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Short Communication

Oral potentially malignant disorder research in Taiwan and mainland China: A scientometric analysis

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Abstract Scientometric analysis of a disease is often conducted to recognize research trends and study hotspots. In this report, we analyze the scientometric characteristics of oral potentially malignant disorder (OPMD) research in Taiwan and mainland China. There are 324 and 718 articles on OPMD research originating from Taiwan and Mainland between 2006 and 2021, respectively. The most common subtype of OPMD research in Taiwan and Mainland is oral submucous fibrosis and lichen planus, respectively. Based on the list of main keywords extracted from the included articles, areca/betel quid chewing and alcohol use are the distinctive risk factors in Taiwan. Research on cancer screening, fibroblast/myofibroblast, and smooth muscle actin α are distinctive keywords in Taiwan; whereas the research on apoptosis, cytokine, and inflammation are distinctive keywords in Mainland. The distinctive

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characteristics of OPMD research are analyzed between Taiwan and mainland China, which may reflect the importance and concerned topics of research.

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Introduction

The term *oral potentially malignant disorder* (OPMD) was recommended by the World Health Organization Collaborating Centre workshop in 2005.¹ OPMDs contain a group of lesions including oral leukoplakia (OLK), erythroplakia, oral submucous fibrosis (OSF), oral lichen planus (OLP), oral verrucous hyperplasia, *Candida* hyperplasia, discoid lupus erythematosus, and actinic cheilitis, which are associated with various risk of oral cancer development and malignant transformation rate (MTR).^{1–4} The MTR of the same subtype or the different subtypes of the OPMDs may vary due to distinct ethnic, genetic, geographic, and lifestyle factors.^{1–6} Thus, there is a need for comprehensive knowledge and strategy to prevent malignant transformation of OPMDs, especially oral cancer screening.

Although people in Taiwan and mainland China share the main ethnic origin, they have distinct political regimes and health care systems. Notably, life habits of areca chewing and cigarette smoking as the notorious risk riskers for oral cancer prevail in Taiwan.^{1–3} These characteristics may lead to different scientific research productivity output in two regions. Scientometric analysis is a useful tool that utilizes citation data to measure scientific output of a disease or region in a particular field, which will help investigators to recognize study hotspots and research trends in the specific field.^{7–9} However, the analysis focused on OPMD research in Taiwan and mainland China has not been addressed. Therefore, we provide a comprehensive overview of bibliometric characteristics of all the original articles on OPMD research in Taiwan and mainland China for the consideration of the clinicians and investigators.

Materials and methods

As per the methodology described previously,⁹ the articles on OPMD published between 2006 and 2021 were retrieved on 20 May 2022 from the Scopus database. We searched the OPMD papers since 2006 because of its inception in 2005.¹ According to the search strategy described in [Supplementary Table S1](#), we used medical subject term “OPMD” and the synonyms in the title/abstract, and selected “China” or “Taiwan” in the filter of Country/Region. Then, original “article” in the filter of Document type and “English” in the filter of Language were included. Repeated publications were identified using the following the authors and the authors’ affiliations. Titles and abstracts or full texts of the articles were screened and re-evaluated to confirm the eligible articles. Data search and extraction were performed independently by two investigators (W.L. and H.S.), and discrepancy of results was

resolved in a consensus symposium. The scientometric characteristics of all the eligible articles were reviewed and recorded the following information: title, keyword, citation count, publication year, authorship, affiliation, and country/region of origin. Descriptive statistics and associations were calculated for scientometric characteristics. The Bibliometrix Biblioshiny R-package software (<https://www.bibliometrix.org/home/>; K-Synth Srl Inc., Naples, Italy) was used to analyze the relevant bibliometric data.

Results

Citation characteristics

With the search strategy algorithm, 324 articles on OPMD research originate from Taiwan between 2006 and 2021. As presented in [Fig. 1A](#), the total count of citations is 7076 and the *h* index is 45. The maximum and mean count of citations is 175 and 40.4, respectively. On the other hand, 718 eligible articles originate from mainland China at the same period. The total count of citations is 10249 and the *h* index is 47. The maximum and mean count of citations is 251 and 14.3, respectively. To concretize the trends of research output in Taiwan and mainland China, we assess the annual number of articles and accumulated citation count during 2006–2021. For Taiwan, the annual number of articles maintain stably between 14 and 29 during 2007–2021 ([Fig. 1B](#)), and accumulated citations increase from 14 to 1069 during this period ([Fig. 1C](#)). On the other hand, the annual number of articles from Mainland China shows a stair-like increasing from 7 to 90 during 2006–2021, and accumulated citations increase from 5 to 2051 during this period.

Besides, the institutions of origin, contributing authors, and journal of publication on OPMD research from Taiwan and mainland China are recognized in the bibliometric analysis ([Fig. 1D](#)). In Taiwan, the contributing author with largest number of original articles is Chiang, C.P. (*n* = 47), followed by Chen, H.M. (*n* = 40), and Yu, C.H. (*n* = 35). The institution of origin with the maximum number is National Taiwan University (*n* = 87), followed by Chung Shan Medical University (*n* = 77). The journal of publication with largest number is *Journal of the Formosan Medical Association* (*n* = 41), followed by *Journal of Oral Pathology & Medicines* (*n* = 28). In Mainland, the contributing author with largest number of original articles is Zhou, G. (*n* = 37), followed by Liu, W. (*n* = 36), and Chen, Q. (*n* = 34). The institution of origin with the maximum number is Shanghai Ninth People’s Hospital (*n* = 101), followed by Sichuan University (*n* = 79). The journal of publication with largest number is *Journal of Oral Pathology & Medicines* (*n* = 58), followed by *Oral Diseases* (*n* = 25).

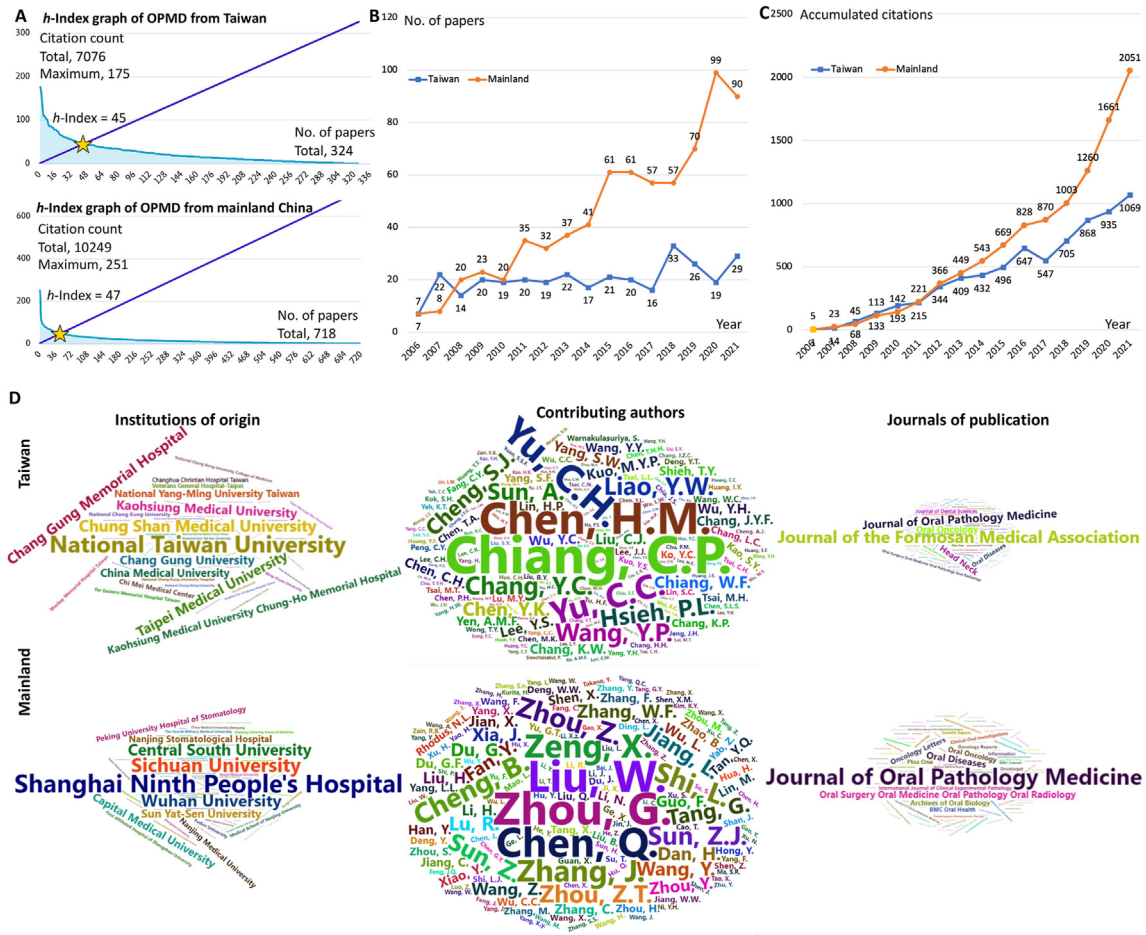


Figure 1 Citation characteristics of the articles on OPMD research during 2006–2021 from Taiwan and mainland China. (A) The *h*-index graphs. (B) The annual number of articles. (C) The accumulated citations. (D) The cloud graphs of institutions of origin, contributing authors, and journals of publication.

Research characteristics

Based on the frequency of keywords in all included articles from Taiwan and mainland China (Fig. 2A), we highlight the analysis of distinctive characteristics of OPMD research. A list of 160 keywords is automatically recognized in the order of highest to lowest frequency by the database. In Taiwan, the most common subtype of OPMD research is OSF, followed by OLK research. This is owing to the prevalence of areca/arecoline, smoking, and alcohol consumption in this region. In Mainland, the most common subtype of OPMD research is OLP, followed by OLK research; while the areca/arecoline and alcohol consumption in this region are not in the list (Fig. 2B). For the topic or area of study, we identify 10 distinctive topics among the keywords in both Taiwan and Mainland, respectively (Fig. 2C).

Consistently, the research on fibroblast, myofibroblast, and smooth muscle actin α are the distinctive keywords in Taiwan; whereas the research on apoptosis, cytokine, and inflammation are the distinctive keywords in Mainland. Notably, cancer screening and early detection of cancer are not in the keyword list of Mainland but in that of Taiwan. Based on the representative results of investigations,^{1–6} the MTR of OSF in Taiwan is higher than in Mainland,

while the MTR of OLK in Taiwan is lower than in Mainland (Fig. 2D). The main study designs and experiment methods are identified among these keywords. In general, these 2 aspects in Taiwan and Mainland are similar (Fig. 2E). For instance, controlled study, major clinical study, and human cell study are the most 3 types of designs in both two regions. The research on genotype and cell movement are common in Taiwan, while protein research and genetic transfection are common in Mainland.

Discussion

It is an obvious fact that early detection and cancer screening of high-risk patients is a high priority for decreasing both morbidity and mortality of oral cancer.^{1–3} Cancer screening and early detection of cancer as the main keywords of OPMD research are not found in Mainland articles but in Taiwan articles, which is possible owing to Taiwan government policy. Taiwan government launched a free oral cancer screening program targeting at general population with risk habits of smoking and/or areca chewing. This program covered over 99% of the Taiwan’s 23 million legal residents since 2010.² Oral cancer screening for high-risk individuals, e.g. cigarette smokers and betel

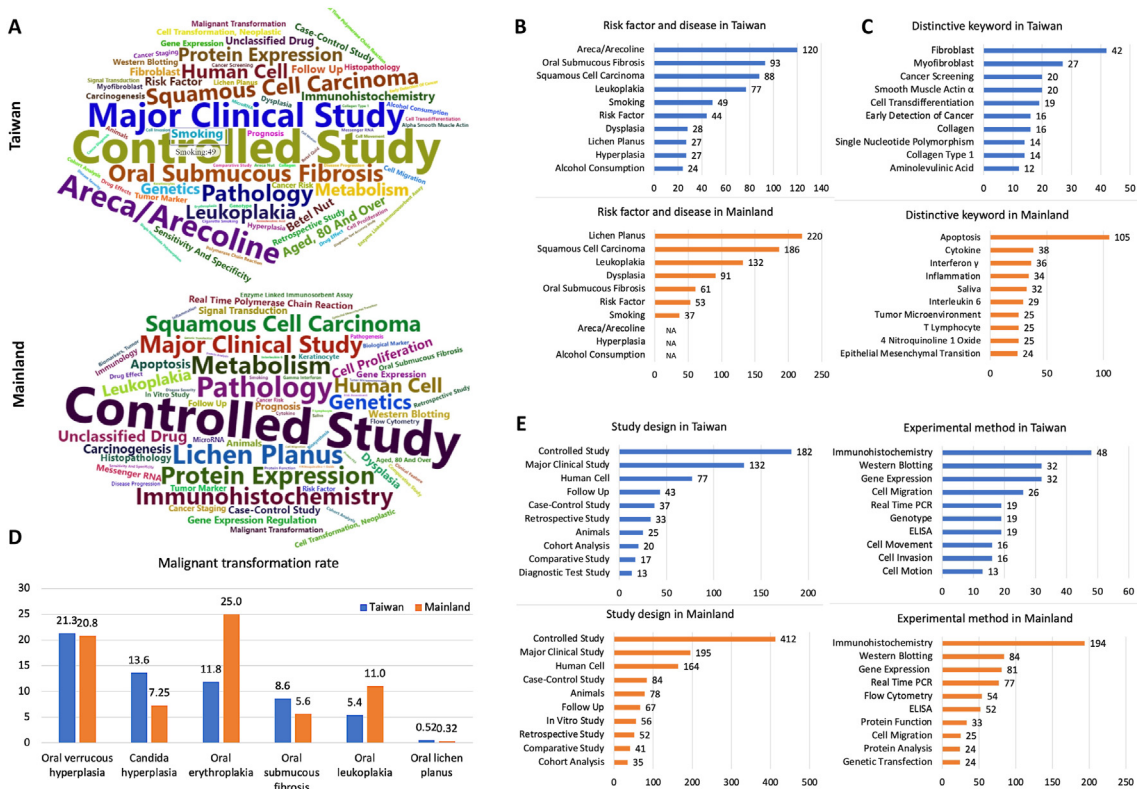


Figure 2 Research characteristics of the articles on OPMD research during 2006–2021 from Taiwan and mainland China. **(A)** The cloud graphs of the main keywords extracted from the included articles. **(B)** The ranks of risk factors and subtypes of OPMD. **(C)** The ranks of distinctive keywords. **(D)** The malignant transformation rate of the subtypes of OPMD extracted from the representative results of investigations. **(E)** The ranks of study designs and experiment methods.

quid chewers with OPMD, is essential for early diagnosis and has the potential to improve patients’ outcome. However, most countries and regions do not have screening programs for OPMDs, such aspect in mainland China thus should be encouraged to learn from Taiwan.

It is noteworthy that distinctive characteristics of OPMD research are analyzed between Taiwan and mainland China, which may reflect the importance and concerned topics of research. For example, areca/betel quid chewing and cigarette smoking are crucial risk factors of OPMD in Taiwan research. This reflect that the relatively high incidence of OPMD, particularly OSF and OLK, is mainly due to betel nut chewing and cigarette smoking in Taiwan.¹⁰ To the contrary, the most common subtype of OPMD research is not OSF but OLP in Mainland.⁴ Besides, we are aware of certain limitations in a bibliometric analysis. First, we used only Scopus database not do other different databases for analysis, although Scopus database may be of more coverage and accuracy.⁹ Secondly, citation counts do not directly reflect quality of an article but enable a quantitative evaluation of the scientific impact in a designed field. Thirdly, there is definite time effect from publication to the time of the search in bibliometric analysis. And, authors tend to cite previous highly cited articles independently of content and quality through snowball effect.

In summary, this bibliometric analysis helps in evaluating the historical citation and research trends in OPMD field

that has undergone scientific evolution in Taiwan and mainland China. We hope that the scientometric characteristics of this analysis will be able of benefit to clinicians and researchers in obtaining information on OPMD research and can be of guidance for future studies in Taiwan and mainland China.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jds.2022.06.003>.

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