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Survey of Medical Ethics Research with the Science Drawing Method

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Abstract

The advancement of human knowledge in the field of medical science has brought activists to the field with new ethical issues. addressing medical ethical issues is one of the essential requirements in the health system. at present, the evaluation of science production can provide a clear picture of the growth, progress and important issues of a scientific field. in this study, we aimed to identify important areas of research in the field of medical ethics through a scientometric study. This is a scientometrics research using one of the most important techniques of this method, namely, the drawing of science. the statistical population of the study consisted of 3333 scientific papers indexed in the WOS database by the end of 2019. a researcher-made checklist was used for data collection and Ravar-matrix and ucinet6 software were used for data analysis. The results showed that the amount of scientific output in the field of medical ethics is 3333, starting with 1946 with two documents and reaching 2019 with 104 documents. the average annual growth rate is 21.03%. the world of medical ethics consists of 9 clusters worldwide and the concepts of bioethics, ethical counseling, education, medical education and autonomy have been the most commonly used keywords in medical ethics research, respectively. Iranian products in this field also consist of 6 clusters which are the key concepts in medical ethics, bioethics, ethics committee, strategic planning and medical education.

Keywords: *Medical Ethics; Clustering; Science Drawing; Scientometrics*

1. Introduction

The most important crisis of human social life in different periods of human history has been the issue of morality and how human beings behave in society. As human life becomes more complex and out of the ordinary, the issue of morality takes on a broader and more complex form, the moral definition of human relations in society becomes more difficult, and it becomes more difficult to distinguish moral examples from immorality. The complexity of today's world in different aspects of life has led to its

ethics and philosophy being presented separately in different professions [1]. Accordingly, thinkers in various fields sought to try to solve existing problems or at least reduce them by providing appropriate ethical solutions [2]. In the medical community, the discussion of the philosophy of ethics has a special place due to the importance of the medical profession, and even the topics of medical ethics called Medical Ethics, have a very serious and wide scientific topic [1].

Medical ethics is an interdisciplinary science and its subject is ethical issues and debates in the field of medical sciences, so that issues and related issues in various branches of medical sciences as a profession and health system policy. Today, with the advancement of medical knowledge, traditional medical ethics has lost its effectiveness and modern medical ethics has replaced it [3]. Medical ethics no longer just means good morals for doctors, or how a doctor treats a patient, or merely the development of professional rules on physician social etiquette or the expression of religious rules alone. Medical ethics is an analytical activity in which thoughts, ideas, commitments, behaviors, arguments, and numerous discussions in the field of ethical decisions in the medical profession are carefully and critically examined, and instructions are issued when necessary. Medical ethics decisions, in the field of medicine, are obvious issues and values, and in general, the do's and don'ts [4].

The development of human knowledge, the advancement of technology, the increase of capabilities in the diagnosis and treatment of diseases, and the multiplicity of selectable ways for physicians and patients have raised many questions that traditional medical ethics has not been able to answer alone. In our country, with religious and Islamic background in the field of medical ethics research, on the one hand, it is necessary to explain, interpret and justify jurisprudential and Islamic in this field, and on the other hand, research on scientific, technical and legal issues is needed [3]. With the growth of various fields of knowledge, scientific publications have also developed rapidly and as a result, it has become difficult to observe scientific and research outputs. Specialists in scientometrics and computer science, by combining illustration tools, indicators and scientometric techniques in order to create a complete and comprehensive picture of different sciences, have provided a map of scientific fields [5].

Drawing scientific information in the form of scientific maps is a kind of interpretation, so that real complex data and phenomena become comprehensible messages, and this drawing makes the data and phenomena of the invisible body of the knowledge structure understandable to us. In fact, information visualization is one of the methods used to better transmit information and use its display methods properly. Due to the fact that in this way, the exchange and transfer of information is done visually, efforts are made to increase the user's power of understanding and learning by visual display of information, and a large amount of information is presented in a compact, less voluminous and illustrated form. In other words, the slogan of illustrating scientific information is to use the way of looking or insight for thinking [6].

These types of maps try to show the processes of growth, integration and decomposition of different fields of science over time. This approach conceptualizes science as research on the page of abstract issues. The scientific fields in these maps are determined in proportion to the level of activity of scientists in them, and the empty spaces indicate the unworked or unknown fields of science. In this type of performance, the growth, integration, or decomposition of different scientific fields can be observed over time [6]. Scientific maps are drawn using various techniques and methods, one of which is the coincidence of words [7]. Vocabulary analysis is a method of content analysis that is obtained through the coincidence of words or concepts in texts and resources, and through which the main concepts of a field or scientific field can be identified and through this knowledge, they discovered and managed conceptual patterns and events, scientific structure, conceptual network, hierarchical relationships of concepts and conceptual categories of that field. Synonym analysis is a tool for discovering hidden patterns and emerging conceptual events [8].

In this regard, in a study conducted by men and colleagues in 2018 on articles published in the field of medical ethics, they showed that medical ethics, medical education and Islamic ethics are frequently repeated topics in Persian articles, respectively. Also, this study showed that the annual growth rate of article publication is 23.17%, which has been declining since 2013 [9].

In another study, Jafarifar examined the world's scientific products in the field of applied ethics. The results show that between 1992 and 2014, 1,763 documents were identified on the Web of Science database, in which 61 countries were involved in writing, The United States, Britain and Canada are ranked first to third in this ranking and Iran is ranked 42nd in this ranking [10].

In the article on thematic and quantitative articles related to medical ethics in the Islamic countries of the Eastern Mediterranean region of the World Health Organization, indexed in the citation database of PubMed, Dehghan et al. have shown that between 1971 and 2012, one article was from Palestine and Djibouti and the largest number was 71 articles related to Iran. Also, the lowest number by titles was one article related to clinical trials and health fraud and the highest number was 64 articles related to the principles of medical ethics [5].

In a letter to the editor of Iran Journal of Medical Sciences, Morovati et al. Stated that a review of medical ethics articles in the Thomson Reuters database found that between 1990 and 2010, the highest scientific output was in 2009 and the lowest was in 1992. 82 countries had articles in this field, with the United States, Britain, and Germany ranking first to third. They also stated that only 55.9% of these documents were published in the journals of Medical ethics, which indicates that the field is interdisciplinary [11].

One of the first articles to examine the scientific outputs in the field of medical ethics is an article by Makkizadeh and Ossareh, which refers to the citation analysis and mapping of scientific outputs indexed in the Web of Science database between 1990 and 2008. The study found that a total of 5,690 documents were submitted in 15 different formats. 10326 The author has been involved in the production of these documents, and the Journal of Medical Ethics has published the most articles in this field [12].

At the international level, there is no article that examines the scientometrics of the field of medical ethics, but we can mention articles that have evaluated the scientific productions of fields in which ethics also has a special place. In a study, Parvin et al. evaluated the scientometrics of research ethics products at the Scopus database. The findings show that by the end of 2017, 16,615 documents had been indexed in this area, with the United States accounting for 31.6 percent of production with 5,253 documents, and then there is the United Kingdom, and Iran, with 68 degrees, ranks 25th in the world and first in the Middle East [13].

In an article, Koseoglu et al. Evaluated co-authorship networks in scientific publications published in four prestigious international journals in the field of business ethics. Their research findings show an increase in the rate of cooperation during the years 1960 to 2015 [14].

Scientometric evaluation in the field of digital ethics has also been done by Mahieu et al. findings from the research show the exponential growth of journals in this field [15].

Using scientometric studies, parts of the scientific development of countries can be studied. It is obvious that the scientific products indexed by each country in the valid international indexes are part of the most important signs of scientific development and are among the output indicators of each country's research [16]. Reviews of the writings show that so far the scientific productions in the field of medical ethics, which have been indexed in the Web of Science database, have not been analyzed in terms of words. Therefore, in this research, an attempt has been made to illustrate the widely used concepts of scientific products in the field of medical ethics by using drawing a map of science and co-words analysis.

2. Method

The present study is a descriptive-analytical study with a scientometric approach that was originated using important techniques such as content analysis and drawing science. The statistical population of the study includes 3333 scientific documents indexed in the WOS citation database until the end of 2019. To collect data from the desired database, the following search strategy has been used in the advanced search section:

Ti = ("medical ethic*" OR "clinical ethic*")

After searching and saving the recovered documents, they were extracted in the form of 500 files in Tab delimited-UTF8 format, and transferred to Excel software. Then, the documents that were duplicate or untitled were removed from the research community and at the end, 3222 documents remained for analysis. 643 documents had the author's keyword used to analyze the content. Vocabulary was identified using Ravar-matrix software. Keywords that were in the search strategy, such as ethic, medical, and clinical, and titles such as country and center names were removed, two-part words with symbols, such as decision-making and decision-making, and descriptors, which were plural and singular, such as nurse and nurses, were merged. Then, the data were classified into three general periods, ten-year and five-year. Data analysis was performed using Excel. VosViewer software was used to create the Ravar-matrix software and draw it.

3. Findings

The process of publishing scientific productions in the field of medical ethics has started since 1964 with two degrees and in 2019 it has reached 101 degrees. Calculation of the average annual growth rate of 21.03 percent, shows that science production in this area is growing upwards, although in some years we see a decrease compared to the previous year (Diagram 1).

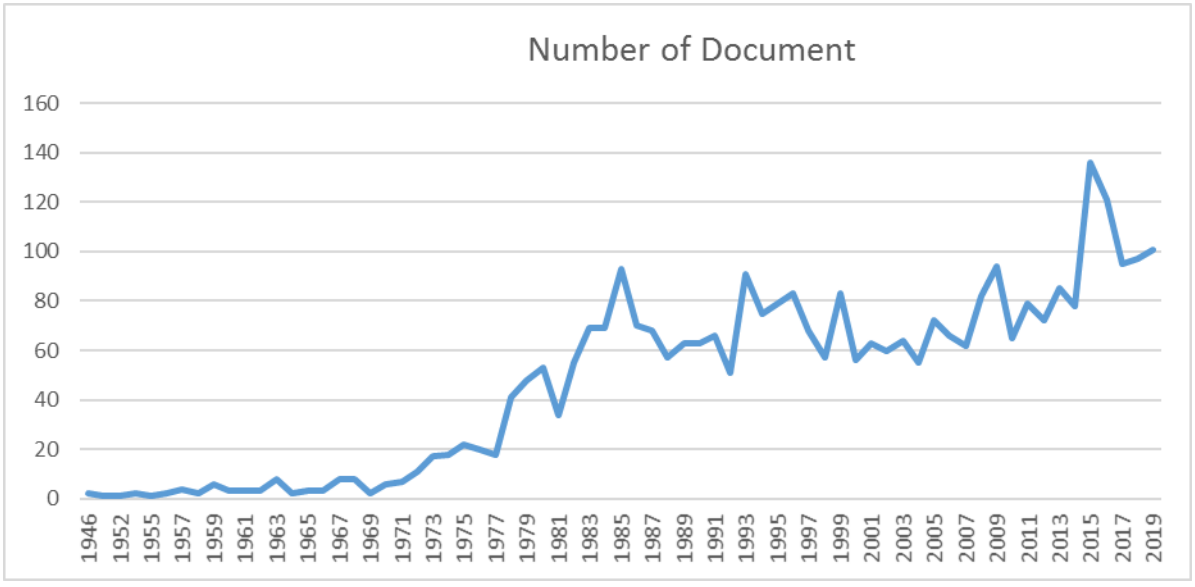


Diagram 1. The growth trend of medical ethics products during the years 1964-1999

Scientific publications in the field of medical ethics have been published by 1155 research centers in 17 formats with 74 thematic titles and in 493 journals. About 90% of the documents are in English. Table 1 lists the top five cases, each containing the largest number of documents.

Table 1

		Number
Journal	Journal of Medical Ethics	215
	Journal of Medicine And Philosophy	58
	Journal of Clinical Ethics	34
	Hastings Center Report	30
	Cambridge Quarterly of Healthcare Ethics	29
Document Type	Article	1447
	Editorial Material	610
	Book Review	546
	Letter	360
	Meeting Abstract	98
Research Center	BAYLOR COLL MED	36
	GEORGETOWN UNIV	22
	UNIV OSLO	21
	UNIV CHICAGO	20
	IMPERIAL COLL SCI TECHNOL	17
Country	USA	817
	ENGLAND	226
	GERMANY	150
	CANADA	81
	AUSTRALIA	55

Figure 1 shows the network of cooperation of countries in the field of medical ethics. Authors from 71 countries wrote together. Iran has also collaborated with Canada in only one article.

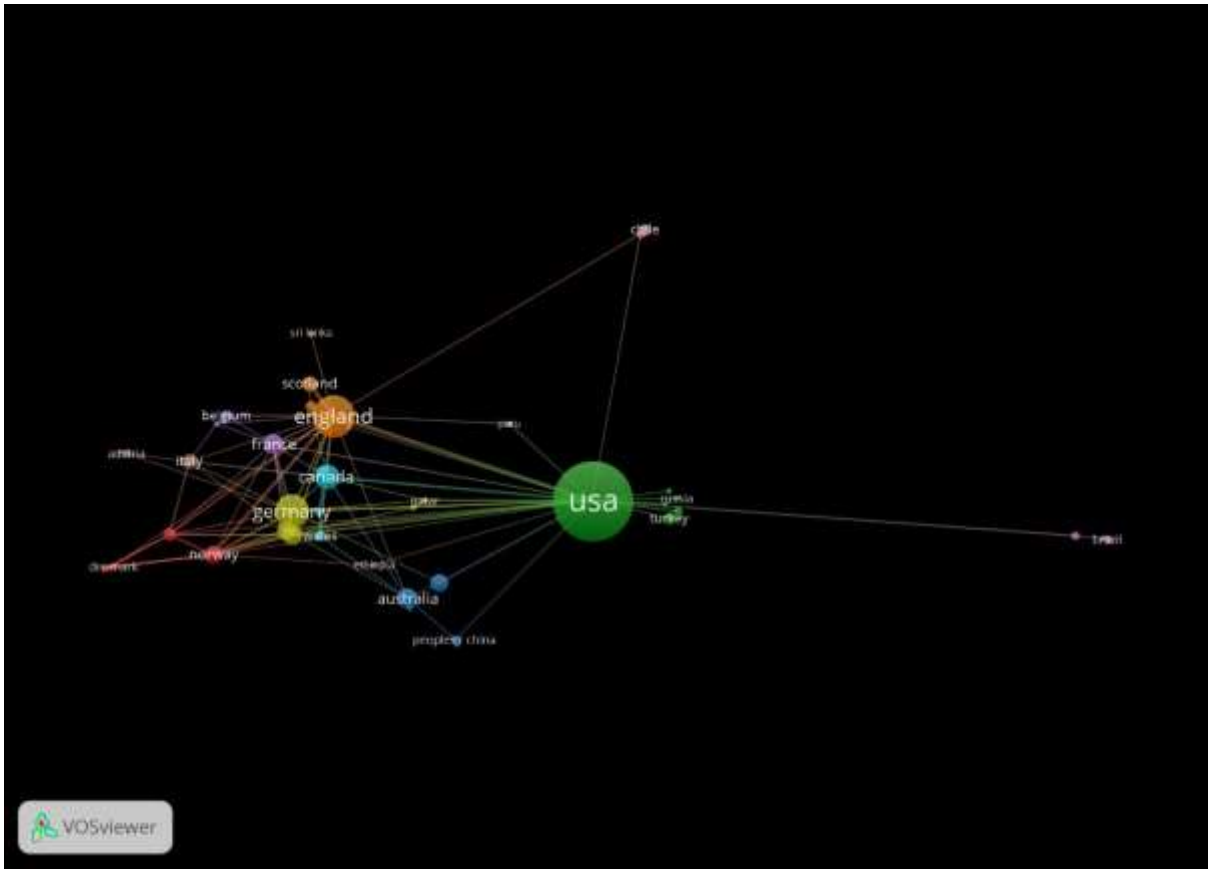


Figure 1. Countries producing science in the field of medical ethics during the years 1964-2019

As can be seen, the United States, with 817 degrees, has a quarter of its output, followed by the United Kingdom, Germany, Canada and Australia. Iran is also ranked 13th in the world with 22 degrees. Content analysis is one of the aspects of scientometrics that, by finding the relationships between words, identifies the most important topics of a research field and even shows the time of emergence or decline of a topic in a specific period. Diagram 2 shows the most important topics in the field of medical ethics during the period under review. The findings of the present study show that the most common topics were biological ethics, medical ethics and counseling, professional communication, medical ethics commission, autonomy or independence and ethics and medical education, respectively.

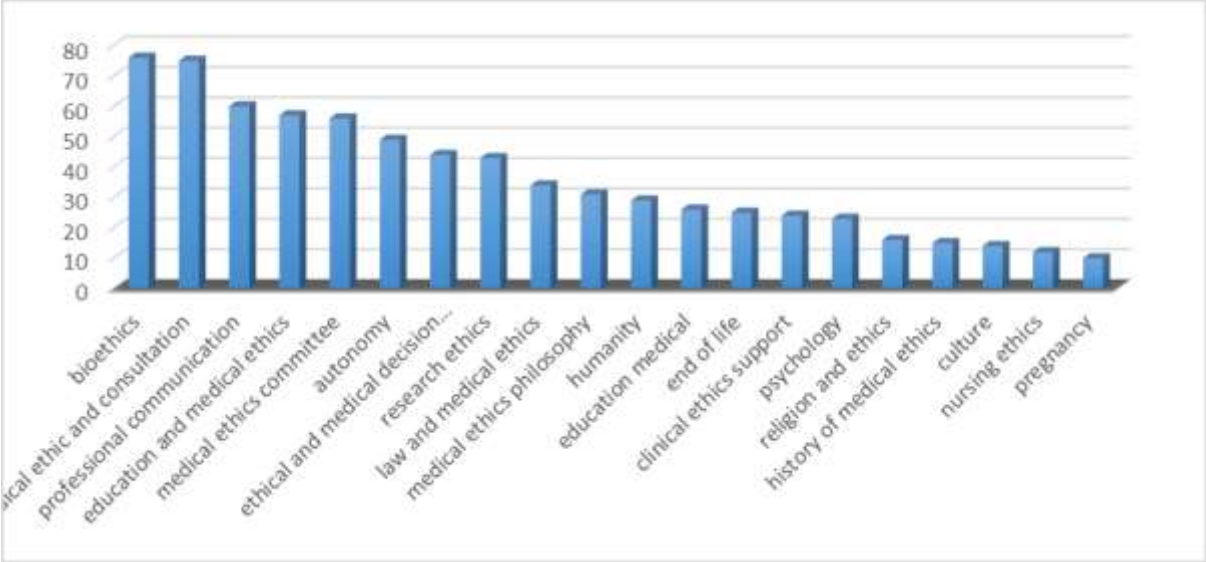


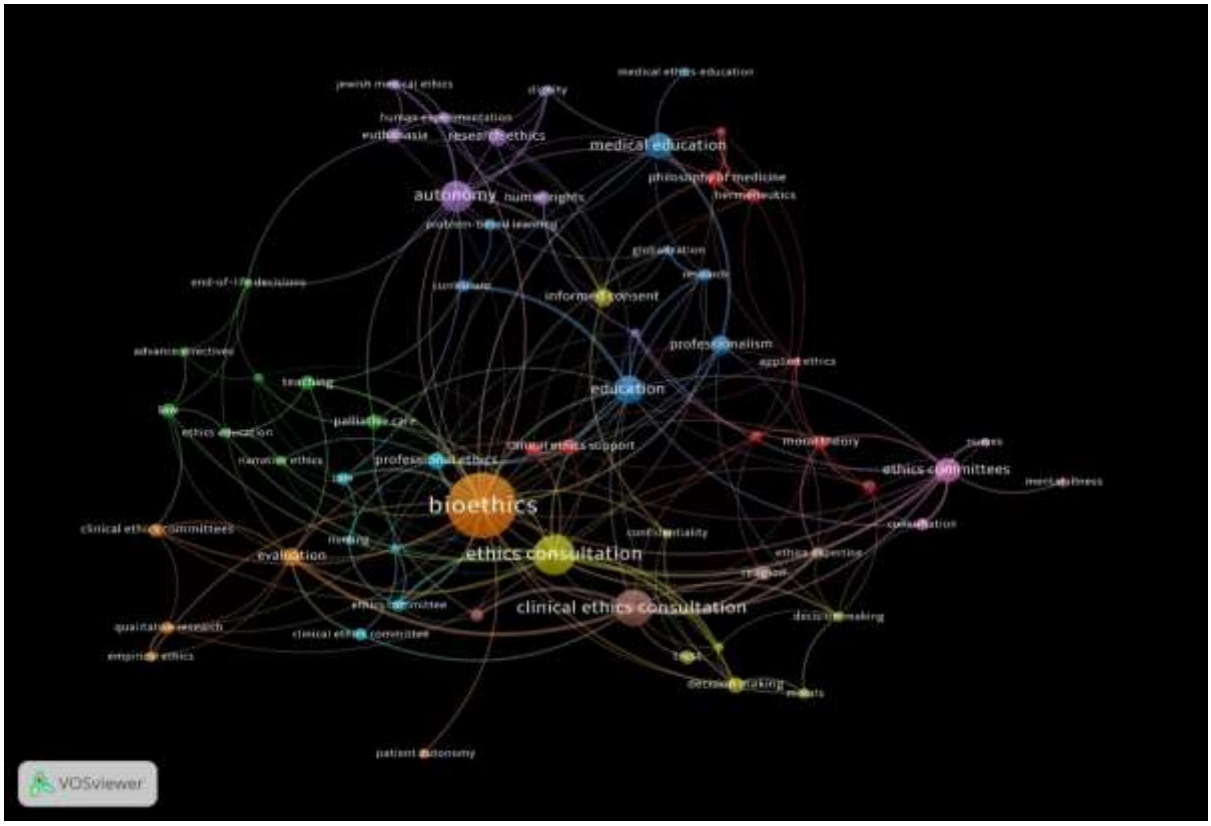
Diagram 2. The most important topics in the field of medical ethics during the years 1964-2019

In order to identify new issues in the field of medical ethics, the production process in the last two ten-year and five-year periods was examined and the words that had the most frequency are listed in Table 2.

Table 2

Number	Between 1964 and 2019	Number	Ten-year period (2010-2019)	Number	Five-year period (2015-2019)
76	bioethics	21	education and medical ethics	14	education and medical ethics
75	medical ethic and consultation	17	bioethics	8	medical ethic consultation
60	professional communication	16	professional communication	7	bioethics
57	education and medical ethics	14	medical ethics committee	7	medical ethics committee
56	medical ethics committee	12	medical ethic consultation	7	medical ethics philosophy
49	autonomy	10	law and medical ethics	7	psychology
44	ethical and medical decision making	10	medical ethics philosophy	6	professional communication
43	research ethics	9	research ethics	5	law and medical ethics
34	law and medical ethics	8	autonomy	4	clinical ethics support
31	medical ethics philosophy	8	psychology	4	humanity
29	humanity	7	ethical and medical decision making	4	research ethics
26	education medical	7	humanity	3	autonomy
25	end of life	5	culture	3	culture
24	clinical ethics support	5	history of medical ethics	3	ethical and medical decision making
23	psychology	5	rights	3	history of medical ethics

As can be seen, issues such as the end of life, religion and ethics, and medical education have diminished, and topics such as psychology, culture, and the history of medical ethics have emerged over the past decade. On the other hand, the issue of medical ethics education has received more attention than before and has emerged in more evidence.



Five-year period (2015-2019) 1946-2019

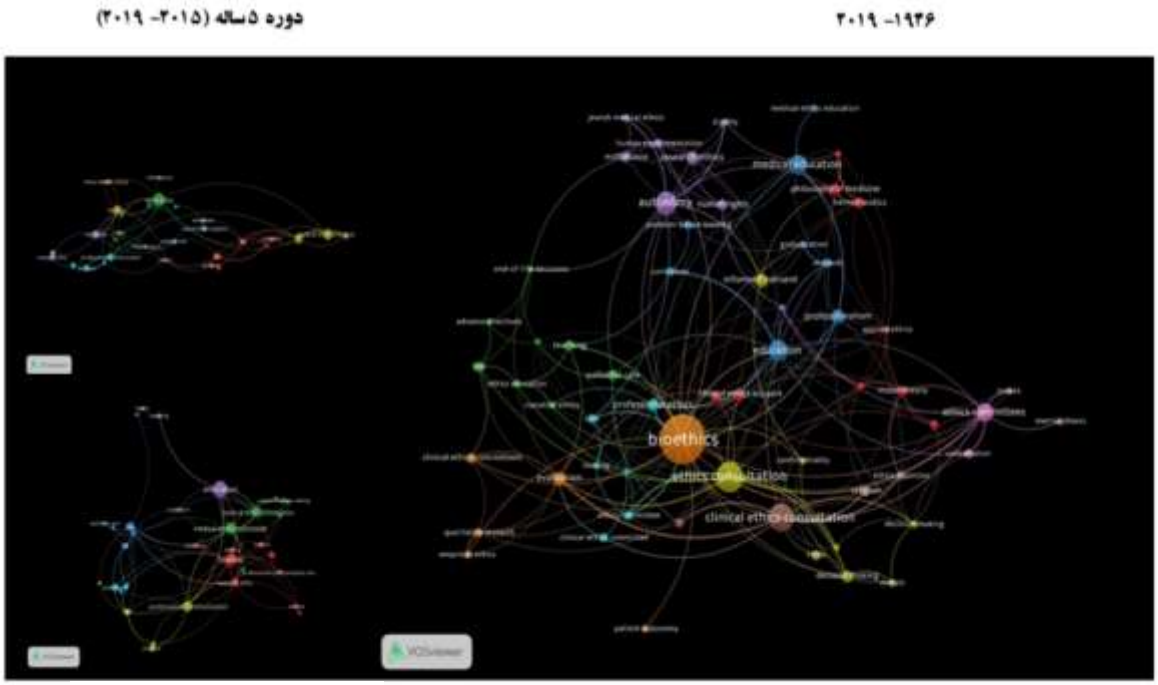


Figure 2. Practical terms in the field of medical ethics during the years 1964-1999

Figure 2 is a graphical view of the widely used words in the field of medical ethics that are linked together in 9 clusters with 211 links. As it is obvious, the word bioethics has the most frequency and is related to 7 other clusters and has a central role. In other words, it plays an important role in transmitting information and linking various issues with each other. A study of Iranian products in the field of medical ethics shows that it consists of 6 clusters and the most important topics of documents in this field are the keywords of bioethics, ethics committee, strategic planning and medical education.

4. Discussion and Conclusion

In the present article, we have tried to provide an overview of the world's scientific productions in the field of medical ethics and to examine the most important issues in this field. The results showed that scientific production in the field of medical ethics, like other scientific fields, is increasing and the average growth rate of 21.03 is the result of the work of researchers. Countries such as the United States, Britain, Germany, Canada and Australia are at the forefront of science production in this area. Previous research has shown a growth rate of 23.17 [9] and the leading countries of the United States, Britain and Canada [10].

Ethics is one of the most important topics in medical science and has a long history. In fact, the life of medical ethics should be equated with the science of medicine. What connects ethics to medicine more than ever today is scientific advances and the emergence of various topics. For this reason, today, medical ethics is presented as a science and covers various topics. Among the topics that are important to pay attention to in modern medicine are topics such as philosophy of medical ethics, professional communication in medicine, human body in medical ethics, topics of pre-human medical ethics, medical ethics in children, medical ethics in organ transplantation, end of life humanities, biotechnology and medical ethics, ethical issues in inducing pregnancy, medical ethics in the mentally ill, old age, dementia and medical ethics, ethics and research, medical ethics and education and law, medicine and medical ethics [19]. The present paper shows that scientific publications in the field of medical ethics around the

world have addressed some of the issues raised in this field. The findings show that researchers have studied topics such as bioethics, counseling, patient communication, ethics education and the philosophy of medical ethics over the years. Topics that have been growing in the last decade include culture, psychology, and the study of the history of medical ethics. On the other hand, looking at issues such as the role of religion in medical ethics is declining, which in turn will play an important role in the poverty of the medical community in the use of religious teachings. Issues such as old age, children, women and pregnancy need to be given more attention due to the sensitive and vulnerable nature of this segment of society, because the ignorance of health officials about moral issues can cause them more harm. Organ transplantation is also an up-to-date issue in the field of medicine, which is mentioned in only five sources in the scientific products of medical ethics of the present study, while this issue is associated with many ethical issues and can provide the ground for the use of profiteers. On the other hand, although organ transplantation brings a person to life, but it is the end of another person's life that will be associated with issues such as euthanasia. Therefore, researchers need to identify issues and problems in this field with more research and try to solve it. Despite the range of topics raised in the field of medical ethics as well as the increasing advances in science and technology in the field of medicine, the medical community will face new ethical challenges every day that affect ethical decisions and their professional relationships. The first goal of medical ethics education is to strengthen the abilities of staff in this field in relation to patients and their families and to make appropriate decisions in times of need, therefore, it is necessary to prepare the employees of this field to face new problems by training in this field and using different educational methods and provide a more prudent and comprehensive ethical decision-making process on issues such as euthanasia, abortion, brain death, organ transplants and organ donation, the competence of physicians, patients and their relatives to make decisions and insurance. The findings of the present study also show that dealing with medical ethics education has been one of the most important issues in the last decade. Therefore, medical ethics should be considered as an interdisciplinary knowledge in the health system that education can play an important role in disseminating its values. The results of this study show that although medical ethics education has become more important in the world, this issue has received less attention in Iran.

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