USE OF INDIAN DIGITAL LIBRARIES BY BIOMEDICAL PRACTITIONERS IN WEST BENGAL REGION: A STUDY

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ABSTRACT
The use of Internet by students, teachers, researchers, journalists, librarians, information scientists, and numerous other professionals have already gathered momentum in our country with the strengthening of information infrastructure day-by-day. The number of Internet service providers, personal Internet connections, institutional Internet connections, cyber cafes, etc are also multiplying at a rapid rate. Biomedical practitioners in the world are also finding Internet-based information resources highly useful inasmuch as it is providing latest information about the harmful drugs being withdrawn, new drugs being introduced in the world, novel medical equipments being marketed, unique surgical techniques becoming successful, and so on. At this juncture, a question automatically arises as to what extent this facility is being used by biomedical practitioners of a region of our country, where computerization and Internet facility etc have started rather late.

The study aims to find out the use of Indian digital libraries by biomedical practitioners in the West Bengal region. The data is to be gathered through a structured questionnaire that was circulated among biomedical practitioners. The questionnaire seeks to elicit the information on the extent of the use of open access biomedical literature; awareness about the biomedical databases, electronic journals, digital libraries, digital archives, web portals of biomedical organizations, etc.

Digital libraries have already started coming up in India. National Institute of Science Communication and Information Resources is developing Traditional Knowledge Digital Library (TKDL), and National Informatics Centre is developing INDmed (Indian Biomedical Database), medIND (Indian Biomedical Literature) and OpenMed (Open Access archive on biomedical literature). All these databases are accessible free of cost. The study will lay special emphasis on the use of these biomedical information resources.

Based on the findings of the study, suggestions are made as to how the awareness among biomedical practitioners can be increased to optimize the use of biomedical information resources in general and Indian digital libraries in particular.

INTRODUCTION
Since independence, Government of India is taking many measures to improve the infrastructural facilities for accessing S&T literature. Creation of National Informatics Centre (NIC) to act as a backbone of our country's information superhighway is one such measure. NIC was to act as an intermediary between the information-seekers and the knowledge resources. Its area was all-pervasive enclosing different disciplines of knowledge. In recent days, NIC worked a lot in the field of biomedical literature – building up databases, organizing training programmes, creating and maintaining discussion forums, liaising with the medical librarians, presenting papers related with NIC's activities in the librarians' gatherings (conferences, etc.) and in general promoting the creation, awareness and use of indigenous biomedical literature and access and use of international biomedical literature.

India is thought to be a country with high quality IT people. Despite poverty and other problems, abundance of cyber café and numerous home or workplace Internet use proves the entry of Indians in the Internet arena in a big way. Though email, chat, Internet telephony, instant messages, Internet games, aimless browsing and viewing sensational but obscene pictures exemplify some of the most frequent uses, it is not all. It is also the medium of the more serious and scholarly communication who are happy to have the instant access of the storehouses of Indian and world knowledge.

Internet has made the World Wide Web accessible and popular. It has accelerated the birth and growth of the Open Access Movement which highlights that the world's knowledge should be open to all and sundry. Though the proprietary houses mostly go firmly against the idea (for e.g., Microsoft Corporation), it engaged the attention of many super-brains like Richard Stallman of Open Source Software project or the giants of GNU project. Digitization of good, old or important literature as well as generation of more born-digital materials are taking place everywhere accelerating the birth and/or growth of bibliographic databases, electronic journals, and digital libraries or digital archives.

Internet also facilitates the e-publishing. Even scholarly publishing going more and more towards adopting electronic means for every bit of work – from submission of manuscripts, editing and/or reviewing, layout, till publishing and access. The aim of this study is to find out the awareness and usage of some good quality, open access biomedical literature and resources.

GLIMPSES OF BIOMEDICAL INFORMATION RESOURCES
The biomedical information resources commonly used by the biomedical professionals in this region are included in the questionnaire for this study. These information resources are briefly discussed below:
1. **IndMED@NIC database** (http://www.indmed.nic.in):
   a. Creator: Indian Medlars Centre at National Informatics Centre (NIC), New Delhi.
   b. Coverage:
      i. Journals: 77 Indian biomedical journals among which 37 are full-text.
      ii. Period: 1985 till date
      iii. Journal type: Peer-reviewed, non-Medline journals
   c. Type: Citation, Abstract, Keywords, links to Full-text (PDF file)
   d. Other features:

      i.   Through MetaMED (a search tool), allows to search IndMED and PubMED together.

     ii.   Connected with Google and other search engines

    iii.   Since 1990, this centre has been recognized as the 17th International Medlars centre, commonly known as Indian Medlars Centre.

2. **PubMed/Medline database** (http:// www.pubmed.gov):
   a. Creator: National Center for Biotechnology Information (NCBI), National Library of Medicine, U.S.A.
   b. Coverage: About 16 million citations, from 1950 till date.
   c. Linked to: PubMed includes links to full text articles from participating publishers and other related resources.
   d. Options available: Automated updates of other databases, setting search filters, and highlighting search terms.
   e. Includes: Journals Database , MeSH Database, Related Resources, NLM Catalog

3. **Medline Plus database** (http://www.medlineplus.gov):
   a. Creator: National Library of Medicine, National Institutes of Health (NIH), other government agencies and health-related organizations of U.S.A.
   b. Type: Biomedical journal articles, clinical case studies, biomedical encyclopedia, interactive patient tutorials, extensive drug information, herbs and supplements, sources on over 700 diseases and conditions, lists of hospitals and physicians, biomedical dictionary, links to numerous clinical trials.
   c. Currency: Updated daily
   d. Intended audience: Health professionals and consumers
   e. Special feature: Does not allow any advertisement or endorsement.

4. **National Library of Medicine (NLM) Catalogue database** (www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=nlmcatalog):
   a. Contains: Access to NLM bibliographic data for journals, books, audiovisuals, computer software, electronic resources and other materials. Links to the library's holdings in LocatorPlus, NLM's online public access catalog, are also provided.

5. **NLM Gateway** (http://gateway.nlm.nih.gov): It is a common gateway to different NLM resources:
   a. Bibliographic Resources (NLM catalog, Medline/PubMed journal citations, abstract, full text biomedical books, etc.)
   b. Consumer Health Resources on health, medicine, etc.
   c. Other Information Resources on health projects, etc.

6. **MEDind open access journals** (http:/medind.nic.in):
   a. Developed by: National Informatics Centre
   b. Coverage: Fulltext of 38 Journals Indexed in indMED in different biomedical subjects.
   c. Type: Peer reviewed Indian biomedical literature.

7. **OpenMED@NIC** (http://openmed.nic.in):
   a. Creator: National Informatics Centre
   b. Type: Open access digital archive
   c. Scope: International biomedical literature
   d. Subject covered: Medical science, nursing, pharmacy, dentistry, medical informatics, etc.
   e. Type of document covered: Pre-refereed and post-refereed journal papers, technical reports, clinical cases, conference papers/posters/presentations, theses, etc.
   f. Access Points (Descriptive Metadata): Author, Title, Source, etc.

g. Activities allowed: After a user registration, it allows self-archiving of relevant literature.

h. Specialty: It gives biomedical authors a chance to communicate their research findings and thereby to increase their recognition and presence in their chosen research arena.

8. **Traditional Knowledge Digital Library** (http://www.tkdl.res.in):

a. Developed by: National Institute of Science Communication and Information Resources (NISCAIR), CSIR and Department of Indian Systems of Medicine (AYUSH).

b. Subject: Traditional knowledge on Indian systems of medicine as available in Ayurveda, Unani, Siddha, Yoga, Naturopathy, etc.

c. Languages of documentation: English, German, French, Japanese and Spanish

d. Classification scheme used: IPC (International Patent Classification) group on medicinal plants (AK61K35/78)

e. Coverage: 10,500 subgroups evolved by Traditional Knowledge Resource Classification (TKRC).

9. **Digital Library of India** (http://www.new.dli.ernet.in & http://dli.iiit.ac.in):

a. A part of Universal Digital Library and Million Books Project, conceived by Carnegie Mellon University, USA.

b. Coordinated in India by: Indian Institute of Sciences, Bangalore; Mega scanning centres and scanning centres are located across India.

c. Subject Coverage: All major subject areas including Medicine and Health.

d. Coverage: Rare books, out-of-print books and periodicals, Indian literature, government reports, etc.

10. **The Yale Medicine Thesis Digital Library** (http://ymtdl.med.yale.edu):

a. Developed by: Medical Library and Office of Student Research of Yale School of Medicine

b. Started: Graduating class of 2002

c. Purpose: To make available the full text of student theses and original source materials to researchers throughout the world.

11. **DigitalCommons@The Texas Medical Center** (http://digitalcommons.library.tmc.edu):

a. Developed by: the Houston Academy of Medicine-Texas Medical Center Library, materials are chosen and submitted by all the academic institutions and research centers in the Texas Medical Center.

b. Search : Through research unit/center/department; personal researcher pages, journals and peer-reviewed series.

c. Type: Repository containing research and scholarly outputs.

12. **National Science Digital Library** (http:www.nsdl.org):

a. Subject Coverage: S&T, Medicine, Engineering and Mathematics

b. Funded by: National Science Foundation of U.S.A.

c. Resources for: Teachers, students, librarians, faculty members, researchers, professionals, etc.

OBJECTIVES OF THE STUDY

In this study, the authors tried to map:

- Information seeking pattern of biomedical practitioners in the West Bengal region;
- Awareness vs. usage of Indian and international digital library resources by the biomedical practitioners in the region;
- Awareness vs. usage of Indian and international open access electronic journals and bibliographic databases by the biomedical practitioners in the region;

- Awareness vs. usage of web portals, information gateways and websites of national and international biomedical organizations by the biomedical practitioners in the region;
- How do they give priority on four kinds of information resources, based on their relevancy in finding professional information;
- Whether they are finding these usable;
- Whether the information is up-do-date;
- Whether these are rich and adequate in content;
- Whether these e-resources are providing enough points of access through their respective search mechanism;
- Whether these have quality browsing facilities available like easy downloading, proper hyper-linking, etc;
- Whether the User Interface is attractive, usable, or user friendly; and
- Whether the user's account is easily manageable without facing any difficulty to an average user.

FINDINGS AND OBSERVATIONS

This study is based on the feedbacks received from about sixty three respondents, mostly doctors and biomedical practitioners. A structured questionnaire was framed, tested and circulated among more than hundred biomedical practitioners in this region.

This study reveals that the biomedical professionals in this region daily use Internet to access biomedical information resources for 1 hour 34 minutes on an average, either from their offices or from their homes using mainly broadband and dialup connections. The authors identified four major divisions of open access biomedical resources, namely, Bibliographic Databases, Electronic Journals, Digital Libraries/Digital Archives and different web portals of biomedical organizations. In this study, the authors wanted to know whether the biomedical professionals are aware of the existence of these resources, how far they are utilizing these knowledge-bases and how they are ranking these resources according to the relevancy to their information needs. From the questionnaire circulated, the authors observed that many Internet-based open access resources are available for this particular community. The authors have made comparative studies on Indian biomedical resources vis-à-vis international biomedical resources (Table 1). The authors found that biomedical professionals of this region use Indian bibliographic database (IndMED) more comprehensively than international bibliographic database (Medline) (Fig.1 and Fig.2). On the other hand, biomedical professionals of this region, who are not regularly using, are more aware of Medline than IndMED. Medline Plus database is more popular than NLM Catalogue database or NLM Gateway.

Half of the biomedical population is aware about the MedInd open access journals and it is very encouraging to note that one third of the said population is really using it. The NIC people with their continuous training progammes may be a causal factor behind it (Fig.3). Although almost three fourth of the population are aware of MedKnow open access journals, only 5.6% respondents are regularly using it (Fig.4). About 55.6% of the population is aware of the PubmedCentral open access journals and BiomedCentral open access journals, but 16.7% and 11.1% respondents are using them respectively. 47.1% know about the existence of the Public Library of Science (PLoS) open access journals, but 11.8% are using it.

More than half of the population is using the OpenMed open access archive whereas another one-third is aware of it (Fig.5). More than 50% are aware of the Traditional Knowledge Digital Library (TKDL) whereas more than 10% is really using it. 44% are aware of the Digital Library of India and another 33% are using it actively (Fig.6). People know about The Yale Medicine

Thesis Digital Library and DigitalCommons@The Texas Medical Center (61 and 21% respectively) but no Indian biomedical professional is using it at present. On the other hand, another international Digital Library (National Science Digital Library) is used by 35% and known to 29% practitioners. Most of these professionals know about the websites and web portals of biomedical organizations but only the WHO web portals are frequently accessed.

Table 1: Usage of Different Kinds of Information Resources by the Biomedical Professionals in the Region

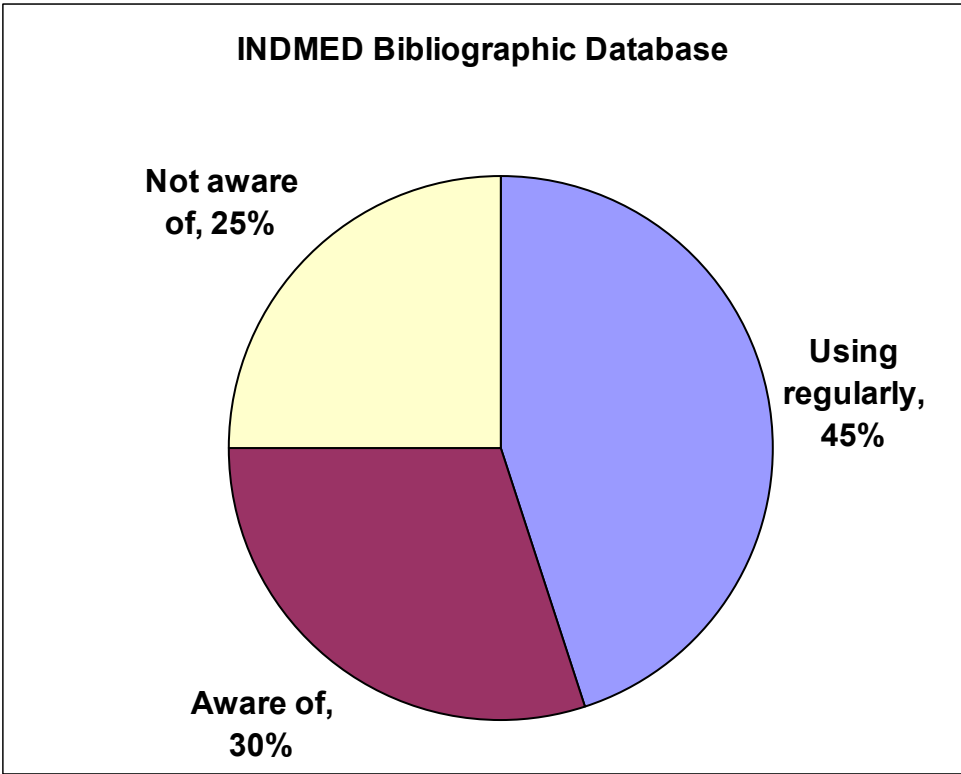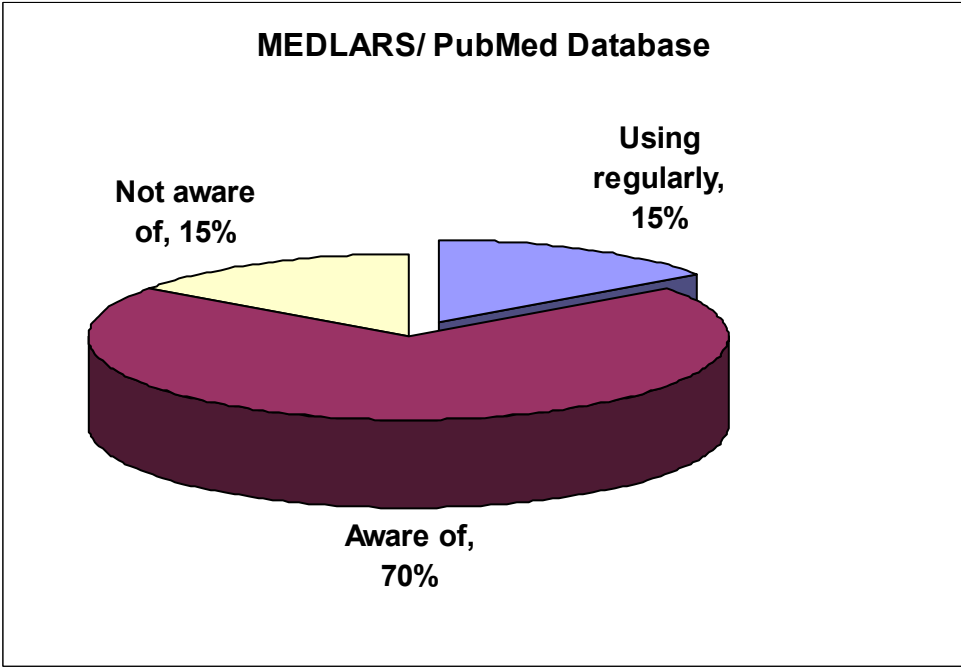| Type of Information Resources	Origin	Using regularly (%)	Aware of (%)	Not aware of (%)
A. Bibliographic Databases:				
INDmed @ NIC database	Indian	45	30	25
PubMed / Medline database	International	15	70	15
Medline Plus database	International	40	45	15
National Library of Medicine (NLM) Catalog database	International	15	55	30
NLM Gateway	International	5	40	55
B. Electronic Journals:				
medIND open access journals	Indian	33.3	50	16.7
MedKnow Publishers journals	Indian	5.6	72.2	22.2
PubMedCentral open access journals	International	16.7	55.6	27.8
BiomedCentral open access journals	International	11.1	55.6	33.3
Public Library of Science (PLoS) open access journals	International	11.8	47.1	41.2
C. Digital Libraries/ Digital Archives:				
OpenMed open access archive	Indian	55.6	22.2	22.2
Traditional Knowledge Digital Library (TKDL)	Indian	11.1	55.6	33.3
Digital Library of India	Indian	33.3	44.4	22.2
The Yale Medicine Thesis Digital Library	International	0	61.1	38.9
DigitalCommons@The Texas Medical Center	International	0	27.8	72.2
National Science Digital Library	International	35.3	29.4	35.3
D. Websites/ portals of Biomedical Organizations				
WHO websites/ portals	International	27.8	66.7	5.6
Ministry of Health & Family Welfare websites	Indian	5.6	83.3	11.1
ICMR websites/ portals	Indian	11.1	77.8	11.1
Websites/ portals of Indian biomedical institutions (like AIIMS, etc)	Indian	17.6	70.6	11.8
Websites/ portals of International biomedical institutions (like NIH, USA)	International	7.1	78.6	14.3
Websites/ portals of Indian professional societies (like IMA, etc.)	Indian	7.1	85.7	7.1
Websites/ portals of International professional societies (like, Royal Societies, etc.)	International	7.1	71.4	21.4

INDMED Bibliographic Database

Not aware of, 25%

Using regularly, 45%

Aware of, 30%

Figure 1: IndMED Bibliographic Database

MEDLARS/ PubMed Database

Not aware of, 15%

Using regularly, 15%

Aware of, 70%

Figure 2: Medlars/ PubMed Bibliographic Database

MedIND Open Access Journals

Not aware of,
16.7%

Using regularly,
33.3%

Aware of,
50.0%

Figure 3: MedIND Open Access Journals

MedKnow Open Access Journals

Using regularly,
5.6%

Not aware of,
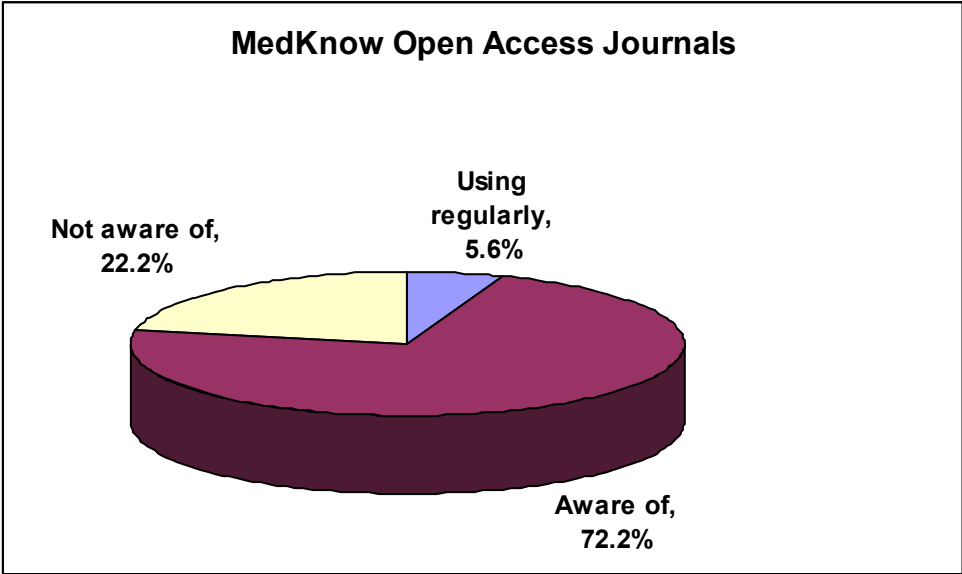22.2%

Aware of,
72.2%
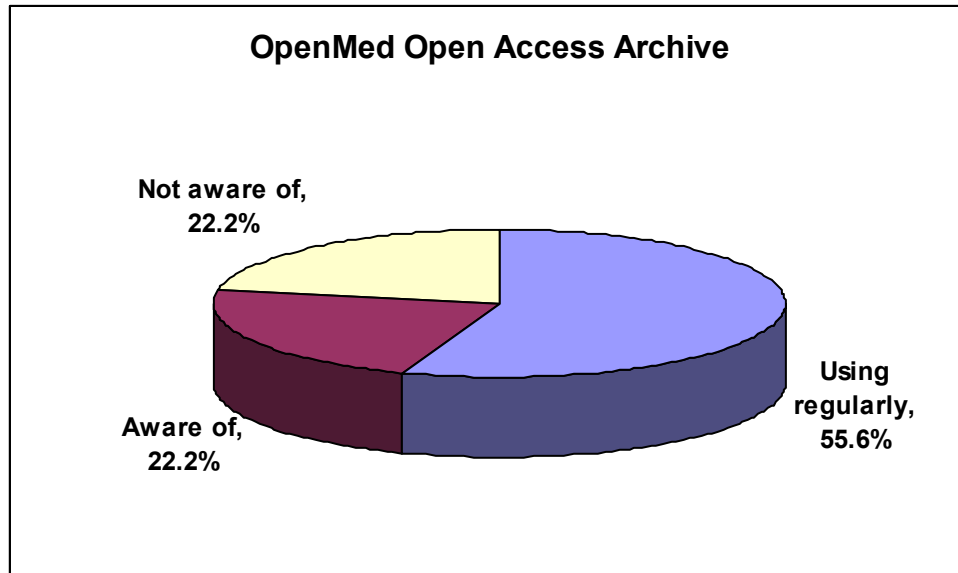
Figure 4: MedKnow Open Access Journals

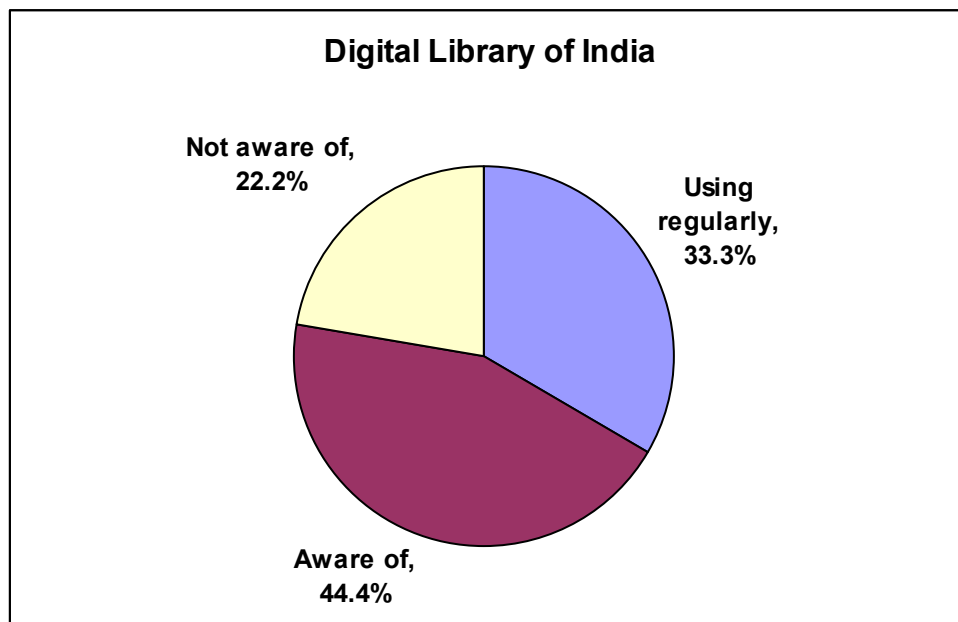**Figure 5: OpenMed Open Access Archive**

Figure 6: Digital Library of India

Table 2: Different Indicators on Information Use and Information Dissemination pattern of the Biomedical Professionals in the Region

	Yes	No
Do you get sufficient information from the Internet resources?	75%	25%
Do you submit your Articles in Journals through Internet?	16.7%	83.3%
Do you submit your articles in Digital Archives (like, OpenMed)?	5.6%	94.4%

Table 2 shows that the majority of the respondents (three fourth) are satisfied with the literature available on the Internet with regard to adequacy to their information need. But they mostly depend upon the general browsing and general search rather than finding specific information or consulting specific web portals as revealed from their lack of maximum utilization of the Indian and/or international biomedical information resources. Though using the Internet is now widely popular, especially among the younger generations, submitting own contributions to these open access archives (5.6%) is rare. Many such persons are not at all doing any professional writing. Those who are writing are still to use Internet as the primary vehicle of submission (only 16.7%).
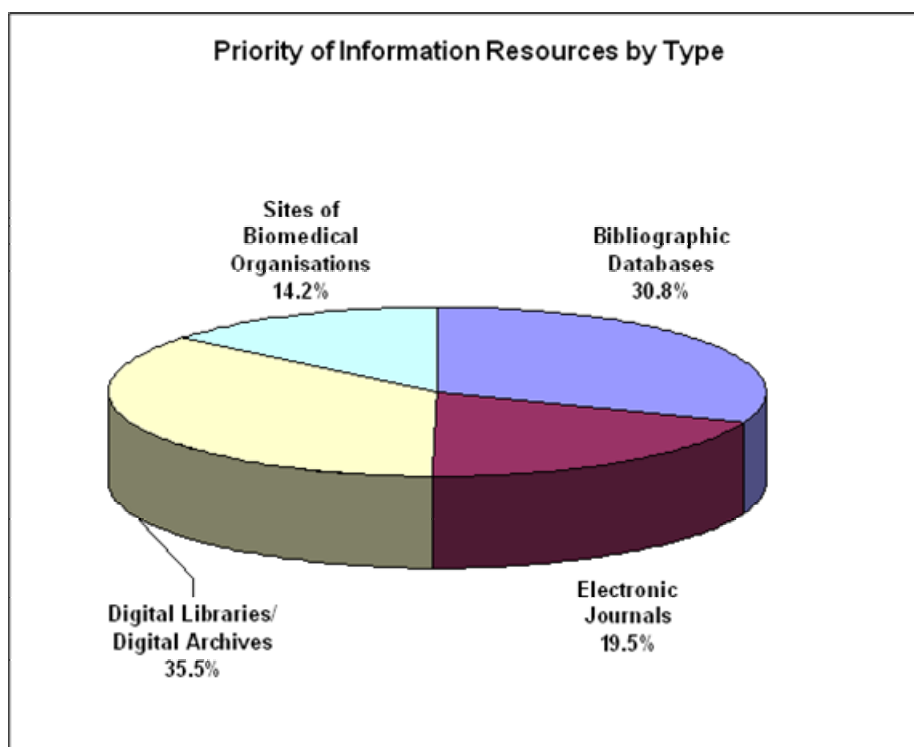

Figure 7: Priority of Type of Information Resources for Obtaining Relevant Information

Figure 7 shows a list of priority amongst four broad types of biomedical information resources. Digital libraries/digital archives topped the list bagging about 36% of the users, bibliographic databases a close second with 31%, electronics journals a mere third with 20%, but the websites and web portals of the biomedical organizations are lagging behind with only a 14% priority. In other words, digital libraries stand top priority in retrieving relevant professional information, followed by bibliographic databases, electronics journals and web portals of the biomedical organizations.

Table 3: Assessment on Indian Biomedical Information Resources

Assessment on	Excellent (%)	Good (%)	Average (%)	Poor (%)
Content	5.0	55.0	40.0	0.0
Currency	0.0	50.0	50.0	0.0
User Interface	0.0	35.0	65.0	0.0
Search Facility	0.0	30.0	65.0	5.0
Browsing Facility	0.0	35.0	65.0	0.0
Users' Account	0.0	22.2	77.8	0.0

In this study, Indian biomedical information resources as available in the Internet have been assessed by the respondents. Several parameters like content, currency, user interface, search facility, browsing facility; user's account, etc have been used (Table 3). As regards to content, only few (5%) thought them excellent, half of the participants (55%) felt it as good enough, less than half (40%) took them as only average but hopefully none of them told that the content is poor. Not even one of the respondents thought these resources are excellent in terms of currency, user interface, and search facility, browsing facility or user's account. Half of the study population considered the currency as good whereas other half thought them to be only average standard. Most of these respondents (65%) found the user interface neither excellent (0%) nor good (35%) but only average. According to most of the respondents (65%) the search facility is only of average kind, for about one third of them (35%) it is good and for the others rather poorly (5%). Browsing facility is also not good (35%) but just average (65%). User's account is required for accessing certain information resources where user login and password are given to registered users free of cost.   User's account is thought of mostly as an average (77.8) or occasionally as good (22.2%).

CONCLUSION
With the advent of modern information communication technologies, dissemination of biomedical scholarly literature in India has grown up at the optimal level. The availability of information infrastructural facilities across India may vary from a region to region. Also, metropolitan cities have better 'infostructure' as compared to non-metropolitan areas. The biomedical practitioners are supposed to have better 'infostructure' than other communities and citizens, as they afford to avail these services. If we visualize a situation where both adequate relevant information and information infrastructure are available, we may assume that the professionals and scholars are utilizing the facilities at the fullest possible extent. If that is not happening, we have to find out the reasons behind this lacuna. Present study reveals that the similar things are happening in this region too, i.e., under-utilization of biomedical information resources although these are available free of cost (excluding accessing costs). The awareness level should be increased through continuing education programmes, information literacy programmes, etc. Also, the curricula of undergraduate and postgraduate programmes in biomedical sciences should accommodate information literacy competency development, so that, the practitioners can grasp the new information and can apply the new knowledge in their professional life for the better benefits of the society. In every five or ten years, they should refresh their knowledge in their professional areas too. Also, biomedical practitioners, who always handle unique kinds of diseases and treatments, should be documenting the findings and courses of actions of these unique clinical cases. These cases can be communicated to the peers and fellow practitioners, in the forms of journal articles, conference papers, popular articles, clinical cases, etc. for the further development of scientific knowledge. Thus, we may recommend that information literacy competency development programmes that ensure lifelong learning should be designed and undertaken for the biomedical practitioners. The open access digital repository for clinical cases of tropical diseases, India-centric diseases and rare diseases should also be planned and implemented so that biomedical practitioners can reach out the solutions and experiences that may be needed to them in handling real-life situations. The ETD (electronic theses and dissertations) repository is another kind of open access repository that also needs to be established in India in the areas of biomedical sciences. All these efforts would obviously lead this noble profession into more dignified, knowledgeable and responsive to the societal needs.

REFERENCES

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