DOI: 10.7860/JCDR/2020/45785.14060

Review Article

Education Section

Systemic Shortcomings in Medical Education System of India: A Review with Radical Solutions

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ABSTRACT

India leads the world in the number of registered medical institutions and produces the largest number of medical doctors in the world. Notwithstanding this, India struggles for the concerns of poor quality of medical education, incompetent medical workforces, and insignificant research contribution to the world which is due to the malfunctioning of Indian regulatory bodies. Many Authors (domestic and foreign) have written extensively on the prevailing deficiencies of the medical education system of India in the last decade but essentially failed in offering effective and realistic solutions for the deficiencies cited by them. The present study undertakes a detailed review of the articles published in the last decade that critically analyses the various aspects of the medical education system of India. The objective of this article is to present the deficiencies in the medical education system in the country supported by statistical facts and figures to provide a framework to enable a better understanding of the complexity of the medical education system in India. This article also attempts to present effective solutions for the same as publicised by the regulatory and governing bodies of medical education and health care system of India thereby providing insight into the future directions in revolutionising it.

Keywords: Competency-based curriculum, Globalisation, Medical council of India, National medical council, Privatisation, The regulatory body

INTRODUCTION

Higher education system of India with 51,649 institutions is one of the largest in the world [1]. In terms of enrolment, India with 35.7 million students currently enrolled in universities and colleges stand next to China (41.8 million) [2]. India continues to produce the largest number of doctors and nurses in the world. The overall doctor population ratio stands as 1:1456, which falls behind the WHO recommendation of 1:1000 [3]. The Center for Disease Dynamics, Economics, and Policy, in their report, estimates that the Indian government provided only one government doctor to every 10,189 people creating a deficit of 6,00,000 doctors [4]. According to the Medical Council of India (MCI), medical colleges in India have increased from 20 at the time of independence admitting 1500 students to 542 medical colleges (government-279, private-263) in 2020 admitting around 80,312 undergraduate students annually [5]. The number of undergraduate medical seats has seen a jump of 48%, from 54,348 in 2014-15 to 80,312 in the academic year 2019-20. Postgraduate seats have also increased by 18,704 (65% jump) during the corresponding period. Therefore, close to 47,000 undergraduate doctors in the country annually are denied the opportunity of postgraduation, resulting in low employability and surge in migration overseas [5].

Despite the increased access to higher education, the challenges remain. The Indian regulatory bodies have miserably failed to discharge their responsibility towards the maintenance of standards of medical education and have erected formidable issues like intrastate and interstate inequalities in the establishment of medical institutions and manpower, insufficient funding of government medical institutions, poor quality of medical education, incompetent medical professionals, insignificant research contribution to the world, low employability of medical graduates, etc., [5].

This paper undertakes a review of all the articles published in the last decade that critically analyses the various aspects of the medical education system of India. The objective of the paper was to present the deficiencies in the medical education system in the country supported by statistical facts and figures to provide a framework to enable a better understanding of the complexity of the medical education system in India. This article also attempts to provide effective solutions for the same as publicised by the regulatory bodies of higher education and the health care system of India thereby providing insight into the future directions in revolutionising it.

Literature Review

Authors conducted a review of articles (in English Language) published from 2010 to 2020 utilising an online literature search with PubMed Central, Medline, Scopus, Google Scholar, using the MeSH terms like medical, education, competency-based curriculum, problems/faults/lacunae with MCI, future of medical education, national medical council, globalisation/privatisation/lack of research in Indian medical education, critical analysis of medical education. The inclusion and exclusion criteria for the selection of articles were established. Articles written by both domestic and foreign authors that analysed or critically analysed the medical education system of India regarding the quality, recommended curriculum, lack of funding, lack of good quality research, overseas migration of medical professionals, in India were included. The articles on globalisation, privatisation of medical education, articles on the similar topic, similar review articles on the same topic were excluded. Around 120 published articles were found related to the medical education system of India and the MCI. After applying inclusion and exclusion criteria, 80 articles were shortlisted. Finally, after reading the full text/abstract of the articles, 54 articles were selected that met the criteria for the synthesis of the review and hence was included in the study as presented in [Table/Fig-1] [6-59].

3. Structure of the Medical Education System in India

3.1 Medical Council of India:

The Medical Council of India (MCI) was established by 'Ministry of Health and Family Welfare' as a statutory body under the provisions of the Indian Medical Council Act (IMC Act), 1933, which was later, replaced by the Indian Medical Council Act (IMC), 1956 and was subsequently amended in 1964, 1993 and 2001 [60]. By its powers, the establishment of a new medical college requires mandatory recognition by MCI, but during the inspection, MCI focuses only on documentation of infrastructure and human

Sl. No.	Title of the article	Name of the Authors and Year of publication	Critical analysis/Suggestions
1	Global Demand for Medical Professionals Drives Indians Abroad Despite Acute Domestic Health-Care Worker Shortages	Walton-Roberts and M, Irudaya Rajan S [6] (2020)	Around 69,000 Indian-trained physicians worked in the US, UK, Canada, and Australia in 2017, equivalent to 6.6 percent of the number of doctors registered with the MCI. Ministry of Health and Family Welfare decided in 2011 to stop issuing a 'No Obligation to Return to India' certificate. 25 percent of Indians receive medical treatment from unlicensed providers, especially in rural areas.
2	Competency-based medical education in India: Are we ready?	Basheer A [7] (2020)	The competency-based curriculum gives no clear guidelines regarding the assessment. Another issue relates to ambiguity regarding the role in internal assessment in the new curriculum. Many medical colleges still have a substantial backlog of faculty awaiting basic training.
3	Medical Education in India: Past, Present, and Future	Kulkarni P et al., [8] (2019)	Need to move away from traditional, teacher-centered, content-oriented model of education to the student-centered, and outcome-oriented medical education system. Highlighted several challenges for the successful implementation of CBME.
4	A cross-sectional survey on medical education needs of general practitioners and family medicine: Delhi, Himachal Pradesh, and Tamil Nadu, India	Bakshi S et al., [9] (2019)	84.2% and 85.4% of the respondents agreed/strongly agreed that family medicine would benefit specialists and decrease health disparities. Challenges include a lack of information about family medicine and patients use of specialists for primary healthcare needs.
5	Competency-based undergraduate curriculum: A critical view	Sharma R et al., [10] (2019)	Highlighted lacunae in the curriculum like de-emphasis on time-based training, exclusion of the concept of family medicine Suggested sensitisation and training of stakeholders and faculty, increase in several faculty, more questions on competencies (knows how, show/perform how) than only on the cognitive domain, more weightage for formative evaluation, OSPEs/OSCEs.
6	The Tyranny of the Medical Council of India's new (2019) MBBS curriculum: Abolition of the academic discipline of family physicians and general practitioners from the medical education system of India	Kumar R [11] (2019)	The new curriculum exposes a treacherous hierarchical monopoly of hospital-based specialists' doctors over generalist community based primary care physicians.
7	Medical Council of India's New competency-based curriculum for medical graduates: A critical appraisal	Jacob KS [12] (2019)	Stated that the focus of the new MCI curriculum is on continued use of specialists. Stressed the significance of empowerment of teachers in General and Family Medicine and Community Health, who run primary and secondary medical facilities.
8	Medical Research in Medical College in India: Current Scenario and Ways to Improve it	Ghosh K and Ghosh K [13] (2019)	Six to ten medical colleges publish more than 60% of research papers in indexed journals out of existing 450 medical colleges in India. Poor mentorship, severe patient load, lack of research interest, lack of funding, and lack of multicentric co-ordinates research activity, lack of incentive for research, are few reasons for poor quality research.
9	Quality medical research and publications in India: Time to introspect	Kapoor A [14] (2019)	Forming an institutional research committee which will facilitate activities like regularly conducting workshops on research methodology, writing research proposals. Mandatory training sessions for all faculty and residents, providing funds, resources, and time, and engendering a boosting environment for encouraging research in India.
10	Pressure to publish: Index Copernicus and predatory journals are helping (?) Academicians	Mondal H and Mondal S [15] (2019)	Critically analysed poor quality research done by Indian researchers published in Index Copernicus.
11	National Medical Commission Bill, 2019-Good intent but unmet expectations	Honavar SG [16] (2019)	National Medical Council bill does not address the ill of postgraduate education and is prone to the politicisation of its governing structure.
12	Medical Students' Opinion and Perception of the Education Environment in a Medical College of Delhi, India	Sachdeva S and Dwivedi N [17] (2018)	75.2% of students opined that current administration is student supportive and 94.8% were in self-assessment state of "happiness".
13	Globalisation of Medical Education: Current Trends and Opportunities for Medical Students	Rizwan M et al., [18] (2018)	Studied the effect of privatisation, globalisation on medical education and development of physicians and proposed vigilance to ensure the quality and competency of physicians.
14	Medical education in India	Sethuraman KR [19] (2018)	The current initiatives undertaken by the government and the regulatory agencies augur well for the betterment of medical education in the foreseeable future in India.
15	Letter to the Editor: Individual Researcher and Author Metrics: A viewpoint from India	Misra DP et al., [20] (2018)	Universities and institutions have a mandate to enable greater access to Scopus as per the proposed national policy. Academics should be made aware of the need to accurately list the source of indices as the h-index listed on their CV. Not only research publications but involvement in other scientific activities such as peer reviewing manuscripts should be valued.
16	Medical Council of India's amended qualifications for Indian medical teachers: Well intended, yet half-hearted.	Bandewar SV et al., [21] (2018)	MCI in (2017) amendment has not specified any particular index(es) for its requirements regarding research publications. The amendment gives credit for a paper to only the first author and corresponding author. Suggested three criteria: duration of service, number of research publications, and clinical/lab services and teaching for candidate eligibility for a position.
17	MCI Challenges to Manuscript Writing and Publishing	Jain MK et al., [22] (2018)	MCI should review the list of indices, should recommend only databases and not search engines, citation index should be included, all authors should be considered for credits. MCI could focus on indexing quality e-journals. All specialties must-have the choice to publish in journals of their choice.
18	Indian government dissolves Medical Council of India	Bagcchi S [23] (2018)	India's government has discontinued the Medical Council of India and divested its functions to an appointed board of governors.
19	Medical Council of India Revised Criteria for Research Publications: A Dilemma	Barwal VK and Sharma GA [24] (2018)	Suggested that two/five/seven/ten of best papers should be considered for promotion in the academic ladder. Evaluation/ranking the best papers remain unanswered. Other forms of publications like editorials, commentaries, short articles, case series should also be considered.
20	The end of the Medical Council of India	Jha V [25] (2018)	Several committees were formed to reform the MCI, but their recommendations were not implemented either cooperated with its directions. Reasons like refusal to share information concerning the controversies in the process of assessing medical colleges, and its tardiness in managing admission processes led to its dissolution.

21	Controversies in Medical Education: National Medical Commission (A Draft Bill for Replacing Medical Council of India)	Minocha VR [26] (2017)	Criticises various points of the draft National Medical Commission (NMC) bill like infrastructural issues are considered 'non-core areas', relatively low status to basic degree (MBBS) holders in health system than the PG degrees.
22	Problems of medical education in India	Deswal BS and Singhal VK [27] (2016)	Criticises MCI as regard to doctor-patient ratio, quality of medical education, the exploding number of medical colleges, increasing capitation fees, shortage of faculty, etc.,
23	The revised guidelines of the Medical Council of India for academic promotions: Need for a rethink	Aggarwal R, et al., [28] (2016)	Criticises MCI's new guidelines for 'research publications' for promotion of teaching faculty for the authorship sequence rule, unclear national versus international journals, types of articles allowed, and suggested exclusion of Index Copernicus from the list.
24	Evolution of medical education in India: The impact of colonialism	Anshu, Supe A [29] (2016)	Proposed that MCI needs to work out a national medical curriculum which caters to our country's needs with a the symbiotic relationship between the indigenous and allopathic systems of medicine.
25	Faculty promotions in medical institutions in India: Can we improve the criteria?	Dhulkhed VK et al., [30] (2016)	For the faculty appointment and promotion, rules and regulations of MCI doesn't evaluate the faculty on the aspects like teaching, administrative and clinical skills, quality and types of publications, teaching abilities, accessibility of the faculty to the students, ability to guide the student, student feedback, patient care, clinical expertise, educational/research innovation, involvement in various academic activities, community programs and service to the college and university.
26	Faculty perception of medical council of India basic course workshop in medical education technologies as a faculty development programme	Yadav A and Chaudhary S [31] (2016)	83.33% of faculties showed a positive response to the compulsion of basic course workshops of MCI for all faculties. 93.33% accepted that this course was beneficial in acquiring new concepts or knowledge. Basic course workshops must be an integral part of the faculty development programme at the institute level.
27	The mandatory regulations from the Medical Council of India: Facts, opinions, and prejudices	Bhaskar S [32] (2016)	For faculty promotion purposes, MCI could permit at least 25% of the publications to be either a Brief Communication or a Case Report.
28	India's Foreign Medical Graduates (FMG): An opportunity to correct India's physician shortage	Sharma A et al., [33] (2016)	In 2013, FMGE saw 9,700 FMGs failing to pass the exam required to enter practice in India. To help FMGs build their skills, additional training and hands-on apprenticeships can be incorporated. Few suggestions given were like participating as observers in the established programs, working outside of clinical care, including in research, hospital administration and public health to enable them to pass FMGE.
29	Health activists join forces to bid to reform Medical Council of India	Sachan D [34] (2016)	Public health activists in India have launched a coalition to try to reform the Medical Council of India.
30	The functioning of the Medical Council of India analysed by the Parliament Standing Committee of Health and Family Welfare	Pandya SK [35] (2016)	Parliamentary committee summarises: Due to massive failures of the MCI and lack of initiatives on the part of the Government in unleashing reforms, there is total system failure due to which the medical education system is so affected that it is beyond the incremental tweaking of the existing system or piecemeal approach can give the contemplated dividends.
31	A radical prescription for the Medical Council of India	Nagral S et al., [36] (2016)	In 2014, a campaign against corruption was launched by BMJ that sparked global interest in the practices of kickbacks for referrals, financial targets in corporate hospitals, and high capitation fees in private Indian institutions.
32	What is Wrong with the MCI?	Barua MP et al., [37] (2016)	Research infrastructure and funding are not essential criteria for the establishment of medical colleges in India. MCI must lay down specific research-related minimum guidelines.
33	Medical Education in India: Introspection, Challenges, and Reforms- A vision.	Sahai A [38] (2016)	Critically reviews the medical education system of India and provided suggestions like articles 7, 8, 10, 42, 45, 48, 51.
34	'Predatory' open access: A longitudinal study of article volumes and market characteristics	Shen C and Bjork B [39] (2015)	Surveyed journals and predatory publishers across the world. States that 35 % of the publishing authors are from India and 27% of publishers are located in India.
35	Reforming the Medical Council of India	Tiwari SS [40] 2015	By making decision-making more transparent, changing the balance of interests in the MCI, and empowering citizens, some real progress can be made in reforming the MCI.
36	Problems and Challenges in Medical Education in India	Goswami S and Sahai M [41] (2015)	Medical education should be integrated, problem-based, and evidence-based teaching.
37	Medical education in India: Problems and solutions	Naik S [42] (2014)	This article discusses the background, the current issues and possible future course of Indian medical education like article 8, 10, 45, 48, 51
38	Corruption ruins the doctor-patient relationship in India	Berger D [43] (2014)	If prompt reform is not forthcoming from within the country (India), the medical licensing authorities of the UK, US, Canada, Australia, and New Zealand could withdraw recognition from all suspect private Indian medical colleges.
39	The Medical Council of India: The need for a total overhaul	Pandya SK [44] (2014)	Council members should comprise of medical, legal, and social experts of unquestionable integrity, and its establishment and processing must be open to public scrutiny. Nonmedical personnel, Politicians, and bureaucrats should not be a apart of the composition and operation of the council. The practice of conducting election must be abolished. Reduction in the number of council members should be considered. All proceedings of the MCI must be publicised.
40	Privatisation of medical education in India	Davey S et al., [45] (2014)	Although privatisation is a powerful tool to support the public health system to increase accessibility and affordability of the health care at low opportunity cost, at the same time, it should be monitored with the stringent implementation of the rules set by Medical Council of India so that health of the nation could not be compromised in the long run.
41	Medical education in India: Current Challenges and the way forward	Solanki A and Kashyap S [46] (2014)	Discussed the flaws within the accreditation system. Presented various features of 'Vision 2015'- A seminal paper proposed by MCI
42	Medical Education in India: An Introspection	Kumar R [47] (2014)	Inclusion of ethics in medical teaching and foundation course. Formulate the National Medical and Health education policy. Abolish Draconian laws haunting doctors and faculty.
43	Medical Education and Training: Implications for India	Anand A and Bammidi S [48] (2014)	Critical analysis of topics like mobility between medical and research fields, human resource management, reorganisation of medical education managers and encouragement of medical entrepreneurship

44	Improving the quality of medical education in India: The need to value and recognise academic scholarship	Chacko TV [49], (2013)	The incremental increase in the number of poster presentations at the successive National Conferences on Medical Education in India demonstrates that faculty capacity and interest in engaging in educational research are already increasing in India. Despite being engaged in educational research and other academic scholarly productive work, the faculties are frustrated by their work remaining unrecognised and unrewarded as well as being denied promotion by their institution by MCI.
45	Medical education in India at crossroads: Issues and solutions	Chandramohan P [50] (2013)	The author critically analysed several aspects of the medical education system of India like article 8, 10, 42, 45, 46, 51
46	Medical education in India: Time to make some changes	Jayakrishnan T et al., [51] (2012)	The author critically analysed several aspects of the medical education system of India like article 8, 10, 42, 45, 46, 48, 50
47	Medical Council of India and Indian Medical Association: Uneasy relations	George T [52], (2016)	Criticises the functioning of Indian Medical Association
48	Ranking of Indian medical colleges for their research performance during 1999-2008.	Prathap G and Gupta BM [53] (2011)	During the period 1999-2008, the top 30 institutes (Karnataka, Delhi and Maharashtra) have published 32,393 papers which constitute 9.68 percent of the total cumulative research output from India during the same period.
49	Medical education in India: Is it still possible to reverse the downhill trend?	AnanthKrishnan N [54] (2010)	The author critically analysed several aspects of the medical education system of India like shortage of faculty, lack of quality research, an increasing number of colleges, etc., like article 8, 10, 42, 45, 48, 50, 51
50	Medical Education- Present Scenario and Future	Kumar MD and Gupta S [55] (2010)	They proposed the fusion of conventional-theoretical, experimental teaching with innovation aiming to develop undergraduates and postgraduates as community-teacher, true academicians/researchers.
51	Systems of medical education in India and abroad: A comparison	Venkatraman A et al., [56] (2010)	Suggested practices like awarding degrees for rural doctors (BRMS), pre-medical coursework before entering a medical college, changing the structure of medical institutions and grading system, making residency must for all doctors, by offering dual degree programs like MD and Ph.D. simultaneously.
52	Medical education in India- Problems and Prospects	Sood R and Adkoli BV [57] (2000)	The authors discuss the issue of capitation fees and privatisation of medical education in India similar to article 8, 10, 42, 45, 48,
53	Trouble at the Medical Council of India	Chatterjee P [58] (2010)	The article discusses the arrest of MCI president by CBI. The CBI website has invited the public to come forward with specific complaints about corrupt and unfair practices by MCI officials. A representation for patients' organisations in MCI has been requested.
54	Gifts to doctors, scientific information and the credibility gap in the Medical Council of India	Thomas G and Varghese J [59] (2010)	MCI needs to do much more than adding another rule (like Ban on gifts to doctors) to set right the numerous infractions of its ethical code. The authors critically analyse the functioning of MCI similar to articles 8, 10, 42, 45, 48, 51.

[Table/Fig-1]: List of the articles on medical education system of India during 2010-2020 [6-59].
CBME: Competency-based medical education; MCI: Medical council of India; CBI: Central bureau of India

resources. There is no inspection of infrastructure proposed for research activities by the institution neither evaluation nor monitoring of student admission procedures, training, teaching-learning strategies, assessment system, student facilities and faculty adequacy, is conducted [61].

There are three important reasons for India's healthcare woes, the first one is there is inadequacy of physicians (both generalists and specialists), distribution of manpower and resources is not equal and lacuna's in the quality of medical education as described by Vision 2015 report of MCI [62]. Needless to say, this vision remained a mere vision, even in 2018, without any marked improvement in ground reality.

Ranjit Roy Chaudhury expert committee (2014) recommended structural re-configuration of the MCI and proposed separation between the regulation of medical education from the regulation of medical practice both regulated by MCI [62].

NITI Aayog Committee (2016) raised allegations regarding the composition of MCI and recommended the appointment of regulators through an independent selection process than elections. The committee also recommended the removal of MCI, as the authority for fee regulation of private colleges as it led to corruption and increased capitation fees [62].

Parliamentary Standing Committee on Health (2016) observed that the present focus of the MCI was only on licensing of medical colleges and no emphasis was given to the enforcement of medical ethics in education [62].

Recent corruption allegations against MCI saw its suspension. MCI was reconstituted in 2013, presently governed by the **'Board of Governors'** followed by the introduction of the **National Medical Council (NMC)** bill in 2018 [62].

3.2 Growth of higher education in India:

3.2.1 Till 1980:

Before 1980, the higher education was supported by government by setting up universities and colleges and also took over the responsibility of running the institutions set up through the private sector.

3.2.2 From 1980 to 2000:

In the 1980s, economic reforms brought an unprecedented demand for quality higher education from the middle class which grew bigger, younger, and richer which saw a rise in entrepreneurship in the country. During this period, the government sector, established very limited universities and colleges, while a very few were brought within the domain of government funding. Extremely, few institutions were set up by religious and altruistic trusts of repute for charitable purposes, whereas 'private unaided Institutions' set up most of the higher education institutions.

3.2.3 From 2000 onwards:

Till the late 1990s, the affiliated colleges saw a rise in number. Advantage of the provision granted in terms of section 3 of the UGC Act, 1956, as urge in the number of 'deemed to be universities' was observed from only two in 1958 to twenty-six by the period 2000-2005 [63].

3.2.4 The emergence of a new type of providers:

This period saw the surge in private institutions, and the 'distance education programs' gained wider acceptance. The self-financing programs were initiated by the public universities and colleges whereas the foreign institutions started offering programs either by themselves or in partnership with Indian institutions.

MCI was incompetent to deal with this influx without a proportionate increase in material and intellectual resources leading to skyrocketed capitation fees and inter-state and intra-state inequality in the distribution of medical colleges [63].

3.3 Current scenario of medical colleges in India:

Report of Ministry of Statistics and Program Implementation (2011), Unique Identification Authority of India (2019) and Medical Council of India (2020) asseverate that five states: Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, and Kerala represent

26% of the population but has 40% of medical seats across India whereas, six states: Uttar Pradesh, Bihar, West Bengal, Madhya Pradesh, Rajasthan and Gujarat representing 51% of the population has only 25% of medical seats [64].

For the academic session 2018-19, the Union Ministry of Health has banned 82 medical colleges- 70 private and 12 government-run from accepting students that meant more than 10,430 seats were blocked citing lack of adequate facilities [65]. In addition to that, for the same academic session, the Union Ministry rejected 68 proposals of new medical colleges (Bihar-4, West Bengal-2) which would have added 9,000 MBBS seats [65].

3.3.1 **Selection of medical students:**

Before 2013, there was no uniformity in the selection of students to medical colleges. A common entrance test at all India level (NEET) was introduced in 2013 to constrain unscrupulous and money-minded businessmen operating in the field of education and to help the deserving students. States like Tamil Nadu, Karnataka, Andhra Pradesh openly objected to the move by citing reasons of large-scale variation in the syllabus and standards of the Central Board of Secondary and State boards [6].

As of 2020, NEET controlling authority faces serious allegations like proxy candidates were caught writing the examination on behalf of other candidates, translation errors in 49 out of the 180 questions in NEET Tamil paper 2018, andstudent protests claiming that four questions were out of syllabus in NEET 2019. Moreover, the NEET examination paper was leaked twice in the last four years [66]. These allegations dented the reputation and authenticity of the 'Common Entrance Test'-NEET considerably.

3.3.2 **Shortage of medical faculty:**

Acute shortage of medical faculty in Indian medical institutions is estimated to be currently 40 percent [8,10,27,54,67]. MCI recommendation of the 1:10 teacher-student ratio is not maintained [67]. To address this shortage, in the departments of Anatomy, Physiology, Biochemistry, Pharmacology, and Microbiology, MCI has permitted non-medical teachers for appointment to the extent of 30% of the total number of the posts in the department. In the Department of Biochemistry, non-medical teachers may be appointed to the extent of 50% of the total number of posts in the department. This decision received several criticisms from the medical fraternity as it led to increased unemployment and also deteriorated the quality of medical education. (Clause 2: MCI: Minimum Qualifications, for Teachers in Medical Education Regulations, 1998).

3.3.3 **Poor faculty development:**

Under the MCI Regulations on Graduate Medical Education, 1997, establishment of Medical Education Units (MEUs) in every medical institution became compulsory, to enable faculty members and residents to enhance their skills in modern education teaching techniques. MCI established Twenty two Regional Centres, since July 2009. But lack of motivation amongst faculty and educational administrators, poor recognition, lack of reward is the impediments in successful faculty development (Faculty Development Program: MCI) [61].

The key determining factor for a good and favorable curricular implementation is the development of faculty. With the introduction of new curriculum, the centre of attention has moved to the Curriculum Implementation Support Program (CISP). The guiding principles and learning plan involved in CBME needs exposure to medical education training, including adult learning principles, framing objectives, aligning objectives and teaching-learning methods to assessments, and various assessment methods. Several medical colleges still have a substantial backlog of faculty deprived of basic medical education training. Conducting CISP training of the faculty, without the minimum basic medical education training, may not provide the desired outcome [7,8,10,31,50,51].

3.3.4 **Shortage of clinical material:**

Costly and unsubsidised, medical services and insufficiency of medical facilities in medical colleges results in poor patient load with bed occupancy less than 30 percent limiting the learning boundaries of the students. In the last ten years, 21 private medical colleges have been derecognised due to a lack of basic minimum requirements (List of Closed Colleges/Institutions with MBBS courses: MCI).

3.3.5 **Flawed assessment pattern:**

The existing assessment system evaluates only the cognitive domain with a minimal evaluation of psychomotor and attitude skills. 'Observed Structured Clinical Examination' (OSCE) and 'Observed Structured Practical Examination' (OSPE) are functional only in premier institutions [7,8,10].

3.3.6 **Lack of research activities:**

Infrastructure for quality research activity in India is the least. Between 2005 and 2014, over 57% of the medical colleges did not have a single publication and only 25 (4.3%) of the institutions produced research papers that accounted for 40.3% of the country's total research output. Since 2015, after the obligatory requirement of publication of papers by MCI for promotion to higher posts, a surge in the number of poor-quality research articles was observed from Indian medical colleges; mostly published in predatory journals or journals indexed in Index Copernicus with a system of pay and publish. From about 53,000 "papers" in 2010, the nearly 8,000 active predatory journals in the world have published a mind-numbing 4,20,000 "articles" in 2014. Over 11,000 fake open access journals were identified. The number of fake journal publishers based in the country has grown several-fold in the last four to five years. Today, as much as 27 percent of fake journal publishers are based in India. India has the dubious distinction of being home to 42 percent of fake single-journal publishers [39]. MCI must lay down specific research related minimum guidelines for institutions so that some responsibility is shared, and meaningful research is carried out [13,14,37,53].

DISCUSSION

Amongst the 54 articles reviewed, Deshwal BS et al., Naik S, Chandramohan P, Jayakrishnan T et al., discussed the issues of irrational increase in medical institutions and admission of medical students, devaluation of merit in admission in private institutions, high capitation fees, questionable validity of premedical test, admission of substandard quality of students with poor motivation, limited academic and research related infrastructure in Indian medical institutions, outdated curriculum and teaching-learning methods and flawed assessment pattern [27,42,50,51].

Chandramohan P advised the regulatory bodies to consult agencies like Indian Institute of Management to formulate a procedure to identify emotionally competent candidates for medical education [50]. To facilitate enough clinical material for teaching purposes, he proposed introduction of student-doctor system where student will be the integral part of treating team and will develop relationship with the patient. He proposed the establishment of a separate 'Directorate of Rural Health' to bring healthcare to the rural areas in order to sensitise the students to the healthcare requirements of rural population [50].

Several Authors stated that despite the mandatory implementation of Competency-based curriculum in Indian medical institutions since 2019, its efficient and successful implementation is impossible due to shortage of patients in hospitals, lack of adequate infrastructure to teach students in small groups and conduct multiple assessments, inadequate faculty strength, lack of commitment among managements to bring changes in the existing systemand principally Inertia among faculty and students for change [7,8,10-12,41,48,54,55].

Basheer A states that curriculum envisages interactive teaching-learning methods in the form of small-group learning, problem-based

learning, and case-based learning, but it leaves assessment to the discretion of individual universities and institutions Students, in the long run, will soon realise this and finally, the learning became mechanical ie without thinking, shattered and short term, beating the objective of CBME [7]. He added that the curriculum has deficits related to the ambiguity regarding the role in internal assessment and exclusion of the concept of family medicine and family physicians. The curriculum program presents a list of certifiable competencies, but there is no clarity about what happens to a student who fails to get certified in a competency Basheer A (2020) [7] however, did not propose any radical solutions. The present review proposes that the respective universities and institutions should formulate the assessment pattern based on the basic guidelines provided by MCI, by constituting an intra-institutional panel of competent faculties. Institutions will also have to be proactive in completing the basic medical education training of their faculty and residents through trained medical professionals [68].

5. Solutions for the Shortcomings:

5.1 '**National Medical Commission' (NMC), 2019**: Introduces four autonomous boards for separately governing undergraduate medical education, postgraduate medical education, assessment and rating of the medical institutions for their compliance with the standards laid down by the said Boardsand for maintaining National Registers of all licensed medical practitioners and to regulate professional conduct and promote medical ethics [69].

NMC proposes a final-year MBBS examination (NEXT), for admission to postgraduate medical courses and for obtaining a license to practice medicine and as a screening test for FMGs like the common national entrance examination (NEET). The compulsory rotation internship, which has become virtually non-existent, will be re-introduced and made more robust and effective [69].

5.2 '**Ministry of Health and Family Welfare', 2018-19**: Administers the schemes for 'Strengthening and Up-gradation of State Government medical colleges for an increase of PG Seats', schemes for 'Establishment of new medical colleges attached with existing District/Referral Hospitals' and schemes for 'strengthening and up-gradation of State government medical colleges for an increase in intake capacity of MBBS Seats' [70].

5.3 **'National Education Policy', 2019:**

5.3.1 **Increasing the intake of students in healthcare education:**

The 600 or so district hospitals in the country will be upgraded to teaching hospitals at the earliest by investing in infrastructure for targeted medical specialties and in stationing adequately qualified teaching faculty. Both the teaching institutions and the hospitals will be mandatorily accredited before they can begin functioning [71].

5.3.2 **Expanding postgraduate education:**

These will be increased as quickly as the available infrastructure in hospitals around the country allows. New medical colleges and hospitals that have an adequate number of patients and well-trained teaching faculty will be allowed to start postgraduate courses and district hospitals will move towards having a medical college attached to them. Diploma courses such as the one being offered by the College of Physicians and Surgeons, Mumbai, will be promoted throughout the country, to help produce sufficient numbers of intermediate specialists [71].

5.3.3 **Pluralistic healthcare education and delivery:**

The first couple of years of the MBBS course should be converted into a common/foundation period for all medical graduates. At the end of it, an exit exam will be conducted that will allow the students to switch to the medical courses and other specialisations based on the merit. Graduates from courses like nursing, dental, etc., can find a 'lateral entry into the MBBS course' through 'Bridging across systems' a phenomenon based on common foundational courses centred towards medical pluralism. A framework of medical education prerequisite to achieve this will be established in concurrence with the NMC. Given the pluralistic health care legacy of the country, the different health systems such as Ayurveda, Yoga, and Naturopathy, Unani, Siddha and Homeopathy (AYUSH) will be mainstreamed, and better access to AYUSH treatment will be provided through co-location in public facilities [71].

CONCLUSION(S)

The prevailing deficiencies in medical education system are necessarily due to malfunctioning of regulatory bodies aided by flawed educational, healthcare and judiciary policies. Rigorous enactment of regulations of 'National Medical Commission' and speedy implementation of 'Ministerial Policies' for strengthening and upgradation of medical institutions along with district hospitals and common foundation courses based on medical pluralism. Urgent curtailment is obligatory in the rate of establishment of medical institutions, increase in undergraduate and postgraduate medical seats, increased privatisation and new models of translational collaborations.

Conflict of Interest

We declare that we are free from any personal, or corporate, association(s) which could symbolise a conflict of interest concerning the submitted article. All the authors have respected the ethical principles supporting the research.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Jul 07, 2020
- Manual Googling: Aug 05, 2020
- iThenticate Software: Aug 28, 2020 (18%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? NA
- Was informed consent obtained from the subjects involved in the study? NA
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Jul 06, 2020**
Date of Peer Review: **Jul 27, 2020**
Date of Acceptance: **Aug 08, 2020**
Date of Publishing: **Sep 01, 2020**