

# Analysis of Periodicals Based on Bibliometric Indicators

## -Taking *J HUAZHONG U SCI-MED* as an example

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**Abstract**—This paper reveals the characteristics of the Journal *J HUAZHONG U SCI-MED*, and analyses its academic influence by using bibliometric indicators and the data from JCR database and InCites database, thereafter compares with ESI clinical medical journals sponsored by domestic universities. Finally, the result shows the current situation of journal and its place in similar journals.

**Keywords**—*Bibliometrics; Periodical analysis; Incites databases; Journal Citation Report*

### I. INTRODUCTION

University science and technology journal is an important platform for University researchers to publish academic papers and conduct academic exchanges, which is usually established on the basis of an advantageous subject. The Ministry of Science and Technology of the People's Republic of China requires scientific and technological journals to: 1) reflect the academic level and development trend of the subjects academically; 2) report the major scientific research achievements (including periodical achievements) and research progress of the discipline in a timely manner; 3) represent the frontier of the subject's development and have advanced consciousness; 4) publish articles with innovation, breakthrough and high academic value."; 5) Focus on the current and long-term, application and reserve, discipline development and the growth point of new disciplines [1]. Subjects are the foundation of universities, which embody the history of university running and the requirement of social development, and not only determine the actual level of university running, but also represent the characteristics of university. With well constructing of the subjects, especially the key subjects, we can continuously promote the development of teaching and scientific research in Colleges and universities, and constantly improve the quality of education and talents [2]. Running academic journals will greatly contribute to the discipline construction, and the development of academic journals sponsored by universities and research institutes will also play a strong supporting role.

This paper adopts the bibliometric method to study and analyze the journal *JOURNAL OF HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY MEDICAL SCIENCES (J HUAZHONG U SCI-MED)* from the perspective of academic influence of the journal, the source of the paper and the contribution to the host universities. At the same time, the journal will be compared and analyzed with other 8 ESI

clinical medical journals sponsored by domestic universities.

### II. DATA SOURCES AND ANALYSIS METHODS

#### A. Data sources

JCR Science Edition (Natural Science Edition) provides the Science Citation Index Expanded in the collection of more than 5000 kinds of science and technology journal citation analysis of information, objectively statistics Web of Science, included journals by the number of published papers, the paper reference number, the number of papers cited, such as raw data. Through the application of the principle of literature metrology, the various quantitative indicators which reflect the journal quality and influence are calculated [3].

InCites database is an analytical database, which is designed by Clarivate Web Analytics company by collecting nearly the 30 years of Science core of seven index database and setting up the basis of analytical database, it has a variety of measurement index and international benchmark data of each subject each year since 1980. In addition, the Academic contribution to the journal, influence of reference paper, timeliness, the authors and econometric analysis of the journal published are quantitatively analyzed in detail.

The data of this study were obtained from the JCR database released in 2016 and the InCites database released in August 2017.

According to the data released by JCR database in 2017, there are 2023 journals belonging to the subject of ESI clinical medicine. Twenty-two of the 2023 ESI clinical journals are domestic journals. Among them, there are 8 kinds of periodicals sponsored by domestic colleges and universities. These 8 kinds of periodicals are: *ASIAN PACIFIC JOURNAL OF TROPICAL MEDICINE (ASIAN PAC J TROP MED)* sponsored by Hainan Medical University; *ENDOSC ULTRASOUND* sponsored by China Medical University; *HEPATOBIILIARY and PANCREATIC DISEASES (HEPATO PANCREAT DIS)* sponsored by Zhejiang university; *INTERNATIONAL JOURNAL OF ORAL SCIENCE (INT J ORAL SCI)* sponsored by Sichuan University; *WORLD JOURNAL OF PEDIATRICS (WORLD J PEDIATR)* sponsored by Zhejiang University. *CHINESE JOURNAL OF CANCER (CHIN J CANCER)* sponsored by Sun Yat-sen University; *JOURNAL OF DIABETES (J DIABETES)* sponsored by Peking University; *JOURNAL OF SPORT AND HEALTH SCIENCE (J SPORT HEALTH SCI)* sponsored by Shanghai University of Sport. In this paper, these 8 journals are selected for comparative analysis with *J HUAZHONG U SCI-MED*.

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### B. Analysis Methods and Indicators

For comparative analysis, the following indicators are mainly used in the analysis:

**Papers:** The number of papers published in journals, reflecting the scale of publication of journals.

**Total Cites:** Total Cites refers to the total citation frequency of all the papers published in the journal, and is one of the basic indicators for evaluating journals. It directly reflects the extent to which journals are used and valued in academic research, as well as the role and status of journals in disciplinary development and communication.

**Journal Impact Factor (JIF):** refers to the average number of citations that a journal published in the past two years has been cited in the current JCR year. For example, a journal's impact factor in 2011 was 4.25, indicating that the journal's papers published in 2009 and 2010 were cited as 4.25 times in 2011. The impact factor is directly related to the overall academic level of the journal, but there are large differences between different types of journals in different subjects. When comparing the impact factors of journals, the same principle should be followed.

**Average growth rate of journal impact factors:** refers to the average of the growth rate of impact factors for all years of the journal. This indicator eliminates the impact of journals on changes in impact factors due to differences in foundations, and reflects the rate at which journals change their impact factors relative to themselves. Its calculation formula is shown as follows:

$$\Delta JIF = (\Sigma(JIF_i - JIF_{i-1}) / JIF_{i-1}) / (Y-1), \quad (1)$$

where,  $\Delta JIF$  is the average growth rate of journal impact factors,  $JIF_i$  is the impact factor of the journal in the  $i$ -th year, and  $Y$  is the statistical year number.

**Journal impact factor percentile:** This indicator converts the ranking of journal impact factors in a discipline into a percentile, making interdisciplinary journal comparisons more meaningful. The formula is calculated through:

$$\text{Journal impact factor percentile} = (N - R + 0.5) / N, \quad (2)$$

where,  $N$  is the total number of journals in a subject, and  $R$  is the descending ranking of the influencing factors of a journal in that subject. The average percentage of journal impact factors of journals belonging to multiple subjects under each subject.

**Category Normalized Citation Impact (CNCI):** The subject-standardized citation impact (CNCI) of a document is obtained by dividing its actual citation frequency by the expected citation frequency of the same document type, the same publication year and the same subject area. When a document is classified as more than one subject, the average of the ratio of actual citation frequency to expected citation frequency is used. The CNCI of a group of documents (a person, an institution or a country) is the average value of each document in the group.

**Country/region distribution:** refers to the number of countries/regions involved by the authors of articles published in periodicals. The number of countries/regions not only reflects the coverage of Journal papers, but also reflects the internationalization of Journal papers.

**Institutional Distribution Number:** refers to the number of institutions involved by authors of articles published in periodicals.

Although the two indicators of national/regional distribution and institutional distribution can reflect the coverage and influence of Journal papers, the research influence of different countries/regions and institutions are neglected.

**Papers with international co-author/total papers:** refers to the percentage of international papers in journals. The value is larger, and the internationalization degree of Journal papers is higher.

## III. ANALYSIS RESULT

### A. *J HUAZHONG U SCI-MED* analysis

*J HUAZHONG U SCI-MED* was founded in 1979, entered the American Medical Abstracts Retrieval System (IM) and PubMed database in 1986, and was embodied in the full text OF Springer China online library in 2005. Since 2007, it has been embodied in international authoritative retrieval systems and databases such as SCI-E.

#### 1) Academic influence of journal

Since 2009, the impact factor of *J HUAZHONG U SCI-MED* has been increasing year by year, from 0.311 to 0.964; the ranking of journals in their respective disciplines has been increasing year by year, from 274 to 257; the JCR partition is always in the Q4; the journal immediacy index has risen from 0.067 to 0.072, the Cited Half-life increased from 3.8 to 4.9, the quoted half-life increased from 5.9 to 7.7, the characteristic factor increased from 0.00171 to 0.00231, the paper influence increased from 0.122 to 0.204, and the journal's ranking percentile decreased from 3.357 to 10.315. The journal indexes are showing an upward trend year by year, indicating that their academic influence is increasing steadily. See Table 1.

#### 2) Journal manuscript source and coverage area

Since 2007, the authors of *J HUAZHONG U SCI-MED* are from 26 countries/regions around the world, and 1678 papers have been published by Chinese authors, accounting for 99.64% of all papers. See Table 2.

Since 2007, the authors of *J HUAZHONG U SCI-MED* are from 219 institutions all over the world, including 125 mainland China institutions, accounting for 57.1% of all institutions. A total of 22 institutions have published more than 10 papers, all of which are Chinese mainland institutions. See Table 3 for details. Among them, Huazhong University of Science and Technology published 1,319 papers, accounting for 80.53% of the papers in the journal. See Table 3 for details.

**TABLE I. J HUAZHONG U SCI-MED JCR THE BASIC INDEX OF DATABASE**

age	2009	2010	2011	2012	2013	2014	2015	2016
<b>Total Cites</b>	384	466	468	671	810	953	1084	1209
<b>JIF</b>	0.311	0.405	0.385	0.581	0.779	0.834	0.838	0.964
<b>JIF without Journal Self Cites</b>	0.263	0.346	0.337	0.512	0.694	0.787	0.803	0.857
<b>5-Year JIF</b>	—	—	—	0.512	0.635	0.749	0.805	0.922
<b>Immediacy Index</b>	0.067	0.065	0.045	0.05	0.057	0.058	0.078	0.072
<b>Papers</b>	163	154	156	161	159	156	153	152
<b>Cited Half-Life</b>	3.8	3.8	4.6	4.7	4.6	4.8	5	4.9
<b>Citing Half-life</b>	5.9	6.6	6.9	7.5	7.5	7.7	7.4	7.7
<b>Eigenfactor Score</b>	0.00171	0.00171	0.00146	0.00182	0.00197	0.00211	0.00205	0.00231
<b>Article Influence Score</b>	—	—	—	0.122	0.146	0.168	0.172	0.204
<b>Rank</b>	274/283	279/286	283/290	277/290	272/291	269/290	266/289	257/286
<b>Quartile</b>	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4
<b>Percentile in Subject Area of JIF (%)</b>	3.357	2.622	2.586	4.655	6.701	7.414	8.131	10.315

**TABLE II. J HUAZHONG U SCI-MED THE COUNTRY/REGION OF AUTHOR**

Serial number	Country/Region	Number of papers	Cited Frequency	serial number	Country/Region	Number of papers	Cited Frequency
1	Chinese Mainland	1678	4737	14	Japan	2	3
2	US	43	89	15	Scotland	1	9
3	Germany	12	20	16	Czech Republic	1	2
4	Canada	6	34	17	Pakistan	1	1
5	United Kingdom of Great Britain and Northern Ireland	4	11	18	Brazil	1	3
6	Hong Kong	4	9	19	Singapore	1	1
7	Australia	3	7	20	Egypt	1	0
8	Tanzania	3	10	21	Yemen	1	0
9	Mauritius	3	6	22	Welsh	1	0
10	Saudi Arabia	2	3	23	Sweden	1	0
11	The Republic of Guinea	2	2	24	Malawi	1	0
12	Iraq	2	5	25	Kenya	1	0
13	England	2	2	26	Norway	1	0

**TABLE III. THE INSTITUTIONS WHICH HAVE PUBLISHED MORE THAN 10 PAPERS IN THE J HUAZHONG U SCI-MED**

Serial number	Institution	Papers	Cites	Serial number	Institution	Papers	Cites
1	Huazhong University of Science and Technology	1319	3957	12	Shanghai Jiao Tong University	15	23
2	Wuhan University	133	291	13	Nanchang University	13	38
3	Zhengzhou University	44	119	14	Jinan University	13	33
4	The General Hospital of the People's Liberation Army	33	73	15	Zhejiang University	13	31
5	Sun Yat-sen University	24	53	16	Jiangnan University	12	31
6	Peking University	24	21	17	Sichuan University	12	31
7	Shihezi University	18	38	18	Wuhan University of Science and Technology	12	19
8	Capital Medical University	17	65	19	Southern Medical University	11	34
9	Central South University	17	46	20	Peking Union Medical College	11	16
10	Shandong University	16	39	21	Jilin University	10	31
11	Xi'an Jiaotong University	15	36	22	ChongQing Medical University	10	27

B. Comparison of Similar Domestic Journals

1) Comparison of the number of papers published in journals

From 2007 to 2016, the total number of articles published by, *ASIAN PAC J TROP MED* and *J HUAZHONG U SCI-MED* was 1,720 and 1,638, respectively, and the annual average number of publications was the highest.

*ASIAN PAC J TROP MED*, *J DIABETES*, *ENDOSC ULTRASOUND*, *WORLD J PEDIATR* sponsored by Zhejiang University, the number of papers published in the overall trend is increasing, *ASIAN PAC J TROP MED* published papers The changes fluctuated greatly; and the number of articles in *JOURNAL OF HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY MEDICAL SCIENCES* and *HEPATO PANCREAT DIS* decreased slowly year by year. The number of papers published in *INT J ORAL SCI* is stable. See Fig. 1.

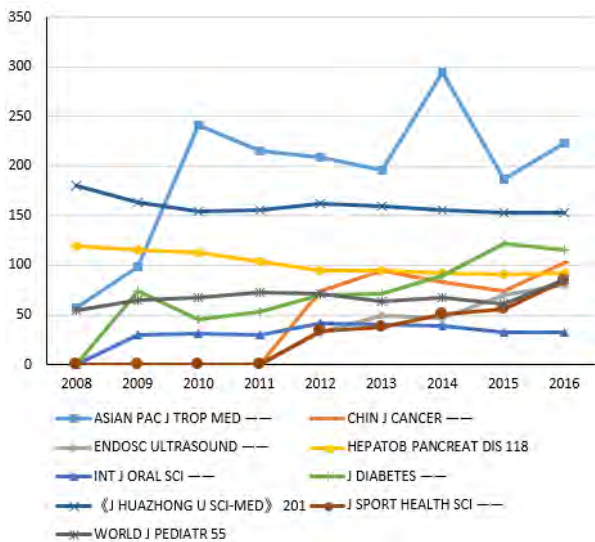


Fig. 1 Comparison of the number of papers published in the journal

2) Journal citations

From the total citation frequency of journals, *HEPATO PANCREAT DIS* is the highest, followed by *ASIAN PAC J TROP MED*. See Fig. 2.

3) Comparison of journal impact factors

The journal impact factor is the average cited frequency of a journal in a certain period of time, and is an important indicator of the academic level of the journal. In the

evaluation of sci-tech journals, the JCR impact factor is the most frequently used important indicator, which is easy to understand and widely used [5].

The average growth rate of journal impact factors is the average of the growth rate of impact factors for journal in all year. This indicator eliminates the impact of different journal foundations on changes in journal impact factors, and reflects the rate of change of journal relative to its journal impact factors. The journal impact factors of the nine journals all are showed different degrees of upward trend. The average growth rate of influence factors of *ENDOSC ULTRASOUND* was the highest for 52.07%. The second are *ASIAN PAC J TROP MED* and *CHIN J CANCER*., whose average growth rates of journal impact factors are 39.89% and 38.34%, respectively. See Table 4.

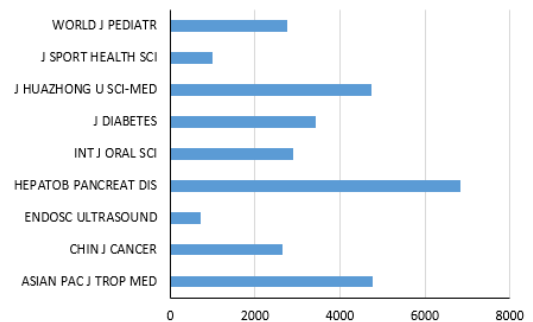


Fig. 2 Comparison of total citations of journals

The JCR database ranks journals of the same discipline in descending order of journal impact factors, but the comparison of journal rankings is only suitable for journals of the same discipline. And the journal impact factor percentile is generated by converting the ranking of impact factors under their disciplines into percentile values, making comparisons between journals belonging to one or more disciplines more meaningful. For journals that belong to multiple disciplines at the same time, the average of the percentile of journal impact factors under each discipline is used.

According to the JCR database released in 2017, the three journals with the highest percentage of journal impact factors are *INT J ORAL SCI*, *J SPORT HEALTH SCI*, and *CHIN J CANCER*. More are shown in Fig. 3.

TABLE IV. Journal impact factors and average growth rate of journal impact factors

No.	Journals	2009	2010	2011	2012	2013	2014	2015	2016	average growth rate of JIF
1	ASIAN PAC J TROP MED	---	0.172	0.371	0.502	0.926	1.062	0.841	0.925	39.89%
2	CHIN J CANCER	---	---	---	---	---	2.155	2.814	4.111	38.34%
3	ENDOSC ULTRASOUND	---	---	---	---	---	1.353	2.794	2.728	52.07%
4	HEPATOB PANCREAT DIS	1.183	1.514	1.082	1.259	1.167	1.517	1.724	1.649	6.83%
5	INT J ORAL SCI	---	0.815	1.411	2.719	2.029	2.531	2.595	3.93	36.53%
6	J DIABETES	---	---	---	2.939	2.349	1.932	2.5	3.039	3.28%
7	J HUAZHONG U SCI-MED	0.311	0.405	0.385	0.581	0.779	0.834	0.838	0.964	18.98%
8	J SPORT HEALTH SCI	---	---	---	---	1.227	1.712	1.685	2.531	29.39%
9	WORLD J PEDIATR	0.365	0.945	1.216	1.084	1.048	1.236	1.025	1.164	26.83%

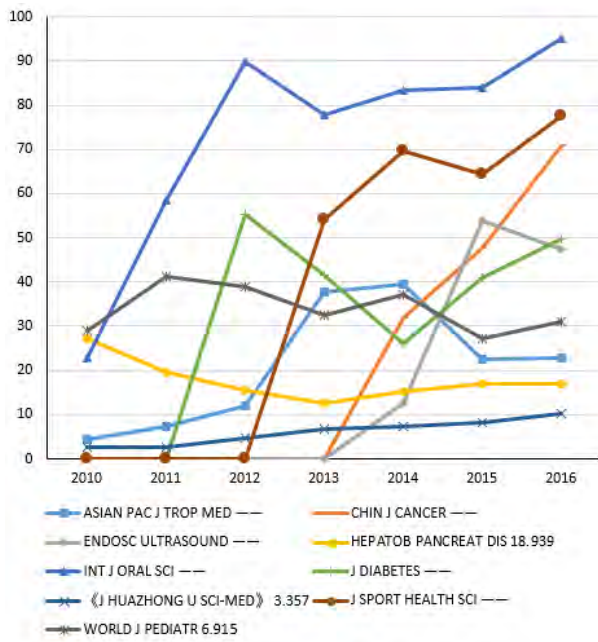


Fig. 3 Journal impact factor percentile

4) Citation influence of discipline standardization

The citation influence of discipline standardization is an unbiased influence index which excludes the role of publishing year, discipline field and literature type. Therefore, it can be used to compare the papers of different scales and different disciplines, and it is an ideal index for benchmarking analysis at various organizational levels.

Because the nine journals belong to different JCR disciplines, it is more objective and impartial to compare the nine journals with standardized index of citation influence. Details are shown in Fig 3.

5) Author's national/regional distribution

Table 5 shows the authors' national/regional distribution and the percentage of international papers in nine journals in the past ten years. These two indicators are the source indicators of Journal papers, reflecting the degree of internationalization of the source of Journal papers. ASIAN

PAC J TROP MED, sponsored by Hainan Medical College, has the largest number of national/regional papers, and ENDOSC ULTRASOUND, sponsored by China Medical University, has the highest percentage of international papers.

The author of J HUAZHONG U SCI-MED is from 23 countries/regions including China, and the percentage of international papers is 5.4%. This shows that nearly 95% of the authors of J HUAZHONG U SCI-MED are from China, which shows that its internationalization is low.

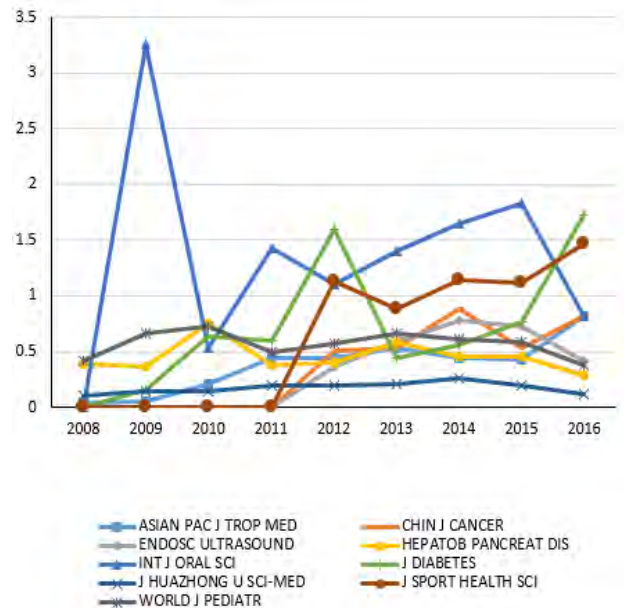


Fig. 4 The citation influence of journal discipline standardization

TABLE V. Comparison of the Percentage of Authors in National/Regional and International Papers

NO.	Journals	Countrys/regions distribution	Percentage of international papers
1	ASIAN PAC J TROP MED	94	71.78%
2	CHIN J CANCER	40	40.56%
3	ENDOSC ULTRASOUND	39	91.48%
4	HEPATOB PANCREAT DIS	51	43.60%
5	INT J ORAL SCI	38	34.86%
6	J DIABETES	73	81.61%
7	J HUAZHONG U SCI-MED	23	5.40%
8	J SPORT HEALTH SCI	36	94.30%
9	WORLD J PEDIATR	58	62.68%

#### IV. CONCLUSIONS AND SUGGESTIONS

From 2009 to 2017, J HUAZHONG U SCI-MED, the impact factors, the immediate index and the quoted half-life index showed an upward trend year by year, indicating that their academic influence was gradually improving, but compared with the other eight similar journals, their academic influence was weaker and the growth rate was lower. The main source of papers is mainland China, and the author's organization is Huazhong University of Science and Technology. This shows that the source of papers in this journal is low in internationalization, the coverage of the organization needs to be expanded, and the influence of the journal is limited. From the comparison results of the nine journals, the proportion of international papers is relatively high, and the journals with higher distribution of authors, especially those with higher distribution of international institutions, have higher academic influence. Therefore, expanding the scope of journal influence and increasing the proportion of international papers play a positive role in improving the academic influence of journals. To this end, journals can consider broadening the sources of contributions from the following aspects: 1. Increasing publicity and enhancing their own visibility, while actively participating in and organizing various forms of academic exchanges with the help of favorable platforms, increasing international visibility, and striving to make journals known to more scientific and technological workers [6]; 2. Strengthening high-cited authors at home and abroad. Communications and exchanges should be timely and in place editorial services, or be included in the editorial committee or the draft database of journals to absorb high-quality overseas manuscripts; 3. Do a good job in the construction of characteristic columns, plan and set up characteristic columns for major scientific research projects, emergencies and hot events, and give priority to major scientific research achievements and innovative research achievements.

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