

Landscape of gerodontology education in Indian dental schools: a scoping review

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Abstract

India's rapidly ageing population has increased the demand for oral healthcare services for older adults. To prepare future dentists to meet these complex needs, it is important to integrate gerodontology into undergraduate dental education. However, the extent to which gerodontology is systematically incorporated into the Bachelor of Dental Surgery (BDS) curriculum in India is not well documented. This scoping review aims to map the scope, characteristics, and available evidence on gerodontology education within undergraduate dental programs in India. This scoping review was conducted following methodological guidance of the Joanna Briggs Institute and reported according to the PRISMA extension for Scoping Reviews. The Population-Concept-Context framework guided the review. Electronic databases, including PubMed/MEDLINE, Scopus, Embase, Web of Science, and Shodhganga, were searched, along with backward and forward citation tracking. Studies addressing gerodontology within undergraduate dental education in India were included. Data were charted, and inductive thematic analysis was undertaken. Twenty-one studies were included in the synthesis. Most were descriptive cross-sectional surveys

or conceptual publications, with few qualitative or intervention-based studies. The findings show that gerodontology is rarely offered as a standalone subject in undergraduate dental curricula and is inconsistently included across disciplines, with no clear competencies or structured assessments. Teaching is mainly didactic, with limited opportunities for practical or interprofessional learning. Although students generally have positive attitudes towards older adults, several studies reported low confidence and a sense of unpreparedness to manage medically complex geriatric patients. Barriers to better curricular integration included faculty limitations, curriculum overload, and restricted institutional support. The findings suggest a persistent gap between demographic and clinical needs, conceptual frameworks, and undergraduate training in gerodontology in India. Strengthening curricular alignment, competency-based assessment, structured clinical exposure, and faculty development may help improve the preparedness of future dentists to address the oral healthcare needs of the ageing population.

Keywords: gerodontology, geriatric dentistry, dental education, ageing population, undergraduate dental curriculum, interprofessional education

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1. Introduction

India is undergoing rapid demographic ageing, with the population aged 60 and above expected to increase from 153 million to 340 million by the middle of the century.^{1,2} This demographic transition is accompanied by increasing multimorbidity, functional decline, and a high burden of oral diseases such as caries, periodontal disease, and edentulism.³⁻⁶ Socioeconomic disparities and urban-rural inequalities in access to

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oral healthcare further exacerbate these challenges,⁷⁻⁹ requiring dentists to manage increasingly complex geriatric cases that demand specialized clinical skills and interdisciplinary collaboration.

India is now one of the world's major centers for dental education, with over 300 dental colleges graduating about 25,000 to 30,000 Bachelor of Dental Surgery (BDS) students each year.¹⁰ Currently, there is roughly one dentist for every 450

to 550 people aged 60 or older, placing a significant geriatric care burden on each clinician. Against this backdrop, undergraduate training is essential for preparing dentists to meet the needs of the country's ageing population. However, uneven distribution of services and persistent access gaps underscore the importance of preparing graduates to manage complex geriatric care across diverse practice settings.²

Despite the increasing need, multiple patient-, provider-, and system-level barriers limit access to geriatric oral healthcare in India. Financial constraints, mobility limitations, and competing medical priorities reduce service utilization.^{9,11} Misconceptions that tooth loss is an inevitable part of ageing also contribute to delayed care-seeking among older adults.⁹

In response to similar demographic and healthcare challenges, several countries have incorporated gerodontology into undergraduate dental curricula through structured teaching, defined competencies, clinical exposure, and interprofessional education models.^{12,13} Contemporary educational frameworks emphasize that graduates should develop competencies in communication, ethical decision-making, and management of medically complex older patients.¹⁴ In contrast, the extent to which undergraduate dental education in India systematically prepares students for geriatric care remains unclear.

The Bachelor of Dental Surgery (BDS) program represents the principal entry point into dental practice in India. It is, therefore, pivotal in determining the baseline competencies, attitudes, and preparedness of future dentists. International experience suggests that early and structured exposure to geriatric dentistry during undergraduate training enhances clinical confidence and preparedness.^{12,14} In the absence of explicit curricular frameworks and clearly defined learning outcomes, undergraduate training may remain fragmented and poorly aligned with the demands of real-world clinical practice.¹⁵

Although individual studies and commentaries have addressed aspects of geriatric oral health and dental education in India, the available evidence remains

scattered across the literature.^{9,12,13} A previous global scoping review (2021) of undergraduate gerodontology education synthesized evidence across multiple countries and identified five key themes spanning from gerodontology curriculum content, attitudes, skills and knowledge of undergraduate dental students, didactic teaching, elective and compulsory teaching, and extra-mural learning. The primary objective of this review was to provide an international overview of gerodontology education which had inclusion of three Indian studies identifying the gaps in the Indian context.¹² Since 2020, there has been a marked increase in dental and medical education research, accompanied by growing recognition of healthy aging as a global health priority under the WHO Decade of Healthy Ageing (2021–2030), increasing longevity of older adults, and expanding policy emphasis on integrating geriatric competencies into healthcare education and service delivery.¹⁶ Consequently, only a limited number of Indian studies were included in the review of 2021, precluding an in-depth examination of the unique educational, institutional, regulatory, and healthcare contexts that shape undergraduate gerodontology education in India. Hence, additional Indian studies examining curriculum content, teaching and assessment strategies, learner preparedness, faculty perspectives, educational interventions, and implementation barriers have emerged.^{17–20} Collectively, these interrelated dimensions extend beyond curriculum content alone and require comprehensive mapping to understand how gerodontology is currently represented within undergraduate dental education in India. A dedicated India-focused synthesis is therefore timely to inform curriculum development, educational policy, program planning, and future research priorities. Therefore, this scoping review aimed to map the scope and characteristics of gerodontology education within undergraduate dental programs in India. Specifically, this scoping review addresses the following research question: “What is the scope, nature, and characteristics of gerodontology education within undergraduate dental programs in India?”

2. Materials and Methods

This scoping review was conducted in accordance with the methodological guidance from the Joanna

Briggs Institute for scoping reviews²¹ and reported in accordance with the PRISMA extensions for scoping reviews (PRISMA-ScR).²² The objective of the review was to map the scope, nature, and characteristics of gerodontology education within the undergraduate Bachelor of Dental Surgery (BDS) curriculum in India.

The review scope was defined using the Population–Concept–Context (PCC) framework recommended by the aforementioned Joanna Briggs Institute for scoping reviews.²¹ (Table 1). The population included undergraduate dental students and faculty involved in undergraduate teaching. The concept domain was intentionally operationalized through multiple educational components because gerodontology education is a multidimensional construct. Rather than representing a single educational outcome, undergraduate gerodontology education encompasses curriculum content, teaching-learning strategies, assessment practices, learner preparedness, faculty perspectives, and institutional factors that collectively influence educational delivery. Consistent with the Joanna Briggs Institute guidance for scoping reviews, broad concepts may be mapped across multiple interrelated dimensions to comprehensively capture the extent and characteristics of the available evidence. The context was limited to undergraduate BDS programs in India. Peer-reviewed empirical studies, narrative reviews, conceptual papers, editorials, and relevant grey literature addressing undergraduate gerodontology education in India were eligible for inclusion.

Studies published between January 2013 and December 2024 were included to capture contemporary undergraduate educational practices following the global shift toward competency-based and outcome-oriented health professions education that gained prominence in the early 2010s.²³ Seminal studies published before 2013 were included if identified through citation tracking and deemed conceptually relevant.

A three-step search strategy, as recommended by the Joanna Briggs Institute, was used.²¹ An initial limited search of the Cochrane Library, JBI Evidence Synthesis Database, and PROSPERO was conducted to identify existing reviews and refine

search terms, followed by a comprehensive search across PubMed/MEDLINE, Scopus, Embase, Web of Science, and Shodhganga using a combination of Medical Subject Headings (MeSH) and free terms related to gerodontology, dental education, and India. Backward reference searching and forward citation tracking were also performed. The detailed search strategy for each database is provided in Supplementary File S3, along with its summary, and the core PCC domains are presented in Table 1.

Studies were included if they addressed gerodontology within undergraduate dental education in India. Studies focusing exclusively on postgraduate training, continuing professional development, or clinical epidemiology without educational relevance were excluded. Articles conducted outside India were excluded unless they directly informed the Indian educational context.

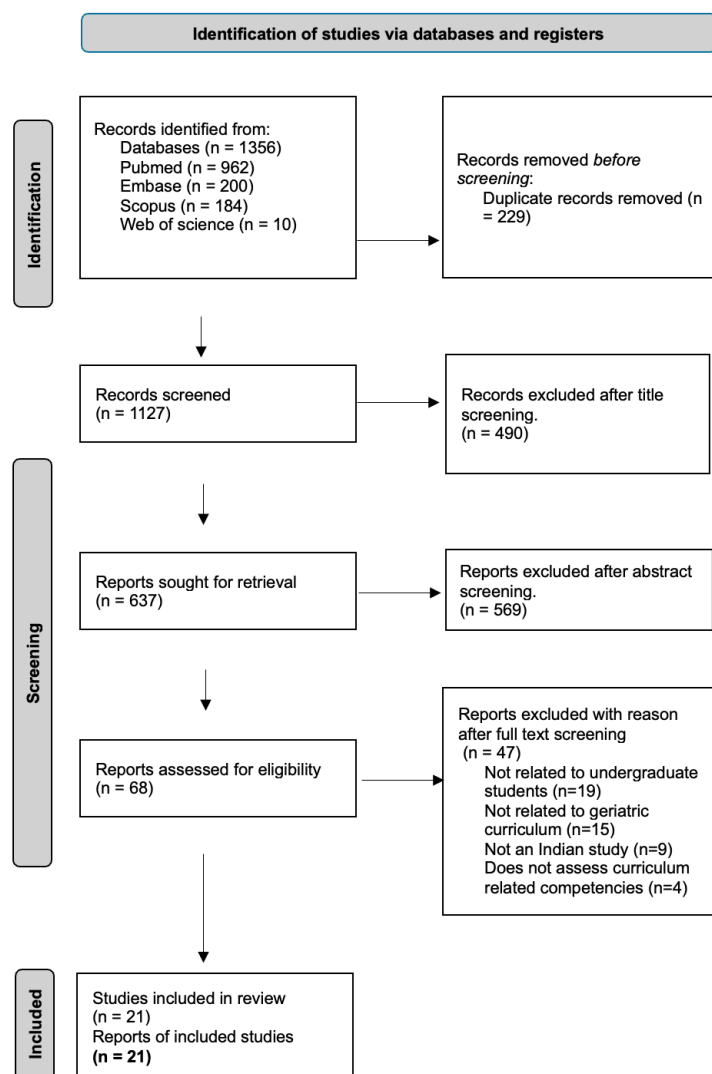
All retrieved records were imported into Nested Knowledge®, and duplicate records were removed. Titles and abstracts were independently screened by two reviewers, followed by a full-text review of potentially eligible articles. Discrepancies were resolved through discussion and consensus. The study selection process is illustrated in Figure 1 using a PRISMA-ScR flow diagram.²²

A structured data extraction form was developed using the Joanna Briggs Institute (JBI) data extraction template for scoping reviews as a guiding framework.²¹ The template was adapted to align with the objectives of the review and used to chart relevant information from each systematically included study (Supplementary File S2). Extracted variables included author, year of publication, journal, study design, study population, key findings, and relevance to undergraduate gerodontology education. In keeping with JBI guidance for scoping reviews, critical appraisal was not used to determine study inclusion.²¹ To describe the methodological characteristics, eligible empirical studies were appraised using the Mixed Methods Appraisal Tool (MMAT, 2018).²⁴

An inductive thematic analysis of extracted textual data from all the included evidence sources, including empirical studies, narrative reviews, conceptual papers, editorials, and the qualitative

Table 1: Search strategy for scoping review

PCC Domain	Concept Area	Search Terms / Keywords
Concept	Gerodontology/Geriatric Dentistry	"gerodontology" OR "geriatric dentistry" OR "elderly oral health" OR "oral health in older adults"
Population	Dental Education	"Dental education" OR "dental curriculum" OR "undergraduate dental education" OR "BDS" OR "dental training"
Concept	Educational Outcomes	"knowledge" OR "attitude" OR "perception" OR "preparedness" OR "competency" OR "ageism"
Concept	Teaching-Learning & Assessment	"Teaching methods" OR "learning strategies" OR "clinical training" OR "assessment"
Context	Geographic Setting	"India" OR "Indian dental schools"

Figure 1: PRISMA-ScR flow diagram illustrating the identification, screening, eligibility assessment, and inclusion of published studies and undergraduate dental curriculum documents for the scoping review on gerodontology education in India(21).

study, was conducted to identify recurring concepts and patterns across the literature. The purpose of this analysis was to organize heterogeneous evidence into overarching themes that mapped the scope and characteristics of undergraduate gerodontology education in India rather than to synthesize qualitative studies alone. Data were coded inductively and grouped into six analytical themes: demographic transition and geriatric oral health needs as drivers for curriculum reform; fragmented and inadequate representation of gerodontology in the undergraduate curriculum; teaching–learning and assessment strategies in gerodontology education; student attitudes, confidence, and ageism toward older adults; institutional, systemic, and faculty-related barriers; and finally recommendations and frameworks for curriculum reform. Findings were synthesized narratively and supported by tabulated data.

As this scoping review synthesized published and publicly available literature, ethical approval was not required.

3. Results

A total of 21 studies were included in the final synthesis (Figure 1). The included studies were published between 2005 and 2025, with the majority published after 2013 ($n = 15$), in line with the predefined eligibility criteria. The publication distribution of included studies across time periods is summarized in Table 2.

The distribution of included studies by study design is presented in Table 3. The evidence base was dominated by cross-sectional questionnaire-based surveys ($n = 9$), followed by narrative or conceptual papers ($n = 6$) and editorials or expert commentaries ($n = 2$). Only a few studies employed evaluative or implementation-focused designs, including curriculum mapping ($n = 2$), one educational intervention study ($n = 1$), and one qualitative study exploring faculty perspectives ($n = 1$). Overall, the literature was largely descriptive, with limited interventional or qualitative research. A summary of included studies is presented in Table 4, and a detailed characteristic table is provided in the Supplementary File S1. Across studies, six interrelated thematic domains were identified through inductive thematic analysis (Table 5).

The multiple educational components defined within the Concept domain of the PCC framework were reflected in the included literature and subsequently organized into six interrelated thematic domains through inductive thematic analysis. These themes represent the principal dimensions through which undergraduate gerodontology education has been investigated in India, including curriculum organization; teaching and assessment practices; learner preparedness; institutional barriers; and recommendations for curriculum reform (Table 5).

Several studies noted demographic ageing and increasing multimorbidity among older adults as contextual drivers shaping undergraduate dental education.^{7,12,25,26} A high prevalence of edentulism, periodontal disease, and recurring cases involving complex medical histories were highlighted as the reason to update curriculum.^{7,12,26}

Multiple narrative and curriculum-focused studies reported that gerodontology is not offered as a standalone subject in Indian undergraduate curricula.^{7,8,15,26,27} Instead, geriatric content is variably embedded within existing disciplines without clearly defined competencies or structured assessment strategies.^{8,14,28}

Didactic lectures and seminars were described as the predominant teaching approach.¹³⁻¹⁵ Evidence supporting structured clinical exposure, competency-based learning, or dedicated geriatric assessments was limited. One intervention study demonstrated improved student understanding following structured teaching.¹⁷ Although students generally reported positive attitudes towards older adults,^{9,29,30} several studies identified low confidence and perceived inadequate preparation for managing medically complex geriatric patients.^{29,31,32}

Validation of an ageism measurement tool among Indian dental students demonstrated the presence of age-related biases and concerns, highlighting attitudinal dimensions relevant to undergraduate gerodontology education.¹⁸

Faculty perception studies and system-level analyses identified curriculum overload, limited

Table 2: Publication Trend of Included Studies

Publication Period	Number of Studies
Before 2013	6
2013–2016	4
2017–2020	4
2021–2025	7
Total	21

Table 3: Distribution of Included Studies by Study Design

Study Design	Number of Studies
Cross-sectional questionnaire surveys	9
Narrative/conceptual papers	6
Editorials/expert commentaries	2
Curriculum mapping studies	2
Educational intervention study	1
Qualitative study	1
Total	21

numbers of trained faculty, inadequate infrastructure, and the absence of regulatory mandates as key barriers to integrating gerodontology into undergraduate education.^{15,20,27,33} A national-level curriculum mapping study by Pati *et al.* suggested limited formal inclusion of dentistry within broader geriatric education initiatives.²⁷

A limited subset of studies advocated interprofessional education (IPE) and multidisciplinary approaches to gerodontology education. Several conceptual frameworks for strengthening gerodontology education were identified across the literature.^{14,19}

The included studies also reported several recurring gaps in undergraduate gerodontology education in India. Gerodontology was infrequently reported as

a standalone subject, with geriatric-related content embedded inconsistently across disciplines and lacking clearly defined competencies or structured assessments.^{7,8,13–15,26,27,34} Teaching approaches were predominantly didactic, with limited use of experiential, competency-based, or interprofessional learning methods^{8,9,17,19,25,28}. Few studies reported formal assessment frameworks for evaluating geriatric competencies, with limited reference to approaches such as OSCEs, entrustable professional activities, or workplace-based assessments.^{12–15,27} Several studies described positive student attitudes toward older adults alongside low confidence and perceived preparedness in managing medically complex geriatric patients, as well as the presence of age-related biases.^{9,17,18,29–32} Faculty and institutional challenges, including limited trained personnel,

curriculum constraints, and inadequate infrastructure, were also reported.^{13,14,20,28,33} Additionally, studies were geographically clustered and predominantly cross-sectional in design, with

fewer qualitative or interventional studies identified.^{13,17,17,26,27,29–32}

Table 4: Characteristics of included studies on undergraduate gerodontology education

S.No.	Study (Author, Year, Place)	Study type	Key outcomes relevant to undergraduate gerodontology education
1.	Venkatesh UG, 2024 (Chennai, Tamil Nadu)	Institution-based cross-sectional study	Moderately positive attitudes toward geriatric oral care; limited clinical exposure and perceived complexity highlighted the need for curricular strengthening.
2.	Devaki et al., 2020 (Guntur, Andhra Pradesh & Panchkula, Haryana)	Institution-based cross-sectional study (multi-state)	Positive attitudes toward geriatric care, but poor confidence, communication gaps, and inadequate undergraduate training were reported as major barriers.
3.	Shigli et al., 2020 (India)	Narrative review	Gerodontology not offered as a standalone subject in the BDS curriculum; content fragmented across disciplines with no structured framework.
4.	Talwar & Chawla, 2008 (India)	Conceptual commentary	Emphasized the importance of formally integrating geriatric dentistry into Indian undergraduate dental education.
5.	Sande et al., 2014 (India)	Narrative review	Discussed geriatric dentistry from an oral medicine perspective and highlighted gaps in undergraduate training for managing medically compromised elderly patients.
6.	Shah N., 2005 (India)	Commentary/ perspective	Argued for recognition of geriatric dentistry as a distinct specialty and highlighted deficiencies in undergraduate dental education related to ageing populations.
7.	Anehosur & Nadiger, 2010 (Dharwad, Karnataka)	Institution-based cross-sectional study	Identified gaps in knowledge, confidence, and preparedness among dental students in managing geriatric patients.
8.	Shigli et al., 2025 (India; multi-state)	Qualitative study (focus group discussions with faculty)	Faculty perceived undergraduate gerodontology training to be inadequate, citing lack of curricular mandate, faculty training, and institutional support.
9.	Mazumdar, 2011 (India)	Editorial	Discussed systemic challenges in Indian dental education, including curricular constraints relevant to geriatric care.
10.	Shigli et al., 2022 (India)	Conceptual/ narrative paper	Emphasized the urgent need to integrate gerodontology into the undergraduate curriculum with defined competencies and assessment strategies.
11.	Shigli et al., 2020 (India)	Narrative review	Advocated interprofessional education as a strategy to strengthen undergraduate gerodontology training.
12.	Shetty, 2014 (India)	Editorial	Highlighted the growing importance of geriatric dental education in response to demographic ageing in India.
13.	Shah N., 2005 (India)	Commentary/short report	Emphasized the need for structured gerodontology education within undergraduate dental programs in India.
14.	Nilsson et al., 2021 (Global)	Scoping review	Reported wide international variation in undergraduate gerodontology curricula and identified best practices for curriculum integration.
15.	Singh et al., 2024 (Delhi-NCR)	Institution-based cross-sectional study	Reported positive student attitudes toward elderly patients alongside perceived inadequacies in undergraduate training and clinical exposure.
16.	Pati et al., 2016 (India)	National curriculum mapping study	Demonstrated limited and inconsistent representation of geriatric health content within Indian dental curricula.
17.	Shah N., 2010 (National/global context)	Narrative review/ educational framework	Proposed competency-based teaching, learning, and assessment models for geriatric dentistry education.
18.	Thomas, 2013 (India/ international context)	Narrative review/ perspective	Discussed challenges and strategies for preparing dental graduates to manage geriatric patients.
19.	Shigli et al., 2016 (Maharashtra, Karnataka, Andhra Pradesh, Uttar Pradesh)	Pre–post educational intervention study	Reported improvement in student understanding following a structured gerodontology teaching intervention.
20.	Shenoy et al., 2023 (Mangalore, Karnataka)	Psychometric validation study	Validated an ageism assessment scale for use among Indian dental students, supporting attitudinal evaluation in gerodontology education.
21.	Kamarthi et al., (Meerut, Uttar Pradesh)	Institution-based cross-sectional study	Identified attitudinal gaps among undergraduate dental students toward the geriatric population.

Table 5: Thematic domains, subthemes, and distribution of included studies (n=22)

S. No	Themes	Subthemes	Number of studies
1.	Demographic transition and geriatric oral health needs as drivers for curriculum reform	Ageing population trends; burden of oral diseases; multimorbidity; need for workforce preparedness	3
2.	Fragmented and inadequate representation of gerodontology in the undergraduate curriculum	Absence as a standalone subject; fragmented integration; lack of defined competencies; lack of structured assessment	8
3.	Teaching-learning and assessment strategies in gerodontology education	Predominance of didactic teaching; limited clinical exposure; lack of competency-based assessment; limited interprofessional education	7
4.	Student attitudes, confidence, and ageism toward older adults	Positive attitudes, low confidence, inadequate preparedness, and the presence of ageism	9
5.	Institutional, systemic, and faculty-related barriers	Curriculum overload; lack of trained faculty; inadequate infrastructure; absence of regulatory mandates	6
6.	Recommendations and frameworks for curriculum reform	Competency-based education; interprofessional education; structured clinical training; curriculum development models	7

4. Discussion

This scoping review synthesized 21 studies examining undergraduate gerodontology education in India. Although scholarly attention to this topic has increased in the past decade, the findings indicate that gerodontology remains fragmented within undergraduate curricula, with limited empirical evaluation of educational effectiveness. The predominance of descriptive studies within existing literature suggests that gerodontology education in India has largely been examined from an exploratory perspective rather than through evaluative or implementation-oriented research.^{9,26,27} Together, these findings demonstrate that undergraduate gerodontology education extends beyond curriculum content alone and encompasses curriculum organization, teaching and assessment strategies, learner preparedness, faculty perspectives, institutional barriers, and curriculum reform, highlighting the multifaceted nature of gerodontology education in India.

A consistent finding across studies was the absence of gerodontology as a standalone subject within the undergraduate curriculum.^{7,8,15,26,27} The persistence of these observations over nearly two decades suggests limited structural progress in undergraduate gerodontology education, indicating that incremental curricular adjustments have not translated into substantive structural reform.

While embedded teaching may expose students to age-related oral conditions, its fragmented nature is unlikely to support the development of integrated competencies required for geriatric dental care. Educational framework-based studies emphasize that geriatric dentistry requires a holistic, competency-based, and patient-centered approach that cannot be achieved solely through discipline-based teaching without explicit curricular alignment.^{14,15}

The predominance of didactic teaching patterns, with limited emphasis on experiential learning,

simulation-based learning, outreach exposure, or structured interprofessional education.^{13,14,19} This suggests that gerontology education within many undergraduate dental programs remains largely theoretical rather than clinically integrated. Although one educational intervention study reported improved understanding following structured teaching,¹⁷ such initiatives appear to remain isolated rather than being systematically embedded within undergraduate curricula. In addition, the near absence of geriatric-focused assessment frameworks, including competency-based evaluation, may further limit the development of clinically meaningful competencies required to manage medically complex older patients.^{15,27}

The coexistence of positive attitudes toward older adults alongside low confidence in managing geriatric patients suggests that favorable perceptions alone are insufficient to ensure clinical preparedness. This discrepancy likely reflects gaps in structured clinical exposure and competency-based training within undergraduate curricula.^{9,29,31,32} Validation of an ageism assessment tool¹⁸ underscores that a favorable attitude alone does not ensure readiness for practice. Collectively, these findings suggest that limitations in student preparedness primarily reflect broader structural challenges within undergraduate gerontology education rather than intrinsic learner deficiencies, and invite comparison with the international curricular developments.

These findings are broadly consistent with international literature on gerontology education. A global scoping review by Nilsson *et al*¹² reported considerable variability in the integration of gerontology across dental curricula worldwide, with many institutions lacking structured geriatric training despite increasing demographic ageing. However, several countries have progressively incorporated dedicated gerontology modules, clinical rotations in geriatric care settings, and structured interprofessional learning models. In comparison, the available evidence suggests that undergraduate gerontology education in India remains relatively fragmented and inconsistently implemented.

Faculty perspectives and system-level analyses further highlight structural constraints that shape undergraduate gerontology education. Recurrent barriers include curriculum overload, limited availability of trained faculty, inadequate institutional infrastructure, and the absence of explicit regulatory or accreditation mandates supporting gerontology integration.^{20,27,33} Although these factors were not always the primary focus of the included studies, their repeated identification across the literature suggests that institutional and policy-level conditions substantially influence the feasibility of curricular reform.

The literature also reveals a predominantly dentistry-centric orientation in undergraduate gerontology education. Student-focused studies consistently report positive attitudes but limited preparedness, with little evidence of structured interprofessional collaboration.^{9,19,20,31,32} In contrast, narrative- and framework-based publications advocated multidisciplinary or interprofessional approaches, recommending collaboration among medicine, nursing, pharmacy, and allied sciences.^{12,19} The national mapping study further underscored this systemic disconnect, highlighting the minimal integration of dentistry within broader geriatric education initiatives in India.²⁷

Distinguishing between explicit interprofessional education and implicit interdepartmental approaches is particularly important. Only a small subset of studies described structured interprofessional models with defined learning objectives and coordinated implementation mechanisms.¹⁹ Most studies acknowledged the multidisciplinary nature of geriatric care conceptually, but did not translate this recognition into formal educational design.^{12,19} This gap suggests that the challenge lies not merely in the absence of theoretical frameworks, but in limited institutional capacity and regulatory support for implementation.^{20,27}

The review also highlights important gaps in geographical representation and research design. Institution-based empirical studies are concentrated largely in southern India and the Delhi–NCR region,^{30,32} with minimal representation from

eastern, north-eastern, or central India. Additionally, the predominance of cross-sectional surveys and the scarcity of qualitative or intervention-based studies limit understanding of how gerodontology education can be implemented and sustained across diverse institutional contexts.^{13,17,26,27,29-32}

Collectively, these findings indicate a disconnect between the growing demographic and clinical need for geriatric oral health care and the current structure of undergraduate dental education in India. While the need for structured, competency-based, and interprofessional gerodontology education is widely recognized, implementation remains uneven and weakly institutionalized.^{14,15,19} Strengthening regulatory clarity, faculty development, curricular alignment, and competency-based assessment frameworks may therefore represent critical next steps in translating conceptual recognition of gerodontology into sustainable educational practice.

To address these gaps, the literature highlights several conceptual frameworks for integrating gerodontology into undergraduate dental education.^{12,14} Multidisciplinary clinical training models emphasize coordinated care across disciplines such as dentistry, medicine, nursing, pharmacy, and allied health. At the same time, interprofessional education approaches promote collaborative learning through problem-based and technology-enabled platforms.^{12,19} Frameworks such as the WHO interprofessional education model advocate learning “with, from, and about” other health professions to strengthen collaborative competencies.¹⁹ In addition, curriculum development models like Kern’s six-step approach provide structured guidance for integration,¹⁴ and age-friendly health system frameworks such as the 4Ms model offer practical, case-based strategies for geriatric care training.¹²

A key strength of this scoping review is its comprehensive synthesis of empirical studies, narrative literature, conceptual analyses, and faculty perspectives, enabling a multidimensional understanding of undergraduate gerodontology education in India. The use of thematic mapping and evidence-gap analysis facilitated the identification

of dominant knowledge domains alongside under-explored areas requiring further research.

However, several limitations should be acknowledged. The included evidence base was heterogeneous in design, methodology, and reporting, limiting direct comparison across studies. Most empirical investigations employed descriptive cross-sectional designs, with relatively few qualitative, evaluative, or intervention-based studies, constraining deeper assessment of educational effectiveness and implementation processes. In addition, institution-based studies were geographically clustered, with limited representation from several regions of India, which may limit the transferability of findings across diverse educational contexts.

Based on the mapped evidence, this scoping review recommends strengthening undergraduate gerodontology education to better align dental training with the oral healthcare needs of India's ageing population. Although geriatric-related topics are currently embedded within existing curricula, their fragmented and non-standardized delivery is unlikely to support the development of competencies required for comprehensive geriatric dental care. Explicit integration of gerodontology within the Bachelor of Dental Surgery (BDS) curriculum through a dedicated, longitudinal, competency-based module with clearly defined learning outcomes and structured clinical exposure may help address these gaps and recognize geriatric oral health as an integral component of comprehensive geriatric healthcare.^{7,13-15,28,35} Such a module should include communication and behavioral skills, ethical and person-centered care, and competency-based assessment to prepare graduates for managing the complex needs of older adults.^{35,36}

At the curricular and policy levels, national regulatory and academic bodies may consider establishing minimum standards for undergraduate gerodontology education, incorporating structured interprofessional learning with medicine, nursing, pharmacy, and allied health professions, supported by faculty development, institutional commitment, and accreditation mechanisms.^{12,15,27,35} Such reforms

may contribute to developing an age-ready oral health workforce capable of delivering holistic, collaborative care for older adults while informing future educational policy. Future research should prioritize multi-institutional qualitative, educational intervention, and implementation studies to evaluate curriculum innovations, competency attainment, workforce preparedness, and long-term educational outcomes.

In conclusion, this scoping review examined how gerodontology is currently taught in undergraduate

dental programs across India and highlighted ongoing gaps in curriculum structure, teaching methods, assessment practices, faculty resources, and regional representation. While students generally demonstrate positive attitudes toward older adults, limited confidence and preparedness highlighted the need for stronger curricular integration. These findings provide an evidence-informed basis for curriculum reform, educational research, and improving the dental workforce's preparedness to care for an ageing population.

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