

# Soft Drinks: A Threat for A Healthy Life

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1 Conception & Study design, Data Analysis and/or Interpretation, Critical Review.

2 & 3 Data Collection & Processing, Data Analysis and/or Interpretation, Drafting of Manuscript.

4 Conception & Study design, Critical Review.

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## ABSTRACT

**Background:** Soft Drink is a non-alcoholic beverage, mainly composed of carbonated water and high amount of sugar. From the studies, it is concluded that people who consumed soft drinks frequently have more chances to develop different diseases.

**Objectives:** This research was designed to observe the consumption of soft drinks in both genders, different age groups, and to gather information with respect to its impact on wellbeing; to analyze the awareness level in general public of Karachi, Pakistan.

**Methodology:** A cross-sectional survey based questionnaire was developed. The relationship between various parameters of the data linking to age, gender, occupation, consumption, effects and diseases were analyzed using basic tools of statistics.

**Results:** From this study we have estimated that 85.79 % of the population consumes soft drinks. Majority of the soft drinks' consumers were teenagers with age range from 15-25 years. It has been observed in study that females who regularly consume soft drinks were more prevalent towards diabetes, obesity and osteoporosis while males showed prevalence of heart diseases, high cholesterol, obesity, diabetes, asthma and tooth decay.

**Conclusion:** Awareness campaigns should be conducted to educate people followed by development of strategies against the consumption of soft drinks especially in educational organizations.

**Keywords:** Soft drinks, Obesity, Diabetes, Awareness.

## INTRODUCTION

Soft drink is a non-alcoholic beverage, mostly carbonated, contains natural or artificial sweetening agent, edible acids, natural or artificial flavors, and sometimes juice. Examples: Pepsi, Coca cola, Marinda, Seven Up. The term soft drink was originated to differentiate the flavored drinks from hard liquor, or distilled spirits [1]. Joseph Priestly was the first who created carbonated water in 1767. Since then, many researchers began working on carbonated water and in 1835 the first bottled liquid soda was manufactured in the United States. In 1886,

Coca-cola was invented by John Pemberton. Presently, it is the oldest top selling sugary soda drink globally [2]. Soft drinks usually composed of carbonated water, sugar syrup, caramel color, caffeine, orthophosphoric acid, citric acid, natural or artificial flavors, carbon dioxide, organic diol, and Brominated oil, in addition to several other ingredients [3].

Soft drinks are high in calories with no other nutrients. The average can of soft drink and fruit drink provides about 150 calories, majority from the added sugar. If you consume soft drink every day without reducing other calories, you can gain weight up to 5 pounds in

one year. Furthermore, these sugary drinks can increase the risk of type-II diabetes, heart diseases, and other chronic diseases [4].

Numerous studies have found relationship between soft drink and obesity. A twenty year study on 120,000 people found that those who increased the consumption of soft beverage by one serving everyday gained more weight than those that didn't change their consumption [5]. One meta-analysis of 88 studies showed that the effect seemed to be stronger in women [6]. Another study found that for every additional 12-ounce soda children consumed every day, the chances of becoming obese increased by 60% during 1½ years of follow-up [7]. Other studies also found a link between sugary drink consumption and weight gain in children [8]. A unique study of 33,097 individuals concluded that among people with a genetic predisposition for obesity, those that drank sugary drinks were more likely to be obese than those that didn't [9]. It suggests that genetic risk for obesity doesn't become a reality if healthy habits, like avoiding sugary drinks, are followed. Alternatively, if we replace sugary drinks or fruit juices with water then there is a less chance of long-term weight gain [10].

People who consume 1 or 2 soft drinks everyday have 25 % more chances of type-2 diabetes than people who rarely consume drinks [11]. The Nurses' Health Study explored the link between soft drinks and diabetes by following the health of about 90,000 women for eight years. The nurses who consumed one or more servings each day of a sugar-sweetened beverage or punch were twice chances to developed type 2 diabetes than those that rarely had these beverages [12]. Another study watching 22–26 years' worth of knowledge from quite 192,000 male and female participating in three long-term studies found that increasing total sugary beverage intake, including both sugar sweetened beverages and 100% fruit crush, by quite 4 ounces per day over a four-year period was related to a 18% higher risk of type 2 diabetes. The study also found that drinking more artificially sweetened beverages in situ of sugary beverages didn't appear to reduce diabetes risk. However, replacing daily serving of a sugary beverage with water, coffee, or tea was linked with a 2–10% lower risk of diabetes [13].

In a study conducted on 40,000 men for time span of almost two decades, explored that people who intake averaged one can of a sugary beverage per day had

a 20% higher risk of having a congestive-heart-failure or dying from congestive-heart-failure than men who rarely consumed sugary drinks [14]. Similar study in women which tracked the health of nearly 90,000 women over 20 years, found that women who drank quite two servings of sugary beverage every day had a 40 percent higher risk of heart attacks or death from heart condition than women who rarely drank sugary beverages [15]. Researchers investigate to find out why and how intake of sweet beverages leads to heart disease. An observational study examined medical data of nearly 6,000 people that were followed for a mean of 12.5 years. Researchers found drinking quite 12 ounces per day of sugary beverages was related to a 53% higher incidence of high triglycerides and a 98% higher incidence of low good cholesterol compared to those that drank but 12 ounces per month [16]. It is concluded that people who drink soft drinks are at high risk of having heart diseases.

A study found that ladies who intake quite three 12 ounce servings of cola each day had 2.3 to 5.1 percent lower bone mineral density in the hip compared to women who intake one serving every day [17].

A high content of orthophosphoric acid in soft drinks has been assumed to be one among the mechanisms linking soft beverages and fracture. Excessive intake of orthophosphoric acid changes calcium/phosphorus ratio and imbalance of not only the calcium and phosphorus ratio but also the acid-base within the body, leading to decreased bone density and even osteoporosis and fractures [18,19].

Consumption of two or more soda drinks daily was related to an increased risk of chronic kidney diseases thanks to high levels of orthophosphoric acid within the body [20]. A study of over 3,000 women concluded consuming two servings or more of artificially sweetened soft drinks each day was significantly connected to more rapid renal function decline in older women and doubled the danger of kidney function decline [21].

There is a robust relationship between a high risk of developing gout and drinking sweetened soda and fructose [22]. A 22-year study of 80,000 women found women who drank a soft drink can each day had a 75% higher risk of gout than women who rarely had such drinks [23]. Researchers found a similar high risk in men [24].

There is a high risk of cavity as many soft drinks contain high levels of sucrose, carbohydrates, and fructose sugars. Over consumption of sugary drinks will cause dental problems due to sugar components [25]. Also, phosphoric and citric acid present in soft drinks weakened the enamel with long exposure time, removing the protective layer (enamel) and exposing the soft dentin. These circumstances cause cavity and hypersensitivity [26].

The main objectives that were taken into consideration for this study includes; To study the consumption rate of soft drinks in both the genders in the sample population, and the ratio of increasing diseases that are occurring and prevailing among the population along with Studying the degree of awareness of usage and consequences followed by the increasing use of these drinks.

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## METHODOLOGY

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### Descriptive Research Design

The study is designed towards a scientific approach to observe consumption of soft drinks in our localities, as soft drinks are the most common and popular beverages used and served in different events and seen everywhere, we wish to collect data regarding its effect on health and to know how much people in our society are aware about it.

For this purpose we have designed a cross-sectional survey based questionnaire, the questions designed are on basic pattern for easy understanding including basic question form like: who, what, why, and how, to analyze the behavioral aspects, adaptation aspects, and habitual aspects of different individuals living in a society towards consumption of soft drinks. This also studies the variations in all of these aspects in individuals belonging to different societies or areas of a particular region or city.

### Sample size

The sample size selection, we applied Z-test with 85% of confidence interval with margin of error of 5%, and keeping population proportion of 50%, the population size used is 20 million as it is reported population of city of Karachi, the sample size obtained is 208.

### Inclusion

The inclusion criterion is decided, using different references from authentic research papers. Inclusion criteria was Age (i.e. 5 to 55), Gender (i.e. Male and

female) and Occupation (including: students, Public sector employed, private sector employed, businessman and others).

### Exclusion

The factors that were excluded in survey conduction are, education status, residence or locality in which individual lives, individual below 5 years and above 55 years.

### Paper setting

The cross-sectional survey is designed using different authentic research papers and studies from different search engines like: Google scholar, PubMed, Springer, Elsevier, ResearchGate, MEDLINE and EMBASE. Using the data of different research papers basic question were design, that were easy to understand by local population of Karachi.

### Set up

The setup of survey was completely based in Karachi, locales selected were from different areas of Karachi. The data was collected manually and online using google forms. Different students from different universities colleges and schools, along with friends, family members, neighbors, random people in shopping mall, markets, dispensaries, pharmacies, and different societies participated in this study.

### Statistical Analysis

The relationship between various parameters of the data linking to age, gender, occupation, consumption, effects and diseases were analyzed using basic tools of statistics. The data was represented in percentages and presented in tabular and graphical form.

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## RESULTS

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The study designed was cross-sectional survey based, in which consumption of soft drinks in normal population was identified along with complications associated with it. For this purpose ad questionnaire was designed which was conducted in normal individuals, the results from the survey are represented in terms of percentages in tables and figures and analyzed by using suitable statistical tools on MS excel 2016.

Table 1 shows demographic features of participants in terms of percentage and the findings are as follows: total respondents were 225 out of which 28% were male and 72% were women. From the survey

we have found that, 85.77 % of the people consume soft drinks and 14.22% of the people do not like soft

drinks. The participants belong to different age groups ranging from 5 to 55 years.

**Table 1. Demographics of individual participated in survey.**

S NO.	FEATURES	N	PERCENTAGE
1	<b>GENDER</b>		
	Female	162	72%
	Male	63	28%
2	<b>AGE</b>		
	5-15	16	7.11%
	15-25	145	64.44%
	25-35	28	12.44%
	35-45	17	7.55%
	45-55	19	8.44%
3	<b>OCCUPATION</b>		
	Student	146	64.88%
	Public	10	4.44%
	Private	19	8.44%
	Others	28	12.44%
	Business	22	9.77%
4	<b>SOFT DRINK CONSUMPTION</b>		
	Yes	193	85.77%
	No	32	14.22%

**Table 2. Overall soft drinks consumption on regular basis.**

HOW OFTEN INDIVIDUAL COMSUME SOFTDRINKS	N	%AGE
Few times a week	79	35.11%
More than one in a day	27	12%
Never	38	16.88%
Once in a month	57	25.33%
Only in special occasion	24	10.66%

Table 2 represents the overall consumption of soft drinks in our society and the results showed that 12% of the people consumed soft drinks more than once a day, 35.11% consumed soft drinks few times a week,

25.333% consumed drinks once in a month, 10.66% people consumed soft drinks only on special occasions, and 16.88% never consumed soft drinks.

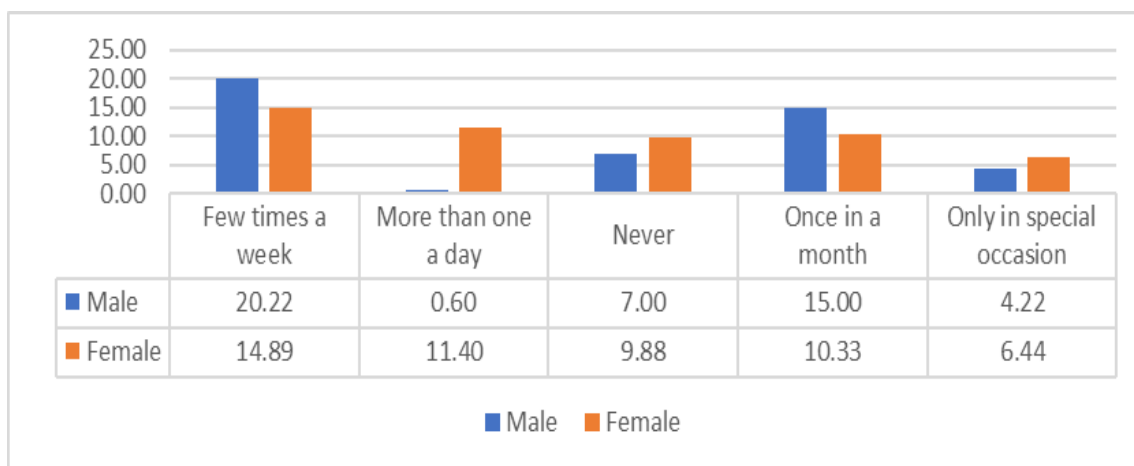


Figure 1. comparative consumption of soft drinks in male and female.

Figure 1 shows that most of the people are consuming soft drinks in their daily lives ranging from few times a day to few times in a week. In this figure, overall ratio also represents that men consume more soft drinks than women.

Table 3 illustrates overall comparison of male and female, in which 80.25% women and 96.90% men consume soft drinks.

Table 3. Overall comparative consumption of soft drinks in both genders.

USE OF SOFT DRINKS	Female		Male	
	N	%AGE	N	%AGE
YES	130	80.25%	61	96.90%
NO	32	19.75%	2	3.10%

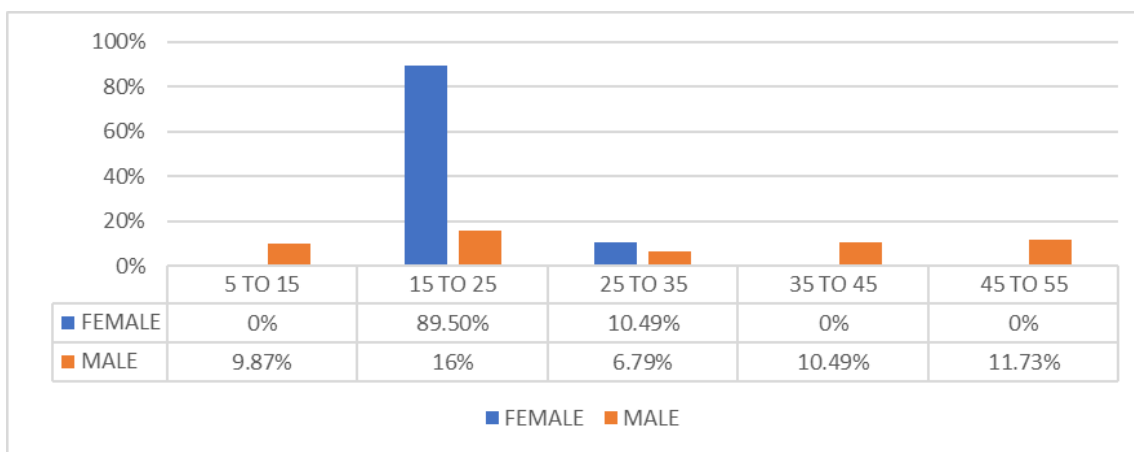


Figure 2. Consumption of soft drink consumption in different age groups.

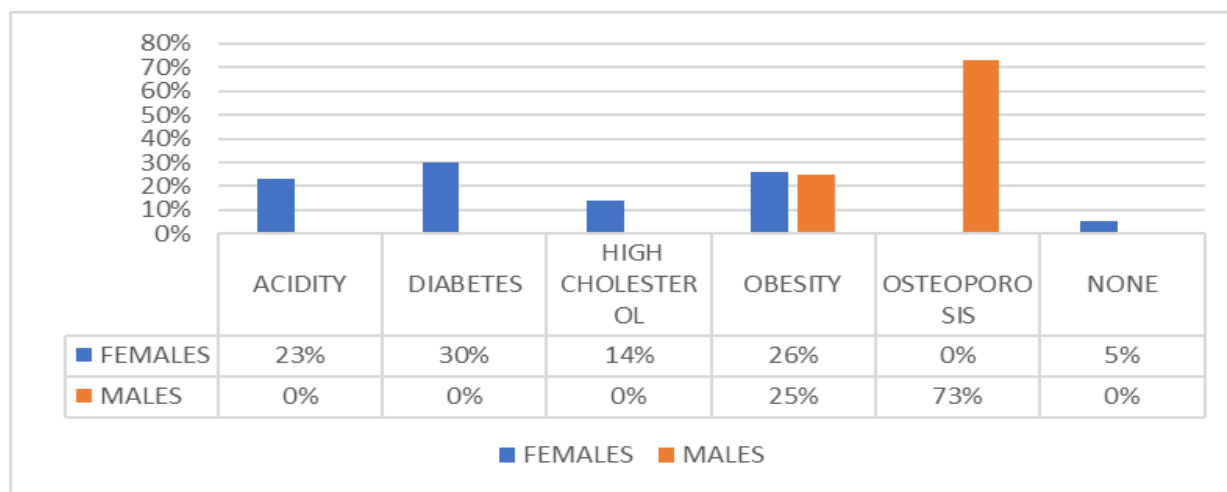
Figure 2 shows comparative soft drink consumption with respect to different age groups. This analysis shows that a large percentage of soft drinks' consumers are teenagers with age range from 15-25 years. 0% of women and 9.87% of men of 5-15 years, 89.5% of women and 16% of men of 15-25 years, 10.49% of women and 6.79% of men of 25-35 years,

0% women and 10.49% men of age group 35-45 and lastly 0% of women and 11.73% of men of age group 45-55 years consumes soft drink.

Table 4 shows almost 79.11 % of the locals are aware of health issues caused by soft drinks while only 20.88% are unaware.

**Table 4. General awareness of soft drink consumption and health issues associated with it.**

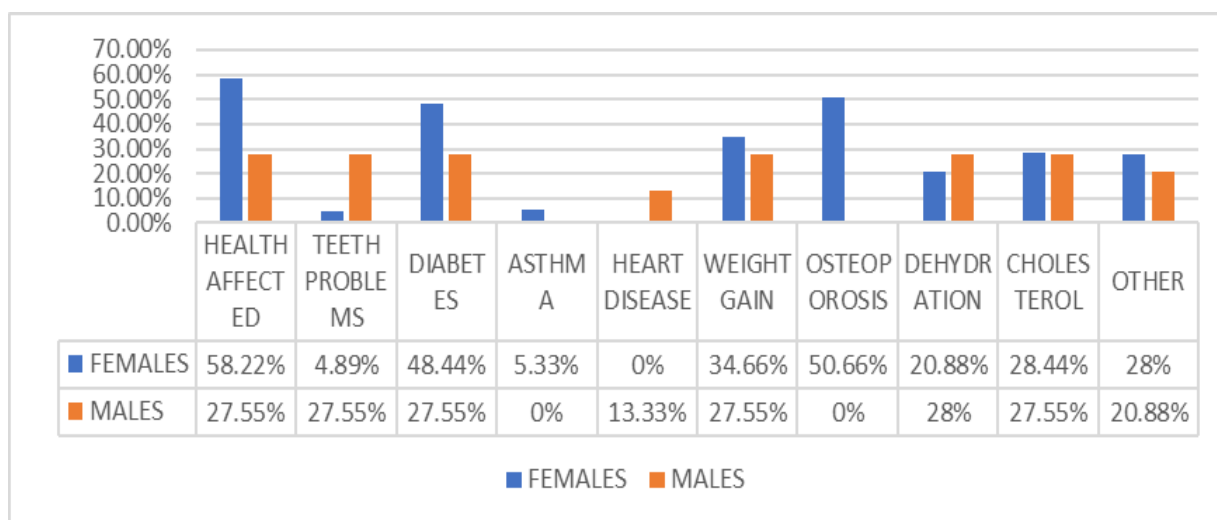
	<b>AFFECT HEALTH OR NOT</b>	<b>N</b>	<b>%AGE</b>
<b>1</b>	Yes	178	79.11%
	No	47	20.88%
<b>2</b>	<b>AFFECT TEETH OR NOT</b>		
	Yes	132	58.66%
	No	93	41.33%
<b>3</b>	<b>DIET DRINK HEALTHIER THAN USUAL DRINK OR NOT</b>		
	Yes	75	33.33%
	No	150	66.66%
<b>4</b>	<b>CAN ARTIFICIAL SWEETNER CAUSE DIFFERENT DISEASES OR NOT</b>		
	Asthma	12	5.33%
	Cancer	40	17.77%
	Diabetes	114	50.66%
	Heart disease	30	13.33%
	Metabolic acidosis	29	12.88%
<b>5</b>	<b>INCREASES WEIGHT OR NOT</b>		
	Yes	141	62.66%
	No	84	37.33%
<b>6</b>	<b>AFFECT BONE &amp; CALCIUM OR NOT</b>		
	Yes	178	79.11%
	No	47	20.88%
<b>7</b>	<b>CAUSE DEHYDRATION OR NOT</b>		
	Yes	141	62.66%
	No	84	37.33%
<b>8</b>	<b>DISEASE OCCURANCE THROUGH SOFT DRINK CONSUMPTION</b>		
	Yes	178	79.11%
	No	47	20.88%
<b>9</b>	<b>HEALTH PROBLEM APPEARS OR NOT</b>		
	Yes	111	49.33%
	No	114	50.66%
<b>10</b>	<b>CAUSE JOINT PAIN OR NOT</b>		
	Yes	80	35.55%
	No	145	64.44%
<b>11</b>	<b>MAY SUFFERING FROM FOLLOWING DISEASE(S)</b>		
	Acidity	38	16.88%
	Diabetes	50	22.22%
	High cholesterol	24	10.66%
	Obesity	58	25.77%
	Osteoporosis	47	20.88%
	None of the above	8	3.55%
<b>12</b>	<b>INCREASES OBESITY &amp; CHLOESTROL OR NOT</b>		
	Yes	127	56.44%
	No	98	43.55%



**Figure 3.** Awareness regarding health issues due to soft drinks consumption in male and females:

Figure 3 shows that both males and females are aware of the health issues related to soft drinks. Females have knowledge about soft drink

consumption may cause acidity, diabetes, high cholesterol and obesity and males knows that the consumption cause obesity and osteoporosis.



**Figure 4.** Prevalence of different health issues due to soft drink consumption in both gender:

Figure 4 indicates that majority of the population is affected by the use of soft drinks. Women show prevalence of diabetes 48.4%, osteoporosis 50.66%, weight gain 34.66%, cholesterol 28.44%, dehydration 20.88%, asthma 5.33%, and teeth problem 4.89%.

Whereas men show high cholesterol 27.55%, obesity 27.55%, diabetes 27.55%, teeth decay 27.55%, heart diseases 13.33% and dehydration 28%.

## DISCUSSION

Soft drinks are one of the most popular drinks that are consumed globally on large scale. In recent years the consumption of soft drinks has increased extensively all around the world. Alone in USA almost 86% of individual consumes soft drinks on daily basis. European countries also shows high percentage of

soft drink consumption, averagely 90 liters per capita is consumption of soft drinks per day in different western countries [27]. In 2019 it has reported that Mexico showed highest consumption of soft drinks followed by USA on second position, while Pakistan was ranked on 8<sup>th</sup> position in consumption of soft drinks in 2019 [28]. The consumption has increased in many regions around the world due to many reasons.

Soft drinks offer wide variety in terms of flavors, size, packaging and formats (low-calorie, diet and low-sugar). The attractive advertisement of soft drinks has become a global trend. It is cheap, readily available everywhere like bakeries, fast food restaurants, hotels, even in school canteens. Easy access to such drinks has increased the consumption drastically. Although consumption of soft drink is directly proportional to many harmful effects and may lead to many health problems like obesity, diabetes, cardiovascular diseases, tooth decay, bones problems and many more [29]. It has been reported that due to high consumption of soft drinks obesity has increased up to 11.2% in USA; dental caries in children and teenagers increases every year by 14% in UK; bone associated problems have raised in many countries like USA, India, Pakistan, UK, Australia; Diabetes type II has also shown rise in many region around the globe.

Pakistan in 2019 ranked in top ten on consumption of soft drinks. In recent years consumption of soft drinks has increased almost 10%, it has become a house hold beverage; found in every house and at every occasion [30]. Students, teenagers, office workers are one of the main consumers of soft drinks all over Pakistan, as they are main consumers of fast foods, and are more engaged in commercials of soft drinks [31].

We have designed a cross-sectional survey to find out the statistics of consumption of soft drinks along with awareness among people about harmful effects associated with it, in locals of city of Karachi. Karachi is the largest and most densely populated city of Pakistan, the trend of fast food is found most common in Karachi among all cities of Pakistan. For this evaluation the designed survey mainly focuses on following certain, age wise consumption, gender wise consumption of soft drinks and what health issues they are facing and are they aware about it or not. From the survey we have found that, 85.77 % of the people consume soft drinks and 14.22% of the people do not like soft drinks (Table 1). Second part of the study was to perform a Comparative analysis of soft drink consumption with respect to different genders. The results showed that 12% of the people consumed soft drinks more than once a day, 35.11% consumed soft drinks few times a week, 25.333% consumed drinks once in a month, 10.66% people consumed soft drinks only on special occasions, and 16.88% never consumed soft drinks (Table 2). High

consumption indicates that how soft drinks are attracting the people by their taste, flavors and colors. It was also found that 80.25% women and 96.90% men consumes soft drinks and are consuming soft drinks in their daily lives ranging from few times a day to few times in a week (Table 3 and Figure 1). This increasingly large consumption is due to the charming advertisements, enhanced flavors, promotions and discount offers by the manufacturer [8].

Third part of the study was the comparative soft drink consumption with respect to different age groups. This analysis shows that a large percentage of soft drinks' consumers are teenagers with age range from 15-25 years (Figure 2). They usually consume soft drinks that are easily available in cafeterias and canteens of schools, colleges and universities.

The study also focused on identifying awareness about harmful effects of soft drinks on our health in general population. Through findings of survey report in Table 4, almost 79.11 % of the locals are aware of health issues caused by soft drinks while only 20.88% are unaware in many ways. Although many individuals are aware of health problems associated with soft drinks still the consumption of soft drinks is pretty high according to our survey as well as global report [12]. Figure 4 represents the outcome of this analysis and indicates that majority of the population is affected by the use of soft drinks. Women show prevalence of diabetes 48.4%, osteoporosis 50%, weight gain 34.66%, cholesterol 28.44%, dehydration 20.88%, asthma 5.33%, and teeth problem 4.89%. Whereas men show high cholesterol 27.55%, obesity 27.55%, diabetes 27.55%, teeth decay 27.55%, heart diseases 13.33% and dehydration 28%. The survey findings show that in 79.111% individuals tooth decay problem is commonly observed, 62.666% people have complained about weight gain due to soft drinks consumption, 79.111% showed bones issues, joint pain problem but still in such conditions 35.555% of the people are still consuming it, 62.666% people know soft drink's consumption can cause dehydration, but still consumption is high as people feel fresh and energize after consuming soft drinks [22].

Survey findings also show a misconception about the use of diet soft drinks. 33.333% people think that the diet soft drinks are healthier than the usual drinks and 66.666% people think that diet soft drinks are not healthier than the usual drinks, out of which 56.444% consider that diet Coke can increased belly fat, leads



to high cholesterol and CVD [12-13].

It is surprising to see a large percentage of affected people associated with the increased use of soft drinks; still the people are in the habit of using them regularly with meals and snacks at any time of the day without realizing that the usage still can cause extremely negative effects on the individual body system.

In the light of this study it has shown, soft drinks have become very popular recently among people of Karachi where men consumption is higher than women and teenagers show most consumption of soft drinks. It has become an essential need in household, basic need in different events and nutritional need in different canteens of offices and educational institutes. The consumption has risen to a threatening level that it is affecting our health, decreasing quality of our life and slowly leading us to different diseases [18, 20, 30].

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## CONCLUSION

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In this research study it has been concluded that, the consumptions of soft drinks are increasing day by day. Due to the attractive advertisement people change their consumptions patterns they prefer soft drinks over juices and a huge population of Pakistan prefer soft drinks, especially teenagers and young adult, as it is in easy access to them. The study shows that soft drink does have adverse effects on health and not many locals are aware of it. Furthermore, individuals being aware of harmful effects still consumes soft drinks on either regular basis or occasionally. Strict strategies should be made against consumption of soft drinks especially in educational organizations and we should promote use of health drinks, milk in societal level, along with it should create an awareness forum to educate people more regarding it.

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