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Quantitative and Qualitative analysis of sugars in carbonated drinks and their impact on teeth

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Objective: The contemporary changes in the diet pattern especially the surge in the consumption of carbonated beverages have its impact on the systemic and dental health among young adults of Saudi Arabia. The pH and the sugars in the carbonated drinks are associated with dental caries and erosion. The study aimed to determine the quantity and quality of sugars and the pH in the commonly available carbonated drinks. The amount of total sugars, glucose, fructose, sucrose, artificial sweeteners were estimated and compared to their labelled values. It also reviews the implications of these drinks on teeth.

Methods: Ten brands of carbonated drinks were obtained from the local supermarkets of Jazan, Saudi Arabia. Their pH was determined using a pH meter. The quantity of total sugar, glucose, fructose, sucrose and artificial sweeteners were estimated based on High performance liquid chromatography using a Dionex ICS 5000 ion chromatography at Food and Drug Authority, Saudi Arabia.

Results: The pH of these drinks varies from 2.46 to 3.20 much below the critical value for enamel dissolution. The total sugar content in this sample ranged from 11.29 to 16.46 with energy drinks such as Bugzy and Bison having highest sugar content but comparatively less sucrose. In contrast, Seven Up had high sucrose compared to their glucose and fructose level but their total sugar concentration was least. Mild positive variation was observed for the sugar concentration compared to their labelled values in most of these samples. Diet Pepsi had artificial sweeteners like acesulfame K, saccharin and aspartame within acceptable limits but no sugars.

Conclusions: The pH, quality and quantity of sugars in the carbonated drinks prove to be deleterious to dental health. This calls for an urgent need to create public awareness about the health implications of consuming these carbonated beverages. Educational and behavioural research is needed to determine strategies to moderate the frequency of intake of carbonated beverages.

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Development and verification of a reciprocating wear test method for dental materials

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Wear is one of the major concerns associated with the biomaterials used for dental restoration. Restorative materials with higher abrasiveness causes higher wear to the opposing teeth enamel. Hence, wear resistance is an important requirement for dental materials. Candidate materials need to be characterized prior to their applications. As clinical trials are long and expensive procedures, simulating wear tests are considered to be easier alternatives. Dental wear, however, is a complicated mechanism influenced by several physiologic factors. Few standards are followed to mimic dental wear mechanism *in vitro*. In this study, an easily accessible reciprocating wear test machine was developed. The machine featured multi-axial loading capacity with six test chambers. Variable temperature exposure of the oral environment was replicated with a thermal water-cycling system. Test parameters were ascertained from Ivoclar Wear Method aiming for 5 kg loading for 120,000 cycles at a frequency of 1.6 Hz. Minimum 0.7 mm sliding movement between specimen surfaces was required. Simultaneously, 320 cycles of 5°-55°C temperature variation was to be implemented with water irrigation. However, a continuous 37°C water circulation was also achievable with the designed system. Servo motors were used as force actuators. Heating and cooling units were equipped in thermal system. Retrieved human antagonists against ceramic restoratives were subjected to the wear experiments. Verification test results were analyzed along with test parameters. Loading velocity, contact time, and tolerance of applied forces were specified. Correlations between influencing factors and wear results were also investigated. Finally, reliability of the reciprocating wear test was addressed in terms of validation of test methods.

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