

Patents & publications: In Indian perspective

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World Journal of Biological and Pharmaceutical Research, 2022, 02(02), 013–023

Publication history: Received on 03 March 2022; revised on 11 April 2022; accepted on 13 April 2022

Article DOI: <https://doi.org/10.53346/wjbpr.2022.2.2.0027>

Abstract

Intellectual property rights are the exclusive rights granted to individuals over the creations of their minds by the country to use his or her creations for a limited period of time. The types of intellectual property rights are Patents, Copyright, Trademark, Industrial designs and Geographical indications. A patent is a grant of right by the government for an invention to the inventor in exchange of full disclosure of the invention. A patent is a legal right that allows applicants and assignees to use and exploit their inventions for a period of 20 years from the date of filing of application. For the duration of the set period, the patent holder has the legal right to prevent others from commercially exploiting/using his/her invention and if anybody found doing so he can take legal actions against that person/company/organization. Patent provides many benefits to the inventor/researcher but why Indian researchers prefer publications instead of patenting their work. In this review article we were tried to find out the reasons behind it. Lot of reasons came to front after the study like totally online procedure of application, long waiting time, application and other fee, answering within time frame, command in English language, drafting expertise etc. And on the other hand publications need less labor, expense and time. Although many problems are there in patenting but if the work is authentic, genuine and novel, the inventor should go for patenting, so that he/she can use it commercially. Commercial use will not only benefit the researcher but it increases the Gross domestic production of the country. It is also duty of the every researcher to help in country's development.

Keywords: Patent; IPR; Intellectual property rights; Publications; Patents in India; Publications in India

4. Introduction [1]

1.1. Intellectual property rights

Intellectual property rights (IPR) are the exclusive rights granted to inventor/creator to use his/her invention/creation for a set time period. Intellectual property (IP) includes novel mind-created works such as inventions, literary works, artistic works symbols, names, images, locations and designs. The different types of IPR are Patents, Copyright, Trademark, Industrial designs and Geographical indications.

1.2. Patents

A patent is a government grant of an invention to the inventor in exchange for full disclosure of the invention. A patent is a legal right that allows applicants and assignees to use and exploit their inventions for a set period of time (usually 20 years from filing). For the duration of the patent period, the patent holder has the legal right to prevent others from commercially exploiting his invention.

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1.3. Copyright

The set of exclusive rights granted to the author or creator of an original work, including the right to copy, distribute, and adapt the work, is known as copyright. Copyright protects the expression of an idea rather than the idea itself.

1.4. Trademark

In layman's terms, a trade mark (also known as a brand name) is a visual symbol that may be a word signature, name, device, label, numerals, or combination of colors used by one undertaking on goods or services or other articles of commerce to distinguish it from similar goods or services originating from another undertaking. The chosen mark should be able to be represented graphically (i.e. on paper).

1.5. Designs

The features of shape, configuration, pattern, ornamentation, or composition of lines or colors applied to any article, whether in two or three dimensional (or both) forms, are referred to as design. An industrial design registration protects an article's ornamental or aesthetic aspect.

1.6. Geographical indications

Geographical Indications of Goods are defined as the aspect of industrial property that refers to the geographical indication referring to a country or a place located therein as being the country or place of origin of that product.

5. Patents

A patent is a government grant of an invention to the inventor in exchange for full disclosure of the invention. A patent is a legal right that allows applicants and assignees to use and exploit their inventions for a set period of time (usually 20 years from filing). For the duration of the patent period, the patent holder has the legal right to prevent others from commercially exploiting his invention. What can be patented? Any invention relating to the composition, construction or manufacture of a substance, an article or an apparatus or an industrial process can be patented. Who can apply for Patent? The inventor may file an application alone or jointly with other or with his/her assignee or the legal representative of any deceased inventor or assignee. Why patent necessary? Patent provide incentives to Individuals by recognizing their Creativity and offering the possibility of material reward for their Marketable inventions. These incentives encourage innovation, which in turn enhances the quality of human life.

1.7. Benefits of patenting

Get rights to stop others from copying, manufacturing, selling or importing the invention without inventor's permission. Patent give protection for a pre-determined period. Invention will be used by the inventor only nobody else can use it. It's a source of revenue (royalty) by licensing the patent for others to use and by selling it. And the most important part is by patenting the invention, nation's GDP will increase which is a contribution to nation's development. [2] There are 29 forms regarding patenting of invention starting from the application for patent to grant of patent. [3] Step by step we will see now the procedure with their forms.

1.8. Procedure of patenting [4]

2.1.1 Step 1: Filing of patent application

Table 1 Statutory Fees for E-filing patent application

Particulars	Natural person (INR)	Small Entity (INR)	Large Entity (INR)
For filling patent application	1,600	4,000	8,000
For each sheet of specification in addition to 30	160	400	800
For each claim in addition to 10 claims	320	800	1,600

Filing of patent application is totally online which starts by creation of login ID & Password. The other requirements are digital Signature and valid debit/credit/net banking facility for fee payment. Form 1 will generate for through portal which is to be filled to provide information of the inventor. Then Form 2 for provisional/complete specification which

comprises of description of invention, claims and abstract. Others things to be provided are drawings, figure of abstract, Form 3 for statement and undertaking, Form 26 for power of attorney (in case other than inventor e.g. patent agent). The Original documents needs to be submitted before Indian Patent Office. Form 5 for declaration of owner of Invention. Finally online statutory fee payment (Details of fee are given in Table 1).

2.1.2 Step 2: Publications

A patent application will be published automatically in the official journal after expiry of 18 Months from date of filing containing title, abstract, application no. and name of applicant and inventor. Using Form 9, request for early publication can be made any time after filing of the application by which the application will be published in one month from the date of request. Early publication fee is Rs. 2500 for natural person, Rs. 6,250 for small entity and Rs. 12,500 for large entity.

2.1.3 Step 3: Opposition (if any)

Opposition is divided into two parts namely pre grant opposition and post grant opposition. One by one we will discuss, lets start with pre grant opposition. After publication any person based on different grounds may file a pre grant opposition in writing, represent by way of opposition to the Controller against the grant of patent. However the opposition will be taken by the patent office only after the filing of request for examination. The applicant shall file his Statement and Evidence (if any) in support of his application within three months from the date of the notice forwarded by the controller. The Controller shall proceed by either accepting or refusing the grant of patent within one month from the completion of the above proceedings. An applicant can go for an appeal against the decision of the Controller before the Intellectual Property Appellate Board (IPAB).

After the grant of patent, if any person based on different grounds file an opposition in Form 7 to the Controller against the grant of patent, this is Post grant Opposition. Post grant Opposition should be done within one year after the grant of a patent. What are the things which are mandatory here? i. Notice of opposition (Form 7) ii. Written statement iii. Evidence iv. Statutory fees are Rs. 2,400 for natural person, 6,000 for small entity and 12,000 for large entity.

Procedure

A copy of Statement and Evidence together with Notice of Opposition shall be delivered to the Applicant. The applicant shall leave a reply statement and evidence within a period of two Months from the date of receipt of the copy of statement and opponent's evidence. The Opposition Board will give his decision of acceptance or rejection to the applicant. The applicant can go for an appeal against the decision before IPAB.

2.1.4 Step 4: Request for examination

Within 48 months of the date of filing of application request for examination should be made by paying the fee. The details of the fee are Rs. 4,000 for natural person, Rs. 10,000 for small entity and 20,000 for large entity. Fee for express request examination is Rs. 5,600 for natural person, Rs. 14,000 for small entity and 28,000 for large entity.

2.1.5 Step 5: First examination report

Thorough examination of the patent application is carried out on the basis of novelty, inventiveness and industrial application. Then the Patent Examiner sends the First Examination Report (FER) to the applicant.

2.1.6 Step 6: Amendment of objections by the applicant

After receiving the FER, the applicant has to file a response and answers/solutions of Examiner's objections. It should be done within 12 months of the applicant receiving the FER. If the response is unjustified, the Controller can refuse the grant of a patent or amended claim/s.

2.1.7 Step 7: Grant of patent

If the applicant responds satisfactorily to all of the objections raised in the FER to the controller, the patent will be granted after assigning serial number under the Indian Patents Act, 1970.

2.2 Renewal fees

After grant of patent, it should be renewed on specified time which is mentioned in the Table 2 below. Without renewal, the patent can be ineffective. If a request for extension in Form 4 with fees Rs. 480 for natural person, Rs. 1,200 for small

entity, Rs. 2,400 for large entity is made, the period for payment of renewal fees may be extended to a period of up to six months.

Table 2 Renewal fees

Particular	Natural person	Small entity(INR)	Large entity(INR)
Before the end of II year for 3 rd –6 th year	500	2,000	4,000
Before the end VI year for 7 th –10 th year	2,400	6,000	12,000
Before the end of X year for 11 th – 15 th year	4,800	12,000	24,000
Before the end of XV year for 16 th – 20 th year	8,000	20,000	40,000

2.3 National and global Patent data [5]

2.3.1 Patents in India

Globally in 2019-20, overall filling of Application for various IPRs were 427,309 and has been higher as compared 405,324 in the previous year 2018-19. In India, a total of 56,267 patent applications were filed in 2019-20 which exhibits an increase of about 11.1% as compared to 2018-19. Status of patents in India in the year 2019-20 are shown in Table 3 i.e. filed, examined granted and disposed and percentage shown in figure 1.

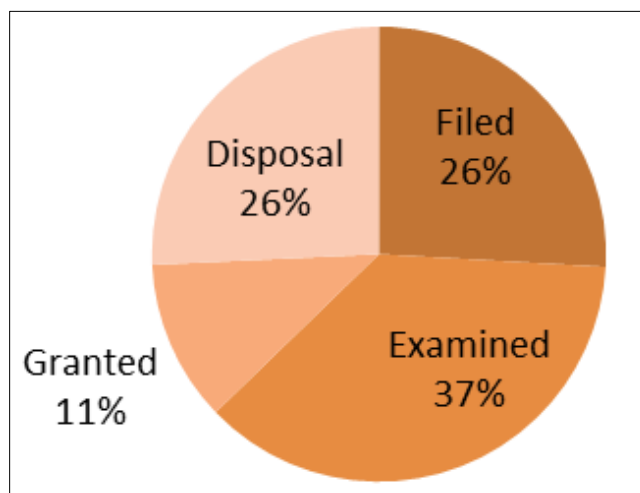


Figure 1 Status of patents in India in 2019-20

Table 3 Status of patents in India in 2019-20

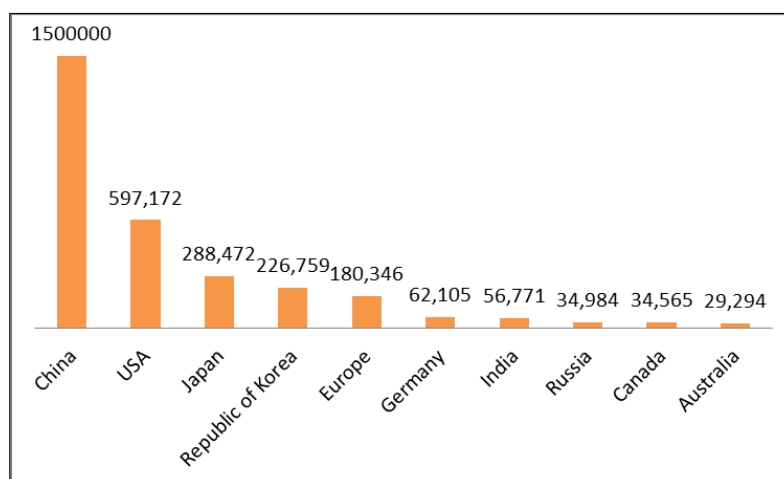
Year	2019-20
Filed	56267
Examined	80080
Granted	24936
Disposal	55945

2.3.2 Worldwide Patents [6]

In 2020, based on number of patent applications top 10 countries were given in Table 4 and graphically it is shown in figure 2. The 33 lakh applications filed worldwide comprised of 23 lakh resident filling (70.3%) and 10 lakh Non – resident fillings (29.7%)

Table 4 Top 10 countries based on number of patent applications filed in 2020

S. No.	Country	No. Of Applications
1	China	15,00,000
2	Unites states	5,97,172
3	Japan	2,88,472
4	Korea	2,26,759
5	Europe	1,80,346
6	Germany	62,105
7	India	56,771
8	Russia	34,984
9	Canada	34,565
10	Australia	29,294

**Figure 2** Patents application worldwide in 2020

1.9. Role of patents in enhancing the GDP of the country [7]

An industrial patent helps the government to attract International investors to invest in India and which accelerates the economy of the nation. The intellectual property index (IP index) status of India shows that there is positive and strong relationship between IP Index and GDP of the country. With the help of patent, a firm/company can capture international advantages and investments. Foreign investors recognized the Indian market good for innovative products and have huge opportunities for patents. Hence inventors play a big role in enhancing the economic growth of the country and create employment opportunities. Indian Status of Patent Application in top fields. Share of different fields of technology in Patent during 2013 to 2017 are 16.34 in science and technology, 6.3 in pharmaceuticals, 14.67 in organic fine chemistry, 7.33 in semiconductors, 4.1 in biotechnology, 4.1 in digital communication, 3.22 in basic materials chemistry, 2.56 in IT methods of management, 2.34 in measurement, 2.26 in medical technology 26.78 in other fields.

Relationship between Patents and GDP: In 2018, India had 11546 patent and on that time the GDP was 4533.01 billion US\$. After 10 years India showed a big growth and led the GDP to 8606.47 billion US\$. Such a strong growth was reported due to large number of filing of patent applications in different fields. Figure 3 is showing increase of GDP with increase in patents (1 represents 2008 and 10 represents 2017).

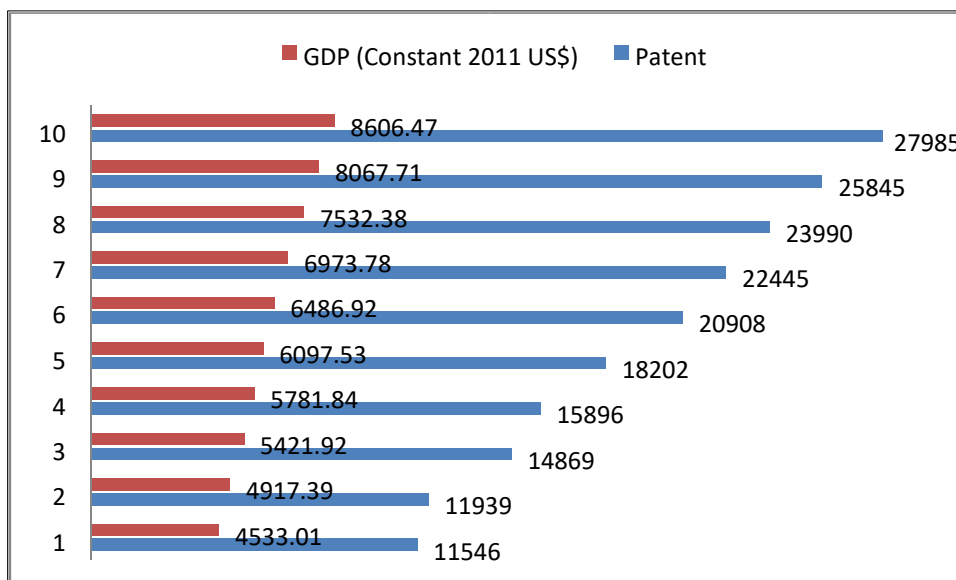


Figure 3: Graph showing the relation between patents and GDP. As the number of patents are increasing simultaneously the GDP is increasing. Source: WIPO Database, August 2019

6. Publications [8]

Publications provide scientific information which allows the rest of the academic community to evaluate the research quality. Publications acts as foundation for new research by application of findings. They impact not only the research community but also the society directly or indirectly. Here ethics are needed means the researchers must ensure that their publications are honest, clear, authentic, genuine, accurate, complete and balanced and it should not mislead also should avoid selective or ambiguous scientific reporting.

1.10. Types of scientific publications

Scientific articles can be published in many ways such as in scientific journals, book as author or co-author, author of a book chapter, presentations at academic conferences (oral or poster), worldwide web scientific publications, technical reports, blogs and science forums.

3.2 Types of manuscripts for Publication [9]

Types of journal manuscripts

Rapid Communications, Original Research, Review Articles, and Case Studies are all examples of journal manuscripts.

3.2.1 Original Research

This is the most common type of journal manuscript. The Original Research is written in a specific format provided by the journal. It contains complete sections on the introduction, methods, results, discussion and conclusion.

3.2.2 Rapid Communications/Letter

Rapid Communications/Letters are the papers which present findings that the editors believe will be of current interest to many researchers and also additional research is required in the field. This format have length limits, sometimes without complete a full Original research manuscript it may not publish.

3.2.3 Review Articles

Review Articles provides a summary of research on a specific topic. They are frequently written by specific subject/field experts. Researchers frequently read and cite the review articles e.g. for introduction to a field. Approximately 100 primary research articles are commonly cited in writing a review article.

3.2.4 Case Studies

Case Studies are carried out with an aim to raise awareness among other researchers about the possibility of a specific phenomenon occurring. In medical field, this type of study is frequently used to report the occurrence of previously unknown or emerging diseases.

3.3 Procedure of how to and where to publish

Researcher has to make a manuscript to publish their research work in a prescribed format. The format differs from journal to journal. Usually, the standard manuscript format consists of following parts: title page, abstract, keywords, introduction, methods and materials, experimentation, results and discussion, conclusion, acknowledgement, references. Before sending or preparing manuscript, researcher have to select journal for publication by keeping many things in mind such as impact factor, journal's field of interest, publication charges, peer review, duration of publication and open access.

3.4 Benefits of publications [10]

Most of the journals are now online, this facilitates other researchers to access i.e. read or see the article from any part of the world. Acceptance of the article usually takes time but once accepted; publication takes no or very less time. For publishing articles, expenses are less i.e. publication charges, sometimes free. Less labor is needed to publish, only needed in preparation of manuscript. As per the suitability, the manuscripts can be prepared i.e. research or review.

3.5 Data of publications nationally and globally

3.5.1 Publications in India [11]

According to Department of science and technology, Government of India, there is an exponential increase in number of scientific publications over last ten years. Quoting an United states agency National Science Foundation (NSF) database DST states that India is currently in 3rd rank after China and United states with 1,35,788 scientific publications in 2018 which shows 12.9% growth rate as compared to world's average growth rate of 4.9%. During 2011-2016, India's growth rate of scientific publication as per the SCOPUS database (Elsevier's abstract and citation database) and SCI database (science citation index database) was 8.4% and 6.4% as against the world average of 1.9% and 3.7%, respectively. Graphically it is shown in figure 4.

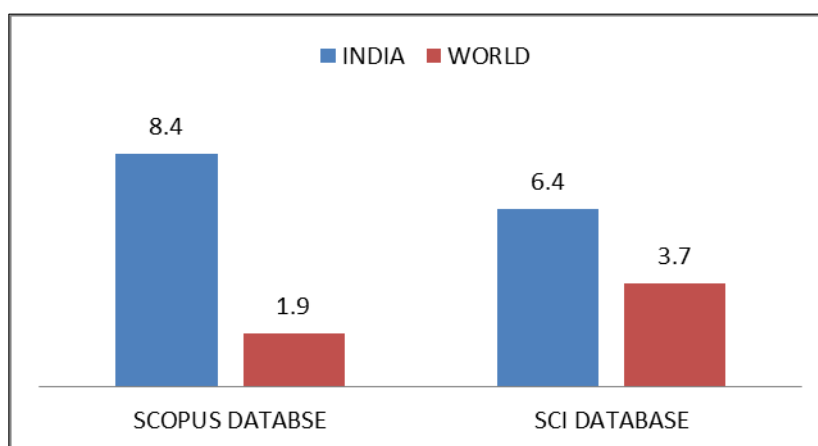


Figure 4 Growth rate of scientific publications in India and World between 2011 and 2016

3.5.2 Global publications [12]

Comparison of publications among three leading countries in 2018

In 2018, China was the top country by number of scientific journal articles in the world with 528,263 publications that accounts for 20.93% of the world's total number of scientific journal articles. United States ranked second with 422,808 publications and India was in third rank with 135,788 publications.

Publications of individual countries in 2018

According to the latest data published by National science foundation (NSF) in the year 2018, the number of publications by individual countries in field of science and engineering with their percentage global share are shown in the figure 5.

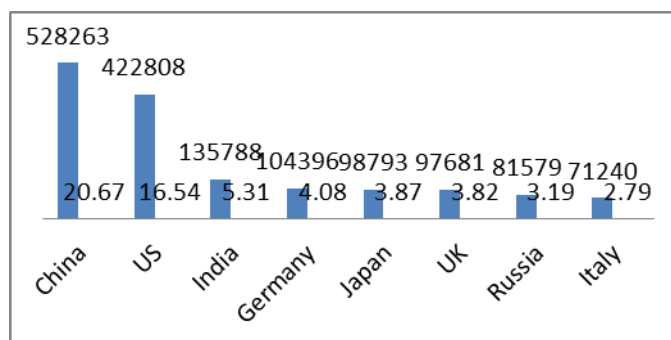


Figure 5 Status of scientific publications in 2018 of eight countries with their global share (Blue shows number of scientific publications and red shows global share)

4 Problems faced by researchers in patenting

After literature review, following problems came out which were faced by the researchers/inventors in patenting their work. The problems are complex application process of patent, difficult to obtain patent, financial problems, feeling of insecurity in obtaining patent, infringement, lack of knowledge, totally online process, difficult to check novelty and patentability, to do everything in a time frame. Below we will discuss the above problems individually.

6.1 Complex application process of patent

Because of the following reasons, the application process is said to be complex e.g. totally online process, computer knowledge, proper English language, patent drafting skills. Each step should be finish in a specified period and also if everything is ok, about 1.5 - 2 years needed to obtain patent. Hence, not only labor but patience is also required here.

6.2 Difficult to obtain patent

From filing of patent application to grant of patent, there are seven steps to follow, any mistake or deficiency can lead to rejection e.g. i. In patent drafting, detailed explanation of research should be provided, here if the patentee is unable to give Clear and justified explanation of his research, then his/her application may be rejected. ii. In case of provisional application, 1 year time is granted to file complete application, failing which application may go for rejection. iii. In publication, if somebody raised any objection on different grounds and the patentee couldn't give proper explanation with evidence the application can also be rejected.

6.3 Financial problems

Although the charges are less for different steps in patenting for natural person, small entity or large entity but the whole process is not so easy to do alone without complete and proper knowledge. On hiring a patent agent for assistance, including his charges the cost may reach up to 35000 – 45000/-. This much amount is a big problem to bear for a person/entity who is not financially strong.

6.4 Infringement

Patent gives patentee an exclusive right to use or to sell and the patentee may take legal action and file a petition against the user for patent infringement in either a district or further in high court. Infringement means the case where others are commercially using that work without permission of owner of patent. Laws are there to protect patent but when someone infringes, it's also difficult to fight the case in court because the process demands expenses, time and evidence.

6.5 Lack of knowledge

Research are continuously going on in all fields of medical and Pharmaceutical Sciences but very less researchers go for patent because of lack of guidance from an experience person, lack of practical knowledge to file a patent and to get patent, lack of computer knowledge, weak English language, difficulty in explaining while drafting, lack of knowledge about patent advisors.

6.6 Totally online process

Filing of patent application to grant of patent, everything is online which means that the patentee must be computer literate with online working skills. To overcome this problem, one go for patent advisor assistance which is very expensive.

6.7 Difficult to check novelty and patentability

Global patent does not exist. Hence, it is very necessary to check the novelty and patentability of research in India as well as in other countries. However, this work is time consuming and also not too easy. For this purpose, software are needed. Checking IP website of each and every country is very difficult. Software like PATSEER provides online patent information of most countries but to purchase or to take subscription is very expensive.

6.8 To do everything in a time frame

In India, there are 7 steps for grant of patent starting from the application of patent.

- Filing of patent application : less than one day
- Publication: 18 Months from filing date.
- Opposition: Pre-grant: within 3 months from the date of publication.
Post-grant: within 1 year after grant of patent.
- Request for examination: within 48 months from date of filling.
- First examination report: within 12 months.
- Amendment of objections by the applicant: within 6 months.
- Grant of patent: 2-3 years.

It takes about 2 year to 3 years and each step should be completed in a specified period. After the specified period, if work not completed/submitted, rejection of application may happen e.g. provisional application gives 1 year for completion, if in case not completed, the application is rejected.

7. Why researchers go for publishing their work in Journals?

Lot of online and offline journals are there to publish the research, mostly online. No need to go anywhere for publication. Because of online publication, worldwide one can refer the articles. Also the publisher proves the hard copy of the article with certificate of publication. Frequency of publication in journals is mostly monthly but some are bimonthly, quarterly or annual. By field of interest also lot of journals are available like engineering and technology journal, pharmaceutical sciences journal, medical journals, science journals, arts and commerce Journals. Apart from these, other benefits are less time taking, less expensive, less labor is needed to publish compared to patenting.

Publications are mandatory for curriculums like Master of Pharmacy and Doctor of Philosophy as well. After completion of work or during work, a researcher can publish his work easily and in less time by preparing manuscript in any one of the following form i.e. Research article, Review article, Short communication, Case report and Letter to editor. Usually, the difference in these manuscripts is in length, number of pages, word count and in writing format.

8. Discussion

Table 5 Advantages and disadvantages of patents as well as publications, this gives rise to more publications and less patents

Patents	Publications
Online procedure which needs computer expertise	Online procedure which needs Basic computer knowledge
Long duration between application and grant of patent	Short duration between submission and publication
Every step needs fee starting from application fee of 1600/- for individual	Publications charges are usually 1500 to 2000 or sometimes free

Everything should be done in time frame e.g. provisional application gets 01 year to complete, failing in this, gives rise to loss of time and money.	Publications don't have such risks. Researcher can publish their work in parts.
Strong scientific English language is needed especially in case of patent drafting	Easy and understandable scientific English language is needed throughout the manuscript.
Good writing skills expertise with good English knowledge is necessary in drafting the heart of patent application	Publication needs writing skills and English but not to that much extent of patent
There is no concept of global patent exists, that's why before application filing specific software is needed which provides database for patent search.	No such software is needed
Patent Search, novelty search, patentability Search takes huge time and patience	No such publication search is needed
Need of novelty in work done as well as in drafting	Publications needs plagiarism free
If the researcher is taking assistance of patent agent to file patent, they charge big amount.	Researchers usually make the manuscript but if he is taking someone's help in preparing, he charge less/nominal amount.
In patent draft everything is new, so there is less importance of plagiarism	Plagiarism is the essential part of publication which tells about uniqueness. Many online free and paid software are available to check plagiarism
The patent must be renewed by depositing prescribed fee before the expiration of 2 nd year, 6 th year, 15 th year from the date of patent	Once published, there is no need of renewal
In case of infringement of patent, the researcher/inventor can take legal actions	Publication comes under copyright and the all rights reserved with the journal publisher. In case of copying or things like this without permission, the publisher can take legal action

9. Conclusion

Although publication is somewhat easy and mandatory too in some cases like for obtaining degree of post graduation and doctorate. Many problems a researcher/inventor faces in patenting as compared to publication but if the work is authentic, fair and novel, he/she must go for patenting because of following reasons

- Researcher/inventor after patenting can use it commercially either by producing herself/himself or by giving it to somebody on contract basis for specified period.
- Commercialization wont only benefit the researcher/inventor but it increases the Gross domestic production (GDP) of the country. Hence, serving nation is also the duty of the researcher. GDP growth helps in the development of the country.
- It makes the country scientifically and financially strong.
- Recognize achievement of researcher at national and international levels.
- Recognize the country at international level in field of science.
- Motivate others to do research and get patent.

Gujarat Technological University's assistance to researchers

IPR Cell is providing online PATSEER for Patent Search Database, for Novelty search, Patentability Search or Technology to its affiliated colleges. As per the scheme under SSIP policy, GTU provides Rs. 25,000/- as financial assistance for patent filing for GTU students, faculty, academic researchers or student start-ups (who are students or passed out in last five academic years).

Compliance with ethical standards

Acknowledgments

Authors are very thankful to the authors of the articles mentions in the references below because of whom we could able to prepare this review article.



Disclosure of conflict of interest

Authors declare that there is no conflict of interest.

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Author's short biography

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