

PREVALENCE, PATTERNS, AND SELF-REPORTED HEALTH CONSEQUENCES OF SODA DRINK CONSUMPTION AMONG MEDICAL STUDENTS: A CROSS-SECTIONAL STUDY

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ABSTRACT:

Background: Soda drinks are widely consumed worldwide despite strong evidence linking them to adverse health outcomes such as obesity, diabetes, elevated blood pressure, dyslipidemia, and cardiovascular disease. The objectives of this study were to determine the prevalence of soda drink consumption among medical students and assess self-reported health consequences.

Materials & Methods: A cross-sectional study was conducted among students from all academic years at Rehman Medical College Peshawar (n = 138). A structured online questionnaire assessed soda consumption frequency, duration, perceived health effects, and demographic information. BMI was calculated for participants with available height and weight data. Statistical analyses included descriptive statistics, Mann-Whitney U tests, Spearman correlations, and logistic regression for adjusted associations.

Results: Of 138 respondents, 91 (65.9%) reported regular consumption and 33 (23.9%) reported daily consumption. Most frequently cited health effects included weight gain and dental problems. BMI did not differ significantly between consumers and non-consumers (median \approx 21.9; $p = 0.827$), nor did years of consumption correlate with BMI ($\rho = -0.022$, $p = 0.814$). Adjusted analysis indicated a borderline significant association between daily consumption and dental problems ($p \approx 0.05$).

Conclusion: Soda consumption remains highly prevalent among medical students, despite awareness of associated risks. Strategies targeting behavioral change and supportive policy measures are recommended.

KEY WORDS: Carbonated Beverages; Health Behavior; Medical students; Soft drinks.

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INTRODUCTION

Soda drinks are non-alcoholic, carbonated beverages containing sweetening agents, edible acids, and natural or artificial flavourings.¹ Sugary beverages are linked to numerous adverse health outcomes, including obesity, impaired glycemic control, and type 2 diabetes.^{2,3} Evidence further associates soft drink consumption with elevated blood pressure, dyslipidemia, and cardiovascular disease.⁴ Even low

levels of intake - such as one soda per day - have been associated with a significantly increased risk of developing type 2 diabetes.³ Companies that sell these drinks like Coca-Cola are also known to seriously undermine the so called side effects which destroy your health.⁵ Moreover, diet sodas, although sugar-free, have been implicated in increased hunger, altered appetite regulation, and metabolic disruption.⁶

In Pakistan, several studies have confirmed the high prevalence of soda consumption among medical and university students, linking this habit to obesity, altered postprandial glucose responses, and urinary disorders.^{7,8} A national survey conducted between 2006 and 2008 found that approximately 26% of households reported soda drink consumption, while another study estimated that 63% of the population - primarily teenagers and university students - consumed approximately 100 ml of soda

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daily.⁹ Globally, the trend is similarly concerning. A multi-country study involving 107 nations reported a positive association between adolescent soft drink consumption and overweight/obesity prevalence, with daily consumption rates as high as 79.6% in certain regions.¹⁰

Given that medical students possess greater health literacy than the general public, their dietary practices can influence both their own health and their credibility as future healthcare providers. So, our question was, what is the prevalence of soda consumption among medical students, and what self-reported physical health consequences are associated with it? Our hypothesis was, does soda consumption among medical students is highly prevalent and is associated with adverse physical health consequences, particularly weight gain and dental problems? Our objectives were: to determine the prevalence of soda drink consumption among medical students and to assess possible self-reported health consequences associated with soda consumption.

MATERIALS AND METHODS

A descriptive, cross-sectional study was conducted among medical students from all five academic years at Rehman Medical College Peshawar. Eligible participants were aged between 18 and 26 years. The student population was approximately 572. Using OpenEpi, a sample size of 138 was calculated. Stratified purposive sampling ensured representation across academic years. Data were collected using a structured, self-administered questionnaire adapted from previous research.⁷ The instrument included demographics, consumption patterns, and self-reported health consequences. Questionnaires were distributed online through Google Forms. Inclusion Criteria were, all medical students aged 18–26 years enrolled at Rehman Medical College. Exclusion Criteria were those students who used cigarettes, naswar, vapes, or illicit drugs; those with recent or chronic illness.

Ethical Considerations were followed. Participation was voluntary, informed consent was obtained, and confidentiality was maintained. Data were analysed using descriptive statistics. BMI comparisons used Mann–Whitney U tests, correlations used Spearman’s rho, and associations with dental problems were examined via chi-square tests and logistic regression.

RESULTS

A total of 138 medical students participated in the survey, with BMI data available for 119 (86.2%) respondents. Analysis of responses to the statement “I regularly consume soft drinks” revealed that 64 participants (46.4%) selected *Agree* and 27 (19.6%) selected *Strongly Agree*, while 25 (18.1%) were *Neutral*, 13 (9.4%) *Disagreed*, and 9 (6.5%) *Strongly*

Disagreed. Combining *the Agree and Strongly Agree* categories, 91 participants (65.9%) were classified as soft-drink consumers. Daily consumption, defined as selecting *Agree* or *Strongly Agree* for was reported by 33 students (23.9%).

The most frequently reported physical health consequences associated with soft-drink intake were weight gain and dental issues. A smaller proportion mentioned gastrointestinal discomfort and fatigue, whereas some respondents reported no perceived adverse effects despite regular intake. BMI comparisons between consumers and non-consumers indicated no statistically significant difference (median BMI = 21.9 for both groups; Mann–Whitney U = 1370.0, $p = 0.827$). Moreover, no meaningful correlation was observed between years of regular soft-drink consumption and BMI (Spearman’s rho = -0.022 , $p = 0.814$, $n = 117$).

Trends across year of study suggested higher prevalence of soft-drink consumption in earlier academic years, with a modest decline in later years. Regarding dental outcomes, unadjusted analyses indicated a higher proportion of self-reported dental problems among daily consumers, although the difference did not reach statistical significance ($\chi^2 = 1.732$, $p = 0.188$). However, logistic regression adjusted for age, gender, and physical activity suggested that daily soft-drink consumption was associated with increased odds of reporting dental problems. This association was borderline statistically significant ($p \approx 0.05$) and warrants cautious interpretation due to the modest sample size and self-reported nature of dental outcomes.

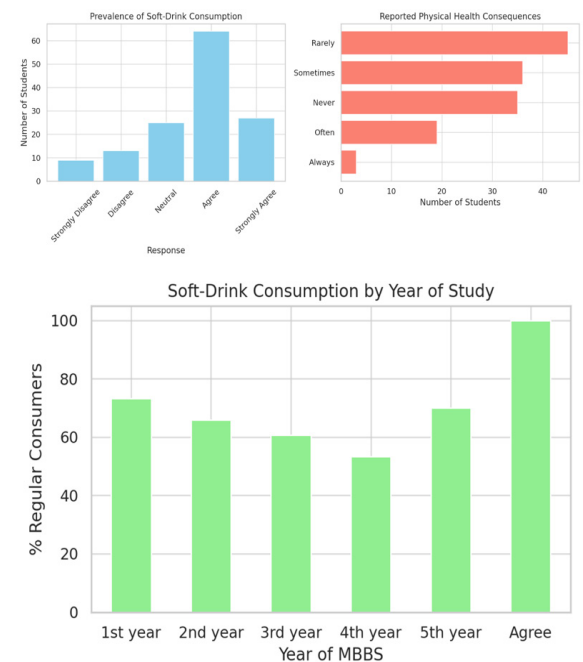


Fig 1: Regular soft drink consumers by year of study of MBBS.

Table 1. Summary of soft-drink consumption patterns, BMI, and health outcomes among medical students (n = 138)

Variable	n (%) or Median [IQR]	Statistical Test	p-value
Total participants	138 (100%)	–	–
BMI available	119 (86.2%)	–	–
Soft-drink consumption (Q8)			
Strongly Agree	27 (19.6%)	–	–
Agree	64 (46.4%)	–	–
Neutral	25 (18.1%)	–	–
Disagree	13 (9.4%)	–	–
Strongly Disagree	9 (6.5%)	–	–
Classified as consumers (Agree + Strongly Agree)	91 (65.9%)	–	–
Daily consumers (Q9)	33 (23.9%)	–	–
Median BMI (consumers)	21.9	Mann–Whitney U = 1370.0	0.827
Median BMI (non-consumers)	21.9	–	–
Correlation: years of regular consumption vs BMI	Spearman’s rho = –0.022	–	0.814
Most reported physical effects	Weight gain, dental issues, GI discomfort, fatigue	–	–
Dental problems: daily vs non-daily	$\chi^2 = 1.732$	Chi-square	0.188
Dental problems: adjusted analysis	OR (adjusted for age, gender, physical activity) borderline significant	Logistic regression	≈0.05

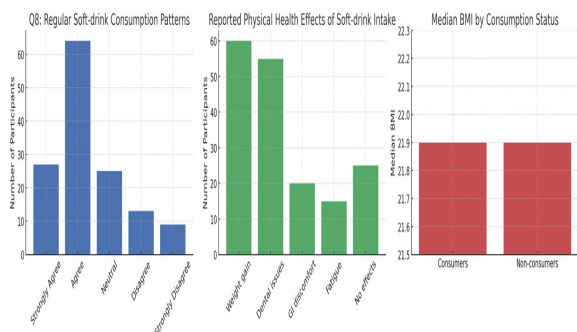


Fig2: soft drink consumption patterns

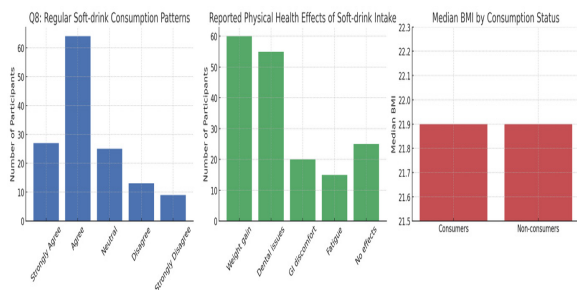


Fig 3: Physical health effects on soft drink consumers. Median BMI of consumers and non consumers.

DISCUSSION

The present study revealed that nearly two-thirds of medical students at Rehman Medical College Peshawar reported regular soda consumption, with almost one-quarter consuming daily. These findings are consistent with previous Pakistani studies that documented high prevalence among young adults¹¹, and align with global data indicating that daily soda intake among adolescents can exceed 70% in certain regions.¹² Despite high awareness of the health risks among medical students, behavioral adherence appears weak. This disconnect between knowledge and practice suggests that factors such as taste preference, social influence, marketing exposure, and availability may outweigh health knowledge in influencing behaviour.¹³

BMI comparisons showed no significant difference between consumers and non-consumers, echoing some cross-sectional studies where short-term BMI differences were not evident due to confounding lifestyle variables. However, the lack of association in this sample may also reflect the small sample size and the relatively young age group, where cumulative metabolic consequences may not yet be apparent.¹⁴ Dental issues were the most frequently reported physical consequence after weight gain.

Although unadjusted comparisons were not significant, adjusted analysis indicated a borderline significant association between daily soda intake and dental problems, supporting biological plausibility through sugar-induced acid erosion and enamel demineralization.¹⁵

This study found that soft-drink consumption is common among medical students: about two-thirds (65.9%) reported regular consumption and nearly one-quarter (23.9%) reported daily use. These rates are consistent with other studies of young adult and university populations. Despite frequent consumption, BMI did not differ between consumers and non-consumers in this cross-sectional sample. Given the young age of the cohort and the relatively short durations of regular consumption reported by many participants, this lack of association is not unexpected as in previous studies.¹¹ Body weight is a multifactorial trait, and cross-sectional self-report data are not ideal for detecting gradual weight changes that occur over longer timeframes. Similar findings in other university-based studies suggest that metabolic consequences may emerge only with sustained, long-term high intake.¹⁶ Dental problems emerged as the most concerning health consequence linked to daily soft-drink consumption. After adjustment for basic confounders, daily consumers had higher odds of reporting dental issues, a biologically plausible finding given the sugar and acid content of many soft drinks. However, the adjusted association was borderline statistically significant; larger samples and clinical dental assessments would be needed to provide stronger evidence.¹⁷

The observed decline in consumption across later years of study could indicate evolving habits as students age or as clinical exposure increases their awareness of personal health. Alternatively, heavier academic schedules in later years might reduce opportunities for social drinking. This trend is worth further exploration in longitudinal designs.

Strengths and limitations: Strengths include the use of an explicit question bank to map items and transparent, reproducible coding decisions. Key limitations are the reliance on self-report (for both exposure and outcomes), the cross-sectional design (no temporal inference), and potential residual confounding from unmeasured variables such as overall diet, oral-hygiene practices, and socioeconomic factors. Additional limitations include the absence of clinical verification of health outcomes, the single-center setting, and the use of convenience sampling which limits generalizability.

Implications: These findings suggest that even medically trained populations can have high levels of soft-drink consumption, and that dental health messaging — which highlights visible, near-term harm — may be an effective target for campus health promotion. Combined strategies addressing avail-

ability, pricing, and peer influence could enhance behavioral change.

CONCLUSION

Soda drink consumption is highly prevalent among medical students, with a substantial proportion consuming daily despite awareness of potential health risks. Although no significant association with BMI was detected, reported dental and metabolic concerns remain noteworthy.

Recommendations:

Educational interventions: Implement targeted campaigns within medical schools to reinforce behavior change.

Policy action: Limit availability of sugary beverages in campus cafeterias.

Further research: Conduct longitudinal, multicenter studies with objective health measurements to establish causal relationships.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	ZK, MA
Acquisition, Analysis or Interpretation of Data:	ZK, MA, MK, MH, MA
Manuscript Writing & Approval:	ZK, MA, MK, MH, MA

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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