With the Advancement of Knowledge Regarding Correlation of Oral Health and Obesity Role of Dentist Emphasized to Act in Prevention of Further Progression, along with Association with Pregnancy, Fetal Macrosomia, Beta 3 Adrenergic Receptor Polymorphisms, Energy Drinks

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Abstract

The incidence of obesity is increasing globally at a very fast pace. Along with that the incidence of associated comorbidities like diabetes mellitus (DM), hypertension, hyperlipidaemia and associated metabolic syndrome (MetS) is on the rise which affects cardiac, renal systems besides higher risks of cancer. Earlier we have highlighted the correlation of poor oral health with obesity and mechanisms like periodontitis, dental caries, all of which are associated with chronic inflammation as is the pathogenesis of obesity along with reduced salivation. Thus, a need is there to tackle the two together to decrease the associated morbidity and mortality. Thus we updated this information using the pubmed search engine using the medical search headings (MeSH) like "Obesity", "Periodontitis' 'dental caries" and emphasis on prevention, role of dentists in diagnosing cardiovascular diseases (CVD), DM, be it use of sidechair HbA1C detection, Anthropometric data recording, and counseling for the importance of foods to be taken special in children and prevention of unhealthy foods in adults. We came across a total of 3925 articles in this context. We selected 58 articles which we had not utilized in our earlier reviews adding new information. No meta-Analysis was done. Besides role of sugar sweetened beverages, we found that the common energy drinks are also not safe for dental and oral health, various herbal products getting used in USA as blood thinners increase the risk of dental bleeding and are not properly approved by FDA, in view of their antiplatelet and anticoagulant activities, role of beta 3 adrenergic receptor polymorphisms especially when lot of smoking is done and clear dose response relationship regarding periodontal progression, advanced dental ages in overweight, obese children in view of genetic variation in FGF 18. Further in pregnancy and postpartum obese ladies had severe periodontal progression which persisted following delivery. Further peri-implant sizes were studied in obese who had greater crest bone loss in obese patients, children born macroscopic had higher incidence of dento alveolar abnormalities. Thus, dentist is placed in a good position to counsel patients against unhealthy foods, French fries, SSB, Energy drinks, daily twice brushing and can help in diagnosing and counsel at risk patients of CVD, MetS.

Keywords: Obesity; Periodontitis; Beta-Adrenergic Polymorphisms; Fetal Macrosomia; FGF178; Energy Drinks

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Introduction

The World Health Organization (WHO) reported that approximately 36 million people die annually from noncommunicable diseases equaling 70% of all deaths in the world in 2008, and the annual number of deaths will increase to 55 million by 2030 [1]. Cardiovascular disease (CVD) is a leading (48% of noncommunicable diseases) followed by cancers (21%), respiratory diseases (12%) and diabetes (3.5%) [1]. Dielman., *et al.* predicted that the global health care will increase from 9.2 trillion US dollars in 2040 [2]. Effective prevention and treatment strategies against CVD and DM, Commonly known as metabolic complications are warranted to reduce the health and economic burden. Earlier we have reviewed different aspects by which obesity and oral health is connected be it the reduced salivation, change in metal components etc. influencing the obesity development [3-7] here we further emphasize on the periodontal factors that influence the development of obesity. Obesity is considered to be a fundamental risk factor for metabolic syndrome (MetS); however, the exact mechanisms underlying the development of MetS have not yet been established and various institutions have suggested different criteria for MetS. In recent years those who fit nontraditional obesity phenotypes (i.e. metabolically unhealthy normal-weight, MUNW, and metabolically healthy obese, MHO) Have been increasingly observed [8]. The prevalence of these phenotypes is not low and their increased risk of diseases and death should not be disregarded [9-16]. These studies suggest that the risk of DM, renal disease, CVD, and death could be more precisely assessed by both BMI and metabolic status. BMI has a J shaped relationship with medical hospital days [17,18] and costs [17,19,20] and death [21,22]. Studies on combined associations of BMI Levels and metabolic dysfunctions on medical care needs are limited [23,24]. Furthermore underweight (BMI < 18.5 kg/m^2) individuals are at substantial risk for mortality in Asia, Europe and North America [16,17]. However, in many studies underweight individuals were excluded from the study subjects [4,5,19] or included in the nonobese (< 25 kg/m^2) group together with normal weight (18 - 24.9 kg/m^2) subjects [11-16,23].

Methods

Thus we updated this information using the PubMed search engine using the medical search headings (MeSH) like "Obesity", "Periodontitis", "dental caries" and emphasis on prevention, role of dentists in diagnosing cardiovascular diseases (CVD), DM, be it use of sidechair HbA1C detection, BP, Anthropometric data recording, and counseling for the importance of foods to be taken special in children and prevention of unhealthy foods in adults.

Results and Discussion

We came across a total of 3925 articles in this context. We selected 58 articles which we had not utilized in our earlier reviews adding new information. No meta-Analysis was done.

Periodontal disease is a predominant oral disease worldwide [25]. This may contribute to the increasing dental costs in adults after reaching middle age [26]. Obesity and MetS risk factors for Periodontal disease, dental caries and subsequent tooth loss [27-30]. Poor oral health is likely to lead to systemic dysfunctions like DM, MetS and CVD [31-34]. MetS and Periodontal disease share common pathogenic backgrounds (e.g. chronic inflammation and malnutrition) and have a bidirectional causal relationship. However, the relationship of different BMI and metabolic status combination with dental care needs is unclear.

Therefore, Nishikawa., *et al.* performed a follow up study in 16,386 Japanese male employees (mean age 48.2 ± 11.2 years) without a history of CVD, cancer or renal failure. They were classified into 8 phenotypes based on 4 BMI levels (underweight (BMI < 18.5 kg/m^2, normal weight (18 - 24.9 kg/m^2, overweight 25,0 - 29.9 and obese > 30 kg/m^2) and the presence or absence of > 2 of 4 metabolic abnormalities: high BP, high triglycerides, low HDL cholesterol, and high blood sugar. Based on their health insurance claims data, they compared medical and dental care days and costs among the 8 different BMI/metabolic phenotypes during 2010 - 2013. The combinations of BMI levels and metabolic status were significantly associated with the adjusted mean and median medical outpatient days and costs

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and the median dental outpatient days and costs. The obesity/unhealthy subjects had the highest medical outpatient days and costs and the underweight/unhealthy subjects had the highest dental care days and costs. The underweight/unhealthy subjects also had the highest medical inpatient days and hospitalization rates of CVD and had higher medical costs between healthy and unhealthy phenotypes were larger year by year across the BMI levels. Thus, concluding that identification of obesity phenotypes using both BMI level (including the underweight level) and metabolic status may more precisely predict healthcare days and costs compared with BMI or metabolic status alone [35].

Dental caries is the progressive destruction of the tooth structure by bacterial acids [36]. It is considered the most prevalent chronic oral disease and the main reason for tooth loss in adults. Dental caries has been estimated to affect almost every individual during their adult life, affecting an average of 5 to 10 teeth per individual [36-38]. The prevalence of caries in a population is affected by various risk factors, like age, sex, oral hygiene and dietary habits. Further the prevalence tends to increase with age in a cumulative process [38-40]. Tooth decay is prevalent especially in developing countries in view of their dietary habits, socio economic conditions and lack of education [41]. Thus., Abbas *et al*. examined a total of 359 Egyptian adults aged 18 - 74 years, over a period of 3 months, from 15th November 2017 till 13th January 2018. Socioeconomic data, brushing frequency, body mass index (BMI) and early habits were recorded and collected during a questionnaire. Dental examination was done using the Decayed, Missing and Filled Tooth (DMFT) index. They found in total, 86.3% of the participants had Dental caries experience. Of the participants, 60.45%, 48.47% and 55.43% had at least one decayed, missing and filled tooth, respectively. The mean number of decayed, missing filled or DMFT for the whole sample were 2.4 ± 3.6, 1.98 ± 3.99, 1.79 ± 2.45, 6.09 ± 5.7 respectively. Decayed tooth were inversely correlated with socioeconomic status (SES), education level, brushing frequency and milk consumption, while positively correlated with grains, junk food and soda drink consumption. Missing teeth were inversely correlated with SES, education level, while negatively correlated with age, BMI, SES, and education level, while inversely correlated with grains and sugars in drinks. Thus, concluding that age, BMI, SES, education level and brushing frequency are risk factors significantly associated with dental caries amongst Egyptian adults. Egyptian adults' dietary habits might lead to obesity, which indirectly causes dental caries rather than directly as in children [42,43].

Medicinal plant products have been used in health care since time immemorial. During the past few decades the use herbal supplements has been on the rise in the USA. A number of these products have been shown to possess the potential to interfere with blood clotting. Abebe B 2019 reviewed blood thinning herbal supplements commonly used in USA and discussed the dental implications of their use along with suggestions for predicting and preventing the risk of bleeding. Twenty herbal supplements belonging to 4 pharmacological groups were identified and reviewed. While the majority (45%) of supplements reviewed possessed antiplatelet properties, the remaining are dispersed among anticoagulant (15%), a combination of antiplatelet and anticoagulant (15%) and other diverse groups (25%). The literature reveals that most of the available information on blood thinning herbs is based on *in vitro* experiments, animal studies and individual clinical case reports. Some herbal effect are also speculated based on theoretical grounds. These observations, together with the deficiency of the law regulating herbal supplements indicate limitations of the literature and the regulatory mechanisms related to these products, further implying the need for additional research and better regulation. While emphasizing the dental implications of the findings reported in literature, suggestions were made for predicting and preventing the risk of bleeding caused by these herbal medications based on the concepts of predictive, preventive, and personalized medicine [44].

Yoshihara., *et al*. conducted a longitudinal study for evaluating the relation between β-3 adrenergic receptor polymorphism and environmental factors like smoking on periodontal disease by considering effect modification. A total of 294 subjects who participated in all follow up surveys over 6-year study period were analysed. After dividing subjects into tertiles according to the number of years exposed to smoking, they conducted a Poisson regression analysis to compare the incidence rate ratio (IRR) for periodontal disease

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events during the 6-year study period with β-3 adrenergic receptor genotype (1: Arg allele carriers, 2: Arg allele non carriers) for each tertiles adjusted for other variables. They found that the number of years exposed to smoking (mean ± standard deviation) for the 1st, 2nd and 3rd tertiles was 0 ± 0,20. 1 ± 9.1 and 45.3 ± 7.7 years, respectively. The IRRs ± SE were 0.89 ± 0.08 (p = 0.218) for the 1st tertile. 1.93 ± 0.36 (p < 0,001) for the 2nd tertile and 2.58 ± 0.23 (p < 0.001) for the 3rd tertile. There was a clear dose response relationships between β-3 adrenergic receptor genotype and periodontal disease progression based on the number of years exposed to smoking [45].

Modesto., *et al.* determined if dental ages are more advanced in overweight children by genetic variation. Panoramic radiographies from 577children were obtained. For performing genetic studies, an additional 236 subjects had Panoramic radiographies and whole saliva samples were collected. Genotyping of IGF, FGF and FGFR markers was done. Dental age was determined in 177 patients utilizing Demerjians method and Panoramic radiographies. Skeletal maturation was determined in 28 patients Baccettis cervical vertebral maturation method on lateral cephalograms. PLINK was used to test for over representation of alleles. FGF7, FGF10 and FGF13 were significantly associated with obesity (p = 0.02). When dental age, was considered, overweight and obese children are more likely to have dental ages more advanced than their chronological ages (p = 0.05). An excess of heterozygotes of FGF18rs4073716 was found in children with dental age more advanced than their chronological ages (p 0.04). Thus, concluding overweight, and obese children have dental ages more advanced than their chronological ages, and this occurrence may be influenced by genetic variation in FGF18 [46].

Forato-Junior GA., *et al.* evaluated the systemic and periodontal conditions along with determinants of health in pregnant women with and without obesity/overweight during the second and third trimesters of pregnancy and after delivery. 93 pregnant women in second trimester (T1) were divided into 2 groups with either excessive weight (G1, n = 53) or normal weight (G2, n = 40) and subsequently examined them in third trimester of pregnancy (T2) and at least 2months after delivery (T3). They analyzed these variables: a) systemic impairments during pregnancy-arterial hypertension (AH) and gestational diabetes mellitus (GDM); b) oral hygiene behavior; c) periodontal conditions; d) anthropometric data and systemic health condition after pregnancy. The Mann-Whitney test, chi squared test, ANOVA, and binary logistic regression were adopted (p < 0.05). They found G1 showed higher frequency of GDM and AH in T1 and T2 respectively (p = 0.047; p = 0.004). Both groups had worse oral hygiene behaviors after delivery. A higher frequency of periodontitis was found in all periods for G1 (P < 0.05). G2 showed improvement of all periodontal parameters after delivery, whereas G1 showed no difference regarding these parameters between time periods. Thus, concluding that pregnant women with excessive weight presented worse systemic and periodontal conditions during pregnancy and after delivery. Thus, low socioeconomic status and obesity/overweight were significant predictors of periodontitis during pregnancy and after delivery [47].

There is dearth of studies assessing clinical, restorative, and radiographic peri-implant outcomes around narrow diameter implants and standard implants (SDIs) in obese and nonobese subjects. Thus, Alshiddi., *et al.* tried to assess clinical, restorative, and radiographic parameters of NDIs and SDIs placed in obese and nonobese subjects. They included obese and nonobese subjects needing NDIs and SDIs in the anterior maxilla/mandible. Based on the implant diameters, participants were further subdivided into 2 subgroups: a) NDIs (3.3 mm) and b) SDIs (4.1 mm). Peri-implant clinical measurements including plaque index (PI), bleeding on probing (BOP), probing depth (PD) and radiographic crestal bone loss (CBL) were evaluated around NDIs and SDIs at 1 and 3 year follow up. A total of 70 patients pts (35 obese and 35 nonobese) were included. Only BOP showed statistical differences between both groups at patients level at 1 and 3 year follow up (p < 0.05). No statistically significant differences in PT and PD around NDIs and SDIs between obese and nonobese patients. Statistically significant differences were seen in the total CBL around NDIs and RDIs in obese and nonobese patients at 3 years follow up (p < 0.05). Thus, concluding that both NDIs and RDIs show consistent stability among obese and nonobese patients. Higher amount of bone loss was observed in obese patients-kulvinder compared to nonobese patients-kulvinder despite regular hygiene maintenance [48].

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The prevalence of soft tissue and hard tooth tissue disease in the oral cavity and the morpho functional disorders of craniofacial complex, require attention of specialists in various branches of medicine. Scientists began to pay attention to metabolic and other violations that have occurred in the fetal development and led to the occurrence of certain changes in the dental status of the child. The aim of this research is to study the features of the dental health condition in the children of North east of Ukraine, who were open with macrosomia during the period of mixed dentition. The study took into account intrauterine obesity or well balanced acceleration of both the body weight and length gain. Thirty 6.5 - 11 year old children with fetal macroscomia were examined (Main Group). A Comparison Group was compared of sixteen children, whose weight-height parameters at birth were normal (fetal normospermia). All children in the Main Group were split into four subgroups in accordance with weight-height parameters at birth using the V.I. Grischenko and his authors harmonious coefficient. The evaluation of the hygiene status of the oral cavity, the dental caries intensity evaluation, and the quantitative analysis of minor salivary gland secretion have been performed. The prevalence of dentoalveolar abnormalities was evaluated. The highest values of caries were recorded in macroscomic-at-birth children born with harmonious (well-balanced) intrauterine development, with intrauterine obesity and increased body length, or with intrauterine obesity and an average body length. Macroscopic children have reduced number of minor salivary glands per unit area in comparison with the normospermic at birth children. The saliva secretion of minor salivary glands in macroscomic children is reliably, by 16. 5%on average reduced. Children born macroscopic have a significantly higher percentage (100% vs 73%) of dentoalveolar abnormalities in comparison with the normoscopic-at birth children. Thus, concluding that the processes causing fetal macrosomia have a great impact on the dental status of children in the period of mixed dentition [49].

Barrington., *et al.* tried to determine the association of overweight /obesity, dental caries and dietary sugars in Australian adults. The National Survey of Australian Adult Oral Health (NSAOH) 2004 - 2006 provided data for analysis of dental caries experience. Self reported body weight were used to calculate body mass index (BMI) for a subsample (n = 3745, 89.8%) of the NSAOH data. A self reported questionnaire of 13 food items estimated the daily intake of added sugar, total sugars and total carbohydrates, using food composition estimates from the AUSNUT 2011 - 2013. Bivariate analysis (Pearson's Chi square with Rao Scott adjustment and Student t-tests) were used to determine the association of overweight/obesity, dental caries, sugar variables and putative confounders. Poisson regression models for the Decayed, Missing and Filled Teeth (DMFT) index and individual measures of decayed, missing and filled teeth were constructed, with models containing BMI, dietary added sugar, total sugar and total carbohydrate, controlling the putative confounders. They found that there was a positive association between dental caries experience and being overweight or obese compared with having normal weight or being underweight as well as between sugar consumption with all 4 dental caries outcome measures. When controlled for putative confounders where sugar consumption was identified as crucial determinant, the Statistical significance between dental caries experience and being overweight or obese disappeared. The demographic and socioeconomic factors associated with dental caries experience were age, sex, education, smoking status and usual reason for dental visit. Thus, concluding that the analysis of the relationship between dental caries and obesity must include data about sugar and carbohydrate consumption [50].

Similarly, Deren K., *et al.* gave a statement of the European Academy of Paediatrics and the European Childhood Obesity Group, to inform health professionals, parents, caregivers, teachers and school head teachers, stakeholders and governing bodies about the risks associated with drinking sugar sweetened beverages (SSBs) in infants, children and adolescents. They searched Pubmed and the Cochrane databases for English language studies published through October 1, 2018, for randomized clinical trials, meta-analysis, systematic reviews and observational studies. They also manually searched the references of selected articles, reviews, meta-analysis and practical guidelines. Consumption of SSB by children and adolescents should be limited and the consumption of water and other non sweetened beverages should be promoted. Educational institutions such as nurseries, preschools should offer unlimited access to drinking water whereas the sale of SSB's should be banned [51].

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Arora., *et al.* conducted a systematic review to synthesize evidence on current practices of, and perceived barriers to, oral health care professionals involvement in obesity screening and management. Key search strings were developed and used in 7 databases from inception through February 6, 2019. Data were screened against inclusion criteria, independently extracted and quality apprised by 2 reviewers based on the Preferred Reporting Items for systematic reviews and meta-analysis. Ten studies were included in this review. The practices of oral health care professionals in relation to obesity assessment, counseling, and specialist referrals were found to be very limited. Oral health care professionals believed in their role to support patients for achieving weight loss goals, however just 1/3rd were trained in anthropometry. Perceived barriers included lack of time, limited knowledge or training, patients' unwillingness to listen to oral health care professionals advice and lack of appropriate specialist referrals. concluding that oral health care professionals are well positioned and supportive in undertaking healthy weight interventions in their clinical practice; however their practices are limited due to barriers such as lack of time, limited training and lack of referrals [52].

Similarly, Singer., *et al.* examined the correlates of dentist's willingness to provide cardiovascular disease (CVD) screening in the dental care setting. Private practice and public health general dentists in the US participated in a nationally representative survey from 2010 to 2011. The survey examined dentists 'willingness to provide a finger stick test to support CVD screening and agreement that their professional role should include CVD screening. Data analysed from1802 respondents indicated that 46. 6% of dentists were willing to provide CVD screening. The adjusted odds ratio (AOR) of dentists' wilingness to screen for CVD was associated with currently screening for hypertension (AOR = 1.49; 95%CI 1.01, 2.20), screening for obesity (AOR = Q1.66, 95%CI 1.17, 2.36) and agreed that their roles include CVD screening (AOR = 3.03, 95%CI 2.15, 4.29). Dentists agreement that their roles included CVD screening was associated with self rated knowledge of CVD (good vs none or limited), and CVD training during their professional education (5 to 8 hours of training vs none or limited), (AOR = 5.75, 95%CI 2.26, 14.62) and (AOR = 3.84, 95%CI 2.17, 6.80), respectively. Thus, concluding that their study highlighted strategies which might be used to expand future access to early detection of CVD risk. Including CVD screening instruction and clinical screening experiences in dental school curriculum might serve as catalysts to reshape the future scope of dental practice [53].

Few studies have examined the relation between food consumption and related attitudes and dental pain among children. Thus Nicksic., *et al.* aimed to examine the association of healthy food and self efficacy of eating habits with dental pain among children. They performed a cross-sectional analysis using child survey data from the Texas Childhood Obesity Research Demonstration (TXCORD) project. Fifth grade students (n = 1020) attending 33 elementary schools in Austin and Houston, Texas, completed the TX CORD Child survey, are liable and valid survey instrument focused on nutrition and physical activity behaviors. All nutrition questions ask about the number of times food and beverage items were consumed on the previous day. Dental pain was reported as mouth or tooth pain in the past 2 week that made the mouth hurt so much that they could not sleep at night. Mixed effect logistic regression models were used to test the association between 10unhealthy food items, 9 healthy food items, 2 health attitudes and self efficacy with dental pain. All models controlled for sociodemographic variables. In total 99 (9.7%) students reported Dental pain. Dental pain was associated with intake of the following unhealthy items: soda, fruit juice, diet soda, frozen desserts, sweet rolls, candy, white rice/pasta, starchy vegetables, french fries/chips and cereal [AOR, 1.27 - 1.81, P < 0.01]. The intake of other vegetables (AOR, 1.56; P < 0.01), a healthy food, and the attitude that healthy food tastes good (AOR, 1.59; P = 0.04) were also positively associated with dental pain. The attitude of eating healthier leads to fewer health problems (AOR, 1.56; P < 0.01). Interventions should focus on improving oral health by reducing intake of unhealthy foods and educating children and families of the importance of diet as a means of reducing dental caries; Knowledge Transfer Statement: The results of this study can be used to inform researchers on potential food items and psychosocial measures to examine in low income, minority populations for longitudinal research. These results would also be useful to educators who could incorporate oral health care and nutrition education into school curriculums [54].

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Nowadays, the epidemic of obesity and metabolic syndrome can be seen not only among adults, but also the younger population with more than 380 million children and adolescents worldwide being affected by these phenomena. Obesity is considered a systemic chronic metabolic disease resulting from the imbalance between energy intake and expenditure. WHO has identified obesity a the most serious chronic disease, which if untreated leads to dangerous health problems (hypertension, heart failure along with kidney, nervous system and eye diseases). Recent scientific findings indicate a close relationship between obesity/metabolic syndrome and changes in the oral environment in children and adolescents. Obesity significantly increases the incidence of dental, heart tissue diseases, periodontal diseases and diseases of the stomatognathic system. It also affects the secretion activity of the salivary glands which changes the quantitative and qualitative composition of unstimulated and stimulated saliva. It is believed that in the face of a growing epidemic of obesity in children, dental practitioners should also participate in the systemic treatment and prevention in this group of patients [55].

Similarly, Abdalla-Aslan tried to analyse and compare associations between metabolic syndrome (MetS) and its components in periodontitis compared to control patients. In a retrospective 7-year cross-sectional study they analysed medical records of 504 individuals aged 18 - 90 who attended the student dental clinic between 2008 and 2014. Demographics, smoking habits, blood pressure waist circumference (WC), as well as presence of periodontitis, MetS, diabetes, hypertension, hyperlipidemia, stroke, heart disease, cancer and psychiatric disorders were recorded. The study population comprised of 231 (45.8%) males and 273 (54.2%) females, with an average age of 55. 79 ± 16. 91 years. A patients profile associated with periodontitis was identified and included male sex, older age, smoking, higher smoking pack-years, abdominal obesity, higher systolic and diastolic blood pressures, the presence of MetS or its components, hypertension, hyperlipidaemia, diabetes or diseases associated with its consequences like ischemic heart disease and stroke. Following multivariate logistic regression analyses, age and smoking retained a significant association with periodontitis, whereas the systemic disorders did not. Thus, concluding that the association of periodontitis and MetS may be explained by shared common profile and risk factors. An appropriate risk factors management approach should be adopted by both dental and general health clinicians and health authorities to control common high risk behaviors [56].

Further Santos., *et al.* tried to evaluate the association of severe periodontitis with overweight and obesity. They performed full-mouth periodontal examination on a random sample of 80 obese, 69 overweight and 87 normal weight individuals (>=18 years). Severe periodontitis was defined by using the Centers for Disease Control and Prevention-American Academy of Periodontology (CDC-AAP) case classification. Weight (kg) and height (m) were measured by a single examiner, BMI was calculated and the subjects were classified as normal range, overweight and obese according to the WHO definitions. Interviews using a structured questionnaire were performed to collected data on demographics as well as socioeconomic and health status. Chi squared and logistic regression tests were used to assess the association of severe periodontitis and obesity (p < = 0.05). Although severe periodontitis was associated with obesity but not with overweight. Patients diagnosed with obesity should be referred for periodontal evaluation [57].

Mataftsi., *et al.* carried out a study with the aim of implementing a chairside diabetes screening strategy for the identification of undiagnosed hyperglycemia in periodontal patients. They measured Hb A1c in pts (n = 139) diagnosed with periodontal disease to determine possible undiagnosed hyperglycemia. Patients fulfilled the criteria for screening according to the questionnaire by the Centers for Disease Control and Prevention (CDC). The Cobase® b101 *in vitro* diagnostic system was used for the measurement of glycosylated haemoglobin (Hb A1c) in capillary blood. BMI and WC were also measured to determine splanchnic obesity. Periodontal parameters were assessed with an automated probe and included probing depth. clinical attachment loss. bleeding on probing and presence/absence of plaque. Most patients had moderate periodontitis. Almost 25% of the subjects tested were found to have unknown hyperglycemia, while 85% of them had splanchnic obesity. A significant association was found between Hb A1c and BMI (Mann-Whitney test; p = 0.0021) as well as between Hb A1c and WC (Spearman rho test; p = 0.0007). No differences were observed regarding Periodontal parameters

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between subjects exhibiting Hb A1c> = 5.7 and those with Hb A1c < 5. 7 (Mann-Whitney test; p > 0.05). although those with Hb A1c> = 5.7 displayed greater proportion of sites with clinical attachment loss > 5 mm (z test with Bonferroni corrections; p < 0.05). Thus, concluding that Periodontal patients, especially those with a bigger than normal BMI and WC are a target group worth screening for diabetes. Thus, dental practitioners can contribute significantly to the worldwide effort of health care professionals in diabetes screening and referring for early diagnosis of the disease [58].

Ciappo., *et al.* aimed to review the most popular energy drinks sold in the UK, for their possible effect on oral health and contribution to obesity. Five drinks representing 75% of the UK energy drinks market were purposely selected (Lucozade, Red Bull, Monster, Rockstar and Relentless). pH and sugar content were measured and their ingredients reviewed in the context of oral and general health, focusing on dental caries and erosion and obesity. All 5 drinks investigated had pH values below the critical value (5.5) associated with dental erosion; the lowest pH was 2.72 (Lucozade) and the highest was 3.37 (Monster). The drinks also contained excessive amounts of free sugars, ranging from 25.5g (Red Bull) to 69.2g (Rockstar). Differences in sugar content were mainly explained by portion size. Other ingredients contained within the energy drinks, caffeine and various acids, are also linked to oral and general health. Thus, concluding regular consumption of energy drinks could contribute to dental erosions and the development of obesity. Lucozade and Rockstar were found to potentially have the greatest impact on oral health and obesity. Achieving a healthy product by reformulation is highly unlikely due to the very high initial free sugar content. Thus, health professionals need to acknowledge the popularity of the products and help their clients to reduce their use. This is the 1ˢᵗ study that compares in detail the potential oral and general health consequences of overuse of a selection of energy drinks in the UK [59].

Conclusions

Thus in conclusions the role of dentists in highlighting and diagnosing obesity, CVD, Screening for DM is important to control the growing epidemic of obesity with dentists helping in prevention by counseling patients regarding food choices, emphasis on brushing, learning how to take anthropometric measures, BP registration etc. Besides role of sugar sweetened beverages, we found that the common energy drinks are also not safe for dental and oral health, various herbal products getting used in USA as blood thinners increase the risk of dental bleeding and are not properly approved by FDA, in view of their antiplatelet and anticoagulant activities, role of beta 3 adrenergic receptor polymorphisms especially when lot of smoking is done and clear dose response relationship regarding periodontal progression, advanced dental ages in overweight, obese children in view of genetic variation in FGF 18. Further in pregnancy and postpartum obese ladies had severe periodontal progression which persisted following delivery. Further peri-implant sizes were studied in obese who had greater crest bone loss in obese patients, children born macroscopic had higher incidence of dento alveolar abnormalities. Thus, dentist is placed in a good position to counsel patients against unhealthy foods, French fries, SSB, Energy drinks, daily twice brushing and can help in diagnosing and counsel at risk patients of CVD, MetS.

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