

## An insight on searching medical literature with basics of Pubmed

Bhola Nath

Professor and HOD, Dept. of Community Medicine, Government Doon Medical College, Dehradun, Uttarakhand, India

**\*Corresponding Author:**

Email: bholanath75@yahoo.co.in

### What is Literature Search?

In simplest way 'Literature Search' (LS) is controlled search for all the literature published on a topic. The literal meaning of literature is from its Latin root *litteratura/litteratura* (derived itself from *littera*: letter or handwriting) which was used to refer to all written accounts, though contemporary definitions extend the term to include texts that are spoken or sung.<sup>1</sup> It is defined as 'a systematic and explicit approach to the identification, retrieval, and bibliographic management of independent studies (usually drawn from published sources) for the purpose of locating information on a topic, synthesizing conclusions, identifying areas for future study, and developing guidelines for clinical practice'.<sup>2</sup> The search for relevant study material can be from books, Journals, souvenirs or from proceedings of conferences etc. In modern epoch computer database/internet is the most common single source which is helping us in 'Literature Search'.


**Why Literature Search:** The basic aim of LS is to help researcher in providing all information about the work which is already carried out by other researchers in same/different settings on a given topic. Since past few years the number of publications in the journals has been mounted tremendously which has set problems among researchers in compilation of all the evidences in form of articles/unpublished/other topic related work from different resources. What has lead to this increased no. of articles is complex but it has certainly produced doubts in the minds of authors/reviewers/editors whether their search on a particular subject/topic is complete or not. The situation has become more complex as a result of availability of articles in different databases which has given easy access to the articles on one side while creating doubts on completeness of search on the other side. Hence, there is need for searching the literature in a way that






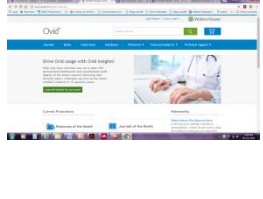
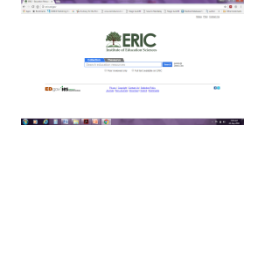
author would be satisfied with his literature search on a specific topic. The other concerns which are addressed by LS are; enabling researcher to compare findings with his own research and generating new thoughts on a specific topic for subsequent researches.


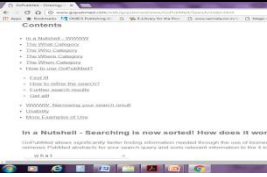
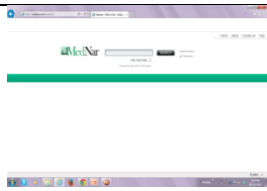


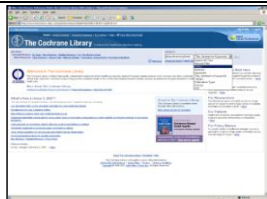
**Challenges in Searching Literature:** A major challenge in searching literature is availability of different types of databases/search engines and each search engine has its own advantages and disadvantages. Another challenge is that no two databases will produce identical results based on the same search query and therefore for best results use of multiple databases is recommended. Juggling with keywords in searching literature also pose a big challenge in searching literature. Therefore, it is suggested to use a different terms/keywords for better results. After each new query is tested out, review the results, document the query and database used which helps you in tracking of the keywords used and results obtained.

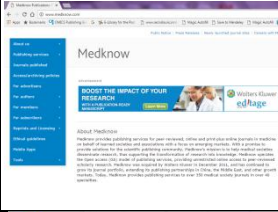

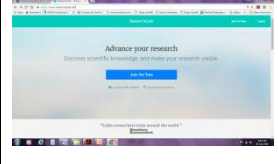
**Different kinds of Search Engines and their Characteristics:** Out of the various databases/search engines available, some are free like Pubmed and some of them are paid like CINAHL, EMBASE, Ovid. At present, the most commonly used free database for searching the articles is Pubmed. Out of the various databases available some of them are discipline specific eg CINAHL which gives you articles related to nursing and some database gives you fuzzy picture on a topic eg Google. A major factor that determine the quality and ability of a database to search the relevant articles is the way it is using the keywords eg there is no specific strategy in searching the articles if we place some key words in Google but if we place same keywords in search box of Pubmed it follows a strategy to search the articles. A list of databases/ search engines is shown in table no 1 along with other details.

**Table 1:**

S No.	Resource/ Search Engines	Website Address	Basis on which search engine works	Image on Webpage	Remark
1.	Google	www.google.com	None		1. Simple search engine 2. It looks for all resources irrespective of their origin.

2.	Google Scholar	<a href="https://scholar.google.co.in">https://scholar.google.co.in</a>	None		<ol style="list-style-type: none"> <li>1. Subset of Google search engine.</li> <li>2. Search for scholarly articles resulted from research articles, theses, books, abstracts from academic publishers, professional societies, pre-print sources, and universities.</li> <li>3. May not find the recent articles</li> </ol>
3.	Pubmed	<a href="http://www.ncbi.nlm.nih.gov/pubmed">http://www.ncbi.nlm.nih.gov/pubmed</a>	MeSH		<ol style="list-style-type: none"> <li>1. Perform systematic search.</li> <li>2. Search for research articles based on Subject Headings.</li> <li>3. It search for citations but not for full text article; however link may be provided for full text articles from PubMed Central and publisher web site.</li> </ol>
4.	CINAHL	<a href="https://www.ebscohost.com/nursing/products/cinahl-databases/cinahl-complete">https://www.ebscohost.com/nursing/products/cinahl-databases/cinahl-complete</a>	CINAHL headings		<ol style="list-style-type: none"> <li>1. Provides access to articles related to nursing and allied health literature.</li> <li>2. It has Indexing for more than 5,400 journals with approx 5million records.<sup>3</sup></li> </ol>
5.	EMBASE	<a href="https://www.embase.com">https://www.embase.com</a>	EMTREE		<p>This database increases the discovery of biomedical evidence to support critical life sciences functions, delivering relevant, up-to-date biomedical information to the global biomedical research community.<sup>4</sup></p>
6.	SCOPUS	<a href="http://www.scopus.com">www.scopus.com</a>	N/A		<p>Abstract and citation based database which provides the peer reviewed literature from scientific journals, books and conference proceedings.<sup>5</sup></p>
7.	OVID	<a href="http://www.ovid.com/site/index.jsp">http://www.ovid.com/site/index.jsp</a>	N/A		<p>It provides 100 core and niche databases to support the breadth of research needs in a wide range of disciplines including clinical medicine, pharmacology and more.<sup>6</sup></p>
8.	ERIC	<a href="http://eric.ed.gov">eric.ed.gov</a>			<ol style="list-style-type: none"> <li>1. ERIC (Education Resources Information Center) is an authoritative database of indexed and full-text educational literature and resources.</li> <li>2. It contains more than 1.5 million records and links to hundreds of thousands of full-text documents dating</li> </ol>

					back to 1966. 3. It includes records for a variety of source types, including journal articles, books, conference papers, curriculum guides, and policy papers. <sup>7</sup>
9.	ProQuest	www.proquest.com			This database provides scholarly journals, newspapers, reports, working papers, and datasets along with millions of pages of digitized historical primary sources and more than 450,000 ebooks. <sup>8</sup>
10.	Gopubmed	http://www.gopubmed.com	N/A		1. GoPubMed is a knowledge-based search engine for biomedical texts. 2. The Gene Ontology (GO) and Medical Subject Headings (MeSH) serve as "Table of contents" in order to structure the millions of articles of the MEDLINE database.
11.	Mednar	http://mednar.com/mednar/desktop/en/search.html	N/A		1. MedNar is a deep web search engine that allows users to find results beyond what they can locate using standard search engines. 2. Deep web searching facilitates the discovery of content that might be hidden behind a pay wall and lets users create custom federated searches. <sup>9</sup>
12.	Pubget	http://pubget.com	N/A		1. Pubget is a valuable life sciences/biomedical search tool. 2. It helps mainly when a researcher is interested in searching for few papers on a topic.
13.	Popline	http://www.popline.org	N/A		1. It's a search engine which mainly provides topic wise arrangement of articles on reproductive health and Family Planning. 2. Besides providing journal articles, Popline also provides monographs, technical reports, and unpublished literature.
14.	Cochrane	http://www.cochranelibrary.com	MeSH		The Cochrane Library is a collection of six databases that contain different types of high-quality, independent evidence to inform healthcare decision-making, and a seventh database that provides information about Cochrane groups. <sup>10</sup>

15.	Medknow	www.medknow.com	N/A		This database provides articles from peer-reviewed, online journals from learned societies and associations. There are over 350 medical society journals available in over 40 specialties. <sup>11</sup>
16.	MedInd	http://medind.nic.in/	NA		MedIND provides free full text articles published in selected Indian Biomedical Journals indexed in IndMED or PubMed
17.	Research Gate	https://www.researchgate.net/	NA		In true sense it's a sharing network rather than search engine where researchers can share their publications and can request the articles from other researchers.

**Why Pubmed:** Out of various databases/search engines mentioned above in table, Pubmed is most commonly used search engine/database by the researchers because it has wide range of biomedical articles besides searching articles is free of cost. Pubmed gives an access to Medline, the National Library of Medicine's (NLM) premier bibliographic database containing citations and author abstracts from more than 5,600 biomedical journals published in the United States and in other countries. It has more than 26 million citations from the 1946 to the present.<sup>12</sup> It provides the most updated list of articles. It also provides link to some full text articles. It gives you most consistent and relevant results as it works on MeSH which is a kind of searching keywords in a systematic way. As per Chapman D "PubMed has sophisticated searching capabilities that may assist you to perform more focused, more complex, more comprehensive and more refined searches. Look for future columns to cover advanced PubMed features".<sup>13</sup>

National Library of Medicine (NLM) which means that there is a specific set of terms which reflects the subject content of each article. Each journal article in the database is read by professional indexers who usually assign 5-12 MeSH headings to cover the topics/subjects of the article. Out of these 5-12 MeSH headings, two to four will focus or main topic of the article which are designated as major MeSH headings for the article. These MeSH terms produced by indexers appropriately describes the concept(s) discussed in the article irrespective of 'title of article' and keywords given by authors which may or may not completely reflect the content of article. These MeSH terms can be accessed on the main PubMed page by click on the dropdown menu beside the search box (Fig. 1). These MeSH terms imposes uniformity and consistency to the indexing of biomedical literature. MeSH terms are arranged in a hierarchical categorized manner called MeSH Tree Structures and are updated annually (Fig. 2).<sup>14</sup>

**What is Medical Subject Headings (MeSH) in Pubmed:** The MeSH is a controlled vocabulary of

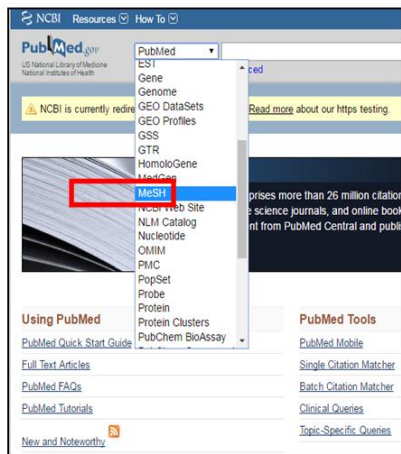


Fig. 1:

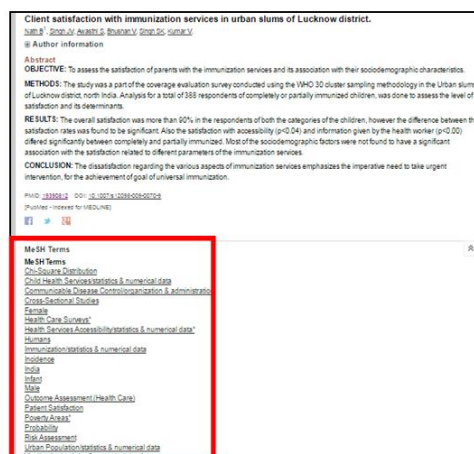


Fig. 2:

**Boolean Operators in Pubmed:** Boolean is a logic system. It helps in providing more relevant citations to our topic of interest by combining two or more than two sentences. These should always be entered in upper case letters. There are three words which are used as BOOLEAN operators in Pubmed

1. **"AND":** This will produce collection of citations to articles which mention both concepts eg. If we place 'TB AND Quality of life (QOL)' in search box of Pubmed, then it will give us results where both these concepts have been used (Fig. 3).
2. **"OR":** It will retrieve citations to the articles where either of the term has been used, therefore 'Tb OR QOL' in search box of Pubmed will retrieve all those citations to the articles where either Tb or QOL concept has been used. It can be assumed easily that it will broaden the search results. (Fig . 3)
3. **"NOT":** Can be used when we deliberately don't wish to include a search term e.g: 'TB NOT QOL' will give us citations to articles which are related with the tuberculosis but skip where QOL concept has been defined (Fig. 3).

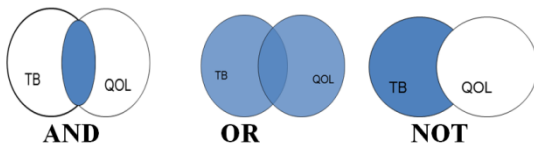


Fig. 3:

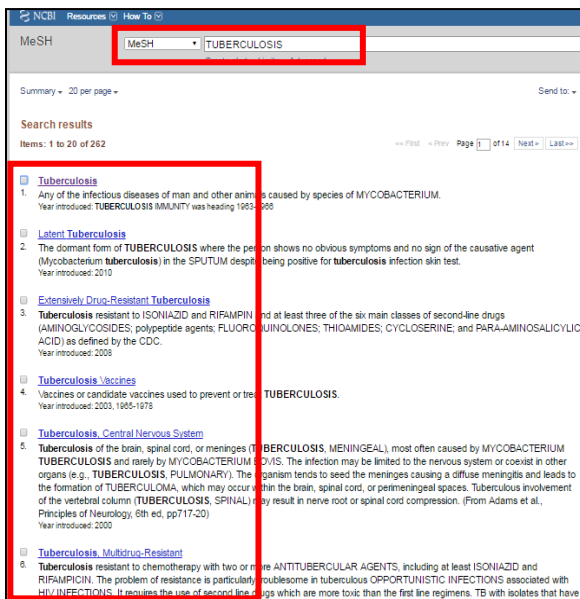


Fig. 4:

To search a specific phrase, enclose it in “double quotation marks” to ensure the words are found together.

**Searching literature in Pubmed:** In order to search literature in the Pubmed, turn your statement into a strategy by breaking your question into concepts. Then for each concept, Identify the subject headings (MeSH) used by NLM indexers (Fig. 4 and 5). Add these MeSH terms in search builder using Boolean words and run search Pubmed. After reviewing your results filter out nonrelevant articles. Example, If I wish to search literature on research question “What is the Quality of Life among Tuberculosis patients” then there are two concepts in this question one is Quality of Life (QOL) and other is Tuberculosis. Now, match the best suitable MeSH terms used for both these concepts in Pubmed (Fig. 4 and 5). If you are unable to decide which MeSH term will be best suitable then keep it as it is in search box of Pubmed. Selecting the subheading in MeSH term will narrow our research items but it will produce more specific results. Add your MeSH terms in ‘Pubmed search builder box’ (Not shown in Figure but located on right corner of the Pubmed page) by pressing ‘add to search builder’ using Boolean words. Then press on ‘search Pubmed’.

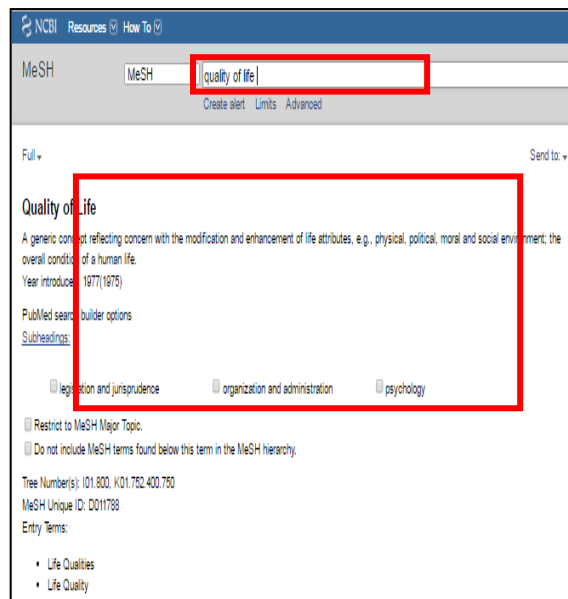


Fig. 5:

**Filtering the search in Pubmed:** Searching literature is like “searching pearl in the sea”, therefore we should be very careful about how we are restricting our search results. There are multiple ways of limiting your search. The aim of limiting your search is to give meaningful results. In reality, searching literature in Pubmed

revolves around the *keywords* used and on how an author has restricted his search items. There are mainly 2 types of limiters in Pubmed one is “Search limiters” and other is “Result limiters”

**Search Limiters:** These will allow researcher to alter, where the database will search for occurrences of his

search terms/ keywords. These limiters are usually located next to the boxes where keywords are entered (Fig. 6).<sup>15</sup>

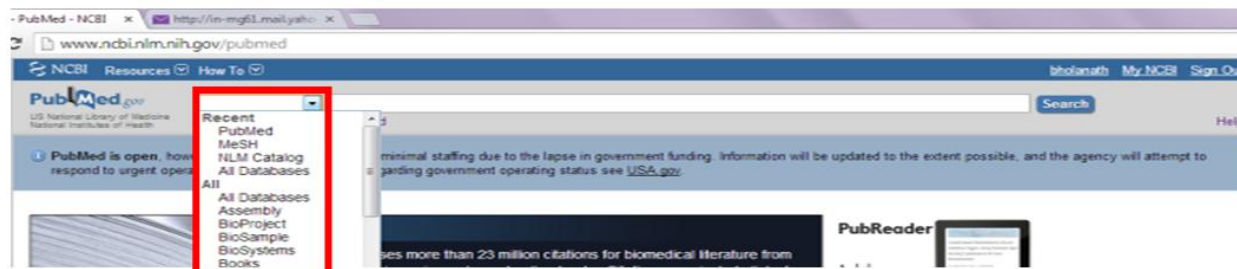


Fig. 6:

**Result Limiters:** These allow you to exclude articles which don't fit into the specification you need from your results list (Fig. 7). We can limit our results in Pubmed under according to following headings

1. According to date of publication eg.
  - a. If we wish studies which are conducted between 2005 and 2010
2. According to participants of subjects
  - a. only children 6 to 12 years of age
3. According to publication language
  - a. only materials written in English
4. According to research design
  - a. only clinical trials

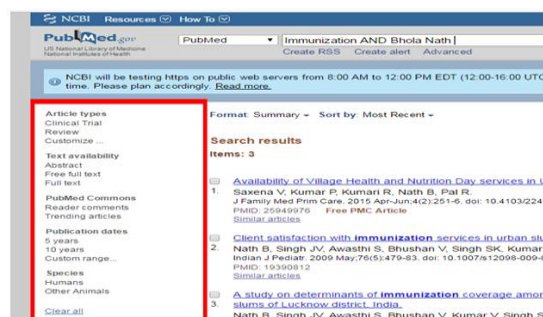


Fig. 7:

**Few additional Features of Pubmed:** Its beyond limit to define each and every item in Pubmed tool therefore only some of the important options of Pubmed tools are defined here.

**Registration in Pubmed-** It's always better to register in Pubmed, as this will help in saving and updating the results (Fig. 8).

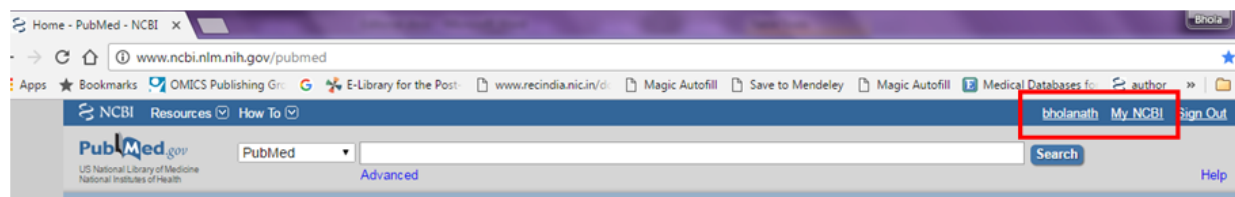


Fig. 8:

**Pubmed Tools:** This option will appear in the middle lower bottom of the Pubmed. There are several options under a heading Pubmed tools (Fig. 9).

**Single Citation Matcher:** This option is helpful, if a researcher wants to search a particular article in Pubmed. There are several ways to search your article

under this option like author name, journal name etc. You can search one and only particular article if you remember all details of the articles, however if you remember some information on the article then it require some efforts to reach exactly to the article you are looking for (Fig. 10).

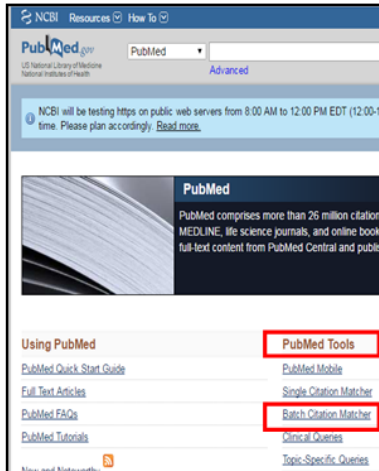


Fig. 9:

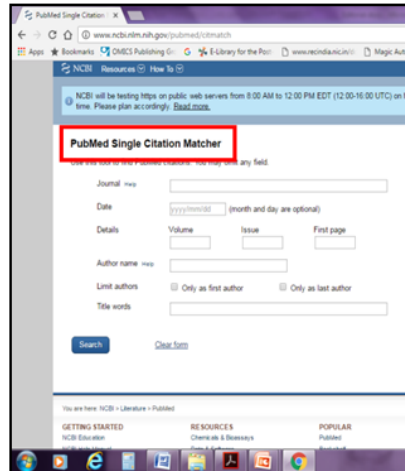


Fig. 10:

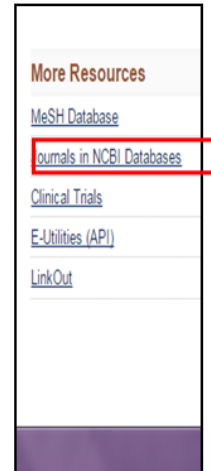


Fig. 11:

**Batch Citation Matcher:** This option will provide you results only via e-mail. The Batch Citation Matcher is a tool used primarily by online journal publishers. (Fig. 9)

**Journals in NCBI Databases:** This option in Pubmed helps you to search specific Journal based on topic, journal title or abbreviation, or ISSN. It also gives information regarding present status of its indexing with Medline (Fig. 11).

**Tutorials:** Tutorials help researchers to become more comfortable with the use of Pubmed.

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