SHORT COMMUNICATION

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Secretion rate and amylase concentration of whole saliva after consumption of beer

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Saliva is of paramount importance for the maintenance of oral health (1). Only a few studies have investigated the acute effects of alcohol consumption on salivary function.

In rats, acute administration of a high dose of ethanol caused a significant reduction in stimulated parotid secretion (2) and reduced the protein synthesis in all major salivary glands (3). Ingestion of a high dose of ethanol by humans also caused a decrease in parotid salivary flow rate (4) and stimulated whole saliva flow rate (5), with a concomitant reduction in salivary amylase activity and output (5). In this study, we investigated the possible effects of a relatively small volume of beer on salivary function.

Ten healthy volunteers (seven men and three women; mean age 32.1 ± 17.9 years) participated in this study. They were instructed to abstain from alcohol at least 12 h prior to the experiment and to abstain from smoking, eating, drinking caffeine containing beverages and toothbrushing at least 1 h prior to the experiment. All experiments took place between 09:30 and 12:30 hours.

In a crossover design, the volunteers consumed either 300 ml top-fermented beer (Palm Breweries, Steenhuffel, Belgium, 5.2% alcohol) within 5 min. As a control, 300 ml non-alcoholic beer was used (Amstel Malt, Zoeterwoude, The Netherlands, <0.1% alcohol). The time interval between both experimental conditions was 1 week.

Immediately before the consumption of beer and 15, 30, 45, 60, 90 and 120 min later, mechanically stimulated whole saliva was collected in preweighed tubes for 5 min by parafilm-chewing (6). The salivary flow rates were determined gravimetrically.



Fig 1. Flow rate and amylase protein concentration of whole saliva before and after consumption of 300 ml beer (solid bars) or non-alcoholic beer (hatched bars). Data are expressed as mean \pm SD (n = 10). *P < 0.05 versus top-fermented beer at T = 0, [#]versus non-alcoholic beer at T = 15.

The salivary samples were transferred to Eppendorf vials, centrifuged at 10 000 g for 10 min and the supernatant was stored at -20° C. Amylase protein was quantified by capillary electrophoresis.

Data are expressed as mean \pm SD. For statistical analyses ANOVA for repeated measures was used, followed by paired Student's *t*-tests where appropriate (SPSS version 10.0: SPSS Inc., Chicago, IL, USA). Levels of significance were set at P < 0.05.

A transient decrease in the salivary flow rate of parafilmchewing stimulated whole saliva was observed after consumption of beer (-15% versus baseline values), which was not observed after the consumption of non-alcoholic beer (Fig. 1).

Both consumptions did not induce significant changes in the salivary amylase protein concentration (Fig. 1) or output.

This study demonstrates that consumption of a relatively small amount of beer induces a transient decrease in saliva secretion rate within 15 min. At 30 min after drinking beer, the salivary flow rate was restored. The reduction of 15% in parafilm-stimulated saliva secretion in our study is much smaller than the decrease of 40% after ingestion of a large dose of ethanol in previous studies (5), suggesting a dose-response effect.

Although one standard amount of beer has only a limited effect on salivary secretion, frequent intake of beer may reduce salivary flow rate more extensively and for a longer time. This may impair the beneficial effects of saliva on oral health and increase the need of dental hygiene treatment, especially in adolescents with a high frequency of (binge) drinking (7).

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