

Exploring Consumption and Effects of Carbonated Soft Drink Among Secondary School Students in Rahim Yar Khan (Pakistan)

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Abstract

This cross-sectional study aimed to evaluate the knowledge, attitudes and practices of secondary school students regarding carbonated drinks in the district of Rahim Yar Khan, Punjab, Pakistan. This study was conducted through a self-reported questionnaire, and 350 students participated in the survey from rural (n=148; 42.29%) and urban areas (n=202; 57.71%). 77.02% of rural students and 84.65% of urban students were aware of carbonated drinks. 31.08% of rural and 44.05% of urban students were mindful of carbonated drinks' components (p=0.014). 16.89% of rural students and 81.76% of urban students were known to know the caloric values of carbonated drinks (p<0.001). 89.19% of rural and 96.04% of urban students were aware of sugar-free carbonated drinks (p=0.012). 85.81% of rural students and 76.73% of urban students believed that consuming carbonated drinks is bad for health (p=0.034). 66.89%, 11.49%, 34.46%, 70.95% & 68.92% rural students and 82.18%, 40.09%, 29.21%, 84.16% & 83.17% urban students thought that carbonated drinks had association with obesity (p=0.001), bone decay (<0.001), dental caries (p=0.296), belching (p=0.003) and hyperacidity (p=0.002) respectively. 66.89% & 75.68% of rural students and 74.25% & 79.21% of urban students believed that carbonated drinks were associated with diabetes type II and sleep disturbance, respectively. 64.19% of rural and 71.78% of urban respondents showed positive attitudes and agreed to stop consuming soft drinks. Most secondary school students from both areas preferred to drink carbonated soft drinks even with their awareness of the health issues of these drinks. Potential repercussions from the authorities in charge of the government might raise people's awareness of the problem.

Keywords: Carbonated Soft Drinks, Knowledge, Students, Urban and Rural, RY Khan.

Introduction

Carbonated beverages are the third most popular beverage worldwide. The word "soft drink" refers to beverages that are not alcoholic and flavored with water. These beverages may be optionally sweetened, acidulated, and carbonated. Additionally, soft drinks may include fruit juice or pulp salts, and their taste may be obtained from vegetable extracts or other fragrant components (Ali et al., 2021; Shafi & Aman, 2017). Numerous scholarly investigations have shown that soft drinks with carbonation and sodas are not beneficial for one's health (Mahmood et al., 2008).

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Joseph Priestley, a British scientist, discovered carbonated water existed for the first time in 1767. Jacob Schwell embarked on an endeavor to cultivate these waters on an industrial basis. He invented machines industry use that could produce carbonated water for industry use. Baking soda and naturally carbonated water have been utilized for a century to gasify water, resulting in cost savings for manufacturing. They consider whether drinking carbonated water is bad for or suitable for human health. The question then becomes whether or not the carbonated beverages that are made today have the same level of carbonation as the water that was used in Hippocrates' cure and whether or not they are just as hazardous to human health (Ahmad et al., 2023; Guljakhon, 2021).

The stimulant caffeine and the sweetener high fructose corn syrup primarily power these beverages. The most typical examples of carbonated beverages include those sold under brand names such as Coca-Cola, Pepsi, Soda, Thump Up, Diet Coke, and different energy drinks. In recent times, there has been a rise in the use of soft drinks. Because of efficient product promotion, the influence of peers, and a lack of understanding about the detrimental consequences of soft drinks, the number of times that kids consume soft drinks has grown (Arria et al., 2011; Bilal, 2021b).

Carbonated beverages have been linked to a wide variety of adverse consequences on the human body and intellect. These include obesity (caused by a decreased sense of satiety and fullness when consuming beverages high in sugar), diabetes (caused by an increase in the amount of sugar), tooth decay (caused by the demineralization of enamel), osteoporosis (caused by disrupting the normal calcium phosphorous ratio), nutritional deficiencies, heart disorders (caused by metabolic and hypertensive effects), and a variety of neurological disorders (caused by a high concentration of caffeine). Carbonated drinks, still drinks, juice drinks, dilutable, fruit juices, bottled water, sports drinks, and energy drinks are all soft drinks (Bilal, 2021; Tahmassebi & BaniHani, 2020).

Carbonated drinks typically consist of water, sugar, caramel, caffeine, phosphoric acid, and flavoring agents; nonetheless, the taste is the primary factor that determines whether or not a person would purchase and consume one of these beverages (Bilal, 2021a; Larsen & Nyvad, 1999). One of the components that has been pinpointed as a contributor to the consumer population's propensity toward addiction is caffeine (Bilal & Ansari, 2021; Sohn et al., 2006). Even though consumers are aware of the negative impacts of these drinks on health, it still seems that carbonated drinks are the beverages that drink the most often at this time (Lee & Messer, 2010).

Recently, there has been a rise in the usage of carbonated drinks, which has prompted us to consider the negative consequences of these drinks on one's health. According to the findings of the study, children who consume a lot of carbonated beverages may be at an increased risk of developing obesity, brittle bones, cavities, and caffeine addiction. Dental enamel erosion, dental caries, bone fractures, low-bone density, obesity and weight gain, non-alcoholic fatty liver disease (NAFLD), chronic kidney disease (CKD), type 2 diabetes, hypertension, increase in uric acid concentration, gout, hyperuricemia, coronary heart disease, belching and heartburn, acidity, and other symptoms are the most common adverse effects of drinking carbonated beverages (Jawad et al., 2023). It has been shown that increasing one's use of carbonated beverages may increase one's risk of developing low bone mineral density (BMD) (Casuccio et al., 2015; Zelber-Sagi et al., 2014).

Erosion of the teeth may be caused by a variety of factors, ranging from those that are systemic and endogenous to those that are exogenous and frequently including aspects of food (Chu et al., 2010; Johansson et al., 2012). It is well known that teeth erosion may be caused by drinking carbonated and acidic fruit drinks (Johansson et al., 2012). The ability of any food or beverage to demineralize tooth material is what we mean when we talk about its erosive qualities. If the

pH level drops below 5.5, dental enamel will wear away due to erosion, which causes tooth decay (Chu et al., 2010; O'Toole & Mullan, 2018).

It is important to emphasize that young children should not have any carbonated beverages as part of their daily diet, and this recommendation should be strictly adhered to. The E 290 warning on the box indicates that carbon dioxide is used as a preservative. Consuming carbonated water has several benefits, one of which is that it increases the number of electrolytes in the body. It is not possible to say with certainty that it is entirely damaging. However, it is abundantly evident that consuming sugary drinks regularly might have unfavorable impacts (Alnusayri et al., 2017). As a food preservative, sodium benzoate is a component that may be discovered in carbonated beverages. The quantity of potassium in the body decreases when sodium-containing preservatives are consumed.

Let's look at what drinking one glass of cola does to a person's physique. After ten minutes, the pancreas will have been exposed to the equivalent of ten teaspoons of sugar in the beverage. Because the phosphoric acid in the beverage mitigates the effects of the sugar, you won't experience feelings of thirst even after consuming it. After twenty minutes, there is a discernible increase in the total quantity of insulin found in the blood. After forty minutes, the liver transforms the sugar into fat, the body absorbs the caffeine, blood pressure increases due to the liver pumping more sugar into the bloodstream, and the pupil becomes larger. After forty-five minutes, there is a rise in the quantity of dopamine, which improves the brain's health.

Consequently, the person's disposition improves, and they no longer feel sleepy or lethargic. However, after an hour and a half, they start to experience feelings of laziness and being impressed. Since these hormones may also be supplied artificially by merely drinking cola, the brain eventually adjusts to a person's habit of consuming carbonated beverages even though the person's body is not generating an adequate amount of the hormones he requires (Sattarova & Xurshid, 2022).

People have been using natural anti-ageing ingredients since the beginning of time. In the Middle East, coffee is consumed, whereas in Southeast Asia and China, people drink tea; coffee and tea are eaten in India, mate is taken in South America, and kola nuts are consumed in Africa. There is a significant demand for Chinese lemongrass, ginseng, and aralia in Mongolia, Siberia, and the Far East. Ephedra, which was found in Asia, and cocaine, which was found in South America, were two examples of more potent stimulants (Sattarova & Farangiz, 2022; Sattarova & Xurshid, 2022).

Caffeine's primary effect is to boost mental and physical performance by enhancing both response speed and memory. Caffeine is primarily responsible for this effect. Concurrently, the rate at which the heart beats quickens and the blood pressure increases, which may, in many instances, result in arrhythmias (Barnokhon et al., 2022).

This study aims to assess the knowledge, attitudes, and practices of secondary school students regarding the consumption of carbonated soft drinks to raise awareness among secondary-level students about the harmful effects associated with the consumption of these beverages focusing on teenagers, to promote healthier beverage choices and informed decision-making regarding carbonated soft drinks.

Materials and Methods

Research Design

The current study was based on a survey to assess knowledge, attitudes, and practices regarding the consumption of carbonated drinks in the district of Rahim Yar Khan in the province of Punjab, Pakistan.

Study Population

The mixed-method study was conducted on Secondary school students to assess their knowledge, attitudes, and practices regarding the consumption of carbonated drinks in the district of Rahim Yar Khan in the province of Punjab, Pakistan.

Study Area and Data Collection

The study area was the urban and rural schools of district Rahim Yar Khan. To initiate the survey for data collection, a permission letter from the University of Okara Department of Zoology is reserved for visiting the Rahim Yar Khan, Punjab, Pakistan schools. It provides legal permission to assess data for this thesis on the topic in district Rahim Yar Khan. Permission letter termed consent was taken from their signature by the student's families of selected institutions to ensure that the information and data collected from these institutions are done with their full consent and harmony, free from coercion, and not improperly obtained. Here, we gathered the data of our research work of district Rahim Yar Khan after visiting the schools including, Govt Boys Secondary School Amin Garh, Govt Secondary School Chak 99/P, Govt Boys Secondary School Chak 100/P, and Govt Girls Model High School.

Figure 1: Study Area; Demographics of District Rahim Yar Khan



The district consists of four tehsils and has a male population of 2,467,840 (51.26%). There are 139 union councils in the district, with a female population of 2,345,938 (48.73%). The district encompasses 1,150 villages, and the transgender population is 228 individuals (0.005%). The total area of the district is 11,880 square kilometers, with a population of 4,814,006 according to the 2017 census. The literacy rate in the district is 56%.

Statistical Analysis

For the purpose of analyzing the data obtained from an intricate sample plan, the Minitab program, version 19.0, was used. Frequency and prevalence in terms of percentage was calculated.

Study Ethics

To collect data from the student's families of selected institutions, permission letter was obtained after getting ethical approval letter from the department of Zoology, University of Okara.

Results

Demography

In current a total of 350 students participated. Among all respondents 52% respondents were male and 48% respondents were female students. Based on residency 57.71% respondents were belonged to urban areas while 42.29% respondents were belonged to rural areas. Fathers of 21.71% students were earning their livelihood from the agriculture, 36.29% were government employees, 26.57% participants were privates while 15.43% respondents were child of business owners. 35.43% respondents were belonged to poor families (low-income families, income range Rs.25,000-35,000), 43.14% respondents were belonged to average families (middle income families, income range Rs.40,000-60,000) and only 21.43% respondents were belonged to (high-income families, income range > Rs.60,000).

Table 1: Demographic characters of respondents

Demographic variable	Frequency n=350	Percentage
Gender		
Male	182	52
Female	168	48
Residency		
Urban	202	57.71
Rural	148	42.29
Father's Occupation		
Farmer	76	21.71
Government employee	127	36.29
Private employee	93	26.57
Own business	54	15.43
Economic status		
Low (25,000-35,000)	124	35.43
Middle (40,000-60,000)	151	43.14
High (> 60,000)	75	21.43

Knowledge of Students Regarding Carbonated Soft Drinks

77.02% rural students and 84.65% urban students were aware about carbonated drinks. 31.08% rural students and 44.05% urban students were known to the components of carbonated drinks the difference between the knowledge of rural and urban students was statistically significant ($p=0.014$). 16.89% rural students and 81.76% urban students were known to the caloric values of the carbonated drinks and the difference between rural and urban students was statistically significant ($p<0.001$). 89.19% rural students and 96.04% urban students were aware of sugar free carbonated drinks ($p=0.012$).

85.81% rural students and 76.73% urban students had opinion that the consumption of carbonated drinks is bad for health ($p=0.034$). 66.89%, 11.49%, 34.46% 70.95% & 68.92% rural students and 82.18%, 40.09%, 29.21%, 84.16% & 83.17% urban students thought that carbonated drinks had association with obesity ($p=0.001$), bone decay (<0.001), dental caries ($p=0.296$), belching ($p=0.003$) and hyperacidity ($p=0.002$) respectively. 66.89% & 75.68% rural students and 74.25% & 79.21% urban students had opinion that carbonated drinks had association with Diabetes Type II and Sleep Disturbance respectively. 68.24% rural students and 80.69% urban students thought that energy drinks contain caffeine. 18.24% rural students and 73.27% urban students thought that energy drinks contain vitamins. 42.57% rural students and 55.44% urban students thought that energy drinks are same as soft drinks. These results are statistically significant ($p<0.005$).

Table 2: Comparison of knowledge regarding consumption of carbonated drinks between rural and urban areas

Question	Rural		Urban		X ²	P value	
	Yes	No	Yes	No			
Have you heard about carbonated drinks?	114	34	171	31	3.285	0.07	
Do you know the components of carbonated drinks?	46	102	89	113	6.072	0.014*	
Do you know the caloric values of the carbonated drinks?	25	123	121	81	64.98	<0.001**	
Are you aware of sugar free carbonated drinks?	132	16	194	8	6.276	0.012*	
Do you think the consumption of carbonated drinks is bad for health?	127	21	155	47	4.497	0.034*	
Do you have any idea if it has Bad Effects on Teeth	31	117	53	149	1.311	0.252	
Associated effects	Obesity	99	49	166	36	10.855	0.001**
	Bone Decay	17	131	81	121	34.687	<0.001**
	Dental Caries	51	97	59	143	1.093	0.296
	Belching	105	43	170	32	8.856	0.003**
	Hyperacidity	102	46	168	34	9.836	0.002**
	Diabetes Type II	99	49	150	52	2.257	0.133
	Sleep Disturbance	112	36	160	42	4.524	0.033*
Do you think that energy drinks contain caffeine?	101	47	163	39	7.143	0.008**	
Do you think that energy drinks contain vitamins?	27	121	148	54	103.445	<0.001**	
Do you consider energy drinks to be the same as soft drinks?	63	85	112	90	5.666	0.017*	

Attitude of Students Towards Consumption of Carbonated Soft Drinks

85.81% rural students and 88.61% urban students were feeling enjoy on having soft drinks. Similarly, when the respondents were asked to stop consuming soft drinks 64.19% rural and 71.78% urban respondents showed positive attitude and agreed to stop consuming soft drinks. When respondents from rural and urban higher secondary schools were asked either they would recommend carbonated drinks for prolong consumption, 84.46% respondents from rural and

82.67% from urban area showed positive response and they denied to recommend soft drinks for consumption. When they were asked about the consumption of sugar free drinks only 12.84% respondents from rural areas and 55.94% respondents from urban areas consumed sugar free drinks. 41.22% respondents from rural areas and 48.51% respondents from urban areas felt change in their body shape after consuming soft drinks for long time.

When asked to the respondents that either they tried to quit the habit of consumption of soft drinks, 81.76% respondents from the area of countryside and 85.64% respondents from urban area told that they tried to quit the habit of consumption. When asked to the respondents that either they experienced any feeling of discomfort after consuming the carbonated drinks 68.24% respondents from the rural area and 76.24% respondents from urban area told that they experienced feeling of discomfort after consuming the carbonated drinks.

When the respondents were asked either they preferred mineral water more than soft drinks, 75.68% respondents from rural area and 84.65% from urban area agreed that they preferred mineral water than soft drinks. When the respondents were asked that their expectations were fulfilled after consumption of energy drinks, 45.27% respondents from rural area and 51.98% respondents from urban were confident that their expectations were fulfilled after consuming the energy drinks.

When the respondents were asked about their concern about the level of sugar in carbonated soft drinks, 30.41% respondents from rural area and 56.93% respondents from urban areas showed positive attitude to have concern about level of sugar in soft drinks. When respondents were asked the prices of SSBs at school canteens 12.84% respondents from rural areas and 17.33% respondents from urban area said that they had no issues with prices of soft drinks remaining all respondents were agreed to reduce the prices of SSBs at school canteens.

When they were asked either their parents asked them to stop drinking soft drinks, parents of 94.59% respondents from rural area and parents of 86.14% respondents from urban areas were asking their children to stop consuming soft drinks. 88.51% respondents from rural areas and 84.16% respondents from urban areas agreed that soft drinks were not safe for health.

Table 3: Attitude of students towards consumption of carbonated soft drinks

Question	Rural 148		Urban 202		X ²	P value
	Yes	No	Yes	No		
Do you enjoy having soft drinks?	127	21	179	23	0.302	0.583
If asked to, would you stop drinking soft drinks?	95	53	145	57	2.285	0.131
Would like to recommend Carbonated Drinks for prolong consumption.	23	125	35	167	0.197	0.657
Did you ever try sugar free carbonated drinks?	19	129	113	89	67.556	0.001**
Did you feel any change in body after carbonated drinks consumption?	61	87	98	104	0.835	0.175
Tried to Quit/Stop Habit of Consumption	121	27	173	29	0.960	0.327
Did you experience any feeling of discomfort after consuming the carbonated drinks?	101	47	154	48	2.760	0.097

Prefer mineral water more than soft drinks	112	36	171	31	4.448	0.035*
Is it possible to say that your expectations are fulfilled after Energy Drinks' consumption?	67	81	105	97	1.539	0.215
Are you concerned about the level of sugar in carbonated soft drinks?	45	103	115	87	24.217	0.001**
Question	Agree	Disagree	Agree	Disagree		
School Canteen should increase the prices of SSBs (sugar sweetened beverages)	19	129	35	167	1.319	0.251
My parents want me to drink less SSBs	140	08	174	28	6.619	0.010**
It is not good to take Carbonated drink	131	17	170	32	1.397	0.246

Practices of Students Towards Consumption of Carbonated Soft Drinks

51 respondents from rural area were coming soft drinks daily, 35 were consuming every alternate day, 47 weakly and only 15 rural students never consume soft drinks. Similarly, 81 respondents from urban area were coming soft drinks daily, 84 were consuming every alternate day, 18 weakly and only 19 rural students never consume soft drinks. 21 rural students were brushing their teeth after drinking the soft drinks, 37 were often brushed their teeth, 39 sometimes brushed their teeth, 51 respondents never brushed their teeth after consuming soft drinks. While, 26 urban students were brushing their teeth after drinking the soft drinks, 51 were often brushed their teeth, 45 sometimes brushed their teeth, 80 respondents never brushed their teeth after consuming soft drinks.

43 rural students were brushing their teeth after drinking the soft drinks, 51 were often brushed their teeth, 17 sometimes brushed their teeth, 37 respondents never brushed their teeth after consuming soft drinks. While 89 urban students were brushing their teeth after drinking the soft drinks, 74 were often brushed their teeth, 22 sometimes brushed their teeth, 17 respondents never brushed their teeth after consuming soft drinks. While 26 rural students were brushing their teeth after drinking the soft drinks, 64 were often brushed their teeth, 43 sometimes brushed their teeth, 15 respondents never brushed their teeth after consuming soft drinks. While 19 urban students were brushing their teeth after drinking the soft drinks, 92 were often brushed their teeth, 72 sometimes brushed their teeth, 19 respondents never brushed their teeth after consuming soft drinks.

34 rural respondents used soft drinks on other hand 39 respondents consume their and 21 are family friend take his and with his family the 54 respondents use only for his test there. 39 urban respondents used soft drinks on other hand 45 respondents consume their and 26 are family friend take his and with his family the 92 respondents use only for his test there. 47 rural respondents used these drinks with his family and 54 respondents used the drink out of his family and the other hand 32 respondents used drink alternate source of water and other things and 15 respondents used these drinks during traveling. 39 urban respondents used these drinks with his family and 45 respondents used the drink out of his family and the other hand 26 respondents used drink alternate source of water and other things and 92 respondents used these drinks during traveling.

43 rural respondents prefer these drinks are minimum consuming and 51 respondents are normal range consume on the other hand 17 and 37 are more than the previous consuming soft drinks there. 89 urban respondents prefer this drink are minimum consuming and 74

respondents are normal range consume on the other hand 22 and 17 are more than the previous consuming soft drinks there. 42 rural respondents not satisfy used this drink and 31 consumers used only for thirsty and 24 respondents used for these drinks obtained for energy and 51 are other purpose. 39 urban respondents not satisfy used this drink and 26 consumers used only for thirsty and 45 respondents used for these drinks obtained for energy and 92 are other purpose.

51 rural respondents start beverage the age of 10 year and 35 candidates start the drink at the age of 11 to 15 years and 47 respondents are 16 to 20-year age to start the soft drinking while the 15 respondents are used to start of the age 21 there. 81urban respondent start beverage the age of 10 year and 84 candidates start the drink at the age of 11 to 15 years and 18 respondents are 16 to 20-year age to start the soft drinking while the 19 respondents are used to start of the age 21 there.

90 rural respondents use caffeine on the school larval age at secondary level and 98 candidates not used caffeine at the school level. 151urban respondents use caffeine on the school larval age at secondary level and 51 candidates not used caffeine at the school level. 119 rural respondents used at 48 to 72 hours take soft drinks 29 respondents not used these drinks. 141 urban respondents used at 48 to 72 hours take soft drinks 61 respondents not used these drinks.

Table 4: Practices of students towards consumption of carbonated soft drinks

	Daily	Every alternate day	Weekly	Never	X ²	P Value
Rural	51	35	47	15	32.854	0.001**
Urban	81	84	18	19		
Do you brush your teeth after drinking the soft drinks?	Always	Often	sometime	Never	X ²	P Value
Rural	21	37	39	51	1.307	0.727
Urban	26	51	45	80		
Do you prefer drinks after meal	Always	Often	sometime	Never	X ²	P Value
Rural	43	51	17	37	20.466	0.001**
Urban	89	74	22	17		
Prefer carbonated drinks after meals	Feeding in resultant	Fast food consumptions	School	Never drink	X ²	P Value
Rural	26	64	43	15	5.702	0.127
Urban	19	92	72	19		
How Do You make the choice of Your cold-drink	T. V	Easy availability in market	Family & friends	Taste	X ²	P Value
Rural	34	39	21	54	2.932	0.402
Urban	39	45	26	92		
When do you like having these drinks	When at home with friends & family	When out with family & friends	When I Feel Thirsty	During Travel	X ²	P Value
Rural	47	54	32	15	10.854	0.013*

Urban	72	92	19	19		
At a time how much of these drinks do you prefer having	A Glass (100ml)	A Glass Bottle(200ml)	Pet Bottle (500ml)	<500ml	X ²	P Value
Rural	43	51	17	37	20.466	0.001**
Urban	89	74	22	17		
Reason to consume carbonate drinks	Non-Specific	Satisfy thirst	Feel energize	Other	X ²	P Value
Rural	42	31	24	51	10.618	0.014*
Urban	39	26	45	92		
At what age, did you start consuming carbonated beverages?	<10 years	11-15years	16-20 years	<21 years	X ²	P Value
Rural	51	35	47	15	32.854	0.001**
Urban	81	84	18	19		
Do you feel that your caffeine consumption has increased since you have joined the School for Secondary classes?	Yes		No		X ²	P Value
Rural	90		58		7.742	0.005**
Urban	151		51			
Could you go 48-72 hours without Carbonated beverages?	Yes		No		X ²	P Value
Rural	119		29		5.028	0.025*
Urban	141		61			

When the respondents were asked about their brand of soft drinks. 24 students from rural area said Pepsi was their favourite drink, 39 individuals selected coke as their favourite drink, 19 respondents selected sprite as their favourite drink, 21 selected Marinda, 11 selected Mountain Dew, 8 selected thumbs, 26 selected string, while, 17 students from urban area said Pepsi was their favourite drink, 56 individuals selected coke as their favourite drink, 26 respondents selected sprite as their favourite drink, 13 selected Marinda, 17 selected Mountain Dew, 19 selected thumbs, 54 selected string.

Table 5: Comparison of perception between rural and urban students towards brands of soft drinks

Favorite Drink	Pepsi	Coke	Sprite	Marinda	Mountain Dew	Thumbs Up	String	X ²	P Value
Rural	24	39	19	21	11	8	26	14.796	0.022*
Urban	17	56	26	13	17	19	54		

Discussions

The intake of carbonated beverages raises the chance of caffeine overdose, which can be harmful, especially to children and teenagers. Consuming significant volumes of sugar-

sweetened drinks can have numerous detrimental implications on dental and overall health. It varies from a greater possibility of tooth decay to a higher risk of heart disease and metabolic illnesses, including type-2 diabetes (Alnusayri et al., 2017; Sabbah et al., 2019).

The current cross-sectional questionnaire study analyzed the knowledge, attitudes, and practices about carbonated beverages among secondary school students in urban and rural areas of district Rahim Yar Khan, Pakistan. In the present study, 77.02% of rural students and 84.65% of urban students were aware of carbonated drinks, which conforms with the findings of Nitya et al. (2015) (98.57%) and Metta et al. (2023) (98.5%).

Furthermore, results of the current study revealed that 85.81% of rural students and 76.73% of urban students had the opinion that the consumption of carbonated drinks is bad for health ($p=0.034$) as findings of the previously conducted study indicated, 86.8% of the participants were aware of the adverse effects of carbonated beverages on general health (Metta et al., 2023). Kharde et al. (2013) noted that 72.7% of the participants were known about the health issues caused by soft drinks.

Moreover, the following study showed that 66.89%, 11.49%, 34.46%, 70.95% & 68.92% of rural students and 82.18%, 40.09%, 29.21%, 84.16% & 83.17% of urban students thought that carbonated drinks had association with obesity ($p=0.001$), bone decay (<0.001), dental caries ($p=0.296$), belching ($p=0.003$) and hyperacidity ($p=0.002$) respectively. 66.89% & 75.68% of rural students and 74.25% & 79.21% of urban students believed that carbonated drinks were associated with diabetes type II and sleep disturbance, respectively. Kharde et al. (2013) reported that 28.2% of students considered obesity to be linked to consuming soft drinks. Furthermore, Martin-Calvo et al. (2014) reported a positive association between obesity and sugar consumption. Apovian (2004) reported a positive association between consumption of soft drinks, diabetes type II, sleep disturbance and obesity.

Respondents in the current study thought that consuming soft drinks is a major cause of teeth issues among those who are habitual of soft drink consumption. Literature also supported these results and reported that Erosion of the teeth may be caused by a variety of factors, ranging from those that are systemic and endogenous to those that are exogenous and frequently including aspects of food (Chu et al., 2010; Johansson et al., 2012). It is well known that teeth erosion may be caused by drinking carbonated and acidic fruit drinks (Johansson et al., 2012). The ability of any food or beverage to demineralize tooth material is what we mean when we talk about its erosive qualities. If the pH level drops below 5.5, dental enamel will wear away due to erosion, which causes tooth decay (Chu et al., 2010; O'Toole & Mullan, 2018).

In the present study, only 20.95% of respondents from rural areas and 26.24% of respondents from urban areas thought that soft drink consumption had bad effects on tooth health. Metta et al. (2023) reported that 58.8% of the participants were aware of the detrimental effects on teeth, while Kharde et al. (2013) reported that 10% of respondents thought that soft drink consumption had detrimental effects on teeth.

In the current study, respondents responded about the consumption of soft drinks. 51 rural respondents started beverages at the age of 10 years, 35 candidates began drinking at 11 to 15 years old, 47 respondents were 16 to 20 years old, and 15 respondents started at the age of 21 there. 81 urban respondents started drinking beverages at the age of 10 years 84; candidates began drinking at the age of 11 to 15 years 18; respondents were 16 to 20 years old to start soft drinking, while 19 respondents were used to starting at the age of 21.

While Martin-Calvo et al. (2014) reported that the majority of individuals started using carbonated drinks between the age of 22-26 years (33.8%), furthermore these results are in line with the study done by (Alnusayri et al., 2017) (38.98%), however in their study age group was in between 11-15 years.

When asked if they had tried to quit the habit of soft drinks, 81.76% of respondents from the countryside and 85.64% of respondents from urban areas said they had tried to quit the

consumption habit. Similarly, Metta et al. (2023) reported that 72.1% replied affirmatively, both of these studies disagree with earlier research by Alnusayri et al. (2017) (14.40%), Nitya et al. (2015) (30.28%), and Kharde et al. (2013) (37.3%).

When the respondents were asked about their brand of soft drinks, twenty-four students from rural areas said Pepsi was their favorite drink, 39 individuals selected Coke as their favorite drink, 19 respondents selected Sprite as their favorite drink, 21 selected Marinda, 11 selected Mountain Dew, eight selected thumbs, 26 selected string. In comparison, 17 students from urban areas said Pepsi was their favorite drink, 56 individuals selected Coke as their favorite drink, 26 respondents selected Sprite as their favorite drink, 13 selected Marinda, 17 selected Mountain Dew, 19 selected Thumbs, and 54 selected String. Literature reported that various people had different brands of soft drinks as their favorite brands (Mise et al., 2013; Smith et al., 2008).

The study found that a significant number of secondary school students, both in urban and rural areas, consume carbonated and energy drinks in large quantities. This highlights the need for education and awareness initiatives, starting at the school level, to inform people of different ages about the adverse effects of these beverages. Increasing awareness through media, potential interventions, and government involvement in promoting healthy dietary habits can likely contribute to reducing the consumption of carbonated drinks. It is crucial to know that secondary school students in Rahim Yar Khan, Pakistan, are concerned about the intake of carbonated soft drinks. This paper will present data concerning knowledge, attitudes, and practices regarding carbonated soft drinks in urban and rural areas. Analyzing awareness and perceptions, patterns by consumption, and attempting to stop will help identify adolescents' knowledge, views, prevalence, and effects of carbonated drink intake. The following findings are in point.

77.02% of rural and 84.65% of urban students are aware of carbonated drinks. This result is from the previously conducted studies and still indicates a high level of awareness among students. About 85.81% of rural and 76.73% of urban attack students think carbonated drinks are bad for health. Literature confirms previous views among students, proving most people know the dangerous nature of such beverages. Many of the rural and urban students connected carbonated drink consumption with obesity, bone decay, dental caries, belching, hyperacidity, diabetes II type, and sleep issues. These findings reflect those from prior studies, suggesting a high potential of simple carbonated and acidic drinks to harm health. Most respondents indicated the negative impact of soft drinks on teeth. This is in line with the adequate fact concerning the erodent action of carbonated acidic drinks on tooth enamel and cavities in the teeth. Most students claim to have started consuming soft drinks between 15 and 17, although some indicate older ages.

On the other hand, such a pattern in earlier research is somewhat different, with some seeing the onset during early adulthood. Most of the studied students have attempted to abandon the habit of consuming soft drinks. In their turn, previous research showed the opposite dynamics, which suggests a change in students' thinking. Most students consume some of the following brands of soft drinks, primarily depending on the area. At the same time, most of the literature studies claimed that different companies see preferences, which is consistent with the current data. The current study's findings revealed unimaginable levels of carbonated drink consumption among secondary school learners.

Education and awareness-raising efforts should be prioritized as a matter of urgency. It may be undertaken by promoting nutritional intervention, media programs, and governance to inspire healthy dietary patterns and reduce carbonated beverage consumption. From the above, the three sections highlight the summary of secondary school learners based on carbonated soft drink intake in Rahim Yar Khan.

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