



## Worldwide Patent Landscaping of AYUSH Technologies

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The paper is a landscape analysis of patenting activity in the field of AYUSH. A patent search was carried out for patents in the field of Ayurveda, Yoga, Unani, Siddha and Homeopathy in the Questel Orbit database. The search was carried out globally and included the patents that were filed in the last five years (February 2015 - January, 2020). A total of 1560 patents were retrieved during the search. The search showed that a disproportionate amount of patents were filed in the field of Yoga followed by Homeopathy and Ayurveda. Pinghu Shengroude plastic industry came out as the assignee with maximum number of patent filings followed by Jiangsu Youth Fitness Equipment. The search also covered products, current developments in the field along with listing potential commercialization opportunities for existing players in the field.

**Keywords:** Ayurveda, Yoga, Unani, Siddha, Homeopathy, AYUSH

Urban lifestyle has caused a large amount of problems and ailments to the people like blood pressure, hypertension, diabetes, stroke etc., these diseases till now were being dealt by use of western medicine but now other alternative medicine systems which are present since ancient times are coming back in prominence. Among the five systems in AYUSH four (Ayurveda, Yoga, Unani and Siddha) have roots in India while Homeopathy although not a part of India has found great acceptance in the country.

WHO in recent time has brought in a string of guidelines to bring traditional medicine systems to the mainstream by setting guidelines and standards to be followed by all practitioners under the 'WHO Traditional and Complementary Medicine Strategy: 2014-2023.'<sup>1</sup> This shows a growing interest in the field. Some of the more recent works showing the growing interest in the field of AYUSH includes:

- (i) Preventive care, symptom management of Covid-19-like illness and add on interventions to conventional care.<sup>2</sup>
- (ii) The CCRAS (Central Council for Research in Ayurvedic Sciences), an autonomous body of AYUSH, had developed AYUSH-64 that claims to treat malaria without side effects. The NRDC (National Research Development Corporation) has signed an agreement with Dabur to market this drug in 2014.

- (iii) "Super critical fluid extracted fatty acids from *Withania somnifera* seeds repair Psoriasis-like skin lesions and attenuate pro-inflammatory cytokines (TNF- $\alpha$  and IL-6) release"<sup>3</sup> by Acharya Balkrishna. The paper has been published in the MDPI Journal and is the first video to be published in the Sanskrit Language.
- (iv) NCCIH (National Center for Complementary and Integrative Health) has signed a MoU with Ministry of AYUSH to conduct research in the field of Ayurveda in combination with Yoga for pain relief.<sup>4</sup>
- (v) Concordia researcher uses gold ash to uncover means for slowing the progression of cancer cells. The research focuses on combining Siddha and Ayurveda to use gold ash for curing cancer.<sup>5</sup>

### Ayurveda

Ayurveda means Science of life and considers health to be a basic necessity which is required to achieve greatness in life. Ayurveda is not just a medicinal system but also guides a person on living a healthy lifestyle and is more in line with being a preventive form of medicine but it has also been used in curative and mitigating forms.

### Yoga

Yoga has a number of postures and exercise for preventing as well as curing diseases. The diseases are prevented by meditation techniques which focus on breathing techniques and exercises which are used to increase stress capacity of the body and increase flow of oxygenated blood in the body.

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**Unani**

Unani medicine system just like Ayurveda also focuses on both medicinal as well as lifestyle aspects of a person. The medicine system checks the temperament of the person to determine both the disease and the drug. The drug is made from naturally occurring substances and focuses to restore the inner balance within the human body.

**Siddha**

Siddha medicine system utilizes the ratio of 4:2:1 *Vaadham*, *Pittham* and *Kapam* to determine if the patient is sick or not; once this ratio gets disturbed the patient gets sick.<sup>6</sup> The system utilizes herbs along with metals and minerals including processed mercury lead, arsenic etc. to make drugs.

**Homeopathy**

Homeopathic medicine system is based on the principle that a substance which causes diseases in a healthy person would cure the symptoms in a sick person this is called the law of similar.

**Research Methodology**

A basic patent search was carried out in the orbit database by only using keywords and not introducing any patent classifications to avoid any omission of records. The search was carried out only in title, abstract and claims so as to extract the most relevant records from the database which contained the keywords Ayurveda, Yoga, Unani, Siddha and Homeopathy. The search was carried out in a broad manner and in the time period from February 2015 to January, 2020 so that most recent filings can be retrieved and a trend in patent filings could be determined. A separate search was also carried out for policy steps taken in India regarding the field of AYUSH this was done to correlate the data obtained from the patents with the corresponding change in government policies.

**Indian Scenario**

The Government of India has realized the immense potential the market for traditional medicines and has upgraded the AYUSH from a Department to an independent Ministry. An increased focus has been put to drive people towards traditional form of medicines and remedies. Facilitating the growth of this sector is of utmost importance with the government leading the way by providing subsidies and soft loans to the players active in the area.

Government labs involved in the sector:

- (i) Central Council for Research in Homoeopathy (CCRH)
- (ii) Central Council for Research in Siddha (CCRS)
- (iii) Central Council for Research in Unani Medicine (CCRUM)
- (iv) Central Council for Research in Yoga and Naturopathy (CCRYN)
- (v) Central Council for Research in Ayurvedic Sciences (CCRAS)

The private sector has also played its part in promoting traditional medicines with some of the major players being:

- (i) Baidyanath
- (ii) Patanjali
- (iii) Himalaya Herbals
- (iv) Ganga Pharmaceuticals
- (v) Hamdard

Table 1 and 2 show some of the products launched in the market by both private and government players. Products in Table 2 have been created by Indians labs and have been licensed out by NRDC to other private players in the market.<sup>7</sup>

**Bibliographic Data Analysis**

Figure 1 shows patents being filed based on priority country which basically means the first country where the patent was filed. The number of patents being filed globally with China emerging as the country with maximum number of patent filings (1016) followed by USA (185) and India (146).

Table 1— Products in AYUSH

Traditional Medicine System	Products
Ayurveda	Dabur Chyawanprash Himalaya Wellness Pure Herbs Ashvagandha Himalaya Liv.52 Tablets
Yoga	Manduka Shade Eko Mat Lite Gaiam Strength and Flexibility Kit Gaiam Rattan Meditation Chair Manduka Soothing Citrus Mat Renew Spray
Unani	Hamdard Habb-e-Musaffi Khoon Hamdard Sualin Hamdard Safi
Siddha	Vetpalai Thailam Urai Tablet Thippili Rasayanam
Homeopathy	Croton Tiglium 30C Homeopathic Remedy Bovista 200C Homeopathic Remedy Warsan Homeopathic Globules

Table 2 — AYUSH products launched by Indian Govt. Labs &amp; Institutes and licensed by NRDC

Product	Use	No. of licenses
AYUSH-64	Anti malarial formulation used for treating malaria	20
AYUSH-82	An anti-diabetic polyherbal formulation for management of diabetes mellitus	13
AYUSH-56	Formulation for management of epilepsy	10
AYUSH-SG	Preparation for treatment of rheumatoid arthritis	5
Herbal formulation for anti-arthritis (CSIR-NEIST)	An ointment for treatment of arthritis	5
AYUSH PK (Avleha)	Formulation for post natal care which enhances the process of recovery after delivery and other complications of puerperal period	2
AYUSH PG Tablet	Tablet is used for treatment of pregnancy induced hypertension (PIH)	2
Bal Rasayana	Strengthens the body and increases immunity in children	2
AYUSH-SS Granules (Payaswini)	Formulation for increasing the quality of breast milk in mothers having deficient lactation	2
AYUSH-AG Tablet (Shatamuli Manduri)	Tablet for general well being of mothers and for promoting growth in foetus	2
AYUSH LND Tablet	Herbal compound for effective management of gynaecological problem by increasing Haemoglobin level	2
AYUSH Ghutti	Prevention of diarrhoea and fever in children	2
AYUSH AD	Useful for mothers in preventing nausea and vomiting during pregnancy	2
Medicine kit for 17 formulations (CCRUM)	Useful for treatment of Hypertension, constipation, etc.	4

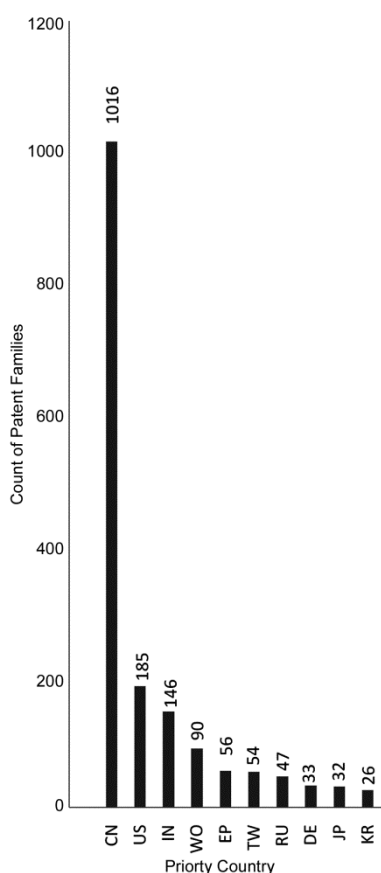


Fig. 1 — Global distribution of patent filings in AYUSH sector

Table 3 — Number of patent filings corresponding to the priority year

Priority year	Number of records
2015	237
2016	337
2017	385
2018	346
2019	114

Priority country can also show markets of interest for relevant key players in the area. Countries like Canada (37), Austria (33), Mexico (17), Ukraine (11), Argentina (11) also saw patent filings in the field of AYUSH. USA and India saw huge amount of Yoga equipment being imported by them with 2,07,358 PVC Yoga Mats<sup>8</sup> being imported by India alone in the period of February 2013 - October 2016. Table 3 depicts an increase in filing trend in the field of AYUSH showing an increase in number of patent filings till 2017 which clearly depicts an increase in R&D expenditure in the field. It shows a decline in patent applications in 2019 but this can be attributed to applications which have not been published till now.

Table 4 shows key players active in the industry. Pinghu Shengroude plastic industry has emerged as the top patent filer with a total of 36 patent filings followed by Jiangsu Youtu Fitness Equipment with 18 patent filings. A total of seven patents have been filed

by Central Council for Research in Unani Medicine. Table 4 only show private companies but academic interest in the field is also growing slowly with 190 patents being filed by universities or academic institutions. Nanjing University of Information Science and technology emerged globally to be the largest patent filer with eight patents. Indian institutes like Janardan Rai Nagar Rajasthan Vidyapeeth have filed maximum patents (Five) in the category from India; other prominent institutes like IIT and AMITY have also filed patents.

Based on publishing country data more than 50 percent of the patents were published in China Followed by USA and India at nine and eight respectively. Table 4 corroborates this data as the top nine assignees are from China and are filing patents exclusively in the field of Yoga. Another metric to observe to which assignee has been most active in patent filings would be assignee acceleration which shows average filings by an assignee per year in the last five years. The top three assignees Pinghu Shengroude Plastic Industry, Jiangsu Youtu Fitness Equipment, Xiamen Sheep Anti-Fatigue Mat saw assignee acceleration at 3600%, 1800% and 1600% respectively. Central council for research in Unani medicine has an acceleration of 700%; it is the only assignee in the list which is filing patents not in Yoga but in Unani. China has dominated the space in the field of Furniture, games, chemical engineering, consumer goods and medical technology yet it is lagging behind India, USA and Russia in the field of pharmaceuticals.

Maximum number of filings has been done in the category of furniture, games, etc. (Fig. 2). This disproportionate rise at 46% is because of maximum number of patents being filed in the field of Yoga. The patents reveal mechanical components like contraptions, devices or garments like gloves, footwear. A number of patents in the category have been filed in the field of making advanced textiles or manufacturing of materials which are used in making yoga mats or other accessories used for performing exercises. Applications in Homeopathy, Ayurveda, Unani or Siddha have correspondingly very few filings as they belong in the pharmaceutical industry which has comparatively a stringent standard for granting patents including regulatory approval, clinical trials, etc.

#### Individual Field Analysis

##### Ayurveda

A total of 106 patents have been filed with 82 in India; with 79 of these patents having India as their priority country which means India was the first

Table 4 — Assignees with maximum patent filings

Top assignees	Patents
Pinghu Shengroude Plastic Industry	36
Jiangsu Youtu Fitness Equipment	18
Xiamen Sheep Anti-Fatigue Mat	16
Guangdong Yuanhua New Material	12
Quanzhou Tianfeng Clothing	11
Suzhou Hotway Foam	11
Hangzhou Jukai Technology	10
Dongguan Hengfeng Household Supplies	8
Nanjing University of Information Science and Technology	8
Nantong Yida Sports	8
Central Council for Research in Unani Medicine	7

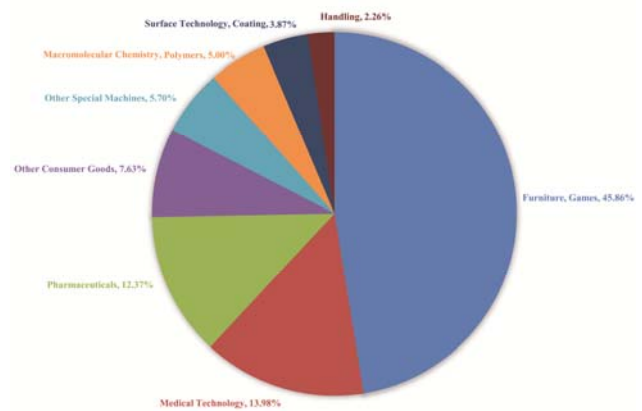


Fig. 2 — Sectoral distribution of patent filings

country they were filed in followed by China at 16 and USA at 6. Patent filing in this field is not that encouraging despite the abundant knowledge present in the ancient texts. The TKDL database developed by CSIR and Section 3(p) {an invention which in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components}<sup>9</sup> of the Indian Patents Act which is the one of the subjects under Section 3 that excludes patents from being granted in the category. The combined effect of these two factors can be considered a discouraging factor for filing of patents in the field of Ayurveda. An alternative path has to be made to encourage patent filing in the field so that this knowledge can be effectively protected and monetized.

Most of the IPC's cover the field of pharmaceuticals (Table 5). Data obtained in the search showed that patents filed in Ayurveda not only cover the field of pharmaceuticals but also cover other categories like food chemistry where patents like:- IN201821010495,<sup>10</sup> IN201821010494<sup>11</sup> cover the

Table 5 — Patent distribution based on top IPC's in Ayurveda

IPC Code	Description	Patents
A61K36/00	Medicinal preparations of undetermined constitution containing material from algae, lichens, fungi or plants, or derivatives thereof, e.g. traditional herbal medicines	18
A61K31/00	Medicinal preparations containing organic active ingredients	6
A61K9/00	Medicinal preparations characterized by special physical form (nuclear magnetic resonance contrast preparations or magnetic resonance imaging contrast preparations)	5
A61K36/185	<i>Magnoliopsida</i> (dicotyledons)	5
A61K8/00	Cosmetics or similar toilet preparations (casings or accessories for storing or handling of solid or pasty toilet or cosmetic substances)	4

Table 6 — Patent distribution based on top IPC's in yoga products

IPC Code	Description	Patents
A63B6/00	Mats or the like for absorbing shocks for jumping, gymnastics or the like	345
A63B26/00	Exercising apparatus not covered by groups A63B1/00 A63B25/00	258
A63B21/00	Exercising apparatus for developing or strengthening the muscles or joints of the body by working against a counterforce, with or without measuring devices	163
A63B71/06	Indicating or scoring devices for games or players, or for other sports activities	80
A61H15/00	Massage by means of rollers, balls, e.g. inflatable, chains, or roller chains	59

field of food chemistry i.e. these patents is regarding preparation of nutritional supplements. An exemplary example of combining ancient ayurvedic knowledge with modern science is the patent IN201941031750<sup>12</sup> which reveals about an IoT based pulse sensor that uses the principle of Nadi Pariksha (Ancient ayurvedic technique of diagnosis through the pulse). It can accurately diagnose physical, mental and emotional imbalances as well as diseases. It is a non-invasive science that enables to reach the root cause of health issues and not just address the symptoms.<sup>13</sup> Patent IN201611017591<sup>14</sup> reveals about a new design for shirodhara stand which is used for pouring hot oil for stress relief.

### Yoga

1237 patents have been filed in the field of Yoga which is the largest among AYUSH (Table 6). The maximum number of patents have been filed in china with maximum number of patents being in the field of furniture and gaming i.e. yoga mats, rods, bands etc. the next prominent field in the category of yoga is medical technology where patents cover massagers, exercise posture detection etc. In intellectual property yoga poses cannot be patented but a trademark can be obtained and in some cases, it might be possible to obtain a copyright but that depends on national law of each country.

Despite Pinghu Shengroude Plastic Industry emerging as the largest assignee in the field it still has the maximum number of patents which were either revoked or lapsed (Table 7). A lapsed patent can still be revived after payment of due amount, but in this

case, it seems to be deliberate as the assignee is active in the field and has left the patents to be lapsed intentionally. A very interesting thing to notice from the table above was that Jiangsu Youth Fitness Equipment had filed 18 patents and allowed all of the 18 patents to be lapsed which can mean that there is certain possibility that either none of the patents were meeting the minimum required criteria to get a patent which the assignee realized and hence did not proceed further with the patents it filed or that the patents could be defensive publications which is an intellectual property strategy used to prevent another party from obtaining a patent on a product, apparatus or method for instance.<sup>15</sup>

Xiamen Sheep Anti-Fatigue Mat has the highest success rate amongst all the assignees as it has filed 16 patents of which 15 have been granted while one patent is still pending. Amongst all the assignees Guangdong Yuanhua New Material has obtained all of their patents from Foshan Yuanhua Plastics Industry by acquisition, this shows that the current assignee clearly saw a potential value in the patent portfolio of the original assignee and hence took steps to obtain the entire portfolio of the original assignee which covers manufacturing, cutting, separating, rolling, bundling and winding of yoga mats.

### Unani

A total of eight patents have been filed in the field of Unani (Table 8) with seven of these patents being filed by (Central Council for Research in Unani Medicine) and one patent being filed by an individual Fareed Nadia Siddiqui. The patents filed cover a wide

Table 7 — Legal status analysis of top assignees in yoga products

Assignee	Granted	Pending	Lapsed	Revoked
Pinghu Shengroude Plastic Industry	19	2	5	10
Jiangsu Youtu Fitness Equipment	...	...	18	...
Xiamen Sheep Anti-Fatigue Mat	15	1	...	...
Guangdong Yuanhua New Material	10	2	...	...
Quanzhou Tianfeng Clothing	1	...	9	1

Table 8 — Patent distribution based on top 4 IPC's in Unani

IPC Code	Description	Patents
A61K36/00	Medicinal preparations of undetermined constitution containing material from algae, lichens, fungi or plants, or derivatives thereof, e.g. traditional herbal medicines	5
A61K9/00	Medicinal preparations characterized by special physical form (nuclear magnetic resonance contrast preparations or magnetic resonance imaging contrast preparations)	1
C07G13/00	Vitamins of unknown constitution	1
A61K35/00	Medicinal preparations containing materials or reaction products thereof with undetermined constitution	1

Table 9 — Patent distribution based on top IPC's in Siddha

IPC Code	Description	Patents
A61K36/00	Medicinal preparations of undetermined constitution containing material from algae, lichens, fungi or plants, or derivatives thereof, e.g. traditional herbal medicines	4
A61K31/00	Medicinal preparations containing organic active ingredients	2
A61Q19/00	Preparations for care of the skin	1
C07k14/00	Peptides having more than 20 amino acids; Gastrins; Somatostatins; Melanotropins; derivatives thereof	1
C12N7/00	Viruses; Bacteriophages; Compositions thereof; Preparation or purification thereof (preparing medicinal viral antigen or antibody compositions, e.g. virus vaccines)	1

variety of diseases including polycystic ovarian disease, asthma, hepatitis etc. All the assignees in the field are Indian which shows that there is no interest in this field from any other player across the globe.

The data obtained in this landscape is not enough to draw specific conclusion although in total 10 patents were granted 2017 in this field to the same assignee CCRUM but they were not included in this study because their priority date was before the dates for which the patent search was conducted. It can be said with reasonable confidence that research in Unani principles can also be directed to other fields like food chemistry or food science as in the case of Ayurveda.

#### Siddha

A total of 18 patents were filed in the Siddha system (Table 9). The top two players being Swami Hardas foundation with maximum number of patents i.e. four followed by three patents being filed by Central Council for Research in Siddha. As in the case of Unani the patents filed are only protected in India and one patent has been filed in USA again

showing that globally the interest in the field is not much. Most of the patents filed cover the pharmaceutical categories which can be seen by the IPC subclass A61K36/00 which is the most prominent IPC class. Patents like IN201841015633<sup>16</sup> cover the principles of organic fine

Chemistry; it reveals about synthesizing nano iron oxide from anhydrous ferric chloride using a Siddha medicinal plant. Patent IN201641043187<sup>17</sup> shows the use of Siddha principles and modern technology to obtain the after-effect of electrical impulse at the heart in the radial artery for classification into major type and sub-type of Naadi which is used for diagnosis of the disease by sense of touch.

#### Homeopathy

In the field of homeopathy 191 patents have been filed (Table 10). USA has topped in filings in the field followed by India and EP (Fig. 3). Lunatech has emerged as the assignee with maximum number of patents filed at six followed by Janardan Rai Nagar Rajasthan Vidyapeeth which has filed 5 patents. An inventor from Russia Epshtein Oleg Ilich has

Table 10 — Patent distribution based on top IPC's in homeopathy

IPC Code	Description	Patents
A61K9/00	Medicinal preparations characterized by special physical form (nuclear magnetic resonance contrast preparations or magnetic resonance imaging contrast preparations)	28
A61K41/00	Medicinal preparations obtained by treating materials with wave energy or particle radiation; Therapies using these preparations	21
A61K45/06	Mixtures of active ingredients without chemical characterization, e.g. antiphlogistics and cardiac	20
A61P31/00	Antiinfectives, i.e. antibiotics, antiseptics, chemotherapeutics	19
A61K39/395	Antibodies; Immunoglobulins; Immune serum, e.g. antilymphocytic serum	17

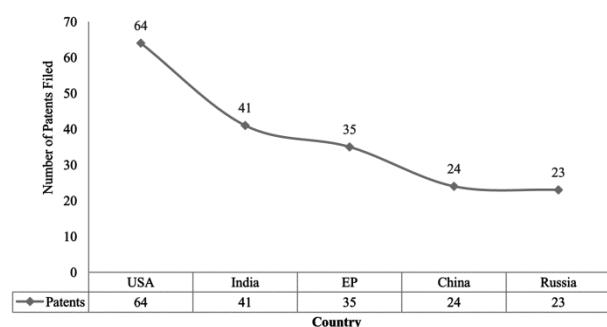


Fig. 3 — Country wise distribution of homeopathy patents

maximum number of patents i.e. 19, most of the patents filed by the inventor. The patents filed by the inventor are broadly covering the fields of biotechnology and pharmaceuticals. The patents filed are for gastrointestinal, cardiovascular, respiratory and various other diseases. The inventor has approached the field of Homeopathy in a new manner so as to provide more legitimacy to the field by conducting clinical trials and providing the data to the relevant authorities for getting approvals for the drugs. Four of the patents filed by the inventor are being litigated and one is being opposed in the EP jurisdiction. Similarly, Patent WO2019134764<sup>18</sup> filed by Herman Mueller is being opposed. It can be seen that patents in the field of Homeopathy are being litigated and opposed more in comparison to other fields being considered in this study.

The patents filed overall not only cover the field of biotechnology and pharmaceuticals but also cover the fields of medical technology, food chemistry, consumer goods, organic fine chemistry etc. Patent like ES2648131<sup>19</sup> covers the field of medical technology revealing a wound dressing consisting of compounds using homeopathic principles. Similarly, patent AU2017101745<sup>20</sup> tells about making syrup using oat based carbohydrates, the patent is linked to the field of food chemistry. A homeopathic aeroponics system is revealed in the patent WO2019112086,<sup>21</sup> the patent reveals a system to deliver homeopathic liquid derived from byproduct of

crops to a nutrient mixing tank. IN201611038850<sup>22</sup> and IN2015DE03598<sup>23</sup> cover the principles of organic fine chemistry and reveal a composition for making tonics/composition which helps in preventing hair fall. Patent RU2662955<sup>24</sup> reveals about a homeopathic composition to boost growth in chickens. Thus, it can be clearly said that homeopathic principles can be used for several other sectors instead of just pharmaceuticals and biotechnology.

#### Citation Analysis

Citation analysis is an important metric to determine the significance of a patent. If a patent has more number of backward citations that means a tremendous amount of work has already been done in the field, meanwhile if a patent has more forward citations i.e. more patents are referring to it then it means that the invention holds value in the field. Another case could be “companies citing their own patents could be a consequence of the cumulative nature of innovation and the “increasing returns” property of knowledge accumulation, particularly within a narrow field or technology trajectory”.<sup>25</sup> In the current landscape despite yoga having maximum number of patent filings, no assignee in the field of yoga has maximum forward citations instead the inventor Epshtein Oleg Iliich has them at 34 in the field of homeopathy. Table 11 shows patents with maximum forward citations. Patents filed by Nantong Yida Sports and Jiangsu Yaozhang Sporting were cited 9 and 5 times respectively by Jiangsu Youtu Fitness Equipment, which means that either they were highly innovative in nature or were blocking the patents filed.

#### Make in India Opportunities and COVID-19 Crisis

In budget 2019 the Government allotted Rs 1,939.76 to the AYUSH sector,<sup>26</sup> this shows that even the government understands the immense potential the sector holds to generate income for India. The global AYUSH market was valued at 3 billion USD of which India holds a share of approximately 400 million USD,<sup>27</sup> this provides a huge opportunity

Table 11 — Forward citations			
Patent Number	Number of citations (Families)	Title	Assignee
EP2036574	11	Medicinal agent for treating fatness, diabetes, and diseases associated with impaired glucose tolerance	Oleg Iliich Epshtein
EP2593138	11	Combination pharmaceutical composition and methods of treating functional diseases or conditions of gastrointestinal tract	Oleg Iliich Epshtein
EP2601219	11	Combination pharmaceutical composition and methods of treating and preventing the infectious diseases	Oleg Iliich Epshtein
US20160137750	11	Method of treating a pathological syndrome	Oleg Iliich Epshtein
EP2595655	10	Combination pharmaceutical composition and methods of treating diseases or conditions associated with respiratory disease or condition	Oleg Iliich Epshtein
US20160272729	10	Method of treating a pathological syndrome and a pharmaceutical agent	Oleg Iliich Epshtein
EP2593474	9	Combination pharmaceutical composition and methods of treating diseases or conditions associated with neurodegenerative diseases	Oleg Iliich Epshtein
EP2596018	9	Combination pharmaceutical compositions and method of treatment of vertigo, kinetosis and vegetative-vascular dystonia	Oleg Iliich Epshtein
CN105176129	8	Composite for manufacturing Yoga ball and preparation method of composite	Liu Li; Wang Shuang; Qiu Jing
EP1997481	8	Solid oral form of a medicinal preparation and a method for the production thereof	Oleg Iliich Epshtein

for India to capture the global market considering the huge amount of knowledge which has been in use in India since ancient times, the TKDL database is consists of knowledge of drugs and herbs being used in India, since Vedic times and can be a potential goldmine if the knowledge within it is used properly. Ayurveda, Unani, Siddha and Homeopathy suffer from being considered alternative medicine and is instead disregarded by most mainstream scientific community. A way to get this field more mainstream recognition would be to introduce studies in the drugs, conducting proper and well documented clinical trials along with strict quality controls.

Fig. 4 shows patents filed globally by academic or research institutions in the field of AYUSH, although patents were filed by the specific institutions, but these numbers are worldwide and not for India alone. If we consider India alone the numbers would further go down which does not justify the budget that has been allocated to this sector in the recent past. At present there are numerous colleges in India specifically setup for providing education in the field of AYUSH with 401 colleges in Ayurveda followed by 11, 13 and 53 in Unani, Homeopathy and Siddha respectively.<sup>28</sup> Several labs at national level are also actively involved in this field with Central council for research in Siddha filing three patents and central

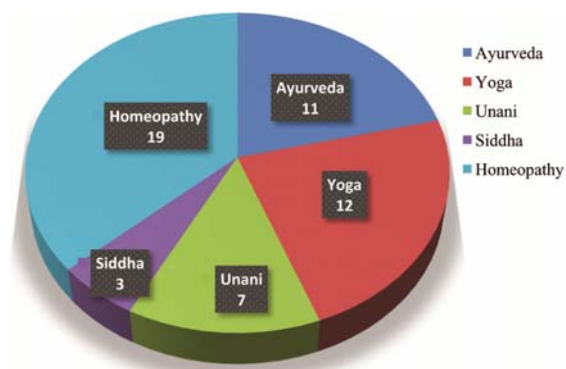


Fig. 4 — Patents filed by academic or research institutions

council for research in Unani filing seven patents. Private players like Dabur, Patanjali in Ayurveda, Hamdard in Unani, Swami Hardas foundation in Siddha actively sell medicines in the field of AYUSH under their brand names. The abundance of infrastructure, knowledge, research institutes, private players etc. create a strong incentive for developing industrial- academic collaboration in the field.

Covid-19 crisis has deeply exposed the lack of medical infrastructure in India with most of the states working at frantic pace to increase the number of hospital beds. This gap in infrastructure should be considered as an opportunity by AYUSH institutions in the country where there are 3986 AYUSH hospitals and 27,199 registered AYUSH dispensaries.<sup>29</sup>



AYUSH medicines can be used for boosting immunity in general public so as to avoid Covid-19 this is where the 8964 AYUSH manufacturing units<sup>29</sup> come in play as they can be used to rapidly increase production of AYUSH-64, Chyawanprash and other traditionally used immunity boosting treatments.

### Conclusion

A patent landscape study was done to understand the various trends regarding assignees, technology area focus, top inventors etc. It was found that China is the most dominant player in the field of Yoga with maximum patent filings; similarly, USA has maximum patents in the field of Homeopathy whereas India has maximum patents in the field of Ayurveda, Unani and Siddha.

It was evident from data that not much industrial-academic collaboration has taken place in the field which is a discouraging sign and could definitely be an area where improvements can be made upon. A separate legal status analysis was done on top assignees in the field of yoga to check if patents filed were valid or were defensive in nature; it was found that most patents filed by the top assignees were to cover all the aspects of a particular technology field for e.g. manufacturing of yoga mats, exercise balls, textiles, etc. In Ayurveda, Unani, Siddha and Homeopathy majority of the patents are filed in the category of pharmaceuticals but it cannot be stated enough that principles taught in these fields can be utilized for various other applications as shown by data extracted in this landscape. It can be said that the field of AYUSH holds immense potential to provide commercialization opportunities as well as benefits to the common people.

### Acknowledgement

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