Pediatric obesity-related curricular content and training in dental schools and dental hygiene programs: systematic review and recommendations

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Abstract

Objectives: The authors conducted a systematic review to determine: a) What dental schools and dental hygiene programs are doing to promote knowledge and skills related to addressing childhood obesity and to reduce consumption of sugar-sweetened beverages (SSBs) and b) What else these schools and programs could do to better equip future oral health professionals to address childhood obesity and reduce consumption of SSBs.
Methods: The authors searched PubMed, Scopus, Education Full Text (EBSCOHost), and ERIC (EBSCOHost) to identify peer-reviewed publications reporting on obesity or dietetic-related curricula in dental and dental hygiene education within the last 20 years. Three studies met inclusion and exclusion criteria. Outcomes of the identified studies were abstracted and summarized independently by two investigators.
Results: The first study describes a 2009 survey of pediatric dentistry residents. Approximately, half had received formal training yet they lacked essential knowledge or skills for managing children who were obese. The second study describes nutrition-related coursework offered in the second year of a predoctoral dental school curriculum in Saudi Arabia, and the third study reports on the development of an "oral health rotation" dietetic internship in a pediatric dentistry clinic, in the context of interprofessional education (IPE).
Conclusions: Evidence of dental schools' and dental hygiene programs' efforts to address obesity and SSB consumption in children in their curricula is scant, while Commission on Dental Accreditation standards make sporadic mentions of diet and nutrition. Opportunities exist to leverage existing resources and innovative, experiential approaches, including IPE, to formally, and effectively address this important issue in predoctoral oral health education.

Introduction

Improving children's oral health in an equitable and effective manner is a laudable goal – one that is arguably unattainable by the dental profession alone. Dental caries in childhood remains a significant public health problem, burdening children, their families, communities, and the health system (1). Importantly, the disease is marked by pronounced disparities and a substantial proportion remains untreated (2). While "proximal" factors such as diet and fluoride exposure are known to be causally linked to the development of oral disease cases, "upstream" factors driven by social determinants of health are more influential, affecting disease incidence at the population level (3,4). Thus, understanding the causal networks or pathways underlying pediatric health and wellness at-large can highlight avenues for bringing about sustained, impactful

improvements in oral health, using a common risk factor approach (5,6).

Diet, and particularly sugar consumption, has long been shown to be a pivotal etiologic factor for dental caries (7-9), overall and within pediatric populations (10-12). Specifically, frequent consumption of sugar-sweetened snacks and sugar-sweetened beverages (SSBs) has been shown to increase susceptibility for dental caries development among children (13-15). Importantly, the nutritional axis of influence underlies both adiposity (i.e., overweight/obesity) and oral health (15,16) and thus offers a promising target for interventions to optimize overall wellness, including oral health. This common risk factor could not be a more timely target – the prevalence of childhood obesity in the United States has remained alarmingly high during the last two decades (17). The "nutrition transition," a term describing the move from traditional diets rich in cereal, whole foods and fiber to a "westernized" diet rich processed foods, high in fat and sugar, including the consumption of SSBs, is now considered a major culprit in developing countries (18-21). Obviously, concerted efforts by multiple stakeholders are required to address this global problem (22,23).

Theoretically, oral health professionals are well positioned to help address the dietary component underlying dental caries and obesity (24,25). A solid evidence base exists to support oral-health-related recommendations, measuring height and weight is becoming part of routine pediatric oral health care (26), dental visits present an opportunity to address nutrition-related issues, and appropriate communication and behavior guidance/change strategies are available (27). However, available evidence indicates that the oral health care team has not yet assumed an active role in addressing the pediatric obesity issue (28-32), with lack of relevant education and training being the major reported barriers (25,28-33). A unique opportunity exists for oral health and allied health education to address this training and preparedness gap. The purpose of this review paper is to serve as a departure point for developing and optimizing educational content and activities within the dental curriculum by answering two main questions: (1) What are dental schools and dental hygiene programs doing to promote knowledge and skills related to addressing childhood obesity and to reduce consumption of SSBs? (2) What else could these schools and programs do to better equip future oral health professionals to address childhood obesity and to reduce consumption of SSBs?

Methods

A systematic review was conducted to answer the question "What are dental schools and dental hygiene programs doing to promote knowledge and skills related to addressing childhood obesity and to reduce consumption of SSBs?" The PubMed, Scopus, Education Full Text (EBSCOHost) and ERIC (EBSCOHost) databases were searched on 4/20/2016 for articles published in English. The search queries used for each database are presented in the Appendix.

Records retrieved from each database were downloaded to an EndNote library, and duplicates were removed. The remaining records were imported into a Covidence.org database and were screened for inclusion by two investigators. Inclusion criteria were any article describing or evaluating pre-doctoral dental, dental hygiene, or dental graduate curricula that promote the development of knowledge and skills relevant to preventing childhood obesity. We excluded articles about continuing education programs and those published more than 20 years ago. Full-text articles of the remaining records were retrieved and screened for inclusion by the same two investigators. We followed the PRISMA checklist (34) for reporting our search strategy and findings. To address the second question "What else could these schools and programs do?" we conducted a scoping-type review of papers that were either in our search results or were manually identified from reference lists that present or discuss potential educational approaches, methodologies, or curricula. We discuss the findings of that review in the discussion section.

Results

Our searches identified 769 records, of which 472 were unique. We excluded 454 records on review of the title and abstract and 15 records on review of the full-length article. Reasons for exclusion revolved around "not addressing dental or dental hygiene education about pediatric obesity." The PRISMA flow diagram is presented in Figure 1. Three studies (35-37) met the inclusion and exclusion criteria and were included in the qualitative synthesis. A summary abstraction of these three studies is presented in Table 1.

Hisaw *et al.* (35) reported the results of a 2009 survey of second-year pediatric dentistry residents in the United States. They used a questionnaire that was mailed to 41 randomly selected pediatric dentistry residency programs and investigated trainees' receipt of obesity-related curriculum, as well as their experiences, perceptions, and readiness regarding the management of pediatric patients who are overweight or obese. Their overall finding was that management of pediatric patients who are obese is currently inadequately addressed in advanced education programs in pediatric dentistry. They report that the curriculum content was varied and had important deficiencies; for example, half of the respondents had a formal curriculum on managing obese pediatric patients, yet they lacked other essential knowledge or skills, such as knowledge about how to measure body mass index (BMI). Based on their findings, the authors suggest the development of accreditation guidelines with competency-based standards for addressing obesity in pediatric oral health care.

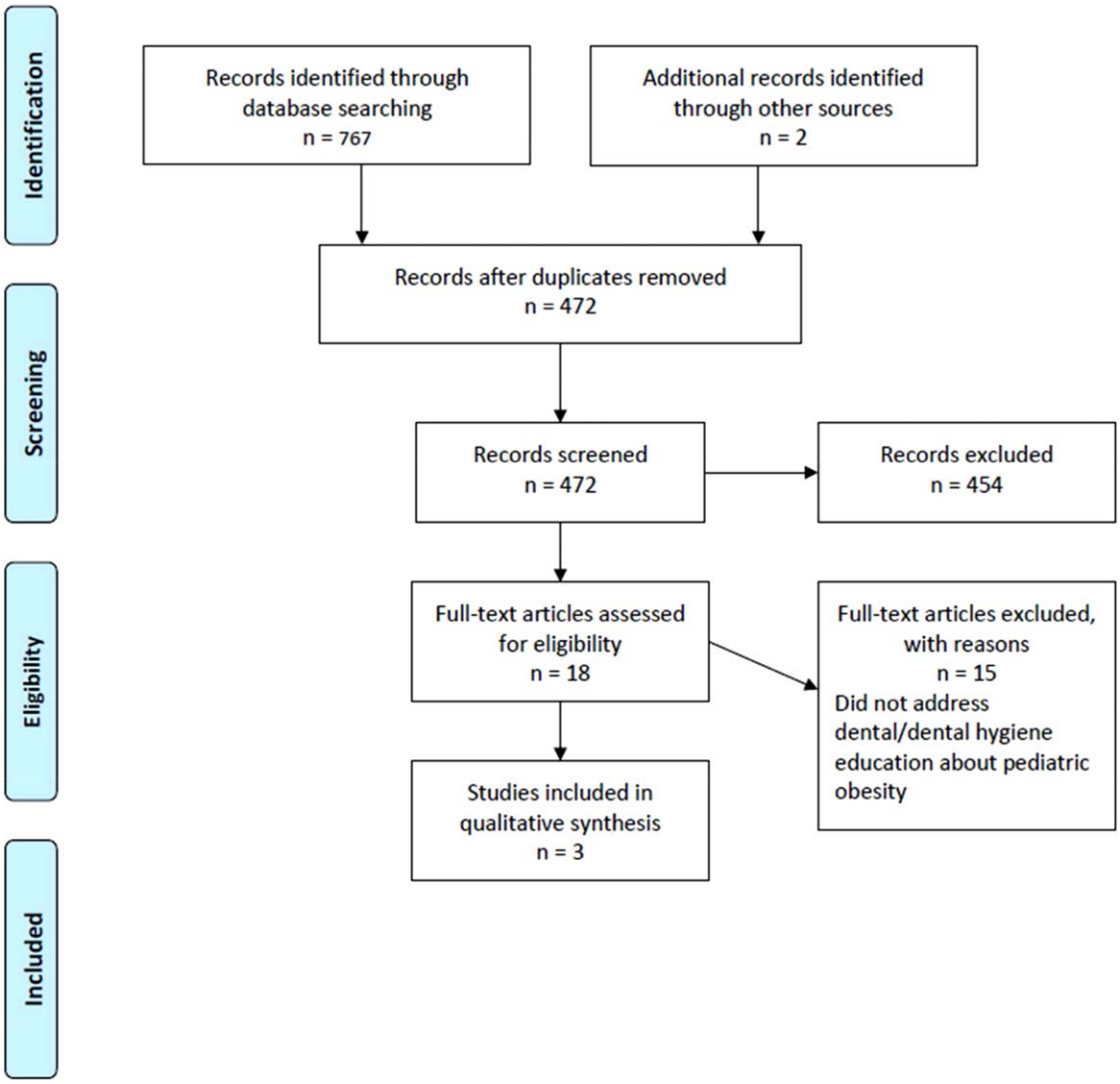

Figure 1 The PRISMA diagram indicating the systematic search process.

Another study by Wyne *et al.* (36) describes the nutrition-related coursework given in the second year of a predoctoral dental curriculum in Saudi Arabia relative to the fourth-, fifth-, and sixth-year dental students' knowledge, beliefs, and perceptions relative to management of overweight/obesity in dental practice, including the care of children. In the College of Dentistry in Riyadh, where the study was conducted, the nutrition-related curriculum comprises two lectures given in the context of the second-year preventive dentistry course. These lectures are focused on nutrition and oral health and diet and dental caries. When students become interns (during the sixth year of dental training), they receive one presentation in their advanced education seminar series addressing the issue of diet/nutrition and reviewing overweight/obesity and BMI. The authors of that study report that 37 percent (96 out of 260) of respondents reported their knowledge of pediatric overweight/obesity as fair/poor, and only one-third identified BMI as the best method to detect obesity. The authors conclude that dental students may benefit from additional training in identification/prevention of overweight/obesity, particularly among children.

The third study (37) reported on the development and formative evaluation of an "oral health rotation" dietetic internship in the pediatric dentistry clinic of the New York University (NYU) College of Dentistry, along the lines of interprofessional education (IPE). The authors describe in detail the planning, development, and evaluation of a demonstration program, aimed to formalize and enhance the collaboration between dietetic interns and pediatric dentistry trainees, in a dental school setting. Using multiple sources of data, including in-person interviews, the authors determined that the program was received favorably by both pediatric

Table 1 Data-Abstraction Table

Citation	Country	Population	Study type	Data-collection method	Response rate	Main outcome	Secondary outcomes	Cardinal findings
Hisaw *et al.* (35)	U.S.	Second-year pediatric dentistry residents, in 41 randomly selected programs ($n = 135$)	Cross-sectional	Seventeen-item questionnaire, mailed	70%	Receipt of obesity-related curriculum	Experiences involving the clinical treatment of overweight pediatric dental patients. Perceptions regarding respondents' level of preparedness to care for overweight/obese pediatric patients.	1. Managing pediatric patients who are obese is currently inadequately addressed in pediatric dentistry advanced education. 2. The current curriculum is varied and has important deficiencies. 3. Residents with a formal curriculum reported being more prepared to manage patients who are obese. 4. Accreditation guidelines with competency-based standards addressing obesity and oral health care should be developed.
Wyne *et al.* (36)	Saudi Arabia	Fourth- and Fifth-year dental students and interns ($n = 260$)	Cross-sectional	Seven-item questionnaire	87%	Determine knowledge and beliefs regarding overweight/obesity	Perceptions regarding the role of dentists in identification/prevention of overweight/obesity. Knowledge of best method to identify overweight/obesity.	1. About one-third of respondents rated their knowledge of pediatric overweight/obesity as fair/poor. 2. One-third of respondents identified BMI as the best method to detect overweight/obesity. 3. Dental students may benefit from training in identification/prevention of overweight/obesity. particularly in children.
More *et al.* (37)	U.S.	Dietetic interns and pediatric dentistry residents at the NYU College of Dentistry	Program description and formative evaluation	Multiple data sources including materials review and in-person interviews with trainees	n/a	Formative assessment of the dietetic rotation at the Pediatric Dentistry clinic at the NYU College of Dentistry	Program development and demonstration. Establishment of dietician-dentist collaboration in the educational environment.	1. The program has been received favorably by both pediatric dentistry residents and dietetic interns. 2. The collaboration has created linkage between clinical dietitians and the health-promotion activity of dentists and has proven to be a valuable and positive interdisciplinary learning experience.

dentistry residents and dietetic interns and that it created a linkage between clinical dieticians and the health-promotion activity of dentists. Besides offering a valuable and positive interdisciplinary learning experience, the program stimulated the conduct of interdisciplinary research, which the authors cite as an additional positive outcome.

Discussion

Overall, a small number of reports were included in the data-abstraction stage, and the level of evidence was weak; we found no study systematically testing what predoctoral dental or dental hygiene students learned after an educational intervention (e.g., a new course or rotation) on overweight/obesity and consumption of SSBs. Two investigations (35,36) were based on cross-sectional examinations of students' self-reports, with no concurrent or historic controls. The third study (37) was essentially a program evaluation report that focused mostly on the acceptance and the interprofessional collaboration benefits of a dietetic rotation. Despite its limitations, the reviewed literature indicates that, amidst isolated efforts in some institutions, the development and introduction of formal training in diet/nutrition in dental and allied health education are in their infancy. This is in stark contrast to the universal recognition of the importance of overweight/obesity and SSB consumption in the oral health domain, and the pivotal role that oral health professionals can play. It is encouraging that issues related to the intersection of pediatric obesity, diet/nutrition, and children's oral health care are becoming increasingly popular in the peer-reviewed literature. This literature stems from both a clinical and health-disparities research standpoint, as well as an interdisciplinary health-professions-education perspective. Training curricula and educational modules to address pediatric overweight/obesity and nutritional risk factors exist in medical education; it is foreseeable that, with concerted efforts, dental and allied-health-education programs can formally and systematically integrate appropriate educational content and training experiences.

It is unsurprising that the limited data that were included in our final synthesis highlight a gap in training and education – in fact, the small body of scholarship on this topic is an indication itself. It is very likely that several institutions and programs may have already developed and implemented formal educational content but have not reported this activity or its outcomes in the peer-reviewed literature. In spite of this, recent national surveys of general dentists (28), pediatric dentists (29), and pediatric dentistry trainees (35) converged in their identification of gaps in health professional training, preparedness and confidence. Although the given research question was broad "What are dental schools and dental hygiene programs doing. . ." this review focused on curricular content and interventions, and did not consider any other "environmental" influences beyond the formal curriculum.

The Commission on Dental Accreditation standards, which are used as a blueprint for predoctoral dental and allied health education, currently contain very few explicit mentions of issues related to overweight/obesity or diet/nutrition (i.e., standard 2.8b in Dental Hygiene education, standards 2.11 and 2.20 in Dental Therapy education and 4.13 in Pediatric Dentistry advanced education). This is reflected in a recent comprehensive report and call for action and interprofessional collaboration by DiMaria-Ghalili *et al.* (38); those authors quoted American Dental Education Association (ADEA) survey data revealing the superior exposure (didactic, laboratory, and clinical experiences) to nutrition in dental hygiene versus dentistry programs, a finding that reiterates dental hygienists' role as a key player in disease prevention and health promotion. Along these lines, a recent survey among U.S. dental hygiene program directors underscored the potential benefits of introducing a standardized nutrition model in dental hygiene education to ensure new graduates are prepared to perform nutrition assessments and intervention to address the *Healthy People 2020* intervention initiatives (39).

Professional associations recognize the importance of diet and nutrition education. For example, the American Dental Hygienists' Association Standards for Clinical Practice address anthropometric measurements and diet/nutrition risk factors, including consumption of SSBs, although this is not specific to pediatric populations (40). The American Dental Association offers a link to guidelines regarding diet and nutrition under its advocacy section (41). The American Academy of Pediatric Dentistry, in its policy on dietary recommendations for infants, children, and adolescents (42) offers generic support and encouragement of "pediatric dentists and other health care providers who treat children to provide dietary and nutrition counseling (commensurate with their training and experience) in conjunction with other preventive services for their patients."

It would appear logical that formalizing educational requirements and standards related to pediatric overweight/obesity would create an impetus for institutions and training programs to take action. Such guidelines for curriculum development were offered by the predecessor of ADEA almost 30 years ago (43), without resulting in substantial traction. It must be acknowledged that the adoption and implementation of guidelines, as well as compliance tracking in dental schools, are slow and not straightforward processes. According to a recent report (44), most U.S. dental schools are currently not implementing guidelines effectively and efficiently. Notwithstanding that some inertia is inherent in dental and allied health education, it must be underscored that we are at a historical juncture. The latest World Health Organization guidelines for the recommended proportion of total energy

intake from free sugars (≤10 or <5 percent) can be readily used for the development of quantifiable oral health promotion goals and benchmarking (45).

It is noteworthy that calls for action and integration of formal nutrition training into dental and allied health education to optimize children's oral health care were first articulated almost a century ago (46) and continued during the last several decades (47-51). IPE is at the epicenter of possible forward actions and educational programs that dental schools and dental hygiene programs can implement to address pediatric overweight/obesity and SSB consumption by adequately training and preparing the next generation of oral health professionals. The multidisciplinary team of professionals (e.g., physicians, nurses, nutrition/dietetic educators and students, dentists, dental hygienists) and other influential agents (e.g., schools, programs, community organizations) in a position to address this issue create unique opportunities for synchronization and reinforcement of the importance of nutrition and the promotion of health and wellness (38). In terms of specific resources and programs to aid in this direction, More *et al.* (37) underscore the relevance of programs that have been developed with the support of the National Institutes of Health/National Heart, Lung, and Blood Institute Nutrition Academic Award Program and that could be used in the oral health domain. These programs provide a focused approach to nutrition as a risk component, can serve as a basis for primary care health professionals to perform risk assessment and suggest strategies to effect change, and include strategies for integration into the medical school curriculum (50). More generally, promising strategies for schools and programs include curricular innovations focused on topic integration, emphasizing relevance and interprofessional collaboration, experiential learning (e.g., use of standardized patients), utilization of existing resources like MedEdPORTAL, collaborating with community partners, conducting outcomes research, and more (38,51,52).

Conclusions

The importance of addressing childhood obesity and its nutritional correlates is frequently articulated by academic and professional agents, but published evidence of dental and dental hygiene curricular content and efforts specific to the pediatric population is scant. Although the introduction of specific training has lagged, it appears that this is an opportune time for academic and professional stakeholders to take concerted action. If successful, this integration could help promote children's health and wellness in an efficient manner by addressing common nutritional risk factors and by optimizing interprofessional coordination and collaboration. Dental schools and dental hygiene programs can leverage a wealth of existing resources and innovative, didactic, and experiential approaches, including IPE, to formally and effectively address this important issue in predoctoral and allied dental education in the oral health sciences.

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Appendix: Search strategies

PubMed: (Obesity[tw] OR Overweight[tw] OR Nutrition[tw] OR Nutritional[tw] OR Diet[tw] OR Diets[tw] OR Dietary[tw] OR Sugar[tw] OR Sugary[tw]) AND (Dental Education[tw] OR Education, Dental[Mesh:-NoExp] OR Education, Dental, Graduate[Mesh] OR ((Dental Student*[tw] OR Students, Dental[Mesh] OR Pediatric Dentist*[tw] OR Public Health Dentist*[tw] OR Dental Hygienist*[tw] OR Dental Hygiene[tw]) AND (Education[tw] OR Curriculum[tw] OR Course*[tw]))) Limit to English

Scopus: (TITLE-ABS-KEY (obesity OR overweight OR nutrition OR nutritional OR diet OR diets OR dietary OR sugar OR sugary)) AND (((TITLE-ABS-KEY ("dental student*" OR "Pediatric Dentist*" OR "Public Health Dentist*" OR "Dental Hygienist*" OR "Dental Hygiene") AND TITLE-ABS-KEY (education OR curriculum OR course*))) OR (TITLE-ABS-KEY ("Dental Education"))) AND (LIMIT-TO(LANGUAGE,"English"))

Education Full Text and ERIC Via EBSCOHost: ("dental student*" OR "Pediatric Dentist*" OR "Public Health Dentist*" OR "Dental Hygienist*" OR "Dental Hygiene" OR "Dental Education") AND (obesity OR overweight OR nutrition OR nutritional OR diet OR diets OR dietary OR sugar OR sugary) Narrow by Language: – English

