma". While social media offers a source of peer support, it may also contribute to psychological distress.<sup>18</sup> Limited access to professional mental health resources and individualized treatment advice highlighting the need for more integrated care.<sup>18,22,23</sup> Dermatologists may play a crucial role by combining medical management with psychosocial support and skincare guidance.<sup>24,25</sup>

The unequal distribution of posts across two platforms reflects real-world differences in user behavior and platform characteristics. Content consisted of promotional material on Facebook was excluded to maintain the focus on patient discussions. Baidu forums featured more user posts relevant to the study aims. Although this imbalance limits direct comparisons, the inclusion of both platforms adds cultural and linguistic diversity to the dataset and allows for a preliminary exploration of how melasma-related concerns may vary across different cultural contexts.

The findings suggest that dermatologists could use social media to better understand patient concerns and provide accurate, evidence-based information in response to common misinformation. Active engagement on digital platforms may enable dermatologists to not only correct misinformation but also promote adherence and trust. Additionally, recognizing the psychological burden of melasma highlights the importance of integrating mental health support and daily skincare guidance into routine care. Analyzing real-world patient discussions (Figure 1) allows researchers to better understand patients' perspectives and needs. These findings can help dermatologists to develop more effective educational strategies and enhance patient adherence in clinical practice.

## Conclusion

Based on a qualitative analysis of social media discussions, this study provides insight into the concerns of patients with melasma. These findings emphasize the critical gaps in patient education and underscore the need for healthcare professionals to engage in digital patient education, clarify misinformation, support patient self-management, and integrate mental health considerations into melasma care. Future research should explore AI-driven tools for improving patient adherence and self-care.

However, this study has several limitations. First, as a retrospective qualitative analysis, it may not fully capture the changing needs of the patients over time. Second, the use of social media data limits representativeness, as users may not represent the broader melasma patient population. Third, although AI-assisted keyword extraction improved efficiency and consistency, its performance may have been influenced by the clarity and context of content. Fourth, while Chinese posts were translated into English to ensure consistent prompt application, minor shifts in meaning may have occurred. Finally, slight variability in AI outputs remains a potential concern, although all keywords were independently reviewed and verified by two researchers to ensure reliability.

These limitations should be considered when interpreting the findings. Future research could benefit from combining AI-based and manual qualitative approaches, and from broader data sources. Continuous communication between dermatologists and their patients is essential. Advanced management technologies can help dermatologists address evolving concerns, optimize care strategies, and improve both the patient experience and quality of life.

## Abbreviation

AI, artificial intelligence.

## Data Sharing Statement

Data supporting the findings of this study are available from the corresponding author Prof. Jiang upon reasonable request.

## Ethics Statement

This study was approved by the Biomedical Ethics Review Committee of West China Hospital, Sichuan University (Approval No. 2024-371).

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. We collected and analyzed anonymized, publicly available social media posts from Baidu and Facebook, focusing only on content that was open accessible without login requirements or privacy settings. In compliance with the platforms' terms of service, we adhered to the guidelines and did not interact with users or collect any personally identifiable information. All data were accessed and used in accordance with the public content and research guidelines provided by each platform at the time.

The ethics committee confirmed that individual informed consent was not required due to the non-interventional design, the anonymity of the data, and the public nature of the content.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest in this work.

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