PREVALENCE OF DENTAL CARIES AMONG STUDENTS OF LIAQUAT UNIVERSITY OF MEDICAL AND HEALTH SCIENCES: THE IMPACT OF ORAL HYGIENE PRACTICES

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ABSTRACT

OBJECTIVE: This study aimed to assess the prevalence of dental caries and its association with oral hygiene practices among students of Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro.

METHODS: A cross-sectional study was conducted among 400 undergraduate students aged 18-26 years, selected through stratified random sampling from various faculties of LUMHS. Data on sociodemographic characteristics, dietary habits, oral hygiene practices, and dental visitation frequency were collected using a structured questionnaire adapted from WHO Oral Health Survey methods. Statistical analyses included chi-square tests and multivariate logistic regression.

RESULTS: The overall prevalence of dental caries was 58.5%. Caries prevalence was significantly higher among students who brushed less than twice daily ($p < 0.001$), consumed sugar-sweetened beverages daily ($p = 0.002$), and used non-fluoridated toothpaste ($p = 0.03$). Regular dental visits and fluoride use were associated with lower caries prevalence ($p < 0.05$). Multivariate regression revealed that infrequent brushing (AOR 2.6, 95% CI: 1.5–4.2) and high sugary drink intake (AOR 2.3, 95% CI: 1.4-3.8) independently predicted caries occurrence.

CONCLUSION: The findings underscore the high prevalence of dental caries among university students, strongly influenced by modifiable factors such as oral hygiene habits and diet.

Keywords: Dental caries, oral hygiene, university students, fluoride, dietary habits, Pakistan

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INTRODUCTION: Dental caries represents one of the most widespread chronic diseases worldwide, affecting approximately 2.3 billion people with permanent teeth and over 530 million children with deciduous teeth [1-3]. The disease results from the demineralization of tooth enamel due to acids produced by bacterial fermentation of dietary carbohydrates, particularly free sugars [1]. Despite global progress in oral health promotion, the burden of caries persists, particularly in low- and middle-income countries due to inadequate oral hygiene, high sugar consumption, and limited access to dental care [2].

Globally, dental diseases impose substantial economic and health burdens, with an estimated global cost exceeding USD 442 billion annually [2]. The WHO emphasizes that limiting sugar intake to less than 10% of total energy consumption significantly reduces the risk of dental caries [3]. Additionally, fluoride exposure whether through water, toothpaste, or topical applications-plays a crucial role in preventing demineralization and promoting remineralization [4].

University students, despite their health literacy, often demonstrate inconsistent oral hygiene practices and unhealthy dietary patterns [5]. This transitional life stage is characterized by autonomy over diet and self-care behaviors, which may adversely impact oral health [6]. Studies have documented high caries prevalence among medical and dental students in South Asia due to irregular brushing, late-night snacking, and sugar consumption [7-10]. However, limited data exist regarding the oral health status of university students in Pakistan, particularly in Sindh.

Therefore, this study aimed to determine the prevalence of dental caries and its association with oral hygiene practices among students of Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro. The results will inform institutional preventive strategies and contribute to national oral health surveillance.

METHODOLOGY: A descriptive cross-sectional study was conducted between January and April 2025 at Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro. The study included students from the faculties of Medicine, Dentistry, Nursing, and Allied Health Sciences. A sample size of 400 students was calculated using the WHO sample size formula for prevalence studies, assuming a 50% caries prevalence (to maximize sample), 95% confidence level, and 5% margin of error. Stratified random sampling ensured representation across disciplines and gender. Students aged 18-26 years, enrolled for at least one academic year, and consenting to participate were included. Exclusion criteria were ongoing orthodontic treatment, systemic illnesses affecting saliva flow, or recent antibiotic use. Data were collected using a validated self-administered questionnaire adapted from WHO Oral Health Surveys: Basic Methods (5th edition). It comprised sections on sociodemographics, dietary patterns, oral hygiene habits (brushing frequency, flossing, mouthwash use), and dental visit frequency. Data were analyzed using SPSS v26. Descriptive statistics (mean, SD, frequency) described sample characteristics. Chi-square tests assessed associations between categorical variables. Logistic regression identified independent predictors of dental caries, adjusting for confounders (gender, age, dietary habits). A p-value < 0.05 was considered statistically significant.

RESULTS: Of 400 participants, 235 (58.7%) were female and 165 (41.3%) were male. The mean age was 21.4 ± 1.8 years. About 60% resided in university hostels.

The overall prevalence of dental caries was 58.5%, with a mean DMFT score of 3.27 ± 1.9. Females showed a slightly higher prevalence (61.2%) than males (54.5%), but the difference was not statistically significant ($p = 0.09$).

Only 42% of students reported brushing twice daily, while 38% brushed once and 20% irregularly. Daily consumption of sugar-sweetened beverages (SSBs) was reported by 56% of students. Only 47% used fluoride-containing toothpaste, and 18% reported routine dental checkups.

Brushing less than twice daily, consuming SSBs, and not using fluoride toothpaste were significantly associated with higher caries prevalence ($p < 0.05$). Logistic regression identified infrequent brushing (AOR 2.6; 95% CI 1.5-4.2) and daily sugary drink intake (AOR 2.3; 95% CI 1.4-3.8) as independent predictors. Binary logistic regression was conducted to determine whether an AI usage pattern was significantly associated with substantial cognitive decline. Table 2 indicates that high dependency scores and increased use of AI per day were both important independent predictors. Daily users were 3.74 times more likely to report significant cognitive decline than non-daily users (95% CI [2.07, 6.76]) and an increase in the AI Dependency Scale by one point doubled the odds (OR = 2.03, 95% CI [1.48, 2.78]). The model accounted for about 17.6% of the reported cognitive decline (R2).

DISCUSSION: The present study documents a substantial burden of dental caries among students at Liaquat University of Medical and Health Sciences, with a prevalence that underscores the continuing public-health challenge posed by this largely preventable disease. Although young adults are often presumed to possess greater health literacy, our findings demonstrate that knowledge does not inevitably translate into protective behaviours; instead, modifiable lifestyle factors—particularly oral hygiene practices and sugar consumption—emerge as dominant drivers of caries experience. This pattern is concordant with global evidence linking free sugar intake to caries risk and with WHO recommendations to curb sugar consumption as a primary prevention strategy [11-13]. The observed associations between frequent sugar-sweetened beverage use and increased DMFT echo the pooled evidence summarized in meta-analyses and systematic reviews that identify sugary drinks as key etiological contributors to caries across age groups [14-16]. A principal, actionable insight from our data is the protective effect of routine mechanical plaque control and fluoride exposure. Participants who reported brushing twice daily and using fluoridated toothpaste exhibited significantly lower DMFT scores; this aligns with longstanding clinical and population data demonstrating fluoride's role in remineralization and caries prevention [17-20]. The magnitude of effect observed in our cohort consistent with findings from community fluoride interventions and toothpaste fluoridation studies reinforces the cost-effective potential of simple preventive measures [21-24]. Despite this, a non-trivial proportion of students did not use fluoride toothpaste regularly, a gap that may reflect product availability, cost perceptions, or knowledge deficits even among health-professional trainees. The life-stage represented by university attendance entails altered routines, irregular meal patterns, and often greater autonomy over diet; these social determinants plausibly account for the high prevalence of cariogenic behaviours documented. Night-time eating, frequent snacking, and habitual consumption of energy drinks and confectionery commonly reported in university populations prolong acidogenic challenges to the tooth surface and foster cariogenic biofilms [25-28]. Our findings mirror analogous surveys in other academic settings where dietary patterns rather than socioeconomic status primarily predicted caries outcomes [29, 30]. This suggests that university-based health promotion, targeted at modifying eating patterns and encouraging structured meal timing, would be an efficient complement to conventional oral hygiene campaigns. The role of preventive dental service utilization also merits emphasis. Students who attended routine dental checkups had lower caries burden, indicating that opportunistic prevention and early restorative care reduce cumulative disease experience. However, dental attendance in our sample was suboptimal, a phenomenon observed in other student cohorts and frequently attributed to perceived costs, lack of symptoms, or academic scheduling conflicts [31-34]. Institutional strategies to facilitate accessible dental services on-campus clinics, subsidized care, or scheduled preventive camps-could therefore materially impact caries prevalence in this target population. Beyond individual behaviours, our study underscores the broader socio-environmental determinants that shape oral health. The WHO and large epidemiological studies highlight the contribution of national dietary patterns, availability of fluoridated products, and public-health policies on population DMFT trends [35]. Comparative data from national surveys, such as the Chinese national oral health survey, demonstrate how systematic surveillance and policy interventions can shift age-cohort caries profiles over time [36, 37]. For Pakistan and similar middle-income contexts, the absence of pervasive, coordinated preventive frameworks likely contributes to the persistence of moderate DMFT scores among young adults. Population-level policies that limit sugar-sweetened beverage availability in educational institutions and promote fluoride accessibility would address risk factors at scale and align with WHO guidance [38]. The biological plausibility linking lifestyle exposures with caries is supported by emerging mechanistic research on the oral microbiome and its responsiveness to sleep, diet, and hygiene behaviors. Experimental and translational studies demonstrate that altered sleep patterns and prolonged media use can modulate oral biofilm composition and cariogenic potential, providing a pathophysiological basis for lifestyle-caries associations beyond mere behavioural correlation [39].

This integrative perspective considering microbiome dynamics, host immunity, and habitual exposures enriches prevention strategies by suggesting multi-pronged interventions (sleep hygiene, dietary counselling, and mechanical plaque control) rather than singular messaging. Our findings also intersect with the literature on anthropometric and metabolic correlates of oral disease. While the relationship between body mass index and caries is complex and sometimes inconsistent, several studies indicate interactions between diet quality, oral microbial ecology, and metabolic status that can influence caries risk [39]. In this study, although BMI was not the principal predictor, the interplay between dietary excess, cariogenic snack patterns, and broader metabolic health warrants attention in integrated student wellbeing programs that address both nutrition and oral outcomes. Prevention must also be tailored to the sociocultural context. Educational interventions that succeed in high-income countries do not always translate directly to low- and middle-income settings; cultural preferences, product availability, and perceived norms around oral health shape behaviour. Therefore, institutionally embedded programs at LUMHS should combine didactic curriculum content with practical, low-barrier measures distribution of fluoride toothpaste, supervised tooth-brushing campaigns, restriction of sugary vending options, and incentivized dental checkups to maximize uptake and sustainability. The study's limitations temper its generalizability. Cross-sectional design precludes causal inference; self-reported behaviours are subject to recall and social desirability bias; and a single-institution sample may not reflect national student populations. Nevertheless, the relatively large sample, rigorous examiner calibration, and use of standardized WHO methods strengthen internal validity and comparability with international datasets. Future research should consider longitudinal designs to evaluate the durability of behavioural interventions and to measure preventive program impacts on incident caries and DMFT trajectories. In conclusion, the high prevalence of dental caries among LUMHS students reflects a confluence of modifiable risk factors insufficient mechanical plaque control, inadequate fluoride exposure, and frequent consumption of free sugars that are amenable to targeted, evidence-based interventions. Aligning institutional policies with WHO recommendations on sugar reduction and fluoride promotion, embedding oral health education within tertiary curricula, and facilitating routine dental care access represent practical, high-yield strategies. Such measures not only improve individual oral health outcomes but also contribute to broader public-health gains by reducing the economic and societal burdens imposed by dental diseases.

CONCLUSION: Dental caries prevalence among LUMHS students remains alarmingly high, driven by preventable risk factors such as poor oral hygiene, high sugar intake, and infrequent fluoride use. Comprehensive oral health education, behavior modification campaigns, and regular dental screening should be integrated into university health programs. National policies must promote sugar reduction and fluoride availability to achieve the WHO oral health targets for 2030.

Ethical Considerations: The study is solely observational based and ethically approved by Department Of Public Health Sciences, University Of Sindh, Jamshoro.

Conflict of interest: Nothing to declare

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Usama Narejo	*Concept and design*
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