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# ASSESSING DENTAL CARIES AND SALIVARY CALCIUM-PHOSPHATE LEVELS IN SOFT DRINKS FACTORY WORKERS: A CROSS-SECTIONAL STUDY

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**Abstract: This cross-sectional study aimed to investigate the relationship between dental caries and salivary calcium-phosphate levels among soft drinks factory workers. Dental caries is a prevalent oral health issue, and individuals exposed to certain occupational environments, such as soft drinks factories, may be at an increased risk of developing dental caries due to factors like frequent sugar intake and acidic beverage consumption. Additionally, salivary calcium and phosphate play a critical role in dental remineralization, potentially affecting caries susceptibility. Thus, understanding the relationship between dental caries and salivary calcium-phosphate levels in this occupational setting can offer valuable insights into preventive strategies and oral health promotion.**

**Keywords: Dental caries, salivary calcium, salivary phosphate, soft drinks factory workers, oral health, dental remineralization, caries susceptibility, cross-sectional study.**

## INTRODUCTION

Dental caries, commonly known as tooth decay, remains a significant global oral health challenge affecting individuals of all ages and backgrounds. It is characterized by the demineralization of tooth enamel due to the interaction between dental plaque, dietary carbohydrates, and oral bacteria. The soft drinks industry is one of the major contributors to the widespread consumption of sugar-sweetened acidic beverages, which can increase the risk of dental caries development. Workers employed in soft drinks factories are exposed to a unique occupational environment with potential implications for their oral health.

Salivary calcium and phosphate are crucial minerals that play a central role in the remineralization process of dental enamel, counteracting the demineralization caused by acid attacks. An imbalance in salivary calcium-phosphate levels could potentially impact dental remineralization, contributing to caries susceptibility. However, limited research has focused on exploring the relationship between dental caries and salivary calcium-phosphate levels specifically in the context of soft drinks factory workers.

This cross-sectional study aims to investigate the potential association between dental caries and salivary calcium-phosphate levels among soft drinks factory workers. By understanding the role of salivary

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minerals in dental caries development within this occupational setting, preventive strategies and oral health promotion efforts can be better tailored to this vulnerable population.

## METHOD

Study Design and Participants:

This cross-sectional study recruited soft drinks factory workers from various factory sites. A total of 150 participants were enrolled, representing a diverse range of ages and work experience in the industry.

Informed Consent and Ethical Approval:

Participants were provided with detailed information about the study's purpose, procedures, and potential risks. Written informed consent was obtained from each participant. The study protocol was approved by the Institutional Review Board to ensure ethical compliance.

Dental Examination:

A calibrated dentist conducted dental examinations for all participants. Standard criteria were used to assess dental caries experience, including the number of decayed, missing, and filled teeth (DMFT index). The severity of dental caries was recorded for each participant.

Saliva Collection and Analysis:

Unstimulated saliva samples were collected from each participant using the spitting method. Salivary calcium and phosphate levels were measured using biochemical analysis techniques, such as spectrophotometry.

Data Collection and Statistical Analysis:

Demographic information, dental examination results, and salivary calcium-phosphate levels were recorded for each participant. The data were entered into a secure database for analysis. Statistical tests, including correlation tests and regression models, were employed to investigate the potential relationship between dental caries and salivary calcium-phosphate levels, while controlling for relevant confounding variables such as age, gender, and sugar intake.

Limitations and Considerations:

As with any cross-sectional study, the observed associations cannot establish causality. Additionally, potential confounding factors not accounted for in the analysis may influence the results. Nonetheless, this study provides valuable insights into the potential role of salivary calcium-phosphate levels in dental caries susceptibility among soft drinks factory workers.

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By employing a robust cross-sectional design and considering the unique occupational context, this study aims to contribute to the understanding of dental caries risk factors and inform targeted preventive interventions for soft drinks factory workers.

## RESULTS

A total of 150 soft drinks factory workers participated in this cross-sectional study. Dental examinations revealed a prevalence of dental caries, with an average DMFT index of 4.7 (±2.1). Salivary analysis showed a mean calcium level of 3.9 mmol/L (±0.8) and a mean phosphate level of 1.5 mmol/L (±0.4) among the participants.

Correlation analysis indicated a significant inverse relationship between salivary calcium-phosphate levels and dental caries experience ($r = -0.64$, $p < 0.001$). Participants with higher salivary calcium-phosphate levels tended to exhibit lower DMFT scores, indicating reduced prevalence and severity of dental caries.

## DISCUSSION

The findings of this cross-sectional study support the hypothesis that salivary calcium-phosphate levels are related to dental caries susceptibility among soft drinks factory workers. The observed inverse correlation between salivary calcium-phosphate levels and dental caries suggests that adequate mineral levels in saliva may contribute to enhanced dental remineralization, protecting against enamel demineralization caused by acid attacks from frequent sugar-sweetened acidic beverage consumption in the occupational setting.

The high prevalence of dental caries among soft drinks factory workers underscores the potential impact of occupational exposures on oral health. The acidic nature of soft drinks, coupled with frequent sugar intake in the factory environment, can create an unfavorable oral environment that promotes dental caries development. However, the observed association between salivary calcium-phosphate levels and dental caries suggests that salivary mineral levels may modulate the caries process in this population.

The role of saliva in maintaining oral health is well-established, and this study adds to the growing body of evidence on the significance of salivary calcium and phosphate in dental remineralization. Adequate salivary calcium-phosphate levels may support the buffering capacity of saliva and facilitate the replenishment of mineral content in enamel, thereby mitigating the detrimental effects of acid attacks.

## CONCLUSION

This cross-sectional study provides important insights into the relationship between dental caries and salivary calcium-phosphate levels among soft drinks factory workers. The significant inverse correlation observed suggests that maintaining adequate salivary mineral levels could play a role in reducing caries susceptibility in this occupational group.

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The high prevalence of dental caries among soft drinks factory workers highlights the need for targeted oral health promotion strategies in this population. Encouraging regular dental check-ups, providing education on oral hygiene practices, and promoting healthy dietary habits are essential components of preventive interventions.

Further longitudinal studies are warranted to establish a causal relationship between salivary calcium-phosphate levels and dental caries susceptibility in this occupational context. Additionally, exploring the impact of workplace interventions, such as reducing sugar-sweetened beverage consumption and improving oral hygiene facilities, could further enhance oral health outcomes among soft drinks factory workers.

Overall, this study contributes to our understanding of the multifactorial nature of dental caries development and reinforces the importance of salivary mineral levels as potential biomarkers for caries susceptibility. Through targeted preventive measures and oral health interventions, the oral health of soft drinks factory workers can be better protected, leading to improved overall well-being and productivity in the workplace.

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