available at www.sciencedirect.com

ScienceDirect

journal homepage: www.intl.elsevierhealth.com/journals/arob

Association between season and temperature and unstimulated parotid and submandibular/sublingual secretion rates

H. Elishoov [a], A. Wolff [b,*], L. Schnur Kravel [c], A. Shiperman [c], M. Gorsky [a]

[a] Department of Oral Medicine and Oral Pathology, The Maurice and Gabriela Goldschleger School of Dental Medicine, Tel Aviv University, Israel

[b] Saliwell Ltd., Harutzim, Israel

ARTICLE INFO

Article history:
Accepted 2 August 2007

Keywords:
Unstimulated salivary flow-rate
Climate
Air condition
Temperature
Parotid
Submandibular
Sublingual

ABSTRACT

Objective: The purpose of the present study was to evaluate parotid and submandibular/sublingual (SM/SL) unstimulated salivary secretion rate in a group of healthy individuals in winter and summer, and to observe the effect of room-adjusted temperature (air-conditioning) on salivary flow-rate in those seasons.

Design: Unstimulated salivary secretion rates of the right parotid and the SM/SL glands were measured in 50 healthy Israeli volunteers. Each volunteer was evaluated four times during the study: twice in winter (February–March) and twice in summer (July–August).

Results: Parotid and SM/SL salivary mean secretion rate in winter was significantly higher than in summer ($p < 0.02$ and $p < 0.05$, respectively). Room heating in winter lowered significantly the mean parotid flow. Air-conditioning cancelled almost completely the seasonal effects on parotid and SM/SL secretions.

Conclusions: The results of this study suggest that room temperature is an important factor in measurement of salivary secretion rate. Hence, temperature should ideally be recorded and reported when assessing salivary flow-rates.

© 2007 Elsevier Ltd. All rights reserved.

1. Introduction

Saliva has a major role in maintaining oral homeostasis.[1] Salivary functions include, among others, preservation, protection and repair of oral mucosal tissues, teeth remineralization and modulation of viral, fungal and bacterial populations. In addition, salivary fluids soften the food, assist in the formation and swallowing of the food bolus and facilitate speech.[2] Alterations in salivary glands function may have detrimental effects on oral health and promote dental caries, oral mucositis, dysphagia, oral infections and altered taste.[3]

Hypofunction of submandibular/sublingual (SM/SL) glands might lead to xerostomia complaints even in the presence of normal whole salivary flow-rate.[4] Since xerostomia is a subjective complaint and not necessarily indicates true hypofunction of salivary glands, an objective evaluation of the salivary glands function in xerostomic patients is crucial.[1]

Salivary secretion rate is generally influenced by physiological and pathological factors[5] among them circadian and circannual cycles.[6,7] General dehydration can be notable in warm climate areas, probably related to insufficient fluid intake and increased loss of body fluids.[5,8] Dehydration of over

* *Corresponding author*. Tel.: +972 9 746 1630.
E-mail address: awolff@zahav.net.il (A. Wolff).

[c] Based on Theses submitted to the School of Dental Medicine, Tel Aviv University, Israel, in partial fulfillment of the requirement for the DMD degree.

0003–9969/$ – see front matter © 2007 Elsevier Ltd. All rights reserved.
doi:10.1016/j.archoralbio.2007.08.002

8% body fluids might result in complete cessation of salivary secretion.[8]

Only a limited number of studies published in the English literature have evaluated whole or parotid salivary flow in association to climate variation. Kavanagh et al.[9] measured the unstimulated whole salivary secretion rate in 43 adolescents at a monthly basis (nine times from September 1990 until June 1991) and reported that the salivary flow-rate was inversely associated with ambient temperature. Louridis et al.[10] found that resting whole salivary flow-rate of three subjects decreased when environmental temperature increased. They reported that changes in the salivary flow-rate were noted even in minor temperature variations. Shannon[11] reported decreased parotid unstimulated flow-rate in soldiers in summer, explained by the relative dehydration common in that season. Kariyawasam and Dawes[7] found that a small change in ambient temperature (about 2 °C) in a warm climate (in Sri Lanka) may be sufficient to influence unstimulated salivary flow-rate. Horowitz et al.[12] reported that parotid glands in rats underwent hypoplastic changes following an exposure to heat as low as 34 °C.

We failed to find studies that evaluated the SM/SL salivary flow in different weather conditions or temperatures, and the effect of room temperature adjustments on major salivary gland output. Thus, the objectives of the present study were (1) to evaluate parotid and SM/SL unstimulated salivary secretion rates in healthy individuals in winter compared to summer and (2) to observe the effect of room-adjusted temperature on parotid and SM/SL flow rates in each season.

2. Materials and methods

Fifty healthy, non-medicated and non-xerostomic volunteers (24 men and 26 women), aged 23–45 years (mean 26.9 years) were evaluated four times during the study, twice in winter (February–March) and twice in summer (July–August) at the Oral Medicine clinic, Department of Oral Medicine and Oral Pathology, School of Dental Medicine, Tel Aviv University, Israel. The study protocol was approved by the institution's review committee. The procedures (particularly saliva collections) were explained in detail to all participants *a priori*. At each visit saliva was collected twice, each time in a different room: one room with open windows (mimicking out-doors seasonal climate conditions) and the other air-conditioned. Saliva collections of 25 individuals from this cohort was first collected in the non-air-conditioned room, while saliva collections from the other 25 individuals were initially performed in the air-conditioned room where the mean temperature was 21.7 °C in winter and 24.8 °C in summer. Subjects switched rooms for their second collections after a waiting period of 30 min.

Unstimulated salivary secretion of the right parotid and SM/SL glands was collected into pre-weighed tubes, separately for 5 min each during the morning (08:00–11:00 a.m.). Subjects were instructed not to brush their teeth, eat or drink for at least 1.5 h prior to collections.

Each individual was seated in an upright position and saliva was collected after adjustment of a minimum of 5 min to room environmental conditions. Saliva collections from the parotid gland were performed using a modified Carlson–Crittenden cup[13] that was attached to the orifice of Stensen's duct. Saliva collections from the SM/SL glands were performed using a universal collector,[14] while keeping covered the openings of the parotid ducts and the labial minor salivary glands by gauze to minimize mixing of SM/SL saliva with fluids from other sources.

Saliva-containing tubes were then weighed to calculate their content. Flow-rate was reported in millilitres per minute (ml/min) assuming a specific gravity of 1.0 g equalling 1 ml.[4] SM/SL flow-rate values were divided by two in order to present them as flow rates from one side.

Statistical evaluations were performed using ANOVA with paired repeated measures test and ANOVA one way. p-value of 0.05 or less represented statistical significance.

3. Results

All subjects were divided into two groups which experienced the non-air-conditioned and the air-conditioned environments in a different order. The order in which these environments were experienced did not affect the results.

Parotid salivary flow-rate in winter was significantly higher (0.071 ± 0.073 ml/min) than in summer (0.048 ± 0.051 ml/min) ($p < 0.02$). Room-adjusted temperature (air-conditioning) had a major influence on parotid salivary flow as room heating in winter decreased significantly the mean output from 0.071 ml/min to 0.054 ml/min ($p < 0.05$). Cooling the room in summer increased the parotid flow-rate from a mean of 0.048 ml/min to a mean of 0.061 with no statistical significance (Table 1).

In winter, SM/SL flow-rate was significantly higher (0.081 ± 0.051 ml/min) than in summer (0.062 ± 0.047 ml/min) ($p < 0.05$). Room air-conditioning in summer increased

Table 1 – Salivary flow-rate in association with temperatures

Season	Outdoors temperature (range) (°C)	AC	Room temperature (range) (°C)	Parotid flow (S.D.) (ml/min)	SM/SL flow (S.D.) (ml/min)
Winter	13.4 (11–16)	–	16.0 (14–18)	0.071 (±0.073)*§	0.081 (±0.051)¶
		+	21.7 (18–25)	0.054 (±0.055)*	0.077 (±0.055)
Summer	27.7 (26–29)	–	27.2 (26–29)	0.048 (±0.051)§	0.062 (±0.047)¶
		+	24.8 (23–27)	0.061 (±0.074)	0.074 (±0.053)

AC: air-conditioning. Values that share the same symbol differed in a statistically significant manner. p-values resulting from each comparison were: for values denoted by (*) $p < 0.05$, by (¶) $p < 0.05$ and by (§) $p < 0.02$.

Download English Version:

https://daneshyari.com/en/article/3121243

Download Persian Version:

https://daneshyari.com/article/3121243

Daneshyari.com