IMPACT OF COLD DRINKS ON UNIVERSITY LEVEL STUDENTS: A CASE STUDY OF UNIVERSITY OF MALAKAND PAKISTAN

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ABSTRACT

This study investigates the effects of cold drink consumption on the academic performance and health of university students. Utilizing a quantitative research approach, data was collected on the frequency and brand of cold drinks consumed and analyzed for its association with students' health outcomes and academic achievements. The findings indicate a significant relationship between the quantity of cold drinks consumed and both health and academic performance, suggesting that higher consumption correlates with poorer outcomes in these areas. Additionally, the specific brand of cold drinks was found to significantly affect health and academic performance, highlighting the importance of ingredient variations among different brands. Conversely, the mere usage of cold drinks, irrespective of quantity or brand, showed an insignificant association with health and academic outcomes. These results underscore the need for targeted educational programs, healthier beverage alternatives, and campus policies to mitigate the negative impacts of cold drink consumption. The study concludes with recommendations for universities to promote healthier lifestyle choices among students, ultimately aiming to enhance their well-being and academic success.

Key words: Consumption, Health, Academic Performance, Cooldrink Brand, Chi Square

1. INTRODUCTION

1.1 Education

Education improves life standards and is vital for societal development, acting as a guiding light. It's a foundational pillar for progress, influencing global trends. Countries with strong education systems experience growth and improvement. According to the American Federation of Teachers (2000), education develops skilled individuals and raises awareness about life's challenges, filling minds with creativity. Thus, educated nations lead globally. Education is key to national development, fostering a sense of responsibility. It helps people understand their duties and acquire their national, social, and individual rights. One goal of education is to enhance awareness of one's national and international role as a global citizen. Education promotes trust and cooperation, driving economic development and prosperity, enabling people to contribute to national progress. An educated person can achieve personal goals and contribute effectively to community well-being, enhancing the standards of living for individuals and nations alike.

1.2 Academic Activities of Students

Academic activities of students, including performance and graduation rates, are key interests for higher education institutions. Numerous studies have investigated factors affecting university students' academic performance. Hanson (2000) identified learning abilities, gender, and race as influential factors, while Hijazi and Naqvi (2006) found a strong link between extracurricular involvement and improved attendance, behavior, and academic performance. Good academic performance enhances the transfer of knowledge, skills, talent,

and proficiency, determining students' future goals and career opportunities. Essential determinants of performance include class participation, assignments, tests, and participation in competitions. Provision of resources such as textbooks, notes, technology, library services, and laboratory facilities is crucial for enhancing students' academic performance. Learning can be challenging for students, making it crucial for them to maintain good psychological and physical health to optimize their skills and academic achievements. Health issues such as stress, anxiety, fear, trauma, depression, or physical ailments can negatively impact academic performance. A nutritious diet, engagement in extracurricular activities, and a positive attitude towards learning help maintain good health. Maganga (2016) noted that students face various issues in educational institutions, including involvement in violent acts, drug abuse, sexually transmitted infections, teenage pregnancies, and abortions, all of which harm their academic performance and lives. Additionally, students who frequently move between home and school face challenges in maintaining their health, leading to poor academic performance. Prolonged separation from family can cause stress and anxiety, further affecting their academic success.

1.3 Cold Drinks

Cold drinks refer to non-alcoholic, water-based flavored beverages that may be sweetened, acidulated, chilled, and possibly contain fruit juice or pulp, salts, and flavors derived from vegetable extracts or other aromatic substances. Research has consistently shown that there is nothing healthy about cold soft drinks or soda. Globally, cold drinks are the third most consumed beverage. Gambon et al. (2010) stated that the consumption of cold drinks is popular across all generations. No sector is unaffected by their influence. People consume soft drinks almost daily, often unaware of their negative health effects. The young generation, in particular, consumes large quantities of soft drinks due to effective marketing, peer influence, and a lack of awareness about their harmful effects.

1.4. Adverse Effects of Cold Drinks

Cold drink consumption is a highly controversial public health issue. Scientific studies have shown that consuming one or two cold drinks daily can significantly increase the risk of numerous health problems. There is growing concern in the medical and scientific communities about the harmful effects associated with cold soft drinks. According to Nylund (2012), cold drinks are major contributors to obesity and other health issues such as diabetes (due to their high sugar content), tooth decay, osteoporosis (by disrupting the calcium-phosphorus ratio), nutritional deficiencies, heart disease, metabolic disorders (due to high caffeine concentration), and various neurological disorders. Despite being consumed for over a hundred years, many of the harmful health effects of cold drinks have not been fully studied or understood. Most people are unaware of these negative effects and therefore overconsume these beverages. Energy drinks, a type of cold drink, contain high levels of caffeine, which adversely affect health. Students often consume these drinks in large amounts, believing they enhance alertness, memory, energy, and mood. According to the American Heart Association, soft drinks and other sugar-sweetened beverages are the primary sources of added sugars in the American diet. The objective of the current study is to analyze the usage pattern of cold drinks among university-level students and to study their effects on both academic performance and health.

2. Literature Review

The review of literature highlights the main findings of previous research, providing direction to address problems and avoiding unnecessary duplication of efforts. Valuable insights can be gained from these studies.

Kassem et al. (2003) investigated soft drink consumption among female adolescents, identifying key factors influencing regular soda consumption. They found that attitude, subjective norms, and perceived behavioral control were significantly associated with the intention to drink regular soda, together explaining 64% of the variance in soda consumption intentions. The study suggested that efforts to reduce soda consumption should involve parents and friends

and recommended limiting the availability of soda at home and in schools.

Nielsen et al. (2004) studied American beverage consumption trends over 23 years, using data from various national surveys. Their analysis revealed an increase in sweetened beverage consumption and a decrease in milk consumption across all age groups. They concluded that reducing soft drink intake could help in addressing obesity.

Vartanian et al. (2007) conducted a study to examine the effects of soft drink consumption on nutrition and health. Their analysis found a clear link between soft drink intake and increased energy consumption and body weight. They also observed that higher soft drink consumption was associated with lower intake of milk, calcium, and other essential nutrients, as well as an elevated risk of various health issues.

Hattersley et al. (2009) conducted a study on the determinants and patterns of soft drink consumption among young adults. Their findings highlighted the significance of social and environmental factors, intrinsic qualities of beverages, and personal health beliefs in influencing soft drink consumption. The study also revealed notable gender differences and variations in individual readiness for behavior change. These insights have important implications for policy and practice, suggesting a substantial opportunity for increasing awareness and promoting healthier choices within this demographic.

Shahzadi and Ahmad (2011) studied factors affecting students' academic achievement and developed a model indicating that academic performance is influenced by learning skills, which are affected by the home environment. They also found that academic interactions, shaped by study habits and the home environment, impact performance. The study concluded that the home environment is the most significant factor, as it influences learning skills, which in turn affect academic performance.

Craft (2012) conducted a study to investigate the relationship between students' academic achievement and their participation in extracurricular activities. The study examined how participation in these activities correlated with grade point average (GPA), absentee rates, SAT scores, and success in the Georgia high school graduation test. The findings indicated that students involved in extracurricular activities had slightly higher GPAs, SAT scores, better success rates on the Georgia high school graduation test, and fewer absences from school.

Kharde et al. (2013) conducted a study to assess students' knowledge, attitudes, and practices regarding cold drinks, using self-structured questionnaires for data collection. The study found that 52 students (48%) had begun consuming cold drinks before the age of 10. Most students acknowledged a link between cold drink consumption and obesity. The study suggested that combining health education with primordial prevention strategies would be the most effective approach to adopting a healthy lifestyle and addressing issues related to cold drink consumption.

Eluwa et al. (2013) conducted a comparative study to examine the effects of diet and cold drinks on the histology of the cerebellum in adult female Wistar rats. The results indicated that diet soda has an adverse effect on the cerebellum of these rats.

Gupta et al. (2015) carried out a cross-sectional study to evaluate the knowledge, attitudes, and practices related to soft drink consumption and its impact on dental health among students aged 18-25 years. The study found that approximately 58% of the students consumed cold beverages twice per day, and only 39% reported experiencing adverse effects from these beverages.

Patel et al. (2016) conducted a study to assess the Knowledge, Attitude, and Practice (KAP) of medical students regarding cold drinks, using a self-structured questionnaire for data collection. The results revealed that 282 students had begun consuming cold drinks before the age of 15. Most students associated cold drink consumption with obesity, dental caries, and bone decay. Additionally, 352 students lacked knowledge about pesticides in cold drinks, and 198 students reported experiencing negative effects from consuming these beverages.

Haque (2018) conducted a study on soft drink consumption behavior among university students, using a standardized questionnaire for data collection. The study found that among 445 students, most consumed soft drinks irregularly and at varying intervals. Although the majority

were aware of the health complications associated with soft drink consumption, they continued to spend significant amounts of money on these beverages, with some students being addicted. The study suggested that promoting healthier food and drink alternatives could help reinforce the idea that there are better options for quenching thirst and satisfying taste preferences.

Tahmassebi and Bani Hani (2019) conducted a study to examine various types of soft drinks and their risks to dental and general health in children and adolescents, as well as the associated costs. The study revealed a dramatic increase in soft drink consumption over recent decades, with the most significant rise observed among children and adolescents.

3. Research Methodology
3.1 Target and sampled population

The target population for this study includes all students enrolled in BS and MSc programs at the University of Malakand in Khyber Pakhtunkhwa (KP), Pakistan. The University comprises 27 departments in total. For this study, a sample of 220 students was selected from six specific departments: Statistics, Biotechnology, Education, Geology, Computer Science, and Sociology.

3.2 Sampling Procedure

A cluster sampling method was employed to select departments for this study. From the total of 27 academic departments at the University of Malakand, a random sample of 6 departments was chosen. This method ensured that each department had an equal chance of being selected, thereby maintaining the representativeness of the sample. The list of all academic departments at the University of Malakand, along with the six departments that were randomly selected for this study.

3.3 Data Collection Method

For data collection, a well-designed questionnaire was utilized. The questionnaire contained a total of 20 questions relevant to the research topic, with the majority being categorical in nature. The investigator visited the selected departments and administered the questionnaire to BS and MSc level students. A sample of 220 students was selected from these departments.

3.4 Chi-Squre Test

The chi-square test is a statistical method used to determine if there is a significant association between categorical variables by comparing the observed frequencies of events to the expected frequencies under the null hypothesis. It assesses whether deviations from expected frequencies are due to chance or indicate a relationship between the variables. In this study, the chi-square test of independence was employed because both the dependent and independent variables were categorical, allowing the researchers to examine if there is a significant association between these variables.

3.5 Null andnd Alternative Hypotheses

The null and alternative hypotheses for this study are defined to determine the relationship between two categorical variables. The null hypothesis (H0) posits that the two variables are independent, meaning there is no association between them. Conversely, the alternative hypothesis (H1) suggests that the variables are dependent, indicating a significant relationship exists between them. To test these hypotheses, the chi-square test of independence was used, with the significance level set at $\alpha = 0.05$. This means that if the p-value obtained from the chi-square test is less than 0.05, the null hypothesis will be rejected in favor of the alternative hypothesis, concluding that the variables are indeed dependent.

3.5 Test Statistic

The chi-square statistic (χ^2) is calculated using the formula:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i} \qquad (1)$$

with $(r-1)$ $(c-1)$ d.f.
where Oij is the observed frequency and Eij is the expected frequency. The summation is over all cells in the contingency table.
And the d.f = (Number of Rows-1) (Number of Cloumn-1).

4. Results and Discussion

4.1 Descriptive Statistics

The results of descriptive analysis are provided in the Table-1

Table-1

Variable	Category	Frequency	Percentage
Gender	Male	217	81.6%
	Female	49	18.4%
Age	22 to 25	261	98.1%
	25 and above	5	1.9%
Weight	60 to 65	193	72.6%
	65 to 70	39	14.7%
	70 and above	34	12.8%
Program of Study	BS	256	96.2%
	Master	10	3.8%
GPA	0 to 2.00	3	1.1%
	2.01 to 2.50	6	2.3%
	2.51 to 3.00	61	22.9%
	3.01 to 4.00	196	73.7%
Cold Drinks Usage	Yes	224	84.2%
	No	42	15.8%
Usage Pattern of Cold Drinks	0 to 250 ml	187	70.3%
	250 to 500 ml	68	25.6%
	More than 500 ml	11	4.1%
Types of Cold Drinks	Pepsi/Coke	54	20.3%
	Fanta/Marinda	34	12.8%
	Dew/7up	38	14.3%
	Sting/Sprite	27	10.1%
	Others	63	23.7%
Awareness of Negative Effects	Yes	236	88.7%
	No	30	11.3%
Adverse Effects of Cold Drinks	Yes	161	60.5%
	No	105	39.5%
Heart Disease Problem	Yes	6	2.3%
	No	260	97.7%
Anxiety Problem	Yes	94	35.3%
	No	172	64.7%
Headache Problem	Yes	163	61.3%
	No	103	38.7%
Hair Fall Problem	Yes	154	57.9%
	No	112	42.1%
Sleeplessness Problem	Yes	97	36.5%
	No	169	63.5%
Dental Problem	Yes	100	37.6%
	No	166	62.4%
Diabetes Problem	Yes	10	3.8%
	No	255	95.9%
Obesity Problem	Yes	39	14.7%
	No	227	85.3%

The Table-1 summarizes the frequency and percentage distribution of various variables among students at the University of Malakand. It reveals that a majority of the respondents are male (81.6%) and aged between 22 to 25 years (98.1%), with most students in the BS program (96.2%) and a GPA of 3.01 to 4.00 (73.7%). A significant number of students consume cold drinks (84.2%), primarily in quantities of 0 to 250 ml (70.3%), with Pepsi/Coke and 'Other' drinks being the most popular (20.3% and 23.7%, respectively). While most students are aware of the negative effects of cold drinks (88.7%),

60.5% report experiencing adverse effects. Health issues such as headaches (61.3%), hair fall (57.9%), anxiety (35.3%), dental problems (37.6%), and sleeplessness (36.5%) are prevalent among these students, highlighting the significant consumption and associated health risks of cold drinks.

4.2 Inferential Analysis
For inferential analysis of the collected data, a chi-square test of independence was used.
The results of the chi-square test are provided in Table 4.2-4.34.

Table-2

S. No	Variable Comparison	Chi-Square	Sig. value
1	Cold Drinks vs. Dental Problem	6.266	0.012
2	Usage Pattern of Cold Drinks vs. Weight	10.453	0.033
3	Usage Pattern of Cold Drinks vs. GPA	12.675	0.048
4	Usage Pattern of Cold Drinks vs. Negative Effects	9.436	0.008
5	Usage Pattern of Cold Drinks vs. Anxiety Problem	7.657	0.021
6	Usage Pattern of Cold Drinks vs. Headache Problem	7.898	0.019
7	Usage Pattern of Cold Drinks vs. Hair-Fall Problem	6.782	0.033
8	Usage Pattern of Cold Drinks vs. Sleeplessness Problem	6.342	0.041
9	Usage Pattern of Cold Drinks vs. Dental Problem	7.254	0.026
10	Usage Pattern of Cold Drinks vs. Diabetes Problem	19.307	0.000
11	Usage Pattern of Cold Drinks vs. Obesity Problem	17.456	0.025
12	Cold Drinks Brand vs. GPA	24.756	0.016
13	Cold Drinks Brand vs. Negative Effects	17.421	0.026
14	Cold Drinks Brand vs. Heart Disease Problem	15.580	0.004
15	Cold Drinks Brand vs. Anxiety Problem	11.405	0.022
16	Cold Drinks Brand vs. Headache Problem	9.621	0.047
17	Cold Drinks Brand vs. Hair-Fall Problem	11.362	0.022
18	Cold Drinks Brand vs. Sleeplessness Problem	12.785	0.012
19	Cold Drinks Brand vs. Dental Problem	172.038	0.000
20	Cold Drinks Brand vs. Diabetes Problem	38.283	0.000
21	Cold Drinks Brand vs. Obesity Problem	15.155	0.004

The Table-2 demonstrate the chi-square analysis indicates significant associations between cold drink consumption (both usage patterns and brand) and various health and behavioral outcomes. Usage patterns of cold drinks are significantly linked to dental problems, weight, GPA, negative effects, anxiety, headaches, hair-fall, sleeplessness, diabetes, and obesity. The brand of cold drinks consumed shows significant associations with GPA, negative effects, heart disease, anxiety, headaches, hair-fall, sleeplessness, dental

problems, diabetes, and obesity. Particularly strong associations are observed for dental problems and diabetes with very low p-values ($p < 0.001$), suggesting robust links between cold drink consumption and these health issues. Overall, these results highlight the potential adverse health impacts of both the consumption pattern and brand of cold drinks.

5. Conclusion
The study explores the impact of cold drink consumption on university students' academic

performance and health, finding that higher daily consumption correlates with poorer outcomes in both areas. The adverse effects are likely due to the high sugar and caffeine content in many cold drinks, which can lead to health issues like weight gain and decreased cognitive function, subsequently impairing academic performance. Additionally, the specific brand of cold drinks consumed also significantly affects health and academics, due to differences in nutritional content and additives. However, occasional or moderate consumption shows no significant impact. The study emphasizes the importance of educating students on the risks of excessive consumption and making healthier beverage choices, recommending targeted university interventions to promote healthier habits. Future research should explore the specific harmful components in different brands and the long-term effects of consumption on students' health and academic success.

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