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Alcohol, It's Effect on Dental Structures and the Role of a Dentist

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Abstract

The first recognized and the most devastating effect of alcohol was the consequence of maternal ingestion of alcohol during pregnancy. Fetal Alcohol Syndrome (FAS) is a distinct condition associated with maternal alcoholism which causes serious birth defects in children due to disruption of normal embryonic development. Other problems that can occur are weak muscles around the mouth that make it difficult to consume food; unusual taste preferences for salty or spicy food at an inappropriate age; gross caries at a young age; prolonged and excessive drooling; weak buccinators muscles that prevent the proper placement of food for chewing. These are a few amongst the many problems which children diagnosed with FAS have to face thus increasing their predilection for caries and require special oral health care. Also, there are other direct and indirect effects of alcohol consumption on dental structures of which a few to be mentioned are dental erosion, attrition sometimes along with behavioral problems.

Keywords: Fetal alcohol syndrome; Dental erosion; Maternal alcoholism; Malformations

Introduction

Alcohol is a known human teratogen that produces physical, mental, behavioral and cognitive abnormalities. Children exposed to alcohol in-utero manifest growth deficiency, central nervous system manifestations and congenital malformations, the most prominent being craniofacial malformations [1]. These have been extensively discussed and reviewed in literature [2-6] but the direct effect on dental structures especially in adults has not been sufficiently described or studied. Also the dental implications of these adverse effects of alcohol on dental structures especially of children are a challenging task which needs utmost attention as their oral health care needs are different in children.

The first recognized and the most devastating effect of alcohol was the consequence of maternal ingestion of alcohol during pregnancy. Fetal Alcohol Syndrome (FAS) is a distinct condition associated with maternal alcoholism which causes serious birth defects in children due to disruption of normal embryonic development [7]. FAS was first reported in French literature in 1968 [8] followed by Jones and Smith in 1973 [9]. There are lifelong consequences, and the behavioral and learning difficulties are often greater than the degree of neuro-cognitive impairment [10]. Varying degrees of damage during fetal development, according to timing and degree of exposure are important variables that contribute to the variation [11]. Hence, the term "Suspected Fetal Alcohol Effects" (FAE) was coined [12]. The United States' Institute of Medicine (IOM), published recommendations in 1996 for diagnosis of FAS in consultation with a panel of experts. The diagnostic categories presented were FAS with and without a confirmed history of exposure, partial FAS, Alcohol-Related Birth Defects (ABRD), and alcohol-related neuro-developmental disorder (ARND) [13]. The term Fetal Alcohol Spectrum Disorder (FASD) was recently coined at a meeting of National Organization on Fetal Alcohol Syndrome (NOFAS); describing a range of effects that can occur in an individual whose mother consumed during pregnancy [14]. The direct effect of alcohol in adults has lead to dental caries; tooth loss, Periodontium and tooth wear i.e. attrition and erosion.

Effect on Dental Structures

The effects can be broadly classified as (i) indirect or teratogenic effects due to consumption of alcohol by mother on fetus and (ii) direct or non-teratogenic as in effects seen in the individual themselves due to consumption of alcohol. Dental problems occur in nearly 80% of children with FAS. The teratogenic effects on dental structures include the lips, teeth, palate, oral musculature etc. The lips are one of the diagnostic criteria for FAS i.e. smooth philtrum, thin vermilion border of the upper lip and a lack of the classic Cupid's bow indentation. FAS patients will also have hypoplastic maxillas/ mandibles. It has also been reported that FAS spectrum patients may have malformed teeth or microdontia, malocclusions and sometimes even missing teeth with delayed exfoliation of deciduous teeth and delayed eruption of permanent teeth [15-17]. Very often they also have wide palatal defects including cleft lip or palate [18].

Other problems that can occur are weak oris orbicularis muscles around the mouth that make it difficult to take food off a fork or spoon or suck on a straw or the nipple of a bottle; unusual taste preferences for salty or spicy food at an inappropriate age; gross caries at a young age; prolonged and excessive drooling; weak buccinators muscles that prevent the proper placement of food for chewing. Multiple facial deformities contributing to mouth breathing and corresponding dry mouth. Mouth breathers tend to have a higher incidence of caries and gingivitis due to loss of the buffering capacity of saliva and gingival irritation on account of drying. Also have CNS and oral/motor deficits, poor tongue-thrusting and speech disorders [19,20].

Now, coming to the direct or non-teratogenic effects, this group consists of Dental caries; tooth loss, Periodontium and tooth wear i.e. attrition and erosion. There have been contradictory reports of dental caries. While some show decrease in incidence of dental caries and

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Rooban et al. and Dasanayake et al. show an increase in the incidence of dental caries [21]. There also may be a direct toxic effect of alcohol on periodontium resulting in periodontal disease and associated tooth loss. Other reasons for tooth loss in alcoholics might be their risk-taking and aggressive behavior which increases the potential for accidental trauma and tooth loss. The probability of traumatic injury is further increased by psychomotor impairment that accompanies acute intoxication. Additionally, alcoholics pay less attention to their general health and hygiene, which may increase dental caries, periodontal disease and associated tooth loss [22].

Alcoholics are also at a higher risk of reporting sleep bruxism resulting in attrition of teeth. Individuals who consume large quantities of alcohol have dental erosion prevalent. A study demonstrated that 49.4% of alcohol dependency patients undergoing rehabilitation suffered from enamel and/or dentine erosion lesions. The tooth wear risk of alcohol use disorders arises, not only from acidic erosive potential of alcohol, but also from high relativity between alcohol, depression, GORD and smoking [23].

Last but not the least definitely purchasing and consuming alcohol by parents has a negative impact on children's psychology, a recent study led by Madeline A, Dalton, PhD, of Dartmouth College in Hanover, New Hampshire, showed that children ages two to six years old were significantly more likely to "purchase" cigarettes and alcohol while pretending to shop if they had observed their parents smoking and drinking, these results show that a child's ideas about cigarette smoking and alcohol consumption are determined at an early age by their parents' behaviors [24].

Dental Management of Effects of Alcohol

Dental treatment of an alcoholic patient with erosion, dental caries and tooth loss is similar to that of a normal adult along with greater emphasis on counseling, motivation to quit habit and rehabilitation of that individual. The greatest challenge is that of managing children affected with varying degrees of severity of FAS. FASD occurs in about 10 per 1000 live births or about 40,000 babies per year. FAS, the most recognized in the spectrum, are estimated to occur in 0.5-2 per 1000 live births. It now outranks Down syndrome and Autism in prevalence [25].

Although the simplest strategy is prevention of women to consume alcohol when pregnant or planning to conceive, one-half of all pregnancies are unplanned. By the time, these pregnancies are confirmed, major embryonic developments have already occurred. The consequences of fetal exposure to maternal alcohol consumption, therefore, are a serious problem for the individual and for society, in terms of human suffering, lost productivity and medical and social monetary costs [2].

Diagnosis

The first step in the dental management of a patient is early diagnosis. Dental problems occur in nearly 80% of children with FAS. Diagnostic criteria for FAS developed by IOM have made the task of identification of classic FAS cases much easier. When the phenotype is less than classic or atypical, confirming the diagnosis becomes difficult, if not impossible. Early diagnosis is essential to allow appropriate intervention for children affected by prenatal alcohol exposure and can reduce their risk of facing social difficulties later in life e.g. problems with employment (due to behavioral and learning difficulties) or trouble with the law (resulting from impulsive behavior and lack of inhibition) [2].

History Recording

Thorough medical history and open discussion with the patient or family members must be taken once a patient with FAS is identified. The dental practitioner must learn as much as possible about the history of the patient, including type and extent of systemic manifestations, current medications, frequency of physician visits, degree of control, and any known contributing factors as in the child's likes and dislikes. In addition, the patient with FAS may have unusual behavioral patterns and tissue and physical sensitivities that make dental treatment difficult making them react in unpredictable manner which sometimes may necessitate the use of general anesthesia.

Written Consent

Consultation with the patient's physician is suggested before dental care is provided to patients with systemic problems resulting from FAS. Problems generally do not occur in providing outpatient dental care if the patient's systemic involvements are well controlled and conservative medical care is being provided. However, if the patient is in the advanced stages of systemic complications of FAS or has other systemic diseases e.g., CNS or CVS disorders, dental care may best be provided after physician consultation. Hospital based settings, ambulatory surgicentre, or other accredited surgical facility which are well-equipped, safe and in compliance with the local rules and regulations are preferred. Treatment may be delayed until adequate control of the child's systemic conditions, is obtained [19].

Oral Hygiene Maintenance

In these patients, it is essential to stress the importance of good oral hygiene. Sensory integration dysfunction of the oral cavity may create some unusual problems. You may want to suggest another type of dentifrice if the taste or texture is irritable to the patient. Commercial rinses that contain plaque removers and/or fluoride should be advised as per their age and motor control. Patient education and oral health promotion is a vital segment of good oral health. Patients with FAS benefit from visual reminders to brush and floss and have to be assisted or performed by their parents as they may have limitations in performing daily self-maintenance activities.

Behaviour Management

FAS patients need to be calmed before treatment and the entire treatment schedule should be structured and routine to avoid upsetting the patient. The entire dental health team should be motivated, positive and have flexibility in their treatment plan. Studies show that a rubber ball to squeeze in hand helps them to relax. Another calming aid is the lead apron used during dental x-rays [26]. The lead apron being heavy makes the child feel relaxed and comfortable and making the child wear the lead apron like a drape throughout the dental treatment shows to have some behavioral benefits.

Regular oral massage with a small portion of a towel or a rubber stimulator can de-sensitized the oral cavity hence reducing the irritable and unexpected behavior during dental treatment at a later date. This in turn will help the patient to become used to objects in the mouth. Sensory integration dysfunction is observed in children affected with severe forms of FAS. This is a neurological condition that causes the perception of sights, sounds, and physical sensations by the individual affected with FAS to be over or under exaggerated. Along with these difficulties; hearing and vestibular disturbances are also seen in FAS which impairs communication and social skills. Since the development of language in a child is dependent on an intact hearing apparatus,

children with FAS often exhibit language disorders, such as poor receptive and expressive language skills, slurred and monotonous speech, articulation, and fluency problems. The vestibular damage commonly manifests as postural disturbances in children with FAS. Central and peripheral hearing disorders, as well as dentofacial defects and mental impairment may contribute to these language and speech disorders which in turn affects their communication capabilities adversely. Hence communication should be made at their mental and psychological level. They are very literal in understanding the meaning of sentences and also visual. They often cannot understand if you turn away when you speak as they might be trained to lip-read. Hand gestures, signing, and visual aids will help them to understand you more clearly [27].

Due to these barriers in managing such children, timely preventive and therapeutic care may increase the need for costly care and exacerbate systemic health issues. Also, lack of experienced and specially trained dental health professionals increases the burden of unmet dental needs. Behavior management is the most important part of carrying dental treatment due to the cognitive and behavioral aspects of FAS and every individual varies. It is also not uniform in each individual; hypo and hyper sensitivities may exist in different areas on the same individual further increasing the non-financial hurdles in managing in a humane manner.

Systemic Considerations

Patients with cardiac involvement should be properly taken care. In case of untreated and operated septal defects antibiotic prophylaxis should be prescribed as and when needed after consultation with their physician. Utmost attention to good surgical technique is essential due to the risks of excessive bleeding and infection while surgical procedures are being performed. Alteration in drug dosage may be needed based on the amount of kidney function present and also appropriate drugs should be prescribed depending on their mode of metabolism and excretion [19].

While treating a patient with FAS meticulous care should be taken while prescribing drug therapy. The drugs which should be prescribed with caution are the drugs which are nephrotoxic, and those that have an effect on the CNS. CNS drugs like nitrous oxide-oxygen and diazepam are anti-anxiety drugs which are considered to be safe for use (with little modifications though) in patients with FAS. All necessary precautions should be taken during sedation and general anesthesia to ensure adequate oxygenation to avoid complications like respiratory and CNS depression etc. In addition, CNS depressants e.g. barbiturates, narcotics are best avoided in FAS as the blood/brain barrier may be permeable and sedation may result due to their crossing the blood/brain barrier [19].

FAS patients with history of seizures can usually be effectively managed on out-patient basis with anticonvulsant drugs. Preventive measures should be taken and the dental team should be well-equipped in case of an emergency. Also, patients on anticonvulsants may also suffer from these drugs toxic and side effects, and the dentist should be able to identify and differentiate their manifestations from that of other such lesions like bone marrow depression and gingival hyperplasia respectively.

Oral physiotherapy training is an inseparable part of life-long oral health care. Maintenance visits and recall-schedule for estimation of caries activity and susceptibility should be strictly followed in order to decrease the development of oral infections, periodontal disease, and caries. Once oral hygiene levels are within normal range, routine dental care is not contra-indicated.

Once the patient is in a normal state, complex dental procedures can be undertaken. The dental visit and treatment plan during the visit should be as stress-free as possible. Good behavior management and non-verbal communication skills of a dentist can help achieve this goal.

Another important responsibility of the dental team is nutrition. Many of these patient's diets are cariogenic and the importance of a non-cariogenic diet should be discussed for life- long prevention of oral disease. In order to effectively and efficiently manage the patient, dental health team has to have a positive attitude and commitment towards motivating and instilling a positive attitude in the children and their parents too. The parents of such children already carry the psychological burden of a child with special health care needs besides facing financial limitations too. Motivation, empathy and a humane approach towards them is essential for long term oral health of the child as the behavioral and cognitive problems increase with age [19].

Conclusion

Amongst the various effects of alcohol the most disturbing is FAS as it has far-reaching effects. Other than these, behavioral and eating disorders need to be appropriately identified and treated promptly. Pschycological effects on children of alcoholics also are a thing of concern. Physical effects like trauma, erosion and attrition can be routinely treated with emphasis on counseling and rehabilitation. Also, lack of experience in diagnosing and specialized training to treat them appropriately including modifications to one's dental office in order to accommodate such individuals is indeed a challenging task. As most of the manifestations are dental or related to cranio-facial structures; a dentist plays an important role in detection of conditions related to alcoholism at earliest and might be the first health professional to diagnose.

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