ESSAY COMPETITION - 2022

SHRI B. V. PATEL EDUCATION TRUST
AHMEDABAD, GUJARAT

Shri Bhupendra V. Patel
2-8-1914 7-6-1974

As a visionary and an educationist acclaimed as the father of Drugs Legislation in India, Shri Bhupendra V. Patel made everlasting contributions to the field of pharmacy at national and international level. He was the first Director of the Drugs Control Administration of Gujarat State. He served as the Vice President of the Commonwealth Pharmaceutical Association. Shri B. V. Patel's life and career continue to be a source of inspiration to the pharmacy fraternity.

SHRI B. V. PATEL EDUCATION TRUST

(TRUST REG. NO. E-2571)

AHMEDABAD, GUJARAT

ESSAY COMPETITION - 2022

ON

"ROLE OF PHARMACY INSTITUTIONS IN INNOVATION AND START-UPS TO MAKE ATMANIRBHAR BHARAT"

ESSAY COMPETITION - 2022

Subject

"ROLE OF PHARMACY INSTITUTIONS IN INNOVATION AND START-UPS TO MAKE ATMANIRBHAR BHARAT"

Number of Entries

19 from all over India

PANEL OF JUDGES

DR. RAJESH H. PARIKH
Hon. Director
SICART-Charutar Vidya Mandal, Vallabh Vidyanagar-388120

DR. PARESH VORA
Director-India Operations
WIN Foundation, 9/310-312, Research Park,
IIT Gandhinagar-382355

DR. SHRINIVAS SAVALE
CEO, AIC-LMCP Foundation,
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Navrangpura, Ahmedabad-380009

WINNERS

GOLD MEDAL
MR. ABU SUFIYAN CHHIPA
Doctoral Research
Nirma University
Ahmedabad

SILVER MEDAL
DR. VIVIDHA PAWAR
Associate Professor,
Department of Pharmaceutics, Poona College of Pharmacy,
Bharati Vidyapeeth University, Erandwane, Pune 411038. Maharashtra. India

The winner of the essay competition- 2022 along with the medals will be awarded a certificate and cash prize of Rs. 31000/- to rank first and Rs. 21000/- to rank second.

In addition, Dr. Pulak Majumder-Sri Adichunchanagiri College of Pharmacy, Adichunchanagiri University, Karnataka will be awarded certificate of appreciation, and Dr. Sadhana Shahi-Govt. College of Pharmacy, Aurangabad, Ms. Christian Ruby Robert-Anand Pharmacy College, Anand, Dr. Amit Shard-National Institute of Pharmaceutical Research (NIPER), Ahmedabad, Ms. Dhwani Rana-National Institute of Pharmaceutical Research (NIPER), Ahmedabad will be awarded certificate of participation.

FIRST PRIZE (GOLD MEDAL) - 2022

Abu Sufiyan Chhipa

Abu Sufiyan Chhipa is currently pursuing his doctoral research as a DST-INSPIRE fellow from the Institute of Pharmacy, Nirma University. His research is focused on cancer immunotherapeutics and their application in reducing stemness in triple negative breast cancer. He was recently awarded with the prestigious Erasmus plus travel and study grant for his short term internship at the University of Turin, Italy. Abu has previously worked as the junior research fellow under the project sponsored by the Board of Research in Nuclear Sciences (BRNS), Govt. of India, for the evaluation of safety and efficacy of cold atmospheric plasma (CAP) for sterilization. He also previously worked as a research assistant at the Institute of Advanced Research, Gandhinagar. Abu completed his M. Pharm in Pharmacology from Bhupal Nobles' College of Pharmacy, Udaipur and B.V. Patel PERD centre, Ahmedabad, and is a recipient of AICTE- GPAT scholarship (2017-2019). His master's dissertation was focused on the evaluation of anticancer potential of an herbal extract in lung cancer. He has thus far published 14 publications that include 2 research articles, 3 book chapters, and 9 review articles. He is also serving as a reviewer for many reputed publishers.

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SECOND PRIZE (SILVER MEDAL) - 2022

Dr. Vividha Pawar

Dr. Vividha Pawar is Associate Professor at Bharati Vidyapeeth University, Poona College of Pharmacy, Pune with 12 years of academic and research experience. She pursued her doctoral, post-graduation and graduation in pharmacy from Bharati Vidyapeeth University, Poona College of Pharmacy with distinction and Gold Medals. Dr. Vividha has received various research projects from UGC, University of Pune, DIAT (Pune), industrial and hospital collaborations; travel grants from Bharati Vidyapeeth University as well as fellowships from AICTE, Dhirubhai Ambani Foundation, Ratan Tata Scholarship. Dr. Vividha has 40 publications in peer-reviewed international journals, 2 Indian patents and 8 book chapters in International books by Elsevier and CRC Press. She has authored a book in Pharmaceutical Microbiology. Her publications have received 746 citations with h-Index (GS) of 13 and i10 index of 15. She has been felicitated with Best Scientific Awards at national and international Conferences. She has been awarded at Indian Pharmaceutical Congress (IPC) and various symposiums by APTI, ICT, IIT and IPA for her research work.

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FIRST PRIZE (GOLD MEDAL) - 2022

"ROLE OF PHARMACY INSTITUTIONS IN INNOVATION AND START-UPS TO MAKE ATMANIRBHAR BHARAT"

SYNOPSIS

India is an emerging economy. As per the recent reports, the country is set to become the 3rd largest economy in the world. From a poor independent nation that relied heavily on other nations for its supplies, to becoming the global purveyor, India has grown exceptionally since its independence to become self-reliant nation. Post covid-19 pandemic experience, India has taken a step ahead with an extended goal of not just becoming a self-sufficient nation, but also to develop a globalized network that is more human centric. The government's initiative to become Aatmnirbhar in all aspects is slowly advancing the nation towards developing a self-reliant economy that is free from any external influence.

India is considered as the pharmacy of the world owing to its capacity for mass production and dissemination of the pharmaceutical products. However, despite being a mass producer of pharmaceutical products, Indian companies rely heavily on other nations for its raw materials. Further, research remains an untouched field in pharmaceutical industries in India. In the process of making Indian pharmaceutical market self-dependent, it is important to encourage young entrepreneurs to establish research based start-ups to

establish local markets for pharmaceutical industries.

Pharmacy institutes in India are well equipped with the required infrastructure and expertise for nurturing the young ideas for establishing Pharma based start-ups in the country. Moreover, these institutes are also supported by government funding to support research and entrepreneurships in these institutes. In that view, the present essay attempts to highlight the roles, challenges and future measures that can be taken by these institutes as well as the industries to make an India Aatmnirbhar for its medicine.

Role of Pharmacy Institutions in Innovation and Start-ups to make AtmaNirbhar Bharat

"At the stroke of the midnight hour, when the world sleeps, India will awake to life and freedom…." These were the words of the first Prime Minister of independent India on independence eve in 1947. Indeed, India was awake with its eyes wide opened, glancing at the world that was completely unaware of the enormous potential of this newly liberated nation. After years of slavery and an ugly episode of partition, the country was left crippled by its machiavellian masters to a point from where, no one, even in his most utopian dream, would have thought of India to be emerging as one of the largest economies in the world. From a tethered independent nation that began its journey with handicapped systems, limited resources and trifling revenues, to becoming a self-sufficient and global purveyor, India has evolved exceptionally and that too, in less than a century. Today, India plays a crucial role as a mass producer and exporter of goods on a global scale.

The cataclysmic Covid-19 crisis was a period of global chaos. Widespread emergence of Covid-19 acquainted the world with a state of misery that can transpire when there is unpreparedness and overwhelming dependence for resources on other nations. The pandemic marks a period of global despondence where even the ostensibly developed states in the world failed to anticipate the scarcity of resources that may arise, if there is a sudden halt in the exchange of supplies between nations. Corona catastrophe brought world to an immediate halt. The pandemic sabotaged the world in a

multifaceted manner. Global supply cuts, scarcity of resources and an overwhelming increase in the burden of inflicted population; the list kept on upgrading with the never ending challenges. India was no different in the beginning. The arrival of Covid-19 era divulged our immaturity and insufficiency in overcoming an emergency. Dearth availability of medicines, PPE kits and even the basic amenities caused a massive uproar for self-dependency. Fall in global supplies affected every nation that largely depended on imports, and in no doubt, India was equally affected. The rising scarcity raised a clarion call to make India a self-reliant country in every aspect.

The concept of Atma-nirbhar Bharat: A self-reliant India was introduced to not only become a self-sufficient nation, but also to serve as a global supplier of resources with a humanitarian goal to develop a human centric globalization, keeping aside the economical aspirations. The Indian pharmaceutical market showed its utmost proficiency by making cost-effective medications and diagnostics. Further, the Indian manufactory not only produced enough supplies for itself, but also assured a significant contribution for the global cure. Despite being one of the most populous states in the world, India not only fulfilled the requirements of its citizens, but also served as a global hub for the supply of pharmaceuticals across the globe. The idea was not just to become self-reliant, but also to serve the humanity.

India is emerging as a global supplier of pharmaceutical products.

However, the country's reliance on imports is a major hurdle in the process. Though India supplies around 20% of generic medicines to the world, it still largely depends on other countries (especially China) for the Active Pharmaceutical Ingredients (APIs) and other chemicals. Further, quality research in Pharmaceutical Industries in India is an idea beyond the horizon. While the government is putting efforts to make Indian pharmaceutical market self-sufficient in terms of API and other intermediates, the research sector still has a long way to go. Considering the fact that research and development is a tedious and risky investment, makes the pharmaceutical companies in India least interested in the field.

Pharmaceutical education institutes in India are well developed establishments that own the basic infrastructure and facilities for research, innovation and development. Further, these institutes are rich in expertise from different departments in the field of Pharmaceutical sciences. Accordingly, these institutes can serve as best platforms for the incubation of innovative ideas in the journey of making an "Aatmnirbhar Bharat". In that view, the present essay aims to highlight the roles of these institutes in nurturing the innovative ideas and supporting the entrepreneurship in Pharma sector.

Aatmnirbhar Aushadhi: Where do we stand?

India is called the Pharmacy of the world. At the time of global dissemination of vaccine, India supplied around 170 million doses of

vaccines to the developing nations. Tens of millions of these doses were provided as a philanthropic gesture to the needy nations. Even at the time of crisis, the Indian pharmaceutical companies were so efficient that they managed to consistently research over the novel approaches to tackle the medical urgency. At the same time, the manufacturers also assured that the non-covid patients are not affected. The market continued to supply medicines for cancer, diabetes, and other chronic ailments at the global levels. The world was made aware of not only India's capability, but also its sense of global compassion and care."Self-Realization defines possibilities." The imposed misery during the lockdowns also allowed us to recognize our capacities and strengths. India acted exceptionally well to emerge as a potential contender for global leadership. In continued efforts, the government of India extended its collaborative hands with the healthcare and pharmaceutical industries of the country to keep up with the productivity after the pandemic. India revealed its prowess during the vaccine supply, and the world is now no stranger to the nation's ability to deliver on global levels.

India stands as the largest provider of generic medicines in the world. The recent Covid-19 experience has also endorsed India as the largest supplier of vaccines in terms of volume across the globe. India exceptionally accounted for 60% of global vaccine supply during the Covid-19 crisis. The Indian pharmaceutical manufacturing market stands as the 3rd largest in terms of volume globally. Till date, India harbors 3,000 indigenous drug companies with more than 10,000

manufacturing units. However, despite being a leading manufacturer, the country, to a great extent, depends on China for the bulk Advanced Pharmaceutical Ingredient (API) imports. The reason being, the affordable prices of APIs and other intermediates procured from the Chinese market. APIs account for a major fraction of overall cost of medicines. That being the case, in-house API production is critical for India to become a global hub for affordable medicine.

Travel and transport restrictions during the Covid catastrophe impaired the production of essential drugs that affected India and the world, equally and adversely. On the bright side, the crisis issued a clarion call for the establishment of local markets and to reduce the reliance on foreign imports. With a vision to encourage the local production of APIs, the government of India set in motion the Production Linked Incentive (PLI) scheme to promote domestic production of 35 critical APIs and related intermediates. The PLI venture not only catapulted the manufacturing of local APIs, but also boosted the production of formulations, biopharmaceuticals and medical devices. As a result of which, flattering rates reduced the nation's dependency on Chinese market while increasing the market share of locally produced APIs.

Given the enormous potential and a global presence, the pharmaceutical giants of India have also initiated their research and development endeavors. The cost effectiveness of clinical trials combined with robustness of higher education has enticed the

multinational companies to collaborate with Indian companies for research and development. However, there exists a clear dichotomy between the motives of academic and industrial research. While the academia is more inclined towards research training, education and recognition, the industry on the other hand, is interested in a research that fulfills their monetary interests. Needless to mention, there is a gap between the academic and industrial research outputs that needs to be bridged for a more organized and applicable research.

Innovate in India

The pandemic experience was an eye opener for India to realize the importance of prioritizing research and development in the healthcare and pharmaceutical industry. An unprecedented impetus was witnessed not only in manufacturing but also in terms of research and innovation during the time of crisis. Post pandemic, the research sector is constantly evolving, making use of modern technologies and scientific minds to innovate and deliver novel approaches for improved outcomes. Indian healthcare is rapidly transitioning into a data driven industry relying on real time data for a more accurate patient centric treatment. Further, the approach is also welcomed by pharmaceutical sector to develop a research driven system for the delivery of medicines in the market. It is an undeniable fact that India is a global hub for quality medicines with favorable affordability. Given the availability of infrastructure, the government has started to take a step ahead for making India an innovation driven pharmaceutical hub for the world.

However, despite growing interest, research and development in pharmaceutical sector in India is still a far cry. As per the recent market report, pharmaceutical industries in India spend on an average around 13 % of their annual turnovers in research, a meager figure that is almost half of what drug companies in USA spend. One of the key reasons behind the reluctance of Pharmaceutical industries to involve into research in India is their monetary interest and return on investment. Given the fact that drug discovery is a sluggish process that demands massive capital investment and years of time to finally bring a molecule from bench to the market, Indian companies make their bet on a more lucrative business model, that is to focus on generic market.

Academic research on the other hand focuses more on experimentations, innovations and recognition. Innovations in pharmaceutical sciences can be accelerated with the involvement of pharmacy institutes in the country. These institutes receive considerable funding exclusively for the purpose of research and innovations from government. Moreover, in the wake of making a self-reliant India, the government has also initiated the funding for incubation Centres to be established within these institutes. Pharmacy institutes can serve as a part of channel to bring new drugs (or related products) to the market, wherein the innovations are done in these institutes and industries are utilized for the purpose of scaling these products to finally make them affordable and market ready. In that case, it is also imperative for these institutes to focus more on

applied research that is avidly welcomed in pharmaceutical companies and ultimately has a market value.

Formulation and development is another bureau in Pharma sector that suffers ignorance from both industries and government research labs. While there are plenty of government labs that perform basic research, very few of these have a department dedicated to pharmaceutics and formulation development. Among major public research labs in India, very few have a distinct wing for formulation research. Formulation process is an important part of drug development. Research in pharmaceutical sciences does not limit only to bringing new drug molecules to the market. Formulation and delivery of drugs is another science that requires attention to effectively deliver the drug at the target site. Given the fact that healthcare industry is more inclined towards a patient centralized and targeted approach, formulation development is thus expected to play crucial roles in the production of next generation medicines. The growing interest in developing targeted medicines with an aim to increase the efficacy of the drug with least precipitation of side effects opens immense possibilities for innovations, which can be done in the pharmacy institutes to bring new techniques and products that can meet the requirement of on-site delivery systems of the market.

Let's incubate...

Higher educational institutes in India have consistently evolved to

meet with the dynamic market demands for talented individuals. From chief scientists and economists to the CEOs of some of the world's largest corporations, the world has witnessed the potential of Indian minds in every domain. All thanks to the constructive Indian educational system that is capable of instilling the core values and leadership skills besides providing high quality tutelage in relevant fields. Educational institutes in India are far more capable in terms of infrastructure and creative minds to nurture the young ideas into realities.

Incubation Centres are the supporting establishments that provide suitable infrastructure to aspiring entrepreneurs to transform their business ideas into materiality. The Centres offer infrastructure and technical aid accompanied with proper mentoring for smooth business processes. The strategy has been fruitful, as evident from multiple examples coming up frequently. One such example is Technology Incubation Centre (TIC) from Indian Institute of Technology (IIT), Guwahati that at present is supporting 42 start ups in different fields including biotechnology, renewable energy and IT, to name a few. The on-campus hosting not only allows real time mentorship, but also develops an entrepreneurial culture for the students. Setting up incubator Centres in educational institutes are also helpful in encouraging students to develop business ideas from their career foundation years. The program also facilitates students with a proper path to acquire proper funding, facilities and most importantly, valuable guidance.

ATAL incubation center is one such program that supports innovative ideas in the field of biotechnology and pharmaceutical sciences. The ATAL incubation center at the LM College of Pharmacy, Ahmedabad supports young ideas and facilitates the setting up of start-ups by providing the required infrastructure and mentorship with minimal investment. The program saves a sizeable amount of initial capital, thus reducing the starting capital investment of the young entrepreneur.The Biotechnology Industry Research Assistance Council (BIRAC) is another such initiative of the government of India that was established with the objective of supporting innovative ideas and entrepreneurship in the biotechnology sector. The scheme has thus far supported the establishment of 20 bio-incubators in the country to foster biotechnology research by providing aid in the form of grants, mentorship and working space with necessary infrastructure.

Pharmacy institutes should also consider encouraging product based research for the doctoral students. Ph.D. students can work on their innovative ideas as a part of their doctoral research. Drug discovery and delivery is a vast field that demands novel solutions to the mundane problems faced during the process. Pharmacy institutes can work on identifying these problems to focus more on research that can be easily applied to solve a real time issue faced by the industries. Such research, being a part of Ph.D. students' work, will also benefit them to start their entrepreneurial journey with their own product developed during the course of their doctoral years. To support this,

few pharmacy institutes have also established their own "idea labs" to shape and support the innovative ideas of its students starting from their graduation years. The initiative is undoubtedly a promising step to promote an entrepreneurial culture over the conventional job oriented curriculum.

Bringing industry into academic labs

The government of India has recently started its new initiative to bridge the industrial research to academia in the form of Prime Minister's Fellowship for Doctoral Research. The program is explicitly designed to encourage PhD students to do industry pertinent research during their doctoral journey. Further, to ensure the industrial applicability of the proposed work, the scheme requires compulsory involvement of a partner company during selection, assessment and release of funds. An attractive feature of this program is that the working fellows are awarded fellowship from government as well as the partner industry, thus assuring double remuneration to the fellows. The scheme has thus far supported 145 fellows partnered with around 60 institutes and 100 companies, and has produced 5 patents that are applicable in industrial settings.

Consultancy projects and contract research has been a part of research works in Pharmacy institutes lately. These institutes have all the necessary infrastructure, facilities and team of experts to execute the industrial projects. Further, the department of Pharmaceutics, a

subject that requires a separate treatment is generally mixed with other departments in the allied fields. However, the department receives exclusive dedication in Pharmacy institutes. Not only these institutes handle formulation and development as one of the core subjects in pharmaceutical sciences, but also constantly work to evolve the department as per the industrial requirements. Academia and industries joining hands for contract research mutually helps both the entities. Firstly, the industrial problems are handled by highly qualified and experienced professors in the Institute. Secondly, the cost of research reduces multifold for the industry. For the institute, the incoming projects provide an additional source of income and an industrial networking channel. At the same time, students working on these projects are also trained as per the industrial requirements.

It is an undeniable fact that a majority of breakthrough biological innovations are done in academic labs. Be it the recent CRISPR-Cas mediated gene editing or the cancer immunotherapy, time after time, the world has witnessed numerous thoroughgoing research coming out of academic labs. Pharmaceutical industries can become arsenals for scaling up these findings; however, nurturing and shaping these ideas into innovations can appositely be done at academic institutes. Innovations act as the backbone of start-up ventures. Pharmaceutical institutes can act as a reservoir of research based innovative products that can find investing partners from the industries for their mass production and dissemination.

Turning institutes into industries

Investing into research has always been the "Achilles' heel" for pharmaceutical industries in India. Drug discovery is a sluggish process that takes years between a drug discovered and when it becomes finally available in the market for human use. Further, the process requires involvement of different departments and experts dealing with distinct steps in the journey of drug discovery. A Pharmacy institute consists of different departments that are involved in a typical drug discovery process. Moreover, all these departments are composed of highly qualified professors, doctoral scholars and graduate students. Further, the institutes involved in research receive funding from multiple sources that include (but not limited to) government and private agencies. In every aspect, these institutes are capable of executing the basic chores of a small pharmaceutical industry. The government of India has also started to establish incubation Centres in the ace institutes to support and nurture the ideas of young minds and provide them with necessary infrastructure for the initial stages of their start-ups.

It appears imperative to bring a paradigm shift in our ways of utilizing these institutes. In the present scenario, enrolling students are made industry ready during the course of their graduation (or even during their 2 years masters programs) with a noble intention to fetch them an industrial job at the end of the day. These institutes are however far more capable of delivering than just producing "job-ready" individuals. Moreover, researches in these institutes are majorly

focused on basic sciences or on subjects that hold limited market value. It is also important to design research proposals (especially for doctoral students) that are patentable or at least have market applicability. In addition to this, institutes should focus on instilling entrepreneurial point of view among students by encouraging them through small funding and rewards for developing a scalable product.

Industry Academia interactions: Time for a paradigm shift

In an attempt to bridge academia and industry and to bring real world practices into lecture halls, the University Grant Commission (UGC) of India has recently updated its guidelines for the appointment of professors in higher educational institutes. The idea is to bring a paradigm shift in pedagogy by allowing distinguished senior professionals having vast industrial experience in their fields to contribute to the academia. The million dollar question however is: Will it work?

Higher educational institutes in India hold sheer stubbornness to grant professorship only to Ph.D. holders. In the current scenario, the universities look for at least a Ph.D. qualification with sufficient publications or a Ph.D. with sufficient industrial experience. That being so, experienced and venerable professionals without the "sufficient qualifications" fail to contribute to academia. Given the current educational curriculum, the strategy may also not work efficiently. Highly qualified professionals that lack industrial

experience or even the Ph.D.s from industries stammer to impart correct knowledge to the future employees due to an obsolete education system we follow. Consequently, industries at present find it cumbersome to train freshers that are directly absorbed from academia, as they lack necessary industrial knowledge and exposure. It is therefore of vital importance that students are timely encountered with real life challenges faced in industries in order to make an industry-fit talent pool. Perhaps, engaging students to industrial projects will provide them with knowledge beyond the confined classrooms. The recent guidelines from UGC are in fact promising, provided some requisite changes are made in the educational establishments. Maybe then the so called prospective "Professors of Practice" can deliver what is expected from this "revolutionary" change. Such training combined with the entrepreneurship support will equip the students with necessary financial, infrastructural as well as technical skills that are important for the establishment of relevant industries.

The novel initiative of UGC can be also be helpful in instilling a business attitude in the students. While appointing the elite professionals from the field, the institutes can also consider appointing successful entrepreneurs as ad hoc professors to share their experiences and perspectives in building an idea into a functional startup. Since many of these institutes are now transitioning towards setting up their own incubation Centres, hiring these professionals in the managing committee will be useful in

shaping the career attitude of students from their foundation years. Needless to mention, all these changes are possible, provided the institutes are ready to accept a paradigm shift in their working practices.

Pharmaceutical industries should reciprocate!

A recent survey published by the Association of British Pharmaceutical Industry (ABPI) on an Academia Industry relationship platform showed the continuous efforts of pharmaceutical companies to support research training of students in Britain and surrounding European nations. The collaboration showed mutually beneficial outcomes that improved the work value of both entities. The interaction further delineated the unresolved differences between the two bodies and permitted networking between people from diverse research backgrounds. As per the survey report presented by ABPI, the industries widened their collaborative gestures to academic organizations through diverse approaches. These comprised of apprenticeships, undergraduate training programs, Ph.D. and post-doctoral research. For industries, the program allowed utilization of academic knowledge to resolve their research issues.

With a large pharmaceutical market and thousands of manufacturing units, replicating the Britain model will have multiple benefits in India. First, the program will allow networking between the academia and industries. Secondly, since a part of research can be done using

industry infrastructure and facilities, Ph.D. and Post-doctoral students can more flexibly design their research that is more industry oriented. For industry, such exchanges will be helpful in resolving their scientific issues from a more theoretically sound academic point of view.

However, given the present monetary interests of pharmaceutical industries in India, research remains a sparingly invested domain in pharmaceutical industries. Further, student training programs are usually taken as mere formalities by both, industries as well as incoming trainees. As a result, training sessions remain largely unorganized wherein the students are randomly assigned to mundane industrial tasks. It is a sad truth in India that while most of the efforts to improve the industry and academia interactions are made by academic institutes, the industries on the other hand are least bothered about aptly entertaining these proposals. That being the case, it is not wise to always criticize the country's education system for its failure to produce industry capable individuals when even the industries are not interested in providing necessary vocational training to their prospective employees or future entrepreneurs.

Industrial Ph.D. in India is generally restricted to part-time doctoral studies where an existing employee of the industry enrolls in the university part-time Ph.D. program to earn his doctoral degree while continuing his/her job. Industrial funding for Ph.D. students is still a bizarre idea in Indian pharmaceutical companies. On the contrary,

pharmaceutical companies in UK maintain close relations with academic institutions and other research councils for Ph.D. studies. For instance, the Industrial Cooperative Awards in Science & Technology (CASE) provides studentship to Ph.D. students in academic institutes as a gesture of collaboration between the pharmaceutical industries and universities. From the recent industry- academia relation survey, 45 institutes in UK were involved in collaborative industrial Ph.D. studentship with the University of Cambridge alone hosting more than 90 studentships. Not just that, the collaborative relations were also active outside the UK with more than 20 studentships active in neighbouring countries. These included the Australia, Belgium, Germany, Netherlands, Sweden and the United States of America (USA). Sadly, such collaboration between the industry and academia is sparingly seen in Indian market. Pharmaceutical industries in India are least interested in academic collaborations that can support doctoral studentships. Post-doctoral research is another sector that is poorly received in the industries. Post docs in India are generally restricted to academic labs. On contrary, pharmaceutical companies in western countries have already started the transition by hiring the post-doctoral candidates for industrial research. The program serves two purposes. One, the industry is benefitted with the expertise of a qualified professional. Two, the hired professional gets to complete his/her Post-doctoral research pertinent to industrial needs.

Investing in research has always been taken as a risky endeavor by the

pharmaceutical companies in India. As a result, India has emerged as a global market for the production and supply of generic medicines. However, no new molecules come from the Indian market. To overcome this, pharmaceutical companies in India should start considering sponsorship for doctoral students working in academic labs. The industries can work in collaboration with the students to solve a research problem by funding their doctoral studies. These industries may also consider financing research based startups in pharmacy institutes that can prove beneficial for both, students as well as industries. In that case, while the entrepreneur researcher will be benefitted with the support for start-up, the supporting organization may be profited by enjoying a share in the new company.

Concluding remarks: What do we know? What have we learnt?

India has emerged as the global pharmacy in recent years. The country's pharmaceutical market not only produces enough medicines for its large population, but also supplies a sufficient quantum of pharmaceutical products across the world. The idea of Aatmnirbhar Bharat has further encouraged the Pharma sector to produce more indigenous medicines with reduced reliance on other countries for the raw materials and intermediates. The project has indeed initiated the establishments of local markets for chemical reagents, APIs and intermediates, thus allowing the sector to be independent on global supplies to maintain its production pace. Further, the initiative has also opened a new route for developing economy of the country.

Pharmacy institutes in India are well established in terms of infrastructure, facilities and expertise. These institutes comprise of all the core departments that come into play during the process of drug discovery, development and production. Moreover, these institutes are far more inclined towards training and recognition with lesser financial motives. The recent initiatives of these institutes to promote an entrepreneurial atmosphere in the classrooms and to shift the job oriented thinking of student towards the business and start-up ventures, has led to the development of novel ideas into products that are slowly taking forms of established companies.

The process however has further challenges to be addressed. For instance, pharmaceutical industries in India are least interested into investing in innovations. It should occasion no surprise in accepting that research is an important sector in any industry that should go in parallel with its production activities. In-house invention and development of methods or products also reduces our dependence on other companies involved in research (which are mostly operated overseas). On the other hand, Pharmacy institutes in India are involved in research activities with reduced or no financial ambitions. However, these institutes fail to amass sufficient capital for investment in research as compared to the industries. Pharma industries should therefore initiate institutional funding in the form of studentship, apprenticeship or even contract research to these institutes to carry out industry pertinent research. Further, these industries should also consider in investing in the ideas of young

minds studying in these institutes to develop a marketable product. In this way, students in these institutes will be motivated to set-up their own industries in collaboration with the established companies, while the investing companies can continue to take their share in the marketed product.

Pharmacy institutes of the country should also consider making its curriculum and pedagogy more dynamic that meets the market's requirements. Besides providing support and infrastructure for the start-ups and businesses, these institutes should also invite veterans from different sectors of the pharmaceutical industries to ensure that these ideas are shaped appropriately in the pursuit of an "Aatmnirbhar Bharat" with its own "Aatmnirbhar Aushadhi".

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SECOND PRIZE (SILVER MEDAL) - 2022

Role of Pharmacy Institutions in Innovation and Start-ups to make AtmaNirbhar Bharat

SYNOPSIS

• Self-reliance in healthcare sector is feasible with Government impetus, Pharmacy institutes willingness, and trust of our People on Swadeshi Medicines.

• Currently, Government is promoting various pharmaceutical avenues via different ministries to promote healthcare startups and foster innovations for the promising future of Indian pharmaceutical sector.

• These initiatives include establishing Institute Innovation Councils (IICs) at HEIs pan India, organizing hackathons, funding supports like BIRAC, MeiTy and facilitating incubators setup in academic ecosystems.

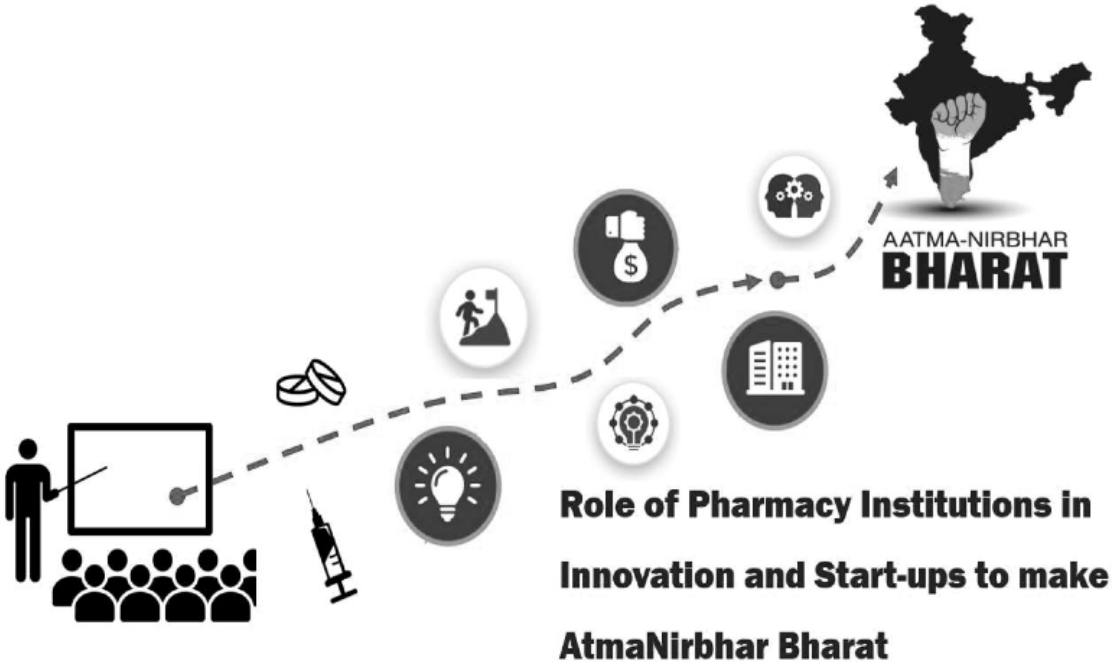
• Self-reliance in healthcare is essential to address challenges of pandemic outbreaks, GIG economy; also to increase the GDP by nurturing innovation, right from grass-root levels with pharmacy students being groomed by expert faculty mentors.

• Prevailing healthcare startups are focusing on affordable diagnostics with help of AI and IoT with vision on 'antimicrobial resistance burden' which persists to be a major challenge for India.

• Pharmacy institutions in higher education have vital role in the transition towards a bright future of the premium Indian pharmaceutical industry which is feasible with the involvement of all stakeholders, right from students, government, academia and industry.

• It involves skill development, grooming of faculty and students for idea pitching and proof of concepts, modifications in pharmacy curriculum, empowering IICs, collaborating and incubating in academic set ups for nurturing the best ideas and more importantly funding aids and incentive supports.

• Thus, pharmacy institutions have a major role to support, mentor young innovators in developing their healthcare ideas into promising inventions for societal and commercial benefits; ultimately towards self-reliant India.



Role of Pharmacy Institutions in Innovation and Start-ups to make AtmaNirbhar Bharat

A year ago; October 21, 2021 at 9.59 am, Tweet by @MyGovIndia……India hails 'vaccine century' with more than 1 billion COVID-19 vaccines administered.

In the inoculation history of India, this was the fastest vaccination drive ever which now exceeds 2.2 billion. This was possible owing to the only MADE IN INDIA vaccines –'Covishield' and 'Covaxin' – just in less than a year post the discovery of the first case in the country. Also, this witnessed the fastest ever vaccine approvals granted in India.

This made the world mark 'My Bharat is now becoming AtmaNirbhar'. Self-reliance in healthcare sector is feasible with Government impetus, Pharmacy institutes willingness, and trust of our people on Swadeshi Medicines.

The Indian pharmaceutical sector seeks to become world's largest drug supplier by 2030 with an objective to increase the industry revenue from current US $41 billion to US $130 billion at a compound annual growth rate (CAGR) of 11%.

Conducive Scenario for Growth of Indian Healthcare Sector

In global pharmaceuticals industry, India stands 3rd in production by volume and 14th by valuation owing to huge investments and special impetus. At present, Government is promoting various healthcare avenues to tap the short as well as long term opportunities for the promising future of Indian pharmaceutical sector.

Grand Startup Hackathons: Government under the Department of Pharmaceuticals and National Institutes of Pharmaceutical Education & Research (NIPERs) routinely launches events and symposiums such as the 'Pharma & Medical Devices Startup Grand Challenge' [Feb, 2021], 'India Pharma & India Medical Device 2021' Conference to provide platform for budding innovators to show case their ideas and proof of concepts wherein they receive enabler partners and sponsors like Laurus Labs and Boston Scientific. Out of 310 startup applications received for the Startup Challenge, 218 were

in the Medical Devices sector and 92 were in the pharmaceuticals sector.

IIC and Incubation Centres : Ministry of Education (MoE) under its Innovation Cell (MIC) has launched Institute Innovation Council (IIC) program across Higher Education Institutes (HEIs) pan India. As a part of this IIC program, HEIs have started encouraging innovation and entrepreneurship in students and faculty members by promoting activities such as Ideation, Problem Solving, Proof of Concept (PoC), Design Thinking and Policy drafting. Additionally, government has come up with flagship initiatives like Atal Incubation Centers (AIC), Technology Business Incubators (TBI), ANIC-ARISE to nurture innovation competitiveness, and promote entrepreneurship in Indian researchers.

Production Linked Incentives (PLI) Scheme for Pharmaceuticals is initiated by the Department of Pharmaceuticals under the Ministry of Chemicals & Fertilizers for encouraging domestic manufacturing of important key starting materials (KSM), medical devices, drug intermediates as well as active pharmaceutical ingredients (API) in the Country with a vision to make our India, a source of affordable and quality medicines to cater to our needs as well as the needs of underdeveloped nations.

Shark Tank India : Such reality shows are creating awareness amongst the next generation about the significance of startups, innovation and their valuation. Majority of the entrepreneurs from healthcare sector

pitched their ideas and business proposals for best investments with safe equity stakes. Majority were healthcare tech startups such as Watt Innovations, Keto India, Peeschute, Menstrupedia and Vivalyf Innovations with youngster founders who received the best valuation and offers.

These factors have propelled the pharma professionals to pitch their ideas, validate and create their business ecosystems.

Major Healthcare Target Areas

While moving towards self-reliance, we have to go beyond drugs for India-specific ailments (Lepsory, Tuberculosis) towards global healthcare challenges. The COVID-19 pandemic was a learning lesson for all of us to have a larger vision and be prepared for new or mutated bugs. Additionally, self-reliance in healthcare will help to increase the GDP by nurturing innovation, right from grass-root levels with students being groomed accordingly.

Address Antimicrobial Resistance: Burden on healthcare

As per the recent reports by ICMR, there is sustained rise in antimicrobial resistance in India. With government, pharmacists and physicians' interventions, we need to control the irrational use of antibiotics. Antibiotic resistance may give rise to another pandemic in the near future if we continue the misuse of antibiotics.

Another reason is we are heavily dependent for the raw material of these chemotherapeutic formulation on China. If we control their prescription, demand for concern raw materials will fall thereby, reducing our dependency.

Diagnostics:

In order to suppress misuse of antimicrobials, there is a need to strengthen and improve diagnostic approaches and tools. Affordable diagnostics has become the basic component of universal health management. MyDiagnostics, a D2C startup model, started in 2016 offers preventive health services, blood tests at home with economic healthcare packages. 3HCare, NRI Family Health, HealthSocho and Orange Health are startups founded with purpose of low-cost, on-demand and reliable diagnosis.

Artificial Intelligence (AI)

Translation and expansion of medtech startups into sustainable businesses would need more investments to cater to the needs huge number of patients. This calls for harnessing technologies such as Artificial Intelligence (AI), Internet of Things (IoT), 5G and Computational programs. Biocalculus, a wearable ECG B2B device uses AI is useful for accurate and timely diagnosis and therapy.

Miscellaneous: Along with these prime issues, problem issues in health & hygiene, geriatrics healthcare, paediatrics therapies, medical devices, nutraceuticals are upcoming startup areas to explore for future ideation and pitching.

Roadmap

A roadmap for the much needed transition towards a bright future of the premium Indian pharmaceutical industry is feasible with the involvement of all stakeholders, right from government, academia to industry. HEIs and pharmacy institutions have vital role in this **(Figure 1).** This roadmap would guide us to strike the right balance between possible risks and the potential prospects.

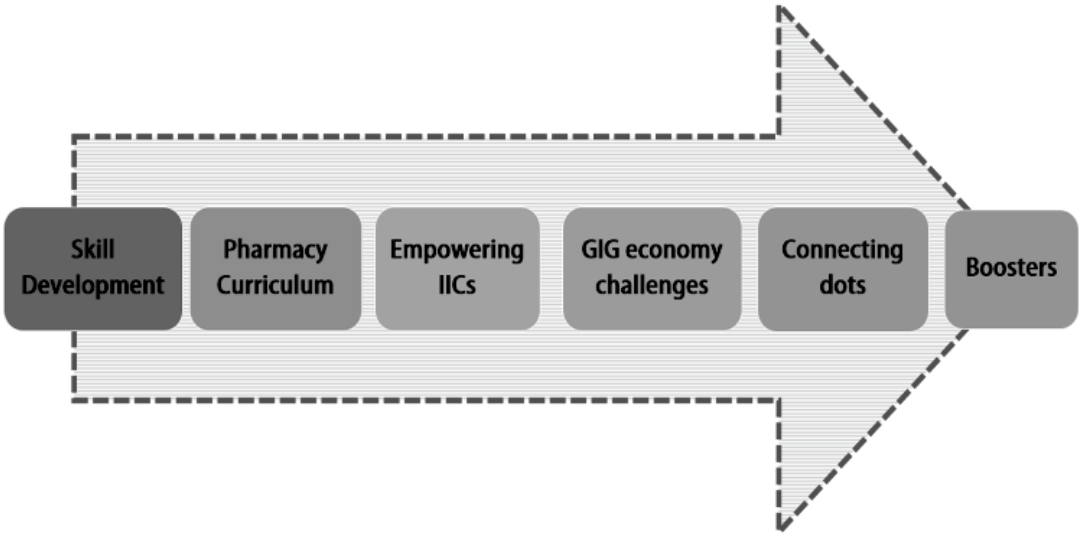


Figure 1: Roadmap for Pharmacy institutions to gear up innovations and startups in India for AtmaNirbhar Bharat

Skill Development: India is known for low cost human resource yet we lack in skilled human resource. Especially pharmacy HEIs need to focus on making the future generation industry-ready. With National Education Policy (NEP) 2020, more weightage is given for developing skilled pharmacists. Skill Development Ministry in general and the Life Science Sector Skill Development Council (LSSSDC) for

pharmaceutical sector is proposed. HEIs can launch training sessions for both, students as well as faculty in actual industrial setups and incubators.

Pharmacy Curriculum : Pharmacy Council of India (PCI) has identified the current needs and revised syllabi of D.Pharm, B.Pharm, M.Pharm and Pharm D. to promote skill building and imbibe professional practices in students with *'Practice School'* and *'Internships'* components in their curriculum. In adherence to these practices, Pharmacy institutions can groom students for better placements, innovation aptitude and entrepreneurship tactics.

Yet, the syllabi is exhaustive and need to revise towards Theory: Practical 25%: 75% with increased practical weightage. Also, conventional examination and assessment process can be modified to interactive, case-based, problem solving and ideation like process where students thinking and inputs should be would be more valued more than mere scores.

As per 'National Innovation and Start-up Policy (NISP) 2019' for students and faculty introduced by Ministry of Education (MoE) under its Innovation Cell (MIC), Universities, HEIs and pharmacy colleges can strengthen their innovation and entrepreneurship ecosystems by giving special impetus in terms of academic-attendance relaxation to student startup founders as well as less academic load to mentor faculties to nurture and explore ideas and solutions with their students.

Empowering IICs: MoE with AICTE have started innovation councils at institute level where systematic training is rendered to teachers to create innovation ambassadors so they can mentor their students for tinkering labs, preinucbation / incubation centers, entrepreneurship cells, idea repositories, patent applications, hackathons, etc. Expert faculty mentors would facilitate student innovators and entrepreneurs to explore their ideas and PoCs with available plethora of government and industry resources **(Figure 2).**

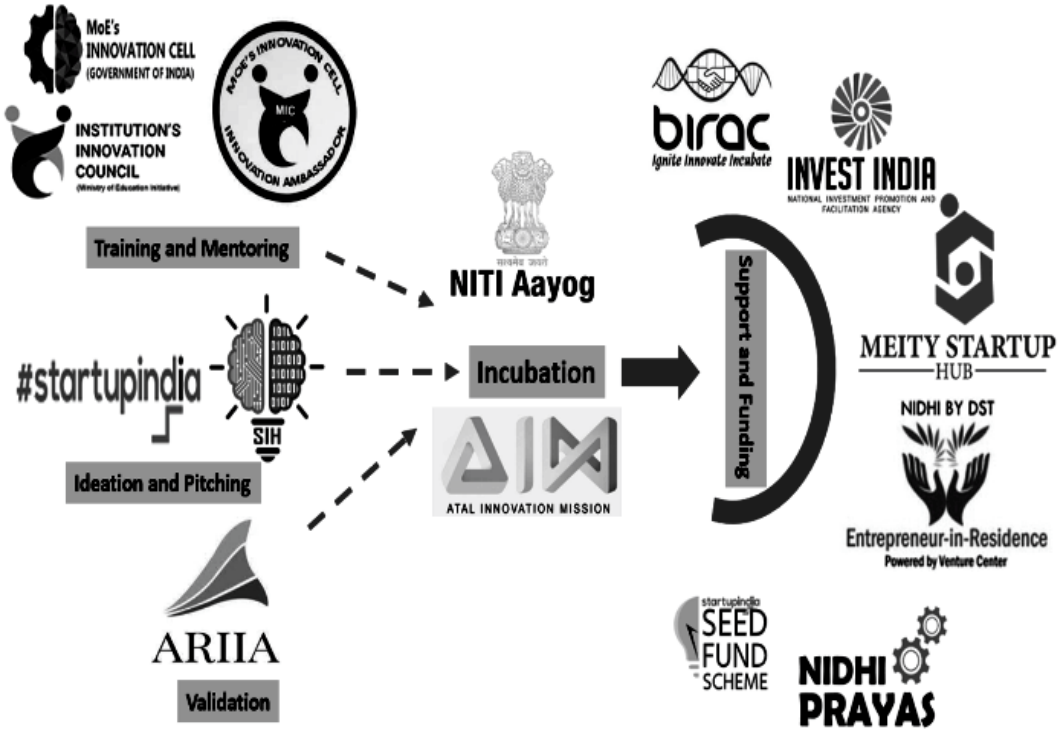


Figure 2: Diverse initiatives to nurture ideas and foster innovation into profitable inventions

Future GIG Economy: With the evolution of 'GIG Economy' in Western countries, Pharmacy institutes have to orient their mentoring and gear up for the 'GIG Economy' challenge. GIG economy is a free market system in which independent workers are hired for temporary work assignments with short-term commitments based on their skills and expertise. With rising number of startups, incubation centres globally, GIG economy seems to be future. Thus, academia and educational apex councils need to make provisions to train the students to become future entrepreneurs or startup founders.

Connecting Dots: Interdisciplinary science and networking in core and allied healthcare sectors has become evident comprehending the current need of employment. It is not possible for pharmacist or engineer or marketing personnel, to innovate as well as do business, solely. One needs to collaborate and network right from the grass-root innovators to the business sharks for idea projection and fund raising. HEIs in pharmacy field possess basic infrastructure (space, laboratories, instruments) as well as expertise (mentor teachers with experience ranging from formulation to clinical and regulatory fields). Also, they have strong networks in the form of industry experts, alumni and other stakeholders. They also receive financial support from diverse public and private sources in terms of consultancy, partnerships, R&D grants as well as CSR initiatives. Strong linkage of all these pillars would lay a robust platform for nurturing student innovation ideas and fostering their startups to make AtmaNirbhar Bharat.

Table 1: Successful healthcare products and ideas developed by diverse startups with help of incubators and funding assistance

Startup	Idea / Product / Service incubated	Incubators	Funds
Care Form Labs Pvt Ltd, 2020, Ranchi	Onpery™ Menstrual Cup is an innovative feminine hygiene product for menstruation control. This designed cup can last upto 5 Years and can collect Upto 10 hours of blood per insertion.	AIC MIT ADT Incubator, Pune	Rs. 48 lakh Biotechnology Ignition Grant (BIG) from BIRAC, DBT; Co-Winner ($5,333) at 'Innovate 4SDGs Contest' of 'UNDP Accelerator Lab India'
EzeRx, 2018, Kolkata	AJO is an affordable, non-invasive device for easy, and painless diagnosis of anaemia, liver, and lung related ailments.	KIIT Technology Business Incubator (KIIT-TBI)	Biotechnology Ignition Grant (BIG) from BIRAC, DBT, NIDHI Prayas by DST, SASACT Grant from MeiTy
MediAsha, 2018, Pune	'FractoAid' is a patented ready-to-use orthopaedic splint with built-in straps to support the fractured limb in just 5 minutes during the golden hour.	Venture Center & Bhau Institute, Pune	Biotechnology Ignition Grant (BIG) from BIRAC, DBT
Neo Inventronix, 2020, Telangana	GermiBAN™ is a fourfold super-sterilizer with integrated approach for 99.99% sterilization.	ATAL Incubation Centre-Association of Lady Entrepreneurs of India (AIC-ALEAP), We-Hub	MeiTy Tide 2.0 initial grant of 4.5 lakh & scale up grant of 38.5 lakh
Coeo Labs, 2014, Bengaluru	1. CPAP (continuous positive airway pressure) called 'Saans' device to assist neonates in respiratory distress. 2. VAP Care, a Ventilator Associated Pneumonia (VAP) preventive device to prevent patients on the ventilator from contracting nosocomial infections	BioIncubator Centre at CCAMP	Biotechnology Ignition Grant (BIG) from BIRAC, DBT; Millennium Alliance, USAID, 2016

Boosters:

Invest India, national investment promotion & facilitation agency aids in associating with global ventures and funding partners, especially in pharmaceutical sectors with India being the liberal investment destination. With proposed pharmaceutical parks for APIs and medical devices along with expanding pharmaceutical clusters in India, there is lot much for pharma fraternity to explore. However, core entrepreneur ecosystems focus on profits as well as return on investment which suppresses the need of breakthrough innovations & discoveries. Hence, the purpose of housing incubators in academic ecosystem will promote innovation culture. Academic ecosystem gives platform for experimenting ideas and problem solutions. NITI Aayog, Atal Innovation Mission (AIM), Biotechnology Ignition Grant (BIG) from BIRAC, Department of Biotechnology (DBT), Department of Science & Technology (DST) and Ministry of Electronics and Information Technology (MeitY) along with MNCs, private firms are providing funds and mentoring aid for establishing on-campus incubators in HEIs to incubate promising ideas and startup founders as depicted in **Figure 2** and **Table 1.**

Concluding Remarks:

"Necessity is the mother of invention" hold true! Outbreak of Covid pandemic globally and need to save our highly populated nation drived the Covid vaccination program with India reaching heights in vaccine production as well as immunization sector. We have the potential to achieve self reliance in all healthcare sectors, which is witnessed from the increased number of health tech startups and

startup unicorns, incubators, lucrative grants and conducive ecosystem development for innovation and entrepreneurship by government. Another goal of supporting innovation and startups is to increase the job creators than job seekers with the help of active role by pharmacy institutions. Basic challenge for pharmacy graduates is not unemployment but skills and productivity. Equality of prospects depends on the infrastructure of opportunities. The infrastructure of opportunity is not just developing the metros, roads or power. Balancing and justifying the three 'Es' i.e. Education, Employment and Employability will do wonders. With this perspective, pharmacy academicians in collaboration with incubation centres and industry, can serve as the nurturing grounds for some of the most innovative ideas and breakthrough inventions to ….and secure the future and health of our youths to make India, "Swastha Bharat, AtmaNirbhar-Bharat"

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B. V. Patel Essay Competition History at a Glance

The trust conducts an all India level Essay Competition every year as one of its activities. The selection of the subject depends on the importance and the current happenings in the Sector. Any one interested in drugs and pharmaceuticals, academically, industrially or otherwise, can participate in the competition. The entries are generally invited in the month of July/August. The essays are evaluated independently by a panel of judges comprising of the expert luminaries of industry and academy. The essays of the winners are printed and distributed during the IPC since 1977.

The year-wise subjects chosen for the Essay Competition :

Year		Subject
1977	-	Good Manufacturing Practice in Parenterals
1978	-	Indian Pharmacopoeia for the Future
1979	-	Documentation and Record Keeping in Drug Manufacture
1980	-	Drug Distribution
1981	-	Review and Modification of Drugs Legislation in India
1982	-	Industry Oriented Pharmacy Education - Its Means and Modifications
1983	-	Role of Testing Laboratories in Assurance of Quality Drugs
1984	-	Material Management in Pharmaceutical Industry
1985	-	Status & Prospect Of Research and Development
1986	-	Manufacture of Dosage Forms - Problems and Remedies
1987	-	Advances in the Technology of Industrial Pharmacy
1988	-	Role of Combination Products in Drug Therapy
1989	-	1. Continuing Education in Pharmacy
		2. Trends in Pharmaceutical Research

1990	-	Restructuring of Pharmacy Education
1991	-	Biotechnology in Pharmacy
1992	-	Role of Pharmacists on Stability of Pharmaceuticals
1993	-	ISO 9000 and its Applicability to Pharmaceuticals-A Pharmacists Perception
1994	-	Challenges and Opportunities in Pharmaceutical Research
1995	-	New Drug Delivery Systems - Indian Scenario
1996	-	Traditional Medicines - Sources of New Drugs
1997	-	Clinical Pharmacy in India - Emerging Facet of the Pharmacy Profession
1998	-	Community Pharmacy
1999	-	Revision of Indian Patents Act 1970 And its Impact on Availability and Cost of New Pharamceuticals
2000	-	Information Technology-Revolutionary Impact on Pharmaceutical, Sciences
2001	-	Aesthetic Design of A Manufacturing Unit in Compliance with National Regulatory Requriement and WHO - GMP
2002	-	Genomics and Proteomics: Treasure for Drug Discovery
2003	-	Pharmacy Education: Current Problems and Suggested Solutions
2004	-	Industrial Growth in Changing Scenario: Strategic Options for Small and Medium Enterprises (SMES)
2005	-	Roadmap to Globalization of Ayurveda as Recognized Healthcare System
2006	-	Prospects for CRO in next Five Years: Indian Capabilities
2007	-	Distribution of Pharmaceuticals and Drugs in India: Its Science, Commerce and Ethics
2008	-	Medical Devices: Opportunities For Indian Industry

2009	-	Steps to Revitalize Pharmacy Profession in India
2010	-	Innovation: Driver for Growth of Indian Pharma ?
2011	-	Vaccines In Healthcare: Indian Perspective And Potential
2012	-	Drug Affordability in India - Post 2005
2013	-	Patent - The Need for Efficient Handling of Disputes
2014	-	Pharmacists in a State of Mortification: Reasons, Responsibilities of Stakeholders and Remedy
2015	-	Pathway for Zero Defect Product and Production in Pharmaceutical Industry
2016	-	Clinical Trials in India and China: Advantages and Disadvantages
2017	-	Stem Cell Based Therapeutics: A Revolution Changing the Treatment Paradigm
2018	-	Advertising in Pharmaceuticals: Therapeutic or Toxic
2019	-	Drug Discovery: Opportunities and Challenges in using Artificial Intelligence
2021	-	Role of Pharmaceutical Research Scientist and Industry in the Pandemic

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