

Correlation of Poor Oral Hygiene with Obesity-A Mini Review

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Abstract

Poor oral hygiene is associated with obesity in both extremes of ages along with decreased salivation. In this minireview we examine the effects of bad dentition, extremes of sweets, and association of obesity with oral hygiene as evidenced by improvement following bariatric surgery both in salivation along with weight loss.

Keywords: Poor Oral Hygiene; Decreased Salivation; Desacyl Ghrelin; Bariatric Surgery

Introduction

Poor oral health in obese people have been found [1]. The greater the number of teeth loss, periodontal disease was found more frequently in obese individuals [2,3].

There has been similar causal and behavioral mechanisms [4] between teeth and oral health and what an individual perceives self regarding oral health has been related to general health [5]. Dental attending patterns are correlated with other health habits [6]. Irregular dental caries was found to be associated with dental anxiety [3].

There are a number of common possible confounders, important to be taken into consideration in studies of oral health and obesity. Like socioeconomic and lifestyle factors which are associated with body weight [7] and oral health [4].

Ostberg, *et al.* studied in Western Sweden the association between oral health variables and total and central obesity respectively and investigated the influence of socioeconomic factors, lifestyle, dental anxiety and comorbidity.

The subjects used were a randomized sample from the 1992 data collection in the Prospective population Study of women in Gotenburg, Sweden (n = 999, 38-> = 78 yr). In this study a clinical and radiological examination along with self-administered questionnaire was given. They defined obesity as a BMI ≥ 30 KG/m², waist hip ratio (WHR) ≥ 0.80 and waist circumference (WC) > 0.88 m. Logistic regression was used to estimate associations including adjustments for confounders.

They found that the mean BMI value was 25.96 kg/m², mean WHR 0.83, mean WC-0.83m. Total number of teeth, the restored teeth, xerostomia, dental visiting habits and self-perceived health were associated with both total and central obesity, independent of age and sex. e.g. There were statistical significant associations between small number of teeth (< 20) and obesity. BMI (OR1.95, CI-1.40 - 2.73),

WHR-1.67, 1.28 - 2.19), WC (1.94, 1.47 - 2.55) respectively. The number of carious lesions and masticatory function showed no association with obesity. The obesity measure was of significance, especially with regard to behavior, like irregular dental visits, with a greater risk associated with BMI (1.83, 1.23 - 2.71) and WC (1.96, 1.39 - 2.75) but not with WHR (1.29, 0.90 - 1.85). Thus they concluded that associations were found between oral health and obesity. Choice of obesity measure in oral health should be carefully considered [8].

Similarly Albright., *et al.* investigated the associations between type2 diabetes (T2DM) and other variables like poor oral health (POH) and overweight/obesity (OW) among a group of elderly Hmong subjects who were > 60 yrs and had emigrated to USA after the Vietnam conflict. Following an interview of each subject their weight, height and waist circumference were measured. Each subject had an oral examination and their saliva was examined for the seven components related to inflammation. The presence of DM was correlated with POH and OW separately. A strong association was found between concurrent POH and OW and the presence of DM: all subjects with both POH and OW had DM. Logistic multivariate analysis of OW, POH, age, years of residency in California, and stress levels showed a marked association between presence of DM and concurrent OW and POH. A change in diet after immigration were excluded as an explanatory variable. Subjects with DM and concurrent OW and POH had significantly elevated salivary levels of 5 analyses related to chronic inflammation. The association between POH and OW and presence of DM needs further study was their conclusion [9].

Cardozo., *et al.* assessed the impact of bariatric surgery on the oral health. They invited all patients who underwent Roux-en Y gastric by-pass at Nossa Senhora da C onceicao hospital between October 2009 - January 2011 to participate. They conducted oral examination and interviews in 2 stages and performed a descriptive analysis, McNemar's test, Students t test for paired samples, and the Wilcoxon test.

39 patients completed the protocol. A statistically significant reduction in the number of medications taken daily, sensation of dry mouth and increased stimulated salivary flow rate. Hence they concluded that oral health of patients who underwent bariatric surgery improved along with reduction in the sensation of dry mouth [10].

Sede and Ehzele conducted a study to determine the relationship between obesity and periodontal status and dental caries experience of a group of Nigerian dental patients. They selected patients attending dental outdoor clinics of University of Benin Teaching hospital, Benin city, Nigeria. Height and weight were measured and BMI calculated in kg/m², gingival health assessed using bleeding on probing index, oral hygiene estimated using the simplified oral hygiene index (OHI-S), periodontal health estimated using the basic periodontal examination (BPE) and caries experience was estimated with the decayed, missing and filled teeth (DMFT) index.

3.8% participants were found to be underweight, 52.6% were In the normal BMI range, 28.2% pre-obese, 12.2% obese class 1 and 3.2% obese class II. The mean OHI-S score was 2.16 +- 1.13 among the overweight participants and 2.05 +- 1.13 among those who are not (p = 0.543). The mean DMFT score was 3.03 +- 4.25 among the overweight participants and 2.32 +- 3.01 among those who are not (p = 0.223). 65% of participants with BPE score 0, considered to signify periodontal health, had normal BMI while all the participants with the worst BPE score recorded belong to the obese group 1 group (p = 0.070). The binary logistic expression showed that the likely predictor of gingival bleeding in the study is BMI between 35.0 and 39.9 (obese class 2 (p = 0.046, odds ratio = 0.07, 95%CI = 0.01 - 0.96). Hence concluded that there are no statistically significant relationship between obesity and periodontal status and dental caries experience in the group of dental patients they studied. Increased BMI may however be a predictor of gingival bleeding [11].

Nakamura., *et al.* assessed the relation of POH, diet in relation to weight loss, stable underweight and obesity in a community dwelling of older adults. They analyzed 96794 subjects of > 65 yrs who were randomly selected from 31 Japanese municipalities in the Japan Gerontological evaluation study. Weight loss was defined as >=2-3 kg of loss over the preceding 6 months. BMI was evaluated in respondents without weight loss. Multiple logistic regression analysis was performed with weight loss, underweight and obesity as dependent variable and having fewer teeth (< 20) and infrequent food intake variables with adjustment for potential confounders.

Weight loss was associated with having fewer teeth (men: odds ratio [OR] 1.3, 95%CI, 1.2 - 1.3, women: OR 1.2, 95%CI, 1.1 - 1.3) and infrequent fruits, vegetables intake (men: OR 1.1; 95%CI 1.1 - 1.2; women: OR 1.4; 95%CI 1.3 - 1.5) and fish/meat intake (OR 1.2; 95%CI- 1.1 - 1.3 for both sexes). No interaction was seen between having fewer teeth and food intake. Obesity was associated with the same factors: having fewer teeth (ORs 1.2 and 1.3 for men and women, respectively) and infrequent intake of fruits/vegetables (ORs 1.1 and 1.2 for men and women, respectively) and fish/meat (ORs 1.1 for both sexes). Infrequent fruit/vegetable intake showed a higher OR for underweight in women with fewer teeth than others. Thus they concluded that having fewer teeth and infrequent food intake was associated with both weight loss and obesity. There was a significant interaction in the association of having fewer teeth and infrequent food intake with underweight in women [12].

Oral Hygiene in Childhood Obesity

Dental Caries and Obesity

96 healthy children between 6 - 11 years were studied by Cotasuna, *et al.* [13] for the effect of dental caries, food intake, oral hygiene and lifestyle on obesity and found a direct association between dental caries and obesity as evident from correlation between prevalence of dental caries in obese children. Analysis of food intake and deciduous teeth/permanent teeth, measured by Dual X-ray Absorptiometry (DXA), showed that specific dietary habits (intake of sugar sweetened drinks, frequency of sugar intake limited to main meals, frequency of food intake between meals) may be considered risk factors that are common to both dental caries and childhood obesity.

Role of Salivary secretions

Various neuropeptides including deasacyl ghrelin, leptin also affect salivary secretions. Saliva gets secreted not only from parotid, submandibular and sublingual paired major glands but also several hundred minor glands spread over oral mucosa. Salivary secretions gets induced by salivary gland reflex on eating, is there on resting and even on sleeping and present during both biting and teeth grinding (bruxism) [14]. Besides components of saliva, like acyl ghrelin desacyl ghrelin, other components observed along with histamine are IgA, epidermal and transforming growth factors and lysozymes. These have been shown to possess properties of growth and differentiation, besides that of wound healing [15]. Mostly secretion is controlled by autonomic nervous system (ANS), with parasympathetic nerves controlling the secretion of water and electrolytes while sympathetic nerves controlling protein secretion from acinar cells by exocytosis [16]. These secretions of saliva control innate immunity as well as defense at mucosal surface and both ghrelin as well as soluble IgA may play a regulatory role against inflammatory infections. These neuropeptides have been identified in saliva as well as their associated receptors being located in the salivary glands and in the nerve innervating the salivary glands. Further salivary ghrelin levels in adolescents as well as children are known to correlate with BMI [16]. The salivary secretion is stimulated through parasympathetic and sympathetic ganglion, parasympathetic ganglion receives its stimulus via Nucleus Tractus Solitarius (NTS) and sympathetic ganglion receives its input from the NTS via the spinal cord. Both ganglia regulate salivary secretion, parotid gland supplies ghrelin which circulates throughout body. Primary parasympathetic salivary centre send connections to lateral hypothalamus, paraventricular hypothalamus (PVN), central nucleus of Amygdala along with the PVN and preoptic area [18,19]. Obesity is associated with decreased salivation and thereby related to severe aspect of oral health such as caries and periodontitis. Hyposalivation is a severe morbidity that can lead to precipitous decline in oral hygiene which further leads to multifocal dental caries and periodontitis or even cardiac disorders [20].

Role of Salivary Antioxidants

An association has been shown between dental caries and gingival inflammation in obese children [21]. Obese children have been shown to have accelerated dental development even after adjusting for age and gender [22]. A study was conducted by Gunjali, *et al.* in 42 children aged 6 - 12 yrs of both sexes from different schools in coastal Karnataka for total antioxidant capacity, oral hygiene index, and dentition status. They found that salivary total antioxidants were significantly high in overweight and obese children as compared to their

normal counterparts. Prevalence of dental caries was high in obese/overweight in contrast to normal children. Normally oxidative stress and low grade silent inflammation, caused due to high levels of free radicals in the body as a result of the unavailability of antioxidants is the underlying cause of chronic diseases like diabetes mellitus, hypertension, heart diseases premature ageing and even obesity [23], so it is paradoxical to find high salivary antioxidants in this study [24].

Conclusions

Thus it is important that to maintain oral dental hygiene, including decreasing oral sweets intake and preservation of salivary secretions in preventing childhood obesity. Similarly in adults as well it has been found that there is a correlation between poor oral health, low salivation and obesity as revealed by results of bariatric surgery while extremes of age further there is a correlation in both underweight and obesity regarding dental health oral hygiene and number of teeth.

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