



Bibliometric Analysis of Trends in Risk Factors in Melasma

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Abstract. Risk factors for melasma have been identified at several points such as the use of birth control pills, cosmetics, sun exposure, estrogen therapy, decreased thyroid and ovarian function, ovarian tumors, nutrition, drugs that are classified as phototoxic or photoallergic, and epilepsy drugs. This article aims to determine the incidence of melasma and its risk factors. This study uses articles collected from the Google Scholar database. The data collection step uses the keyword "Risk Factor Melasma" according to the title and keyword criteria. The articles used are publications in the 2018-2023 year range. The stages of analysis are carried out using VOSviewer software for visualization and trend analysis in the form of bibliometric maps. The bibliometric approach was applied to identify publication patterns, research developments, and relationships among topics related to melasma risk factors. Based on the visualization results, 100 selected documents were published within 5 years, from 2018 to 2023. The findings provide an overview of the main research trends and contribute to a better understanding of the incidence of melasma and the factors associated with its occurrence.

Keywords: Bibliometric Analysis; Google Scholar; Melasma; Risk Factors; VOSviewer.

1. INTRODUCTION

Melasma is the most common pigmentation disorder affecting millions of people worldwide (Raza et al., 2022). Melasma is a hyperpigmentation disorder that generally occurs on the face. Recently, melasma has often become a major cosmetic problem for people, especially women, and has a negative effect on their lives, both from social and emotional aspects (Wijaya et al., 2023).

Changes in skin pigmentation that occur in melasma can cause complaints in the form of skin hyperpigmentation with a symmetrical distribution in the form of nummular spots and plaques with irregular borders. The lesions can vary in color from light brown to dark brown or grayish and generally appear on areas of the skin that are frequently exposed to sunlight, particularly the face. Although melasma is a chronic pigmentary disorder that often affects facial appearance, the condition typically does not produce symptoms such as pain, burning sensations, or itching (Sarkar et al., 2018; Passeron & Picardo, 2018).

Melasma is considered one of the most common acquired hyperpigmentation disorders and can significantly affect an individual's quality of life due to cosmetic concerns. The condition is more frequently observed in women and is associated with several contributing factors, including ultraviolet radiation exposure, hormonal influences, genetic predisposition, and the use of certain medications. Despite its benign nature, melasma often presents therapeutic challenges because of its recurrent course and tendency to persist for long periods,

making early identification and appropriate management important in clinical practice (Handel et al., 2014).

There are several factors that can influence the occurrence of melasma, namely endogenous factors in the form of hormonal and genetic, as well as external factors in the form of sun exposure, cosmetics, drugs that are classified as phototoxic or photoallergic. Pregnancy is also a factor in the occurrence of melasma, this is due to hormonal changes which can affect pigmentation and trigger the emergence of melasma. Identification of risk factors can help to carry out appropriate prevention and treatment in patients suffering from melasma (Cario, 2019; Setyawati et al., 2019).

The prevalence of melasma sufferers at Dr. Soetomo Surabaya in January 2015–December 2018 showed that the proportion of women was greater, namely 734 patients (99.3%) compared to men, namely 5 patients (0.7%). The highest age of patients seeking treatment was 46–55 years old, with 320 patients (43.3%), while the highest onset occurred at 37–45 years old, with 308 patients (41.7%). A total of 561 patients (75.9%) experienced melasma for ≥ 1 year (Devi et al., 2022).

Bibliometric analysis is a popular method for evaluating and analyzing scientific data. This method is widely used to identify research trends, publication patterns, collaboration networks, and the development of knowledge within a particular field. Bibliometric analysis provides a systematic approach for mapping scientific literature and understanding the relationships among authors, institutions, countries, and research topics. This article is a bibliometric analysis using journals from the PubMed database regarding risk factors for melasma using the VOSviewer application (Alifariki et al., 2022; Donthu et al., 2021).

The use of the VOSviewer application enables researchers to visualize bibliometric networks in the form of co-authorship, co-occurrence of keywords, citation analysis, and thematic clusters. Through this approach, it is possible to identify dominant topics, emerging trends, and research gaps related to melasma risk factors. Therefore, bibliometric analysis not only provides an overview of the scientific landscape but also serves as a valuable tool for guiding future research directions and strengthening evidence-based studies in the field of dermatology (van Eck & Waltman, 2010).

2. METHOD

The bibliometric analysis method is an approach to examining the evolution of research domains, discussions, and authors, based on the social, intellectual, and conceptual structure of scientific disciplines, or can be called a mind mapping method that emphasizes the limits of knowledge (Donthu et al., 2020).

All articles were collected from the Google Scholar database, where Google Scholar is one of the most complete peer-reviewed journal databases globally, and the data were taken within the scope of overseas research (Martín-Martín et al., 2018). Data collection steps used the keyword “Risk Factor Melasma” according to the title and keyword criteria. The articles used were publications in the 2018–2023 period. Google Scholar database searches were conducted using the Publish or Perish application and exported in *.ris format (Harzing, 2007). The analysis stages used VOSviewer for visualization and trend analysis in the form of bibliometric maps. VOSviewer is widely used in bibliometric studies because it can visualize relationships among publications, authors, institutions, citations, and keywords, thereby facilitating the identification of research trends and thematic developments in a particular scientific field.

3. RESULTS AND DISCUSSION

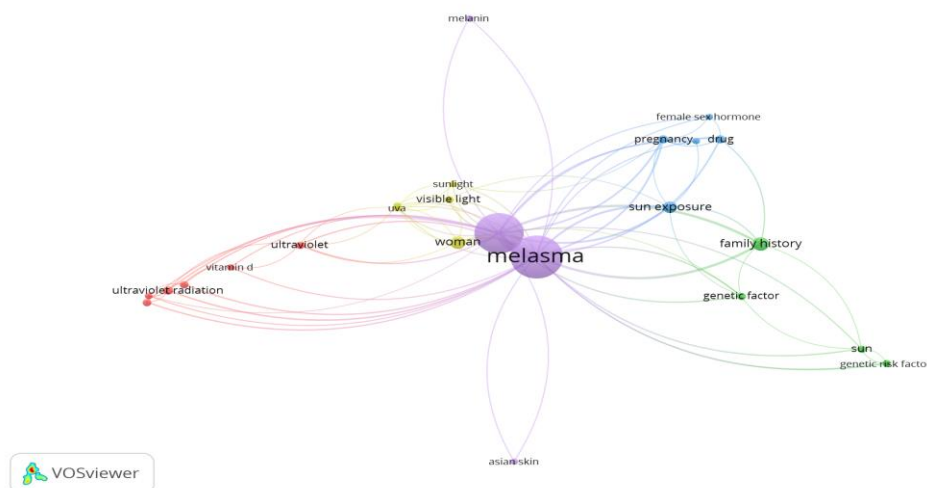


Figure 1. Network Visualization.

Map from the Study of Melasma Risk Factors

In this study, there were 100 selected documents published within a 5 year period, namely from 2018 to 2023. These documents consisted of scientific articles originating from various countries. Figure 1 shows a term occurrence map from a melasma risk factor study where the circles represent the terms, the size of the circles represents the number of journals

taken while the thickness of the lines indicates the strength of the association between the two fields.

The study of melasma risk factors can be seen in the visualization results of mapping the data collected in Figure 1. The differences in color are used to separate each keyword that dominates the cluster. This serves to identify trends in keywords that are frequently researched in several publications. From the results of the VOS viewer analysis in this study, five clusters were obtained that mapped keywords related to melasma risk factors. Each cluster has red, green, blue, yellow and purple colors. Within each cluster there is a grouping of several items from the same category.

Based on the visualization results, each keyword is related to factors that influence the development of melasma. Red focuses on hormonal factors, family history, thyroid disease, ultraviolet, ultraviolet radiation, and vitamin D. Green focuses on family history, genetic factors, genetic risk factors, photoaging, and the sun. Then the blue color focuses on drugs, hormones in women, oral contraceptives, pregnancy, and sun exposure. The color yellow focuses on sunlight, UVA, UVB, visible light, and women. Meanwhile, purple focuses on Asian skin, melanin, melasma and risk factors.

Table 1. Melasma Risk Factor Clusters

Cluster	Keywords	Number of keywords
Cluster 1	hormonal factors, family history, thyroid disease, ultraviolet radiation, and vitamin D	6
Cluster 2	family history, genetic factors, genetic risk factors, photoaging, and sun	5
Cluster 3	drugs, hormones in women, oral contraceptives, pregnancy, and sun exposure.	5
Cluster 4	sunlight, UVA, UVB, visible light, women	5
Cluster 5	asian skin, melanin, melasma, risk factors	4

Keywords in an article can represent the focus of a research theme. In this study, there are keywords that are grouped into the same cluster and tend to reflect identical topics. Each cluster has a different number of keywords. This shows that research on melasma risk factors is quite varied. The top six keywords with a high frequency of appearance are hormonal factors, family history, thyroid disease, ultraviolet, ultraviolet radiation, and vitamin D. This data not only has a high frequency but also reflects that this research topic is attracting more attention and has close relationship with other research topics.

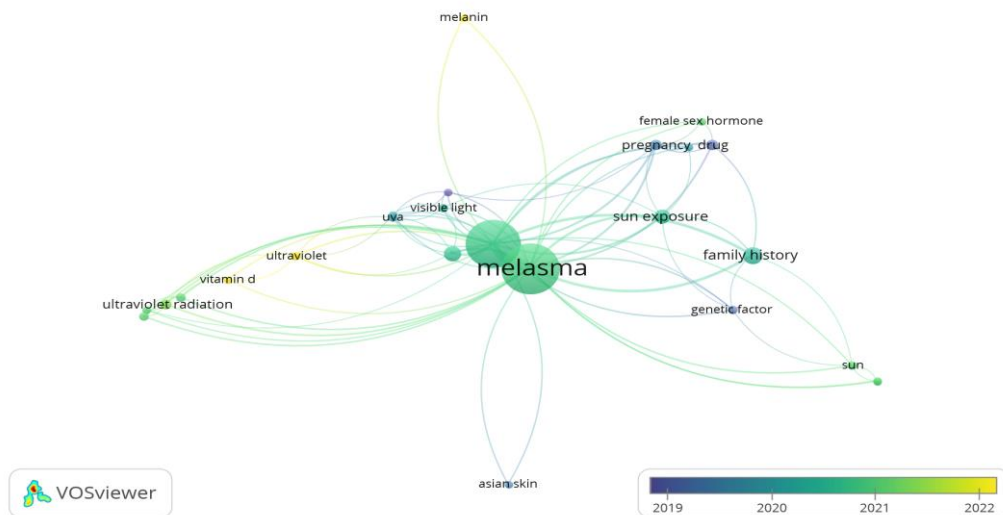


Figure 2. Overlay Visualization

Overlay visualization is similar to network visualization. The blue color in the overlay visualization has the lowest number, then green to yellow are the highest scores. From Figure 2, it can be seen that the discussion of risk factors has increased from year to year, where research on risk factors for melasma was predominantly carried out in 2019-2022.

In 2019, namely blue keywords discussing Asian skin, visible light, medication, genetic factors and pregnancy were widely discussed but not much higher than research in 2020 to 2021, namely green keywords which discussed risk factors for melasma, family history, exposure. sunlight, the sun, hormones in women and thyroid disease. The most discussions in 2022 have yellow keywords such as ultraviolet, vitamin D and melanin.

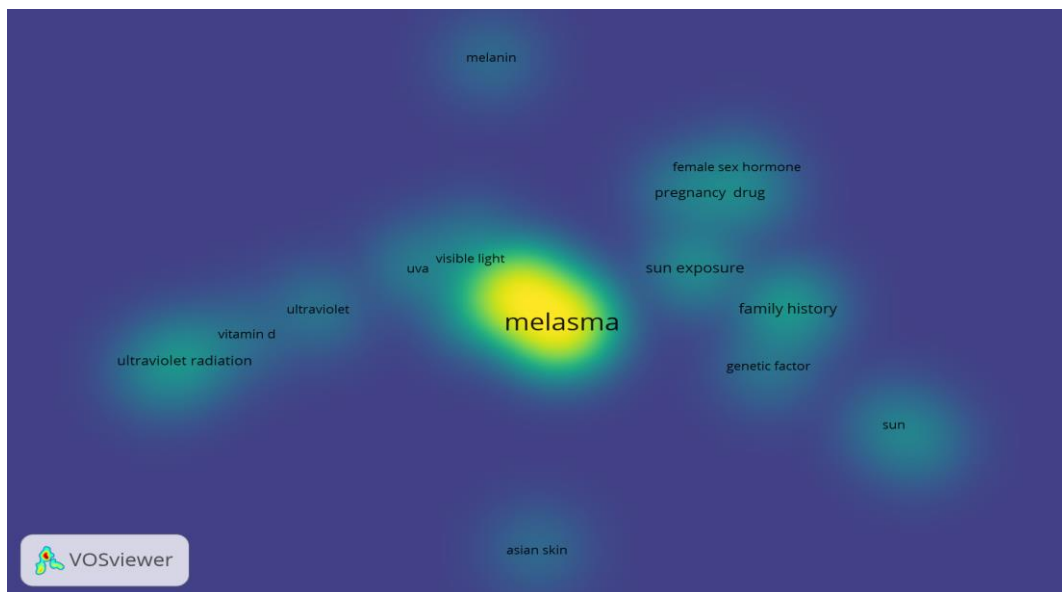


Figure 3. Density Visualization

From Figure 3, the density of melasma risk factors is obtained based on color. Systemically, the colors range from blue, green, to yellow. The closer the color of the keyword dot is to yellow, the higher the weight of the keyword. In the VOSviewer results, it was found that “melasma” and “risk factors” had a high density, representing these keywords prominently. Meanwhile, other keywords such as sun exposure, UVA, UVB, genetic factors, and pregnancy also showed a close relationship with risk factors and melasma.

Exposure to sunlight is a strong risk factor for melasma. This is evidenced by the occurrence of melasma on facial areas that are frequently exposed to sunlight. Melasma occurs on the face because the number of epidermal melanocytes on the face is greater than in other parts of the body (Putri, 2020; Batam & Marianingrum, 2019).

This illustrates that “risk factors” and “melasma” are keywords with extensive development and research attention. However, it cannot be denied that keyword points with the highest density, such as melanin, sunlight, and Asian skin, still have limited research information, and studies on these keywords tend to remain underdeveloped.

4. CONCLUSION

Melasma is a dermatovenerological disease that is currently trending in the field of beauty, so many studies discuss this topic. This study can contribute to mapping keyword trends in melasma risk factor research for 5 years from 2018-2023. This study configures, describes and analyzes a variety of systematic literature using a bibliometric approach. This approach was taken to see updates in studies and identify frequently researched risk factors. There were 5 clusters of keywords that were frequently researched, the keyword that was most researched was sun exposure, while the trend of most risk factor studies was in 2022.

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