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Improvising academic research in an Ayurved Institute: A promising experiment

Research Article

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Abstract

Research is most essential for professional development and growth of a sector particularly in the field of healthcare delivery. After more than 5 decades of expansive institutionalization ayurvedic education – learning and training – is faced with competitive capabilities. In a highly dynamic environment of career opportunities academic institutions are acquisitive to academic research for identity and sustainability. Academic research as a part of higher education in Ayurved has been a challenge due to several reasons, paradigm difference being the main. A pioneering effort undertaken by an Ayurvedic institute to improve its academic research performance with outsourced professional help had remarkable success. The activity driven by an expert with a change mechanism model with teacher, faculty as a focus, identified core issues and helped address it within the prevailing structure in a systematic manner. It innovatively developed measurable performance parameters for individual growth and outcome parameters for the institutional gains. It effectively helped bridge the gap between two parallel streams of principles and practices for research. The attempt elucidated the significance of academic research as an essential tool of learning and training beyond a mandatory requirement thereby evolving positive environment for research. This successful experiment could be utilized by other institutes and could be modified for its wider application for sustainable gains in terms of knowledge and competitiveness for acquiring academic professional efficiency in field of Ayurved.

Key Words: Ayurved Higher Education, Ayurvedic Research, Academic Research Performance Parameters, Institutional Research Performance, Academic Research Parameters, Ayurvedic Educational Research.

Introduction

Research in Higher education

The higher education in India that has expanded rapidly over the last five decades to become the third largest in the world, next to the United States and China, has seen greater momentum recently with more than 1000 public funded and private universities in the country (1). Higher education enables socioeconomic development. Quality of research as part of education - the academic research – has utmost significance in transformation and performance of a sector. Several governmental agencies like University Grants Commission [UGC], National Institutional Ranking Framework [NIRF], and National Assessment & Accreditation Council [NAAC] and private initiatives have geared up to take on present day challenges. With the invention of technology, the method of education is undergoing a sea-change and the emphasis is on improvising research capabilities and its outcomes.

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Medical education and academic research in India

Indian medical education represents more than 600 medical colleges / institutes with yearly intake of about 90000 medical students, probably the largest in the world (2). However, the efforts are required to make it more efficient and effective. Poor quality of research and very limited outcome in terms of innovation and technology development are of serious concerns (3). Several citations revealed that top 06 colleges published more than 56% of total research papers since the 1990s (4). ***(Table -1)*** Severe criticisms including complete lack of initiatives for research at the institutional level, lack of quality publications and only 6 % of the institutes representing good research present a depressive and alarming situation (5, 6, 7, 8).

Poor mentorship, severe patient load, lack of research interest, lack of funding and lack of multicentric co-ordinated research activity, and lack of incentive for research are some of the reasons for this poor-quality research (4). It is estimated that 85% of all research funding is actually wasted due to inappropriate research questions, faulty study designs, flawed execution, irrelevant endpoints, poor reporting and/or

Table 1: Number of Papers Indexed (Citation

Period	World	India (% of world)
1991-1995	392354	12079 (3.07%)
1996-2000	442000	13282 (3.00%)
2001-2005	606000	26016 (4.29%)
2006-2010	699420	51815 (7.40%)
2011-2015	806326	49219 (5.49%)

non-publication (11, 12). As per a survey by *Nature* one of the most reputed journals it was observed that more than two-third of scientists believed that there is a reproducibility problem (13). While research fraud is uncommon, the temptation to cut corners prompts many authors to indulge in poor-scientific practices (14).

Academic Research in Ayurved

Institutionalization of Ayurved Education

During the last five decades, the education in Ayurved has undergone major changes with institutionalization and unprecedented increase in the number of institutes - 425 at undergraduate level and more than 65 at postgraduate level in 18 specialties - imparting Ayurvedic education with university affiliates (15,16). However, very few institutes are engaged in quality research and in most of the institutes it is just a compulsion for acquiring the degree. There is a large network of research institutions providing courses of advanced learning and research leading to Ph.D. in Ayurved. A survey reports that numbers of publications in Scopus, the largest abstract and citation database of peer-reviewed literature are very less compared to dissertations/thesis produced every year (17). At a 'Brainstorming Workshop' on NITI Aayog proposal the participants unanimously agreed that pseudo structure for ISM created over the last few decades has failed to recognize its own objectives and for what it was formed and practically over three generations of professionals have remained underutilized (18). Lack of confident Ayurved graduates to satisfy various development needs of the profession is a major challenge (17, 19, 20). Despite massive institutionalization and human resources it has not provided knowledgeable, skilled and capable professionals for the Indian Systems of Medicine as expected and failed to contribute to desirable levels of health and medical care (21, 22).

Higher Education in Ayurved

Interestingly higher education in Ayurveda at Jamnagar and Varanasi, developing into the first ever Ayurved University, Gujarat Ayurveda University [1967] and first ever integrated faculty in the world, the Institute of Medical Sciences [1971] at Banaras Hindu University respectively influenced the higher education in Ayurved for following decades. With formation of the Central Council for Indian Medicine (CCIM) constituted under Act of Parliament [1970], now *reformed 'National Commission for Indian System of Medicine (NCISM) constituted under Act of Parliament [2020]* and formation of the independent Ministry of AYUSH – Ayurved, Yoga, Unani and Siddha Systems in 2014, the Ayurvedic education has entered into a new phase; its impact on health and medical care of the country will solely depend on research being the most essential factor for development. Recently signed Memorandum of Understanding between the ministry of AYUSH and the World Health organization for establishing the world's first and only Global Centre for Traditional Medicine (WHO GCTM) in Jamnagar, Gujarat is indicative of the consequences (23). ***The emphasis on improvisation of means and methods for productive academic research in the field of Ayurved is an urgently felt and most desirable requirement.***

Present Status of Research in Ayurved Colleges

Post graduate and doctoral level research at institute or university level involve 1000's of PG and Ph.D. scholars who submit their research dissertations/ thesis on a wide range of subjects from literary to experimental and clinical research. Correspondingly, substantial funds are utilized through various schemes under Ministry of AYUSH through CCRAS and other bodies to encourage and improve quality of research (24, 25) including a recent initiative of Studentship Program for Ayurveda Research Ken (SPARK) for BAMS students (BAMS) (25).

Paradigm Difference

Academic research in Ayurved as a part of higher education is a challenge in itself due to lack of clarity about purposes of research and methodologies to be followed. Academic Ayurvedic research is predominantly structured on the experimental and validation approach of conventional science rather than constructed on its own paradigm. Lack of right modalities has impacted the interest and outcomes. A shift, both in terms of attitude and approach towards research as a part of faculty development is the biggest challenge. Blind following of the reductionist approach, poor objectivity, lack of appropriate methodologies, lack of confidence, commitment and efforts and absence of motivation amongst the faculty are reasons for poor research outcomes (4). Failure to recognize the main purpose of academic research and its multidimensional relevance for development opportunities have failed meaningful research that can lead to innovation. In a fast-changing environment research is expected to contribute to Ayurvedic learning and practice (26).

Institutional search for a solution

Ayurvedic institutes face a major challenge to implement research as a meaningful part of Ayurvedic learning and training; adaptability and integration with mainstream mechanisms of research is not easy. There is strong need for an inclusive process to help motivate research among the Ayurvedic faculty to develop confidence and capabilities for productive outcomes.

Institutional Initiative

College of Ayurved [CoA] established in 1990, now a constituent unit of Bharati Vidyapeeth Deemed to be University, Pune [BVDU] runs an undergraduate, 14 postgraduate, 5 Post-graduate Diploma courses in Ayurved and one in Yoga and 14 Ph.D. programs. Both

of its graduate and postgraduate degrees are recognized and approved by the Central Council of Indian Medicine (CCIM & now NCISM) and the Ministry of AYUSH, Govt. of India. It also comprises post graduate and doctoral level research funded by Government agencies and private funding. A need for specific effort was recognized by the university authorities to improve the academic research outcome of Ayurved faculty (27).

Appointment of an Expert

Having recognized this need of a professional approach, the BVDU took an initiative to appoint an expert Dr. Narendra S. Bhatt, having wide-ranging experience in academic, clinical, and industrial research and management as the Honorary Research Director at its College of Ayurved [CoA] with a mandate to improve the research outcomes. The expert had been a former member of the 'Academic Council' and Faculty of the BVDU and had been the chairperson of the 'The Ethics Committee' at the CoA.

Faculty Profile

The profile of 81 (All PG) faculty members [2014-2017] is provided in Table-2.

Table 2:Faculty Profile

Profile of Faculty- BVDU- CoA [2014-2018]							*Present status 2021-2022 as per norms*
2.1 Age and Gender Group							
31-35	36-40	41-45	45-50	51-55	56- 60	**Total**	**Total**
[07+04] 11	[11+09] 20	[09+11] 20	[05+10] 15	[09+04] 13	[02] 02	[43+38] 81	[40+35] 75
2.2 Qualifications							
Ph. D.	M.D./M.S.		Pursuing Ph. D.			81	All are Post graduate Ph.D. - 30, Pursuing Ph.D. -15
29	22		30				
2.3 Designation							
Professor	Associate Professor		Assistant Professor			81	Professor - 15 Associate Professor - 28 Assistant Professor - 32
17	29		35				
2.4 Experience [in years]							
1-5	6-10	11-15	16-20	21-25	25-30	81	More than 30 years experiences - 10
7	26	13	11	20	4		
2.5 Research guide at Postgraduate level							
Professor	Associate Professor	Assistant Professor	Not yet recognized guide			(73) 81	Recognized PG guide 65(75)
21	27	25	8				
2.7 Research guide at Ph. D. level							
Professor	Associate Professor	Assistant Professor	Not yet recognized guide			(30) 81	Recognized Ph. D. guide 40 (75)
17	11	2	51				

Contemplations to strategy

The expert has been actively concerned about the reforms in Ayurvedic education (28). The influence of the prevailing situation of research as a part of higher education, particularly in the field of Ayurved, and its ambiguity about the approach to research were considered while deciding about the strategy for this assignment to differentially study and focus on the individual capabilities and the institutional situation (28, 29, 30).

Fourteen departments covering subjects of fundamental principles and ancient Sanskrit literature on one end and highly complex clinical manifestations of health and illnesses on the other end were dealt with a common method of research making the whole process mechanical, confusing, and at times even pitiable. The academic activities as mandated by the authorities had failed to address the basic issues of the paradigm difference. Except few enthusiasts, the efforts to take on the challenges related to the paradigm difference in their subjects were missing. Most of the faculty members having been trained in a similar setting evolved over three decades were indifferent to research outcomes making it more a mechanical process devoid of true learning.

The strategy to reorient the Ayurvedic faculty for research was to understand reasons of poor research interests, and to identify areas to be strengthened and to evolve practical solutions to overcome issues both at the basic, paradigm level and for individual efforts.

Methodology

Prevailing Status of Research at CoA

The 81 faculty members at CoA represented a variable range of individual capabilities, attitudes, adaptability, sense of responsibility, and commitment to the profession. It was observed that the faculty was influenced by the sectoral and institutional milieu.

In spite of complete full-time qualified faculty, the research performance in terms of publications and projects was less than satisfactory. Only 30 % of the faculty members had papers published with the majority in unrecognized Ayurvedic journals and very few in peer- reviewed journals.

Formation of Ayurved Research Cell [ARC]

Initial meetings were conducted with the departmental groups to grasp the situation. These meetings helped comprehend the reasons for poor performance. The need was to bring in major changes to generate individual interests in research and to create an

institutional atmosphere conducive to research. A senior professor was assigned the task to coordinate the activities. Later a need was felt for additional assistance from a member of the faculty to document the happenings. Thus the 'Ayurvedic Research Cell [ARC]' came into form to identify, document, address issues faced and outcomes observed both at individual and institutional levels in a coordinated manner.

Providing a Solution, the *Manthan* Model (31, 32)

'Manthan' is a management tool developed by the expert for strategic change management. It looks at issues that inhibit growth and helps identify and examine these issues, both individual and organizational, and encourages collective effort to search for solutions from within. It firmly believes in the capability of every individual and helps to alleviate barriers and use one's own potential within the available organizational structure. Though *Manthan* is meant for business management the expert opted to experiment with it for an academic institution to bring in changes within a specific period of time.

Objectives

The following objectives were persuaded.

a. To *identify and understand* reasons for limited outcomes of academic research in terms of performance and quality.
b. To *study* and *analyze* individual, departmental and institutional *strengths* and *weaknesses* in the context of academic research.
c. To *aim higher acceptance* of academic research as a part of learning and training and *create* awareness of good research as a necessary tool for personal and institutional growth.
d. To *guide address* basic issues due to the *paradigm differences* between Ayurvedic and scientific inquiry methods and *help evolve new modalities for objectivity.*
e. To *define new research subjects*, help develop suitable methodologies and parameters, look outwards, encourage to collaborate and facilitate internal and external linkages
f. *Ensure* develop a positive *environment* of inquiry and objectivity to link *shastra* and science.
g. To guide *evolve measurable metrics* for the assessment of their own performance.

Visits, Meetings and Workshops

The expert visited the institute for two full days every fortnight for nearly four years to interact with faculty members coordinated by a senior faculty member and supported by another teacher. Nearly 200 meetings were conducted with faculty members individually or in departmental groups to comprehend personal and practical problems, suggest means to overcome insufficiencies, help define objectives and methods, guide to look at the research as an interesting academic activity and to reorient the whole research purpose and the process. Minutes of all the meetings were recorded for regular follow up on suggestions made and actions taken to see the progress. Reasons of inability to follow suggestions were discussed to offer agreeable solutions. Specially designed templates helped focus on the objectives.

A major *workshop* with participation of all was organized to share the purpose, process and its contour and prospects. Two *mini-workshops* were organized to address subject specific issues. Few *predefined group discussions* helped provide common approaches to similarity of problems. These group efforts helped create an environment of voicing of the issues and evolving solutions with a shared equanimity.

Templates

Three templates were designed to compile and analyse areas and subjects of interest and for follow up on agreed actions at (1) Individual, (2) Departmental and (3) Institutional level.

Three interlinked formats were specially designed to strengthen individual capabilities, group dynamics and the institutional development respectively.

Individual Data [Format 1.1] for each faculty member included following details.

i. Details of MD / Ph. D. and its publication status
ii. Details of PG / Ph.D. guided, their outcome and status of publications
iii. Details of ongoing or to be initiated PG studies
iv. Project/s Undertaken and Outcome
v. Reasons of non-publication or non-performance

Departmental Data [Format2.1] covered overall performance of each subject department as an interrelated activity.

Institutional Data [Format 3.1] indicated the overall outcome of the process at the institutional level to better plan the activities for the institutional development.

Parameters

Based on prolonged experience in the field of research, objectivity - a vital point in research itself - was determinedly attained by evolving measurable parameters for their orientation process.

Six parameters to gauge the **'Individual Development'** included the following.

i) Interest/Initiative
ii) Thought Process
iii) Skills/Method
iv) Traits/Dynamics
v) Commitment
vi) **Potential**

These individual performance parameters were ***evaluated on the score*** of 5 to 0 as - 5 = excellent, 4 = very good, 3=good, 2 = satisfactory, 1 = poor and 0=fail - by the three members of the ARC independently and confidentially. (Averaged).

The five *quantifiable* P- s **'Performance Parameters'** were identified by the expert based on his own prolonged research experiences to measure the contribution at the institutional level.

These were: ***P1 – Publications,***
P2 – Projects,
P3 - Process or Procedure/s,
P4 - Product/sand
P5 - Patent/s

These 'Individual and Performance Parameters' were developed with a firm belief that the individual and institutional development and productivity are necessarily interlinked.

Deliberations

After the initial phase to gauge the situation, a systematic effort was undertaken to implement a change mechanism with clear objectivity. The biggest challenge identified was indifference to research as a necessary tool for development, personal and institutional. The main focus across all the deliberations was to make the faculty appreciate research as an interesting tool of inquiry and learning and training and to search for a solution.

Steady improvements in interaction and openness were achieved by acknowledging the issues of research in Ayurved while making the faculty realize that possibilities for solutions existed within the prevailing structure; the subject of research being encouraged as an intellectual, personal aspiration beyond the earlier set frameworks.

The inherent ambiguity about research was addressed by helping to develop skills and capabilities, both as individuals and in groups (department) as a shared process to cross over barriers for better appreciation of the task.

Group discussions on specific subjects under the guidance of the expert raised the levels of thought process to look for new topics for research, define objectives and consider options for methodologies to achieve it. This helped apprehend the parameters and methodologies as tools rather than follow it blindly thereby recognizing that the basis of inquiry and search for solutions are more important for any research. This also helped recognize research activity as a joint or collective effort and also to collaborate or outsource needs with common objectives. Their attendance, interests, level of participation in the deliberations, eagerness to contribute to the process and desire to become an academic researcher formed part of the dialogs. The focus was on 'eagerness to learn and train' for academic research.

Periodic appraisal with measurable parameters helped avoid perceptive beliefs and gave much needed objectivity to bring in a sense of responsibility.

Outcomes

Developing Positive Approach to Academic Research

The initial resistance, apprehension and anxiety gradually got replaced with acceptance of the process, interest and curiosity. The opening up for change happened as an ongoing rather than an imposed process.

Attitudinal Changes

The individual attitude – indifference, and defiance by few to the progression mellowed down when challenged with outcomes. The demonstration of research as an important tool for learning got accepted by the faculty with renewed inquiry about the research subjects, their relevance and possible outcomes. This helped bring neutrality to work on the right hypothesis for research outcomes. Faculty started appreciating research as a systematic tool to develop structural thinking for possible outcomes rather than a predefined objective to be achieved any way.

Active Participation

The regular follow up helped active participation and involvement to achieve variable degrees of involvement. The deliberations became more involved, lively and even argumentative. This desirably led to parallel thinking and suggestions to experiment with new approaches.

Ability to Address Issues and Overcome Obstacles

The noticeable gain was ability to consider topics and subjects on a broader base. The expert encouraged teachers to consider new ways to look for simple solutions with objectivity to address complex subjects. It was heartening to observe the ability exhibited by several post graduate teachers to understand research beyond a presumed structure and develop new methods based on available information or data to address the paradigm difference.

Role of Postgraduate Guide

The regular efforts by the ARC helped faculty strengthen their role as post-graduate guides to widen their research considerations and to undertake research activities with confidence. Several new subjects and out of box thinking emerged.

Institution Development

Most of the faculty members realised their own importance as the main constituent for the institutional development despite several drawbacks of the system. Identifying inquiry and knowledge with personal growth the individual academics could better relate with the institutional growth and to overcome other situational inhibitions.

Acknowledging the Need of Collective Efforts

A major benefit was to realise academic research as an open and complimentary activity to improve knowledge and learn new methods. ARC led by the expert stimulated joint or collaborative research, and at times even got involved for the outreach to other institutes of altogether different disciplines. Special efforts were made to capture depth of research subjects by proposing cross-subject or cross-discipline research activities.

Research Environment

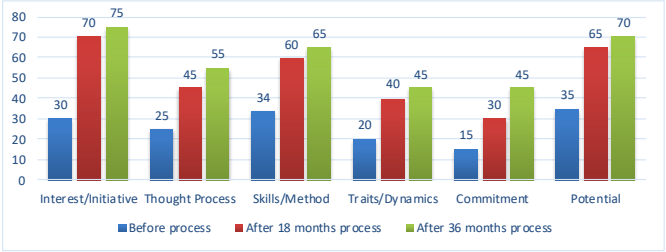
The whole effort did create a positive environment for research.

Faculty Development

All efforts were made to identify strengths and weaknesses, if any, of individual performance and to provide attainable solutions. The deliberations structured as a joint activity based on mutual respect and response helped overcome primary hurdles in a short time with positive responses in most cases. The ARC then could focus more on technical aspects specific to the subjects and the contents.

The following chart provides an average of the grades by three members of ARC independently and separately on six ***'individual developmental parameters'*** at the first phase of 18 months that continued thereafter till the end of the 36 months. This positive response justified the approach being on the right track to further commit to the program.

Graph 1 – Changes in the Individual Issues over a Period of 18 Months and 36 Months



Research Performance (Table 3)

Table 3: Improvisation in Performance Parameters: P1 to P5

P1-P 5	During the *Manthan* Process [2013-17]						Post *Manthan* Process [2018-21]		
	2012-13	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	***2018-19***	***2019-20***	***2020-21***
P1 National	4	14	24	32	30	8	*8*	*11*	*8*
P1 International	3	16	52	56	54	70	*36*	*64*	*70*
P1 Books	0	0	0	1	1	2		*5*	*2*
P2 Major projects	01 Ongoing	0	05 *Submitted*	*04 Submitted*	*04 sanctioned*	*02 Submitted*	*02 Sanctioned*	*02 Ongoing*	*02 Ongoing*
P2 Minor	4	16	14	2	23	16	*04*	*03*	*16*
P3 Process and procedures	Innovative ideas discussed, *Dhoopan Yantra, Aganikarma*								
P4 Products	Ideas discussed, yet to be achieved								
P5 Patents	Possibilities, organization of workshop						01 Patent		

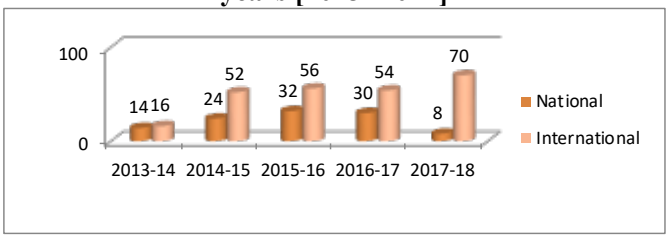
Publications [P1]

A simple inquiry about publication of the post-graduation and doctorate (Ph.D.) works by the teachers was astonishingly deficient. A careful assessment of the reasons thereof was obviously the paradigm difference between the research methodologies that were followed as against the system knowledge of Ayurveda as learnt, taught and trained. In most cases *a distinct lack of right hypothesis* connecting the topic, the objective, and the design, the parameters, and methods followed and expected outcome were observed. Emphasizing that every curious thought is a potential subject for research, the expert advised the faculty to put in their efforts to define the value of their works as to get it published in a right manner. Thus, overcoming a major hurdle of resistance to writing, the faculty got trained in justification and methods to write papers.

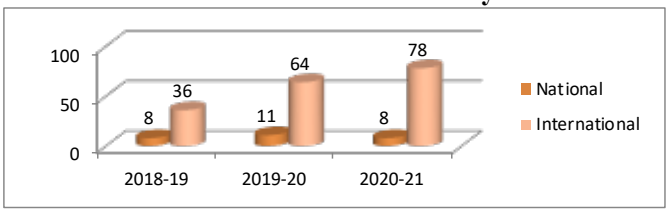
Publications being one of the parameters of performance helped accelerate writing of papers by most of the faculty. The continual guidance from the expert and regular follow up by the ARC increased the number of papers published with gradual improvement in the quality of the writing and the choice of journals.

Three hundred fifty-six (356) papers - significantly a very high number as compared to the earlier for the institute - got published during the five academic years from 2013 to 2018 in a variety of journals having impact factors from 0.5 to 7.5**.**

Graph -2. Publication of papers by faculty- Last five years [2013- 2017]



Graph – 3. Publication of papers – Follow up after Conclusion of the Activity



Projects

Research projects undertaken by the departments and the institute help in developing an environment to persuade new ideas and the search for methods. New ideas were regularly proposed, exchanged, recorded, and followed by the expert and the ARC in fortnightly group deliberations. This encouraged the faculty, particularly the younger members, to develop skills of thinking, communicating and presenting their ideas clearly and to learn to address hitches.

The outcome was so overwhelming that an unprecedented 23 projects were applied for the

University funding when it became necessary to convince the University authorities to increase the funds specifically for the Ayurved faculty! 16 out of 23 of the projects applied were approved after due scrutiny by the authorities.

All the 14 departments got interested in developing and submitting a variety of research projects to different funding agencies. Nearly 60% of the faculty members got into collaborations with other institutes.

With newly found confidence, **34 minor projects were completed and 24 were on-going.** Three major research projects worth Rs. 66 lakhs got sanctioned by the National Innovation Foundation-India (NIF), Ahmedabad. In collaboration with other institutes a major project of Rs. 66 lakh was sanctioned. ***In 2019-20, two projects worth*** *Rs. 51, 05,650 and -Rs 36, 72,000* ***were sanctioned by ICMR and CCRAS respectively.*** In total 4 major projects were submitted to various funding agencies. These put together indicate a remarkable progress for the institute.

Outcomes in the context of other parameters

The regular interaction of ARC covering almost all the faculty members in a systematic and yet parametric way created positive institutional ethos for research.

ARC persuaded other three parameters namely process, products, and patents. This activity shaped into surveys, review papers and proposals for experimental and clinical studies. These culminated into publications, and product and project proposals.

Novel Ideas and Concepts

A major challenge for academic research in Ayurved is to make it exciting. A series of new ideas and subjects were proposed by the expert as an outcome of exchanges with the faculty related to the subjects taught. ***(Table - 4)*** The discussions on *'how to go about'* these ideas or concepts turned into a stimulating activity amongst most of the faculty to think of research more as a tool for new learning and training. Several teachers shared their own research ideas, examined the feasibilities, and worked to develop it further.

Developing interest and a positive thought process for research by the faculty members was a major achievement of this effort.

Table– 4: New Concepts for Research in Ayurvedic Proposed by the Expert

Topics	Innovative concepts	Departments
A. Fundamental research		
Review papers on Fundamentals from classical texts	1. Specific concept from Ayurved classical texts 2. Cancer in context to *Sushruta Samhita*	*Samhita, Sanskrit* and *Siddhant*
Rasadhatu and *Medadhatu* from *Sushruta Samhita* with modern perspectives	3. Biochemical parameters, Controversies 4. Proliferation of metastasis, 5. *Pitta-Agni* in correlation with mutagenic transfusion	*Kriya Sharir*
Panchmahabhuta and quantum physics	6. Structure of *panchmahabhuta* in context with *paradiguna*, 7. Quantum physics & combination of *gunas*, 8. Applicability of *guna* (physical property)	*Samhita, Sanskrit* and *Siddhant*
Chitta in the context of Ayurved *sidhant* & its relevance	9. Concept of *maan - chitta, prana - vayu, gati* its co-relation in Ayurved and Yoga	*Samhita, Sanskrit* and *Siddhant*
Agni and Enzymes	10. Relation and Interpretation of Different Enzymes, Digestion and Metabolism in the Context of *Agni* 11. Co-relation of *Pitta, Agni,* and *Prana* [Oxidative stress and Thermogenic principles)	*Kriya Sharir*
B. Inter Departmental Collaborations		
Nomenclature of *Dravyas*	12. Significance of Sanskrit Synonyms, their Etymology, and Importance/ Relevance for Taxonomical, Pharmacognostic, Properties, and other Applications.	*Dravyaguna Vigyan* & *Samhita*
Fundamental Principles and their Functional Aspects	13. Immunity and ayurvedic concept, *Oja, Bal* at molecular level, 14. All *dhatus* in context of Structural-Function Parameters	*Samhita, Sanskrit* and *Siddhant, Rachana Sharir, Kriya Sharir*
Hormones	15. Ayurvedic Perspectives of Endocrine Secretions / Hormones 16. Comparison of *Srotas* and the Systems	*Kriya Sharir* Modern science
C. Quality Control	17. Standardization of *Rasaaushadhis*	*Rasashashtra* and *Bhaishjyakalpana*
	18. Standardization of *Ksharsutra*	*Shalyatantra*
	19. Standard operating procedures	All clinical departments
	20. Quality control of mineral and metal preparations 21. Develop standard operating procedures of various formulations	*Dravyagunavigyan Rasashashtra* and *Bhaishjyakalpana* Pharmaceutical science

	22. Standard Clinical methods for Ayurved SOP-Standardization of the techniques and therapies	All clinical departments
D. Experimental research	23. Development of various experimental models as per Ayurved fundamentals 24. pre-clinical in vivo or in vitro experimental study on various toxicity	*Dravyagunavigyan* *Rasashashtra* and *Bhaishjyakalpana* Pharmacology
E. Developing Functional gadgets	25. Ayurvedic view in context to Anatomy and physiology for development of modern Gadgets for functionality, 26. Its correlation to remove confusion and sort out controversies 27. Models for vital organs liver, thyroid, endocrine glands –their secretions and function, organs with greater significance	*Kriya Sharir* *Rachana Sharir*
F. Survey Studies	28. Epidemiological/ Survey study on Lifestyle disorders, [Diabetes, BP, IVF, Obesity etc]	*Swasthvrutta, Rognidan*
G. Clinical research	29. Skin disorders, Obesity, Diabetes, Arthritis, Infertility, Wound Healing, *Ksharsutra*, Uvulitis, Inferior turbinate hypertrophy, IUGR, *Suvarnaprashan*, *Amrutdhara* and Respiratory disorders	All clinical departments
H. Model development	30. Structural anatomy 31. *Dhoopanyantra* 32. *Agnikarma* instrument	*Rachana Sharir* *Shalyatantra* *Prasutitantra* and *Streerogavigyan*
I. Software development	33. Database on Medicinal plants 34. E- Governance 35. Software for *Panchakarma*	*Dravyaguna Vigyan* *Panchakarma*
J. Books	36. Asian Medicine	*Samhita*
	37. Glossary of Ayurvedic terminology for graduates	*Rognidan, Panchakarma*
	38. Strotas	*Kriya Sharir*

Discussion

The First Experiment

Universities, institutes, and individuals are concerned about performance of academic research in higher education of Ayurved. The main issue is the paradigm difference between Ayurved as a knowledge-based system of Vedic origin as against the enquiry based on experimentation and validation. In lieu of commonly recognized solutions a university besieged with the issue of quality of research considered appropriate to take professional help so as to strengthen output of its academic research. ***This, probably is the first of its kind experiment by a private Ayurvedic institute to overcome limitations related to the system and the subjects and to improvise its academic research performance.*** This visionary step driven by commitment to the field of education and training of Ayurved showed institutional patience and trust.

Role of Expert

Appointment of a recognized researcher in the field of Ayurved with managerial skill as Honorary Research Director for a period of four years with regular fortnightly visit was a bold and prudent decision. The expert deep-rooted in Ayurved knowledge with extensive research experience was able to address the paradigm difference with an inclusive outlook. A systematic approach to analyse the problem to evolve objective parametric norms helped provide objectivity to the whole process. The expert as an involved researcher opted to play more of a catalytic role for effective enactment of his ideas. Formation of ARC by the expert helped better coordinate and execute the plan. *These three – knowledge, objectivity and execution - were the key components for the success of this assignment.*

Role of Ayurved Research Cell [ARC]

Initially a senior faculty member helped coordination with members of the faculty, the heads of the departments and the head of the institute. With additional assistance of one more faculty member the 'Ayurved Research Cell' [ARC] was constituted to document, follow up and analyse the outcomes as also to bring in three independent views. ARC led by the expert provided the participative mechanisms for the individual, the groups and collective deliberations, suggestions and implementations. It helped develop collective sense of commitment to the purpose. As observed after the tenure the ARC in a modified form did help keep the momentum for a while.

The ARC did experience the interpersonal resistance, predispositions and proprietorship issues that can affect the process. In future the role of ARC could further be strengthened by broadening its base - say by rotating the responsibilities - and modifying its mechanisms.

Manthan (Modified) Model (33)

Various models on education and research are developed to enhance research culture in universities throughout the world. The HumboldtIan model (19th Century) of higher education was a holistic combination of research and studies (34). Lombardi (2003, 2004) presented a model "Quality Engine" for USA research universities (35, 36, 37). Baker (2006, 2007) presented an Emerging Global Model (EGM) emphasizing the international nature of small groups of institutions, and Super Research University (38). A methodically

validated questionnaire-based survey study was carried out to evaluate the "Extent of exposure to basic clinical skills during BAMS course (39).

'Manthan' a management model developed by the expert (one if the authors), is simply stated the churning, a 'Brainwhirl'. It is a process of optimising the inherent strengths within an available sphere of resources and events to provide solutions for the intended transformation, the change.

The four phases of *Manthan* are -

1. Identifying and understanding weaknesses and gaps.
2. Defining objectives in the context of main purpose and developing tools.
3. Appling solutions in a systematic manner.
4. Connecting outcomes with the defined objectives, providing solutions, fixing up gaps, overcoming hurdles and achieving goals.

Manthan in a modified form was utilized for the first time for an academic institute to change perceptions and attitudes towards research to make research acceptable more as a part of learning and training for higher education in Ayurved.

Appropriate Methodology

A systematic approach to identify the issues and address it within the existing framework though challenging was achieved.

The most intriguing aspect has been to successfully unite the individual gain with that of institution where the similarities and interlinking of subjects within the group and amongst the groups were devised.

Parameters, both in terms of quality and quantity, formed the basis to objectively analyse the outcome thereby making the whole attempt measurably accountable.

The three distinctive yet interlinked formats designed by the expert for the individuals, groups and the institution respectively served to gauge the common purpose of academic research performance. These formats ensured avoiding subjective perceptions.

Deep knowledge of the sector and rich research experience helped the expert to aim the basic issue of research as a means for development through learning and training. The whole methodology addressed the basic issue of research as a part of higher education rather than a subject restrained by the issues of paradigm differences, tools used, and results expected.

Impact

The most important gain was the acceptance of research by the faculty as a pragmatic tool for higher education for knowledge gain and self-development rather than a mechanical tool to obtain a degree. Correspondingly it developed a sense of responsibility towards teaching while getting aligned with the institutional growth.

This reorientation of research encouraged sense of enquiry and to articulate various hypotheses and develop methods of justification. It particularly stimulated the curiosity of the younger faculty and channelise their energy.

The departmental activities constitute an important link between an individual and the institute. The individual attitude and communication play a vital role to promote or detain any activity. Complementary or conflicting behaviour within and across the departments clearly surfaced.

The purposefully aimed group dynamics - intra departmental and inter departmental activities - received variable responses. Individual activities and projects require joining of hands and even looking for small favours; the due process of acknowledgement and recognition helped in many ways. Though meets and open discussions encouraged new ideas, exchange of views, improved communication and helped adaptabilities for collaborations; yet there remained a reasonable scope for improvisation. The response to ARC efforts to organize workshops on different subjects was limited.

It was reassuring that several suggestions by the expert received positive responses in the form of post graduate studies or as project-proposals. Excluding few cases, the eagerness to develop project proposals individually and by joining hands was gratifying.

The institute had both quantitative and qualitative gains that sustained later as well. The institutional change brought in a dynamic rather than a mechanistic manner gave productive results. It helped overcome impediments related to institutional primacies by generating a positive attitude. Maybe institutional encouragement for internal debates, symposia or workshops as a pragmatic activity can ensure increased involvement of the faculty. *The outcome would have been more productive and justifiable with active involvement and support to recognise efforts by the faculty added with a reward mechanism within the institutional framework.*

This institutional effort must be applauded for its bearing on the quality of higher education.

The attempt was most rewarding to help create a positive environment for research. There are several learning's of this process that could further be modified and utilized for wider productive outcomes. Such a process can contribute to higher credibility of the institute, improve inflow of better talent, and get more resources for development giving momentum to higher gains in a cyclic manner to contribute to the sector and the society.

Challanges and Solutions

Paradigm Difference

Integration of scientific modalities within the paradigm of Ayurved is a challenging and dynamic process. A systematic effort to develop Ayurved based enquiries and modalities and efforts to develop newer and newer moulds with the innovative outlook for newer applications can give promising results. Integrative modalities built on Ayurvedic principles and practices will provide a new dimension to academic research making it more interesting and more rewarding (40).

Innovative, Not Imitative, Methodology

The most important need is to change the perception of research as an important tool of learning and training in higher education rather than treating it as a modern subject. The subject of research as taught presently within an established framework of methods gives undue importance, at times with conflicting ideas, to tools rather than encouraging a realistic sense of inquiry and search for solutions to validate a hypothesis.

As a knowledge-based system, the contextual interpretations and applications of Ayurvedic fundamentals and literature have great significance to build new foundations for research in Ayurved. The unsuitable construct of academic research on subjects of fundamentals or literary research based on experimental research method need a major change. Even simple reference writing, writing of Sanskrit textual citations, is variable and mostly misleading. An urgent wanting was felt to undertake deliberations to evolve a standard method of citations of ancient texts, commentaries, translations and modern texts.

The narrowed down methodology as prevalent requires diversifying change to suit the scope of Ayurvedic subjects and their relevance. The subjects of Kriya Sharir and Nidan have much wider relevance in the context of human functions, causes of health and illnesses. Research on newer applicability of these subject components could be exciting to derive deeper and newer understanding of complex diseases and their treatments. Several scholars have explored these subjects in past with new thoughts.

Similarly, the common principles as applied to both the nutritional and medicinal substances unlike as followed differently for pharmacologically active drugs and nutritive elements necessitates a very different approach to research on Ayurvedic formulations and ingredients. Several new approaches and methods have been developed for standardization, quality control and development. There is need to enhance search for newer modalities for quality, standardization, development and validation of new Ayurvedic products (41, 42). Clinical richness of Ayurved in itself is a stimulating subject for research. It is much wider area beyond simple clinical trials, though not exclusive of it (29).

Significantly, this experiment has provided with an approach that could be utilized to bridge the gap between inconsistent streams of principles and practices, two parallel paradigms, in a successful converging manner to look for solutions to address the differences.

The need is to define the research objectives with Ayurvedic context and choose the befitting methods including the criteria of validation and or outcomes. ***A visionary and systematic endeavour by the policy makers and institutional authorities can help bring this badly needed change.***

Research Training Programs

It is heartening to know of an aggressive approach, a strong momentum, to promote and propagate methodologies for research (24, 25, 43). The faculty is struggling over last several years to adapt to the mandatory requirements (16, 44, 45). Academic research has a very important role to play for integration and adaptability with new ideas, concepts, methods and new outcomes. A step is taken by NCISM and initiated training course for UG and PG teachers on Medical Education Technology and scientific writing and publication Ethics in order to promote scientific diversity. At university level it is mandatory to publish at least two research papers annually in SCOPUS or Web of Science or UGC care listed journals. A caution is however necessary to not to push reorientation programs that are structured on blind followings of methodologies in the name of science that may be restrictive of innovation or novelty and thereby frustrating the innovative thought processes. The institutional authorities and policy makers shall must encourage inter disciplinary and cross faculty research activities (26) and try to address issues of ambiguities and parallelism in a system-oriented and subject driven manner.

Need of New Journals

Over last few decades sincere efforts are made to publish journals related to Ayurvedic research to satisfy academic needs. ***Two main issues faced by the Ayurvedic researchers are mushrooming of predatory journals on the one hand and lack of journals that recognize Ayurvedic approaches and viewpoints on the other.*** It is equally amusing to come across promotion of certain norms and parameters that are applied mechanically where worldwide meanings, applications and fallacy of those parameters have already come under serious scientific scrutiny (46). Proponents of these parameters, mastered even fraudulently (47) by some, are trying to provide direction without commitment to Ayurved knowledge-base or its logical - scientific rationale. Meaningless continuance of this approach may do more harm to the subject than benefit. Initiating and sustaining of new journals in present technology-based system is not difficult. *It is urgently necessary to publish more and more quality journals designed within the premises of Ayurvedic principles and practices through due processes of diligence and peer reviews to boost quality of academic research in Ayurved.* New theme or activity-based journals to satisfy the diverse applicability of Ayurvedic subjects with scholarly levels of authenticity, credibility and scrutiny are needed to encourage new hypotheses, new models of integration and contemporary relevance of the outcomes.

Mandatory Timeframes

The time required for concept building, developing the hypothesis, undertaking the actual research activity, its analysis and final presentation requires time. *A mechanistic process without purpose of true inquiry and right methods compromises on the purpose and the outcomes.* There is need to encourage the concept building and to provide a scope for innovation that can truly contribute to research in Ayurved. ***A new framework with early initiation of concept building, institutional procedures and***

recognition will provide momentum to new Ayurved research.

Conclusions and recommendations

Repositioning Academic Research in Ayurved

This attempt comprised of a sincere effort to improvise the process of academic research in Ayurved as an intriguing, stimulating and potent activity – full of promises - to enthuse and motivate an inquisitive mind. This experiment justified the focus of academic research to be an essential tool of learning and training beyond the means and methods.

Need for a New Path

It is necessary to innovate new models of enquiry and options beyond blind mocking of prevalent research methods for Ayurved research to address epistemological differences.

The Teacher Researcher

Ayurved Education policy and reorientation programs should focus for a new trend of 'Teacher Researcher' for proficiency. It must be realised that the faculty improvement is directly related to institutional support, resources, incentivisation, promotion, and assurance of future aspects and growth.

Integration

Developing newer and newer models of integration in a multidimensional manner will help develop contextual variations (48).

Developing Research Environment

Developing an environment of excellence based on objectivity – evaluation and outcome parameters - is very vital to make research more interesting, rewarding and relevant and to adapt to ever changing needs.

More Ayurved Journals

There is an urgent need of providing openings and creating a new wave of journals or publications to present exciting and fulfilling renaissance of Ayurved.

Cross Faculty Research

Initiate and encourage cross system research and industrial private partnership to enhance the whole research momentum for to be more meaningful and productive**.**

Need for a Major Endeavour

The need is to undertake a massive predefined multilevel national program - a national endeavour for reorientation of Ayurved research – involving central, state and institutional network to create and encourage national movement to develop clusters of excellence driven by commonly identified purposes, priorities and processes in an open and dynamic manner.

Sustainable Gains

This pioneering experiment has potent applicability that could further be modified and applied for its wider use and sustainable gains to the higher education in Ayurved.

Conflict of interest

One of the authors was assigned as Hon. Res. Director at the College of Ayurved.

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