Effect of Virtual Reality Goggles for Changing Behavior of Uncooperative Children Aged From 3-5 Years Old during Dental Treatment

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List of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

VR	Virtual Reality
AAPD	American Academy of Pediatric Dentistry
ECC	Early Childhood Caries
GA	General Anesthesia
AV	Audio Visual
3D	Three Dimensional
LP	Lumbar Punctures
FIS	Facial Image Scale
CNS	Central Nervous System
RBCs	Red Blood Cells
Nm	nanometer
SD	Standard Deviation
CI	Confidence Interval
SPSS	Statistical Package for the Social Sciences
IBM	International Business Machines

Introduction

Oral health care for young children can have a significant effect on their wellbeing and that of their families; however, dental fear and anxiety can be major barriers to children accepting dental treatment. For this reason behavior management is an essential skill and should be acquired by all members of the dental team who treat children.[1]

Fear is an unpleasant emotional reaction to a real external threat. It is one of the primary emotions acquired after birth to protect the individual from harm and self-destruction.[2]

Anxiety emotions are more diffuse than fear and are attached to many different situations and events. In contrast to fear, anxiety may be felt even though the feared stimulus or the threat is not present [3].

Anxiety related to the dental environment in children is a problem suffered by many patients worldwide, and it remains a significant challenge in providing dental care. Therefore it is of great importance for the pediatric dentist not only to identify an anxious child but also to manage him in a way which imparts a positive attitude in him for dentistry.[4]

Debate over the best method of behavior management in children experiencing dental treatment is of great importance nowadays.[5]

The American Academy of Pediatric Dentistry (AAPD) has outlined a series of behavior management techniques to handle the problem, ranging from voice control, to distraction, to physical restraint. When all that fails, sedation or general anesthesia have been advocated. Behavior management techniques are meant to reduce the need for excessive and unsafe use of medications. There is evidence to indicate that an integration of good

behavioral techniques could lead to better results, greater patient safety and reduced side-effects.[6]

In distraction, the patient's attention is diverted from what may be perceived as an unpleasant situation. Virtual reality distraction is a new technique in which patients listen and watch a videotaped film during a stressful procedure.[7]

The efficacy of the 3D distraction virtual reality goggles on young cooperative children is under study. Therefore, this study aimed to evaluate the effect of using virtual reality goggles on the behavior of uncooperative children during dental treatment.

Review of literature

Dental caries is an important public health issue worldwide due to the pain and suffering caused to subjects, the high cost of its treatment, and the impact on quality of life.[8]

Many children require invasive dental treatment due to early childhood caries (ECC). The disease is a major health problem in many countries, with 9% (621 million people worldwide) of the global population. A study has shown that 19.5% of the American children between the age of two and five were reported to be affected by dental caries in the deciduous teeth in 2010.[9]

Many studies have linked the relationship between dental caries and dental fear/anxiety levels in children. As fearful children may try every possible means to avoid or delay treatment, resulting in deterioration of their oral health.[10] [11]

Fear and anxiety are often used interchangeably within the literature, fear has been described as the reaction to immediate danger.[12]

The majority of fear evident in children may have been acquired either objectively or subjectively where objective fear is produced by direct stimulation of sense organs and it does not have any parental origin. Subjective fear is the one based on feelings and attitudes that have been suggested to the child by others mostly through parents [2].

Anxiety is usually classified as a disorder of neurotic nature. It is defined as a diffuse, unpleasant feeling of apprehension/worry and has physical symptoms such as headache, muscle tension, restlessness, chest pain and mild stomach discomfort.[4]

Information about the origin of dental fear/anxiety and uncooperative behavior in a child patient before starting the treatment procedure will help the dentist plan a suitable behavior management technique and treatment strategy[13].

To be a successful pediatric dentist, managing uncooperative children is an important factor and it depends on the dentist's capability to maintain cooperation. Thus, to accomplish treatment successfully, some behavior management techniques may be used.[14]

The American Academy of Pediatric Dentistry (AAPD) stated that behavior management is a comprehensive continuous methodology which aims to build relationship between child, parent, and doctor, focusing on eliminating fear/anxiety and ultimately building trust. It enables the dentist to build a positive dental attitude, to guide the child through their dental experience, and to safely achieve the best outcome [7].

Factors affecting child cooperation

A child cannot be treated as a single entity since his behavior depends on his/her parents and the surrounding environment.[15]

Dental fear and anxiety have multifactorial origins which could be divided into personal characteristics, environmental factors and situational factors.[13] Though personality characteristics are believed to influence dental fear and behavior the most, they are also intensely affected by social and family environments.[16]

a. Parents influence and acceptance:

Among environmental factors, it has been well documented that parental dental fear is strongly related with that of the child. The "pedodontic triangle" is equally divided between the child, the parents and the dentist, and there should be a permanent dialogue between all parts of the triangle for better delivery of dental care.[17][18]

The children of parents with anxiety disorders are more expected to develop anxiety disorders themselves, because of genetic factors plus the atmosphere in which they are raised. [4]

In communication with the parents, it is necessary to transfer the information about the pediatric behavior management, and an informed consent has to be obtained as a practical standard for using any technique during the treatment phase. The main goal of presenting information to the parents is to enhance their acceptance and reduce their anxiety in using such techniques.[19]

There is a concern over how the parent should receive the information. In pediatric dentistry, the amount of tolerability of behavior management

techniques and the way of informing the parents about these techniques have attracted the attention of the researchers in this discipline.[20][21]

b. Growth and development:

Children's awareness of a deformity in physical growth and development or presence of a congenital malformation, e.g., cleft lip increases with time. It leads to psychological trauma due to rejection by the society. There is some evidence of increased social anxiety in cleft patients. [22]

Mental disability, epilepsy, cerebral palsy etc., make the child mentally disabled. Here, the child cannot react to the requirements of the parents and expectations of the society. Hence, there is a failure of cognitive development and therefore variations in the child behavior are expected.[23]

c. Nutritional factors:

Nutritional deficiency affects the milestones of biological and cognitive development. For example, a study has shown that an increased intake of sugar causes an irritable behavior, while hypoglycemia causes a criminal behavior. Another study stated that skipping breakfast leads to an impaired performance [24].

Therefore, teaching parents about nutrition and healthy lifestyle habits results in greater understanding and improve health behaviors.[25] [26]

d. Past medical and dental experiences:

Any past unpleasant dental experience, prior hospitalization, sickness etc., are associated with a higher rate of uncooperative attitude. Studies showed that experiences at the first dental visit seem to influence dental fear and child behavior.[24]

On the other side, repeated asymptomatic dental visits seem to act in a prophylactic way concerning dental fear/anxiety. For instance, previous research has found that children who participate in preventive programs show a lower level of dental fear/anxiety [27].

It was reported that early visits to the dentist should not be driven by urgent dental problems such as pain, trauma, or caries, because problematic first visits are linked to the development of dental anxiety in children [28].

e. School environment:

Children spend a significant time of their lives in school settings. Children's experiences in schools not only affect their academic development but also strongly influence their emotional, social and physical health development, both positively and negatively. [29]

Schools are an excellent place to reach children, as a large number of children world-wide are being taught in schools. Thus, the best venue to conduct surveys or health check-up examinations among children undoubtedly is the school environment.[30]

School is very important in improving oral health literacy. Low oral health literacy is associated with poorer health status, less use of preventive measures, higher hospitalization rates and less awareness about disease management.[31]

f. Socioeconomic status:

Family poverty is strongly associated with children's behavioral problems. The link between poverty and a child's emotional/behavioral problems can be caused by different reasons such as the parents lack of education, weak family relationships and shortage of resources to purchase materials and to get proper services that benefit the child well-being. [32][33][34]

Higher levels of dental caries are more common in populations of rural than of urban areas and differences in dental anxiety rates regarding area deprivation were also observed [35].

Children with higher socioeconomic status may develop normally because the family can provide all the necessary requirements to aid in a normal psychological development. On the other hand, this child may also become spoilt if he always gets what he wants.[23]

g. Dental office environment:

The child's perception of the dental environment is a major factor causing dental anxiety. It's a challenging mission for the pediatric dentist to develop a more child-pleasant atmosphere in his clinic.[36]

It was reported that the clinic environment should be warm and colorful. The operating room should be lively with posters, TV, videogames, toys and story books. Dental auxiliary should be kind to the children and meet them with a smile.[23]

Appointments should always be short, i.e., less than 30 minutes. Early morning appointments are preferable for young children. Children should not be kept waiting for too long in the waiting area because they tend to become restless.[37]

h. Dental clinic interaction:

Before going to the dental clinic, child might have acquired an impression of a clinical environment and dentist's appearance. Different kind of doctor's attire may evoke different reactions [23]. Researchers have found that appropriate clothing of the dentist might possibly contribute to dentist's empathy[38].

Barrett and Booth[39] were the first to report a negative aspect of the traditional white coat attire. They observed that children regard formally-dressed doctors as competent but not friendly.

The American Academy of Pediatric Dentistry (AAPD) describes behavior guidance of children in the dental clinic as a field of interaction involving the dentist & dental team, the patient, and the parents with the goals of easing fear and anxiety, enabling the dental team to perform excellent treatment safely and efficiently, and develop a positive dental attitude in the child.[40]

In order to stimulate both children and their parents to make the behavioral changes that are vital for good dental health, any dentist who treats children should implement a program to educate them.[41]

For example, when dentists give dietary advice, they should recommend non-cariogenic snack substitutes such as popcorn, potato chips, peanuts or sucrose-free chewing gum. This type of recommendation is more likely to be followed than in one which demands the complete elimination of snacks from the diet.[23]