

SOFT DRINK CONSUMPTION PATTERNS: A COMPARATIVE STUDY BETWEEN DENTAL AND NON-DENTAL STUDENTS

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ABSTRACT

The prevalence of soft drink consumption is on the rise globally, and with it, the frequency of dental health issues. The objective of this study was to compare the consumption patterns of soft drinks in dental and medical students.

This cross-sectional study was conducted amongst dental and medical students of Lahore Medical and Dental College, Lahore, from June till November 2022. The e-questionnaire consisted of demographic data, frequency of soft drink consumption, volume of consumption and frequency of diet soft drink consumption. Chi-square test was used to determine any significant association. p value of less than 0.05 was considered statistically significant.

401 questionnaires were returned duly filled by participants. Dental students were 200 (49.9%) whereas medical students were 201 (50.1%) in number. When participants were inquired of soft drink consumption within the past 3 months, 395 (98.5%) answered in the affirmative while 6(1.5%) had not consumed any soft drinks. Statistically females consumed more soft drinks than males. At p-value of 0.04, results demonstrate that medical students consumed more volume of soft drink bottles compared to dental students. At p-value of 0.03, results demonstrate that dental students consumed more diet soft drinks compared to medical students.

Dental students were applying their vocational education into their lifestyle; even though they consumed soft drinks, they preferred diet soda and consumed them in a lesser amount. Medical students consumed more volume of soft drink per sitting compared to dental students.

Key words: Keywords: Carbonated Beverages, Dentists, Prevalence, Students

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INTRODUCTION

The prevalence of soft drink consumption is on the rise globally, and with it, the prevalence of dental health issues. Many countries have adapted their eating habits to more Westernized diets and the people of Pakistan are no exception. Diets that have been heavily influenced by the West tend to be rich in added sugar, salt, and fat.¹ A huge part of the western diet is soft drinks. The USA has the largest annual per-capita bottle consumption of soft drinks with approximately 350 bottles, compared to Pakistan's annual average of 13 bottles.² Interestingly, the manufacturers' intended consumer market are children and adolescents who regularly consume these soft drinks. According to reports, young adults consume the most of these sugar-sweetened beverages.^{1,3}

The rapid rise in soft drink consumption has rekindled interest in their negative effects. In both children and adults, obesity and weight gain have been linked

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to sugar-sweetened beverages (SSB), which include soft drinks, energy drinks, fruit drinks, sports drinks, and cordial.^{2,4,5} Children's dental erosion and caries are likely exacerbated by the acidity of soft drinks.⁶ It has been determined that individuals who consume these beverages have a high prevalence of health conditions like enamel erosion, dental caries, bone fractures, decreased bone density, obesity, gastric acidity, type 2 diabetes and hypertension, amongst an array of other diseases.⁵ This is due to the added sugars, low pH, and other constituents of these beverages.

A study of medical students found that they were unaware of the specific negative effects of carbonated beverages, such as diabetes, gastritis, tooth decay, and a lack of bone mineral.⁶ The majority of people were unaware that carbonated beverages may contain caffeine and phosphoric acid. In another study, 99.5% of medical students enjoyed drinking soft drinks, and only 3% of the 200 participants had heard about the harmful effects of carbonated beverages.⁷ This clearly demonstrates the need to educate the general public about the harmful effects of soft drinks.

The scientific and medical communities are concerned about the adverse effects of carbonated soft drinks. Although soft drinks have been around for over a century, many of their harmful health effects may have not been studied in detail or even discovered yet. It is essential to investigate the oral health knowledge, attitudes, and behaviours of the present dental students because these students will be responsible for public oral health education of the future and provide future health services. This study aimed to compare the soft drink consumption in dental and medical students.

METHODOLOGY

A descriptive cross-sectional study was conducted from June till November 2022 in Lahore Medical and Dental College, following approval from ethical review committee of the college. Using convenience sampling, self administered pre-tested structured e-proformas were dispersed amongst currently enrolled, dental and medical students of the college, aged 18 to 25 years. Aim of the study was described to the students. Informed consent was obtained from each participant assuring confidentiality of their responses. Questionnaire consisted of demographic data, frequency of soft drink consumption in past 3 months, volume of soft drink consumption and frequency of diet/sugar-free soft drink consumption. Sample size was calculated using WHO calculator. Using 95% confidence level, 5% margin of error, population proportion 50% and population size as 11.13 million (Census of Pakistan, 2017), the sample size was calculated as 385. It was increased to 405, anticipating a 5% non-respondants rate.

Data analysis involved using SPSS version 25. Categorical data underwent frequency calculations, while quantitative data from the questionnaire were subjected to descriptive analysis. The analysis primarily focused on cross-tabulating students' responses and their related factors, with significance determined through the Chi-squared test, considering a p-value of 0.05 or lower as statistically significant.

RESULTS

Ninety-nine percent of the total proformas, specifically 401 out of 405, were completed. Of these 282 (70.3%) participants were female and 119 (29.7%) were male. Mean age of respondents were 20.70 ± 1.9 years. Participants aged 18-21 years were 226 (56.4%) and those aged 22-25 years were 175 (43.6%) in number. Dental students were 200 (49.9%) whereas medical students were 201 (50.1%) in number. Of these dental students aged 18-21 were 104 (52%) and those aged 22-25 were 96 (48%) in number. Medical students who were 18-21 were 122 (60.7%) and those aged 22-25 were 79 (39.3%) in number.

When participants were inquired of soft drink consumption within the past 3 months, 395 (98.5%) answered in the affirmative and 6(1.5%) had no soft drink consumption.

Table 1 shows relation of type of soft drink consumed with profession of participants and gender of participants. Chi-square presented no association between type of soft drink consumed with profession of participants. Statistically significant association was found in profession of participants and gender regarding energy drinks, males consuming it more than females.

Table 2 shows relation of frequency of soft drink consumed with profession of participants and gender of participants. Chi-square showed no statistically significant association frequency and profession. Statistically significant association was found between gender and frequency, females consuming more than males.

Table 3 displays significant relation between profession of participants and the volume of soft drinks consumed in a single sitting. At a p-value of 0.04, results demonstrate that medical student consumed more volume of soft drink bottles compared to dental students.

Table 4 demonstrates relation between profession of participants and frequency of diet/sugar-free soft drink consumption. At a p-value of 0.03, results demonstrate that dental students consumed more diet soft drinks compared to medical students.

DISCUSSION

The prevalence of consumption was extremely high

TABLE 1: TYPES OF SOFT DRINK CONSUMED AND ASSOCIATED PROFESSION OF PARTICIPANTS

Type of Soft Drink Consumed		Profession		p -value	Gender		p -value	Total n (%)
		Dental n (%)	Medical n (%)		Male n (%)	Female n (%)		
Carbonated drinks	Yes	150 (47.7)	164(52.3)	0.11	97(30.8)	217(69.2)	0.31	314 (78.3)
	No	50(57.4)	37(42.6)		22(25.3)	65(74.7)		
Fruit Juices	Yes	103(50.7)	100(49.3)	0.72	58(28.6)	145(71.4)	0.62	203 (50.6)
	No	97(48.9)	101(51.1)		61(30.8)	137(69.2)		
Fruit Powder	Yes	11(42.3)	15(57.7)	0.43	11(42.3)	15(57.7)	0.15	26 (6.5)
	No	189(50.4)	186(49.6)		108(28.8)	267(71.2)		
Energy drinks	Yes	26(53)	23(47)	0.63	29(59.2)	20(40.8)	0.00	49 (12.2)
	No	174(49.4)	178(50.6)		90(25.5)	262(74.5)		
Lemon tea	Yes	44(50)	44(50)	0.98	27(30.7)	61(69.3)	0.81	88 (21.9)
	No	156(49.9)	157(50.1)		92(29.4)	221(70.6)		

TABLE 2: FREQUENCY OF SOFT DRINK CONSUMED AND ASSOCIATED PROFESSION OF PARTICIPANTS

Frequency	Profession		p -value	Gender		p -value	Total n (%)
	Dental n (%)	Medical n (%)		Male n (%)	Female n (%)		
2-3 times per day	7(33.3)	14(66.7)	0.42	11(52.4)	10(47.6)	0.02	21 (5.2)
Once per day	51(54.8)	42(45.2)		30(32.2)	63(67.8)		
1-2 times per week	75(47.5)	83(52.5)		50(31.6)	108(68.4)		158 (39.4)
2-3 times per month	63(51.6)	59(48.4)		25(20.5)	97(79.5)		122 (30.4)
Never	4(57.2)	3(42.8)		3(42.8)	4(57.2)		7 (1.7)

TABLE 3: VOLUME OF SOFT DRINK CONSUMPTION IN A DAY AND ASSOCIATED PROFESSION OF PARTICIPANTS

Volume	Profession		p -value	Gender		p -value	Total n (%)
	Dental n (%)	Medical n (%)		Male n (%)	Female n (%)		
Small glass (118-200 ml)	62(54.8)	51(45.2)	0.04	24(21.3)	89(78.7)	0.18	113 (28.1)
Medium glass (200-350 ml)	54(56.3)	42(43.7)		32(33.3)	64(66.7)		
1 Can (330 ml)	32(54.3)	27(45.7)		17(28.8)	42(71.2)		59 (14.7)
500 ml Bottle	51(39.5)	78(60.5)		45(34.8)	84(65.2)		129 (32.2)
1 Liter Bottle	1(25)	3(75)		1(25)	3(75)		4 (1)
1.5 Liter Bottle	0	0		0	0		0

TABLE 4: FREQUENCY OF DIET/ SUGAR-FREE SOFT DRINK CONSUMPTION AND ASSOCIATED PROFESSION OF PARTICIPANTS

Frequency of Diet drinks	Profession		p -value	Gender		p -value	Total n (%)
	Dental n (%)	Medical n (%)		Male n (%)	Female n (%)		
Never	93(46)	109(54)	0.03	59(29.3)	143(70.7)	0.54	202 (50.4)
Rarely	49(44.9)	60(55.1)		33(30.3)	76(69.7)		109 (27.2)
More than once a week	25(59.6)	17(40.4)		9(21.4)	33(78.6)		42 (10.5)
Daily	15(71.4)	6(28.6)		7(33.4)	14(66.6)		21 (5.2)
More than once a day	18(66.7)	9(33.3)		11(40.7)	16(59.3)		27 (6.7)

among all students at 98.5%. This was in accordance with the study conducted by Alfawaz et al in which they stated the prevalence of consumption to be 90.6% in Arab students.⁸ Although all age groups are inclined to such beverages, adolescents and young adults are particularly prone because of their heightened predisposition for socializing, examination stress, and a desire for quick energy.

Soft drinks are one of the most prevalent beverages that are consumed universally and this consumption is still on the rise exponentially. At present, low- and middle-income nations heavily consume sweetened drinks. According to reports, Mexico had highest consumption in 2019 with 630 8-ounce servings per capita, followed by the USA in second place. Pakistan was ranked eighth in terms of consumption with 49 8-ounce servings per capita in 2019 and this is anticipated to increase to 34.12 litres per person by 2023.⁹ Another study stated that soft drinks constitute approximately 60–70% of everyday consumption of non-alcoholic beverages in Pakistan.¹⁰ As teenagers become older, their eating habits change and they start to choose these sweetened liquids over milk and other nutritious drinks. Knowledge and awareness have an impact on health-related behaviours. Considering that dental students have a heightened awareness of the adverse effects of consuming soft drinks, the anticipation was that they would demonstrate a lower frequency of soft drink consumption. In our study, approximately 47.7% dental students drank soft drinks whereas 52.3% medical students consumed them. This outcome was startling since dental students are believed to be better equipped with dental health knowledge than the general public, and are expected to advise adolescents and young adults to avoid drinking soft drinks, having a responsibility to educate the society.

As per this study, 70% females and only 30% males consumed soft drinks. This aligns with the results of a study conducted by Beal et al., where 28.1% of males

consumed soft drinks as compared to 49.2% females.¹¹ Similar results were found by Abbas et al where 62% female and 38% male medical students consumed soft drinks.¹² Our findings are contrary to the results of Alfawaz in which males displayed a higher frequency of soft drink consumption at 37.5% compared to females at 18%.⁸ In addition, Jalloun showed the consumption percentages of 47% males and 53% females.¹³

In this study, 33% dental students consumed soft drinks 2-3 times per day, whereas 67% of medical students consumed soft drinks at the same frequency. This percentage is a stark difference and it proves that dental students may have better knowledge of the side effects of drinking soft drinks regularly compared to medical participants. Contrary results found by Abbas et al stated that 12% of their participants, consisting of medical and dental students, consumed soft drinks one or more times per day.¹² Yang et al stated that 36.6% Pakistanis consumed soft drinks at least once per day.¹⁴

A positive correlation was identified between gender and the frequency of soft drink consumption, with females consuming soft drinks more often than males. This is contrary to the findings of Badil et al who stated that males consumed soft drinks more frequently compared to female participants.¹⁵

The total frequency of soft drink consumption was recorded highest as 1-2 times per week at 39.4% and least value as never having consumed a soft drink in the last 3 months. Nawab et al stated different findings in which they stated that 35% of their students consumed drinks few times a week, and only 16.9% never consumed carbonated drinks.⁹

In this study, the most consumed volume of soft drink consumption was 500ml at 32.2%, followed by 28% of 200ml, and more than 500 liters at 1%. This was in accordance to Mohammed et al who stated 500ml consumption at 31% for participants in the Aljoug

region of Saudi Arabia.¹⁶ These were contrary to the findings of Komotar et al who stated that 42% of their students consumed an average volume of 200ml and only 6% consumed 500ml volume in a single sitting.⁶ Similarly, Johny et al. reported that 47% of their participants consumed less than 200 ml, 10% consumed between 350-500 ml, and the remaining 2% consumed more than 500 ml.¹⁷

This study showed that the consumption of 500ml volume of soft drinks was 39.5% by dental and 60.5% by medical participants. There was significant association between profession and volume consumed, with medical participants consuming more 500ml as well as one-liter soft drinks. This outcome was important because dental students consumed lesser volume of drinks, utilizing their vocational education into their lifestyle.

Artificial sweeteners are sugar alternatives used currently in foods labelled as sugar free or diet. They have less calories and a higher sweetening capacity than ordinary sugar.¹⁸ Due to efforts made by administrations worldwide to reduce the use of added and free sugars, a wider range of innovative soft drinks with low or no sugars are increasing in production. In this study, 50% participants had never consumed any diet drinks, followed by 27% rarely consuming it and 10% consuming more than once a week. There was statistically significant association between profession and diet drinks consumption, with a higher predilection of dental students consuming them daily. This result was noteworthy because dental students, even though they consumed drinks, opted for diet soda, saving their dentition from caries. Females consumed more diet soft drinks than males. This was in accordance with the study by Ghotbi, which concluded that females are more concerned about the total calories they consume in a day.¹⁹

The limitations were that no interpretation of a causal association was possible as this was a cross-sectional study. The data gathering period was confined from June till November 2022. Weather plays a part in increased consumption of cold soft drinks. Ideally the data collection should have been either restricted to one season or carried out for one annual year. Lastly, the study's findings could have been impacted by recollection bias.

CONCLUSION

People should be made aware of the causes, risk factors, and preventative measures for oral disorders. It is advised that these techniques be taught in local communities. According to the study's findings, there is a correlation between dental and medical patients' intake of soft drinks. It is evident that those who are

more knowledgeable about oral health tend to consume less overall, whereas those who are less informed frequently do the opposite. This suggests that educating people about the need of good oral hygiene and diet may help to reduce general levels of soft drink consumption and hence improve overall oral health.

Future research ought to be longitudinal rather than cross-sectional, in order to better understand how dietary changes throughout the course of a person's life. The characteristics of sugar consumption from soft drinks or solid foods might differ, therefore future research should explore and compare both the amount and frequency of sugar intake from different foods and the effects on dental health.

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