THE TRADITIONAL CHINESE MEDICAL LITERATURE ANALYSIS AND RETRIEVAL SYSTEM (TCMLARS) AND ITS APPLICATION*

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Abstract: The Traditional Chinese Medical Literature Analysis and Retrieval System TCMLARS is a database system established by the Institute of Information on Traditional Chinese Medicine, China Academy of Traditional Chinese Medicine, to meet the increased need for traditional Chinese medical information services in the 1980's. The system contained over 340,000 references and abstracts to literature on Traditional Chinese Medicine including Chinese materia medica, acupuncture, qigong, Chinese massage and health promotion. Source material for TCMLARS is drawn from more than 800 Chinese biomedical journals published since 1984. Over 30,000 records are added to the system annually. There are 15 databases in the system, 4 of which include both Chinese and English versions. Extensive indexing according to *Chinese Traditional Medicine and Materia Medica Subject Headings* and *Medical Subject Headings* (MeSH) is done for each citation. Information can be searched from almost all of the fields including title, author, author affiliation, subject headings, key words, classification, publication type, and abstract. The database system is available via website (http://www.cintcm.com, http://www.cintcm.ac.cn, http://www.sinomd.com), or CD-ROM or floppy disk. A bibliometric study reviewing the traditional Chinese medical literature on neoplasm was conducted using TCMLARS. 10,185 references were pulled up from the databases (1984-1998) by the subject heading "neoplasms". For advanced searches, the following subheadings were used: traditional Chinese drug therapy, acupuncture-moxibustion therapy, qigong therapy, massage therapy, acupoint therapy, integrated Chinese traditional and Western medicine therapy. Further analyses were performed on neoplasm type, year of publication, author's organizational affiliation, type of literature, and the research grant. This study clearly outlines the extent of clinical work and research on neoplasms treated by Traditional Chinese Medicine in China. TCMLARS is proving to be the most efficient and effective means of literature retrieval and analysis for Traditional Chinese Medicine in the world.

Keywords: Literature Database, Traditional Chinese Medicine, Neoplasms, Bibliometrics

Introduction

For thousands of years, Traditional Chinese Medicine (TCM) has provided a system of health care for the Chinese. In recent decades, more and more people

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pay attention to Traditional Chinese Medicine since it is natural, has less side-effects, and most of all, is effective for some patients who can not be cured by conventional medicine. According to statistics from 1998 compiled by the Chinese government, there are 2,629 traditional Chinese medical hospitals, nearly 300 traditional Chinese medical clinics and over 350,000 TCM doctors in the whole country. TCM clinics and schools have now been established in most countries and regions in the world. [1] With the advance of experimental research and clinical studies, the amount of TCM literature is increasing rapidly. The need for information services is growing dramatically. However, MEDLINE, the largest biomedical bibliographic database in the world, and other famous medical bibliographic databases, such as EMBASE or BIOSIS, index only a few traditional Chinese medical journals. The number of articles about Traditional Chinese Medicine in these databases is much smaller than what is actually published in China and other countries. For instance, less than 900 citations could be searched from MEDLINE in 1991 by using the subject headings "Medicine, Chinese Traditional", "Acupuncture" or "Drugs, Chinese Herbal", while more than 17,900 journal articles on those topics were published in China this year. In response to the increasing demand for Traditional Chinese Medicine information by clinical practitioners, researchers, teaching professionals and students, the Traditional Chinese Medical Literature Analysis and Retrieval System TCMLARS , a bibliographic database, was developed and established by the Institute of Information on Traditional Chinese Medicine, China Academy of Traditional Chinese Medicine in the 1980's. Thousands of online searches are done each year. This paper details a bibliometric study of the traditional Chinese medical literature on neoplasm retrieved from TCMLARS.

Methodology

TCMLARS

Coverage
Until March 1, 2000, TCMLARS, the Traditional Chinese Medical Literature Analysis and Retrieval System contained over 337,100 references and abstracts to literature on Traditional Chinese Medicine, including Chinese materia medica, acupuncture, qigong, Chinese massage, health promotion, and other topics. The source material for TCMLARS is drawn from more than 800 Chinese biomedical journals published in China since 1984, of which over 100 are speciality periodicals in Traditional Chinese Medicine. More than 30,000 records are added to the system annually. There are 15 databases in the system, consisting of the Chinese Medical History Database (TCMHIST), Chinese Materia Medica Database (HERBLINE) Acupuncture-Moxibustion Literature Analysis and

Retrieval Database (ACULARS), TCM Clinical Trials Database (TCMTRIAL), AIDS Database (AIDSHERBS), Cancer Database (TCMCANCER) STD and Sexual Disorder Database (TCMSEXLINE), Geriatrics Database (TCMGERIAT), TCM Physician Query Database (TCMPHYSICIAN), Chemical Compounds of Chinese Drug Database (TCDCHEMLINE), Chinese Pharmacology Database (TCDPHARMACOL), Experiences of Famous TCM Doctor Database (FAMDOCTEXPER), TCM Research Project Database (TCMPROJ), Traditional Chinese Medical Abstract Database (TCMABST), and TCM Periodical Database (TCMPERIOD). The Acupuncture-Moxibustion Literature Analysis and Retrieval Database, Chinese Materia Medica Database, Chemical Compounds of Chinese Drug Database, and Chinese Pharmacology Database have both Chinese and English versions.

INDEXING

Descriptor language is adopted in indexing. *Chinese Traditional Medicine and Materia Medica Subject Headings* [2] and *Medical Subject Headings* (MeSH) [3] are used as the thesauri. In general, MEDLARS indexing principles and the MeSH thesaurus created by the National Library of Medicine in the United States have been proved to be successful and efficient in medical literature indexing. However, MeSH is not adequate for indexing Chinese medical literature, for it contains only a few subject headings about Traditional Chinese Medicine, and the subheadings in MeSH can not meet the special requirements for indexing TCM articles. Therefore, a special thesaurus was compiled for TCMLARS. *Chinese Traditional Medicine and Materia Medica Subject Headings* contains 5,806 medical headings representing TCM concepts and 93 subheadings (including 11 TCM subheadings and 82 MeSH subheadings)

The policies and rules of MEDLARS [4] are followed in analyzing and indexing journal articles for TCMLARS. Guidelines for the indexing of traditional Chinese medical literature [5] are also followed. MeSH subject headings are selected first when doing indexing. If there is no suitable MeSH heading for indexing the particular TCM concept, then *Chinese Traditional Medicine and Materia Medica Subject Headings* are used. In addition to using 82 subheadings from MeSH, another 11 subheadings are added when indexing. These are: /traditional Chinese medical therapy, /traditional Chinese drug therapy, /acupuncture-moxibustion therapy, /qigong therapy, /massage therapy, /acupoint therapy, /integrated Chinese traditional and Western medicine therapy, /acupuncture-moxibustion effects, /qigong effects, /pathogenesis (TCM), and /production and preparation.

HARDWARE AND SOFTWARE

The system was initially run on an IBM PC/XT and AT with MICRO CDS/ISIS information retrieval software developed by UNESCO, then on a VAX 4500 minicomputer with TRIP software. Now the software, ORACLE, is installed to run TCMLARS.

SEARCH CAPABILITIES

There are 30 categories of information for each citation in TCMLARS. Information can be searched from almost all fields including title, author, author affiliation, subject headings, key words, classification, publication type, journal sources, publication year, and abstract. The database system is available via website (http://www.cintcm.com, http://www.cintcm.ac.cn, http://www.sinomd.com), or CD-ROM or floppy disk.

BIBLIOMETRIC STUDY

A bibliometric study was performed based on TCMLARS. 10,185 references were searched from the databases from 1984 to 1998 using the subject heading "neoplasms". For advanced searches the following subheadings were used: /traditional Chinese drug therapy, /acupuncture-moxibustion therapy, /qigong therapy, /massage therapy, /acupoint therapy, and /integrated Chinese traditional and Western medicine therapy. Further analyses were performed on neoplasm type, published year of the articles, author's organizational affiliation, type of literature, and the research grant.

Results

Articles Published Each Year

The search results show the number of articles published each year on neoplasms treated by Traditional Chinese Medicine, as well as the percent of articles on neoplasm in the system for every year is increasing. (See Table 1.)

Table 1 Articles Published Each Year

Published Year	Total Articles	Articles on Neoplasm	% of Total
1984	11,405	273	2.39
1985	14,477	296	2.04
1986	15,446	305	1.97
1987	16,264	362	2.22
1988	16,898	411	2.44
1989	16,112	391	2.43
1990	17,036	524	3.08
1991	17,921	570	3.18
1992	19,390	645	3.33
1993	19,942	711	3.57
1994	22,262	802	3.60
1995	26,702	809	3.03
1996	31,033	1,081	3.48
1997	33,470	1,339	4.00
1998	37,736	1,666	4.41
Total	316,094	10,185	3.22

Classification of Articles on Neoplasms

Among the 10,185 neoplasm references searched from the databases for the years 1984 to 1998, 7,101 (69.72%) are about clinical studies, and 5,296 (74.58%) of these are about traditional Chinese therapies. (See Table 2 and 3.)

Table 2 Classification of Articles on Neoplasms

	Clinical Studies	Experimental Studies	Reviews	Historical	Others	Total
Articles	7,101	2,079	902	67	36	10,185
% of Total	69.72	20.41	8.86	0.66	0.35	100

Table 3 Classification of Articles on Clinical Study on Neoplasms

	TCM Therapies	Other Therapies	Diagnosis	Nursing	Total
Articles	5,296	1,075	616	114	7,101
% of Total	74.58	15.14	8.67	1.61	100

Kinds of Neoplasms Treated by TCM Therapies

Analysis of the 5,296 articles on neoplasms treated by traditional Chinese therapies shows that more than 30 types of neoplasms were treated. Neoplasms with greatest coverage in the Chinese medical literature included lung neoplasm, stomach neoplasm, liver neoplasm, esophageal neoplasm, breast neoplasm, thyroid

neoplasm, nasopharyngeal neoplasms, brain neoplasm, Leukemia, and rectal neoplasm. (See Table 4.)

Table 4. Kinds of Neoplasms Treated by TCM Therapies

Neoplasms	Articles	% of Total
Lung neoplasms	823	15.54
Stomach neoplasms	796	15.03
Liver neoplasms	783	14.79
Esophageal neoplasms	483	9.12
Breast neoplasms	278	5.25
Thyroid neoplasms	180	3.41
Nasopharyngeal neoplasms	178	3.36
Brain neoplasms	148	2.80
Leukemia	133	2.51
Rectal neoplasms	132	2.49
Colonic neoplasms	124	2.34
Cervix neoplasms	86	1.62
Lymphoma	72	1.36
Laryngeal neoplasms	70	1.32
Bone neoplasms	67	1.27
Ovarian neoplasms	67	1.27
Pancreatic neoplasms	67	1.27
Bladder neoplasms	60	1.13
Skin neoplasms	43	0.81
Penile neoplasms	25	0.47
Kidney neoplasms	24	0.45
Prostatic neoplasms	23	0.43
Tongue neoplasms	23	0.43
Vaginal neoplasms	13	0.25
Eye neoplasms	6	0.11
Fallopian tube neoplasms	6	0.11
Choriocarcinoma	4	0.07
Testicular neoplasms	4	0.07
Mouth neoplasms	3	0.06
Bile duct neoplasms	2	0.04
Urethral neoplasms	2	0.04
Others	571	10.78
Total	5,296	100

Traditional Chinese Therapies Used for Neoplasms

In the 5,296 articles on neoplasms treated by traditional Chinese therapies, 3,765 (71.09%) are involved traditional Chinese drug therapy, 945 (17.84%) integrated Chinese traditional and western medicine therapy, 278 (5.25%) qigong therapy, 201 (3.80%) acupuncture-moxibustion therapy, 100 (1.89%) acupoint therapy, and 7 (0.13%) Chinese massage therapy. (See Table 5.)

Table 5 Traditional Chinese Therapies used for Neoplasms

Therapies	Articles	% of Total
Traditional Chinese Drug	3,765	71.09
Integrated Chinese Traditional and Western Medicine	945	17.84
Acupuncture-moxibustion	278	5.25
Qigong	201	3.80
Acupoint	100	1.89
Massage	7	0.13
Total	5,296	100

Distribution of Authors of Articles on Neoplasm

The distribution of authors of articles on neoplasm is shown in Tables 6 and 7. From Table 6 we can see that most of the authors work for hospitals and clinics, then medical schools, research institutes, military institutions, and others institutions. Table 7 indicates that the highest number of authors come from Jiangsu, Beijing, Shanghai, Shandong and Zhejiang, which all are the economically and culturally developed area in Mainland China.

Table 6. Distribution of Authors of Articles on Neoplasm (by organizational affiliation)

Organizational affiliation	Articles	% of Total
Hospitals and Clinics	5,859	57.53
Medical schools	2,239	21.98
Research institutes	1,227	12.05
Military institutions & hospitals	471	4.62
Others	389	3.82
Total	10,185	100

Table 7. Distribution of Authors of Articles on Neoplasm (by area)

Area	Articles	% of Total
Jiangsu	837	8.22
Beijing	791	7.77
Shanghai	702	6.89
Shandong	626	6.15
Zhejiang	590	5.79
Guangdong	507	4.98
Henan	489	4.80
Military	471	4.62
Hebie	438	4.30
Sichuan	311	3.05
Hubei	295	2.90
Shaanxi	294	2.89
Fujian	277	2.72
Hunan	264	2.59
Anhui	258	2.53
Liaoning	223	2.19
Jilin	204	2.00
Shanxi	202	1.98
Heilongjiang	195	1.91
Tianjin	188	1.85
Jiangxi	162	1.59
Gansu	129	1.27
Guangxi	125	1.23
Yunnan	90	0.88
Guizhou	90	0.88
Inner Mongolia	68	0.67
Chongqing	61	0.60
Xinjiang	50	0.49
Qinghai	26	0.26
Ningxia	24	0.24
Hainan	9	0.09
Hongkong	5	0.05
Taiwan	3	0.03
Other Countries	1,181	11.59
Total	10,185	100

Research Grants

Among the 10,185 citations on neoplasms searched from the database system, 251 authors indicate that their studies are sponsored by grants. Details are shown in Table 8.

Table 8. Research Grants

Grants	Citations	% of Total
National Natural Science Foundation	102	40.64
Ministries (except for the Ministry of Public Health)	79	31.47
State Administration of Traditional Chinese Medicine	25	9.96
Local Government	24	9.56
Ministry of Public Health	12	4.78
Other Grants	4	1.59
Grants from Other Counties	3	1.2
Military	2	0.8
Total	251	100

Discussion

The fast increasing traditional Chinese medical literature is a useful information source for medical professionals, as well as for the public. Since such information is published in many different journals, it can be difficult to locate traditional Chinese medical literature on a particular topic[6]. However, TCMLARS makes it possible.

Cancer is one of the most dangerous diseases known to mankind. This bibliometric study based on TCMLARS shows that studies on neoplasms treated by Traditional Chinese Medicine are increasing. Most of the researches (69.72%) focus on clinical study. Lung neoplasm, stomach neoplasm, liver neoplasm, esophageal neoplasm, and breast neoplasm are the top five cancers covered in the traditional Chinese medical literature, which correlates to the mortality of neoplasms in the world [7]. Among the traditional Chinese therapies for neoplasms, Chinese drug therapy predominates (71.09%), followed by integrated Chinese traditional and western medicine therapy (17.84%).

The study reveals that most authors of papers on neoplasms treated by TCM are clinical doctors, then medical educational workers and research professionals. In mainland China, authors of papers on neoplasms treated by TCM come from economically and culturally developed regions like Jiangsu (8.22%), Beijing (7.77%) and Shanghai (6.89%) rather than undeveloped areas such as Qinghai (0.26%), Ningxia (0.24%), and Hainan (0.09%). According to the search results, most research grants for studies on neoplasms treated by TCM are sponsored by the Chinese central government. National Natural Science Foundation is the most important grant.

Conclusion

The results of this study clearly outline the extent of clinical work and research on neoplasm treated by Traditional Chinese Medicine in China. TCMLARS is

proving to be the most efficient and effective means of literature retrieval and analysis for Traditional Chinese Medicine in the world.

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