
Searching online and Web-based resources for information on natural products used as drugs*

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Finding and evaluating information on natural products used as drugs can present challenges to the information professional. In this study, eight databases including resources retrieved on the Web were compared for relevancy and uniqueness. Ten reference questions related to natural products used as drugs were searched in the latest three year file of a number of databases, including MEDLINE, *International Pharmaceutical Abstracts*, and EMBASE/Excerpta Medica. In addition, the Web was searched for relevant Internet sites using the Alta Vista search engine. EMBASE/Excerpta Medica retrieved the largest number of relevant citations for four of the ten questions. MEDLINE, the Health Reference Center, and Alta Vista each retrieved the largest numbers in two questions. Overall, the standard medical databases were the first choice for the health professional and for many lay people because of their more extensive indexing and coverage of authoritative journals.

INTRODUCTION

This paper compares databases for finding information on natural products used as drugs. Increasingly, patients are turning to natural drug products as part of their therapy. Eisenberg reported that 34% of participants surveyed had used at least one unconventional therapy in the previous year [1]. These products

may include homeopathic preparations, medicinal plants, minerals, and animal products. Der Marderosian noted that alternative medicine has gained in popularity for several reasons. Patients want a more active partnership with their practitioners and less expensive testing and treatments. Alternative medicine also attracts patients with immune system diseases, chronic diseases, stress disorders, and mental illnesses that are often difficult to treat using conventional medicine [2].

Finding information on natural products used as drugs can present challenges for the information professional. Providing appropriate information for a va-

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riety of clients ranging from health professionals to consumers is one difficulty. For example, physicians, pharmacists, and nurses need scientific resources to identify and describe the therapeutic use of products and their potential for side effects or drug interactions. Patients need similar information to substantiate or disprove claims made by product advertisers, but they often need it synthesized and presented in nontechnical language. Standard medical journals may not always be appropriate for them. Providing access to patient-related materials that are reliable and authoritative may be a new avenue of service, particularly in academic medical libraries.

Another difficulty in locating natural product information is that research on many products is still in the initial phases. Although many cultures traditionally may have used certain medicinal plants for centuries, formal studies of their use may not be documented in the scientific literature. Particularly in the herbal literature, research is often written in non-English languages and published in journals not readily available in libraries in the United States. Leaflets, newsletters, and government pamphlets also contain information on herbs, but this information may be difficult for libraries to obtain [3]. Online information is available to some extent, but users are often reluctant to pay the costs for fee-based searches, preferring to use databases that are available at no charge.

LITERATURE REVIEW

Several authors have examined information resources for natural products. Allan described resources for many alternative therapies including acupuncture, aromatherapy, and traditional healing [4], and Feuerman and Handel discussed print resources for alternative medicine, including herbal medicine [5]. Van Camp focused on online databases for alternative medicine information, including MEDLINE, Allied and Alternative Medicine (AMED), nursing and allied health (CINAHL), PsycINFO, CHIROLARS (later renamed MANTIS), EMBASE/Excerpta Medica, Health Periodicals Database (HPD), and DIRLINE [6]. Chadwick and Craker reviewed the herbal literature noting characteristics, problems, and resources in the literature [7]. Articles by Kupferberg, Westbrook, and Curry and Smith discuss collection development of alternative medicine books [8–10]. Other articles note the availability of alternative medicine documents, news, and bulletin board services on the Internet [11, 12]. In a 1992 study, Kleijnen assesses the comprehensiveness of MEDLINE and EMBASE/Excerpta Medica for controlled trials of homeopathy, ascorbic acid for the common cold, and ginkgo biloba for cerebral insufficiency and intermittent claudication [13].

Table 1
Sample questions

1. A friend of mine who is in menopause has been taking dong quai. What is it and does it control symptoms?
2. I've seen echinacea tea in the grocery store. What is it and what is it used for?
3. Is garlic effective against cancer?
4. Is there any information about using homeopathic treatments for asthma?
5. Is there any literature that discusses the use of zinc for treating the common cold?
6. I need information about taking feverfew to prevent migraine headaches.
7. Are there any side effects or contraindications for using aromatherapy?
8. I'm taking colloidal silver as a treatment for the flu. Are there any contraindications or side effects I should know about?
9. Should my father be taking large doses of vitamin E while he's using warfarin?
10. A cardiac patient was monitored with unusually high plasma digoxin levels. It was discovered that he was also taking a Chinese medicine called kyushin, made of dried Chinese toad venom. Could this product affect the assay?

METHODOLOGY

Ten reference questions related to natural products used as drugs were searched in eight databases. Questions were selected from those asked at the University of Maryland Health Sciences Library reference desk, as well as questions featured on alternative medicine Internet discussion groups. Topics focused on identification of products, their therapeutic uses, interactions, and possible side effects. To increase comparability, searches were limited to the years 1993 to 1996. Table 1 shows the questions used in the study.

A combination of databases for health professionals and the general public that would be readily available to local users at no charge was chosen. The exception, EMBASE/Excerpta Medica, was included to provide a gold standard for comparison. EMBASE/Excerpta Medica was chosen as the standard because of its extensive coverage and indexing of drug literature, especially European literature where much of the research on natural products has been published. EMBASE/Excerpta Medica provided an index to the international drug, pharmacology, and medical literature from 1974 to the present.

Four other databases commonly used by health professionals on campus were explored: MEDLINE, *Cumulated Index to Nursing and Allied Health* (CINAHL), *International Pharmaceutical Abstracts* (IPA), and Microdex Computerized Clinical Information System (CCIS). MEDLINE, produced by the National Library of Medicine, provides coverage of medical, nursing, and dental literature from 1966 to the present. CINAHL covers English-language nursing journals, primary journals from allied health disciplines, and publications from the American Nurses' Association and the National League of Nursing from 1982 to the present. IPA is produced by the American Society of Health-Systems Pharmacists and indexes the pharmaceutical literature from 1970 to the present. Micro-

Table 2
Total number of relevant citations

	Health Ref	EMBASE	Alta Vista	MEDLINE	UnCover	CINAHL	IPA	CCIS
Total	91	87	76	46	46	17	15	3
Percentage	23.9	22.8	20.0	12.1	12.1	4.4	3.9	.8

medex CCIS is a collection of databases, most of which provide full-text information written by health professionals. Monographs are updated on an ongoing basis. The Drug Evaluation Monographs and Drug Consults sections were searched.

Several other locally available resources were also explored: UnCover, the Health Reference Center, and Web resources. UnCover is an online periodical article delivery service and current awareness alerting service. UnCover provides broad coverage of the literature and includes both academic and popular materials. The Health Reference Center was included as a source of information for the general public. The database is produced by the Information Access Company and indexes a variety of publications including journals, magazines, and newsletters. Full text is available for many titles. Coverage extends from 1993 to the present. Other potentially useful databases, such as BIOSIS and CHID were excluded because of time, cost, or other constraints. The appendix lists online resources used and publisher information.

Finally, Web resources were searched using the Alta Vista search engine. Alta Vista was used because it offers an extensive index of over 31 million pages found on 627,000 servers. In addition, it provided flexible search features that allow the construction of complex Boolean queries and was highly rated for its comprehensiveness [14].

Questions were searched in each database and on the Web. Because the databases used a variety of indexing structures and vocabulary, searchers tailored strategies individually for each database. Strategies were double-checked by at least one other searcher to guarantee maximum retrieval for each question in each

database. Since the Alta Vista search engine often retrieved hundreds of references, the relevancy of the first thirty sites was usually evaluated. Questions 3 and 5, however, retrieved more than thirty items in other database searches. For those two questions, forty and fifty sites respectively were examined to remain consistent with the maximum numbers of citations retrieved in other databases.

The number of citations or Web sites retrieved and their relevancies were compared. Results were examined by three searchers, and at least two had to agree on the relevancy of material. Items were considered relevant if they addressed the topics posed by the question. Because individual situations might vary, no attempt was made to judge whether items would be relevant for professionals or nonprofessionals. Obvious advertisements on the Web were excluded as relevant sites. Overlap of citations from different databases was also examined.

RESULTS

EMBASE/Excerpta Medica retrieved the largest number of relevant citations for four of the questions. MEDLINE, the Health Reference Center, and Alta Vista each retrieved the largest numbers in two questions. Except for question 3 regarding garlic and cancer, there was little overlap of retrieved items.

Table 2 shows the total number of relevant sources retrieved and their percentages. The Health Reference Center retrieved ninety-one relevant items, followed by EMBASE/Excerpta Medica and Alta Vista at eighty-nine items and seventy-six items respectively.

Table 3 displays the number of relevant citations per

Table 3
Number of relevant citations retrieved per question

	Databases primarily for the health professional				Databases for the general public			
	EMBASE	MEDLINE	CINAHL	IPA	CCIS	Health Ref	Alta Vista	UnCover
1	0	0	0	0	0	0	6	0
2	11	1	1	7	0	28	12	9
3	37	22	1	1	0	33	22	18
4	12	10	5	1	0	4	6	1
5	12	1	1	2	1	21	14	10
6	6	1	3	3	0	5	11	5
7	3	8	4	0	0	0	3	0
8	1	2	0	1	0	0	1	1
9	3	1	2	0	1	0	1	1
10	2	1	0	0	0	0	0	1

Table 4
Percentage of unique citations

EMBASE	MEDLINE	CINAHL	IPA	CCIS	Health Reference	Alta Vista	UnCover
56.3	32.6	88.2	33.3	100	97.8	100	65.2

question and groups the databases for which the results indicated that some databases were more useful for health professionals and others were more useful for the general public for the ten queries investigated. Of the databases targeted to professionals, EMBASE/Excerpta Medica retrieved the largest number of relevant citations, followed by MEDLINE, CINAHL, and IPA. Of the resources most useful for the general public, the Health Reference Center retrieved the largest number of relevant items.

The amount of overlap among databases was also examined. Table 4 shows the percentage of citations that were unique to each database. The greatest percentage of overlap occurred between EMBASE/Excerpta Medica and MEDLINE, related primarily to question 3 that dealt with the effects of garlic on cancer. Retrieval in UnCover also overlapped on ten citations on this question. However, other questions produced little overlap of retrieved items.

DISCUSSION

In general, the standard medical databases are the first choice for the health professional and for many lay people because of their more extensive indexing and coverage of authoritative journals. EMBASE/Excerpta Medica is an excellent resource for users needing comprehensive information, although many users would have to pay the cost of an online search. Most users would find sufficient information in MEDLINE. IPA and CINAHL would be useful to fill gaps for users needing either pharmacy or nursing perspectives, but probably would be insufficient on their own. Micromedex CCIS provides background information, and if searches had not been restricted by year, it would have provided useful information for 50% of the questions rather than 20%.

The general databases provided information for users, both health professionals and consumers, who needed access to a broader range of journals. UnCover retrieved information from a wide spectrum of academic and popular literature. The Health Reference Center could be used for questions from the lay public or for health professionals to find patient literature.

The quality of material on the Web is more variable and is generally recommended only for background information or when nothing else is available. A large amount of unfiltered material was retrieved from the Alta Vista searches that was time consuming to ex-

amine. For the topics searched, much of this material was insubstantial with extensive advertising. Users need to be especially aware of the need for critically evaluating these sites. Often the authors of supposedly "scientific" articles were also selling the products they were describing and discretion would be needed to decide whether to exclude these opinions because of possible bias or conflicts of interest. On the other hand, even if they are selling merchandise, naturopathic or homeopathic practitioners may have unique expertise with some products.

Web-based material should not be discounted altogether. A few sites do provide reliable, authoritative material. In addition, the Web is occasionally the only source of information for topics where research is in its initial stages. One useful Web resource is the United States Department of Agriculture, Agricultural Research Service site.[†] It includes medicinal plant and ethnobotany databases. Another valuable resource is the University of Texas Center for Alternative Medicine Research in Cancer site.[‡] This site provides systematic reviews of biopharmacologic and herbal products, as well as extensive annotated bibliographies. Information professionals should continue to monitor the Web as more authoritative sites are added.

In all of the resources examined, formulating search queries posed several challenges. Nomenclature of medicinal plants is sometimes confusing, and searchers needed to use both scientific and common names for complete retrieval. Foreign names of herbs also pose problems because of variant spellings and translations. Vitamin and mineral products also are referred to by a variety of terms that are sometimes not immediately obvious to searchers.

Another difficulty searchers face is deciding the relevancy of retrieved items. Obviously, relevancy will vary with individual users and their needs. Users need to be aware that individual databases target different audiences. In particular, the Health Reference Center includes many popular magazines that are not based on scientific research or peer reviewed. However, the database also indexes many well-regarded consumer

[†] The United States Department of Agriculture, Agricultural Research Service Web site is available at <http://www.ars-grin.gov/~ngrlsb>.

[‡] The University of Texas Center for Alternative Medicine Research in Cancer Web site is available at <http://www.sph.uth.tmc.edu/utcam>.

newsletters from medical centers, as well as citations to medical journals such as *JAMA*.

Other online services are available in addition to the ones used in this study. For example, the IAC Health and Wellness Database, available through the Information Access Company, indexes consumer literature from 1988 to the present. It provides access to a wide range of journals and newsletters suitable for patients and their families. In addition, the Manual, Alternative, and Natural Therapy (MANTIS) database covers alternative medicine literature from 1880 to the present. CHID and BIOSIS are also potentially useful resources. Studies of these databases, and especially comparisons of Web search engines on natural products topics, would be useful in the future.

Although searching for reliable natural product information presents challenges, new interest in the field is fueling research that could make more scientific information available in the future. In the meantime, a wide variety of information resources are available for both the health professional and the consumer. Information professionals will want to continue to monitor this emerging research area, provide access to new research findings as they become available, and educate users in critically evaluating the resources.

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APPENDIX

List of online resources used

Cinahl Information Systems
1509 Wilson Terrace
P.O. Box 871
Glendale, California 91209-0871
818/409-8005, 800/959-7167

EMBASE
Elsevier Science B.V.
Secondary Publishing Division
Molenwerf 1
NL-1014 AG Amsterdam, Netherlands
+31/20 485 3507

Health Reference Center
Information Access Company (IAC)
355 Lakeside Drive
Foster City, California 94404
650/378-5000, 800/321-6388

International Pharmaceutical Abstracts
American Society of Health-System Pharmacists (ASHP)
7272 Wisconsin Avenue
Bethesda, Maryland 20814
301/657-3000

MEDLINE
U.S. National Library of Medicine (NLM)
MEDLARS Management Section
8600 Rockville Pike
Bethesda, Maryland 20894
888/346-3656

Micromedex CCIS
6200 S. Syracuse Way, Suite 300
Englewood, Colorado 80111-4740
303/486-6400, 800/525-9083

The UnCover Company
3801 E. Florida Avenue, Suite 300
Denver, Colorado 80210
800/787-7979