ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

Oral Hygiene in Pediatric Patients

Ali Abdul Sattar Ahmed[1]

[1]Ministry of High Education and Scientific Research IBN Sina University of Medical and Pharmaceutical Sciences College of Dentistry

Publication Date: 2026/02/04

How to Cite: Ali Abdul Sattar Ahmed (2026) Oral Hygiene in Pediatric Patients. *International Journal of Innovative Science and Research Technology*, 11(1), 2750-2774. https://doi.org/10.38124/ijisrt/26jan1319

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

ABSTRACT

- ***Objective***

The Aim of this study is to evaluate the progress of oral hygiene in pediatric patients through different times and conditions by comparing two different study groups with different parameters, we will be able to comprehend the improvement or deterioration in oral hygiene.

- ***Method***

A study was performed in the pediatric clinics of IBN SINA UNIVERSITY that included 35 patients with ages (6-11) years. For determination of the OHI - index we used the Simplified Oral Hygiene Index of Greene and Vermillion.

- ***Result***

The results of the current study were better than the results of the previous study due to the COVID-19 pandemic and people staying in their homes with parents following up on children regularly, and these are good indicators for the health of children's teeth, The COVID-19 pandemic led to early restrictions on access to oral health care and social distancing requirements.

- ***Conclusion***

The findings from the study showed that most of the children had adequate knowledge about causes and prevention of dental caries and gingival disease.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

DEDICATION

“Everything we are

Or ever will be, we owe it to our mothers “.

Our success is because of them.

To our mothers, this is just the beginning

To our biggest supporters,

Who keeps saying “we are proud of you

To our fathers

To our great teachers , will be always appreciated to you for your efforts and all hard worked you did to us

Thanks to All

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

ACKNOWLEDGMENTS

At the outset, we thank God Almighty for enabling us to complete this research, to Him be praise and thanks, then I would like to thank my supervisor(Dr. Shahad Zahed Al-Janabi),whose experience was invaluable in formulating the most important topics and methodology of the research.

I offer you the most beautiful expressions of thanks and gratitude from a loving heart full of love and affection, and all respect and appreciation to you for your tireless efforts with us.

Special thank to

Dr. Baydaa Ali

Dr. Raya rashid

Dr. Wajnaa Fareed

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

LIST OF CONTENTS

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

LIST OF FIGURES

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

LIST OF TABLES

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

CHAPTER ONE
INTRODUCTION

➢ *Introduction*

Dental health can affect the functional, psychological and social dimensions of a child's well-being. Oral pain has devastating effects on children, including lost sleep, poor growth, behavioural problems and poor learning. Developmentally crucial processes of communication, socialization and self-esteem are also affected by poor dental health. Dental problems are associated with a substantial reduction in school attendance and in parental working days. There is also recent evidence linking oral disease to other health problems, such as low birth weight, preterm delivery and iron deficiency.[(1)]

The condition of the teeth, periodontium and oral mucosa determines directly and indirectly the general health of the organism and, therefore, requires to be monitored. Epidemiological studies indicate that in children and adolescents the most often observed gingivitis is dental plaque-induced gingivitis, which is a reversible and nondestructive form of periodontal disease Poor oral hygiene and the accumulation of bacterial plaque is a known and important predisposing factor of gingivitis. However, the prevalence of destructive forms of periodontal disease is lower in young individuals than in adults. Still, dental plaque accumulation in childhood and adolescence can be associated with the development of periodontal disease in later life.[(3)(2)]

Children with healthy gingival tissues most likely progress to adult life with good periodontal health. Therefore, the key concern is periodontal health and good oral hygiene in childhood.1–5 Childhood, especially the first years of life, is the time when proper health-promoting behaviors are formed, allowing the future prevention of such diseases as dental decay and gingivitis. A fundamental element of prevention are effective daily prophylactic-hygienic procedures to remove dental plaque. Studies concerning the gingival status and bleeding in children are scarce, although such knowledge can be useful in planning preventive programs.[(3)(2)]

- *The Aim of the Study:*

To evaluate the progress of oral hygiene in pediatric patients through different times and conditions by comparing two different study groups with different parameters , we will be able to comprehend the improvement or deterioration in oral hygiene.

➢ *Review*

- *Oral Health*

Refers to the health of the teeth, gums, and the entire oral-facial system that allows us to smile, speak, and chew. Some of the most common diseases that impact our oral health include cavities (tooth decay), gum (periodontal) disease, and oral cancer. [(4)]

- *Dental decay*

Dental caries, or dental decay, is an infectious condition that deteriorates the structure of teeth. The most common result of dental caries is a cavity a hole or space in the teeth. Without proper treatment, dental caries can cause pain, tooth loss and in rare cases when the infection spreads to the brain even death. [(5)]

- *Periodontal Diseases*

The term 'periodontal diseases' encompasses a wide variety of chronic inflammatory conditions of the gingiva (or gums, the soft tissue surrounding the teeth), bone and ligament (the connective tissue collagen fibres that anchor a tooth to alveolar bone) supporting the teeth. [(6)]

- *Pediatric Dentistry*

Pediatric dentistry is an age-defined specialty that provides both primary and comprehensive preventive and therapeutic oral health care for infants and children through adolescence, including those with special health care needs. [(7)]

- *Dental Home*

The dental home is the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated, and family-centered way. The dental home should be established no later than 12 months of age to help children and their families institute a lifetime of good oral health. [(7)]

- *Oral Hygiene*

Is the practice of keeping one's mouth clean and free of disease and other problems (e.g. bad breath) by regular brushing of the teeth (dental hygiene) and cleaning between the teeth. It is important that oral hygiene be carried out on a regular basis to enable prevention of dental disease and bad breath. The most common types of dental disease are tooth decay (cavities, dental caries) and gum diseases, including gingivitis, and periodontitis. [(8)]

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

- *Dental Calculus*

Dental calculus is a hard deposit that is formed by calcification of dental plaque primarily composed of calcium phosphate mineral salts which is deposited on natural teeth and restorations and is covered by a layer of unmineralized plaque. These hard deposits may form coronal to or apical to the gingival margin, hence named accordingly as supragingival and subgingival calculus respectively. The distribution of calculus is very versatile and it differs from individual to individual, from tooth to tooth, and from surface to surface. So, a thorough knowledge on prevalence of calculus is important for the clinician in outlining the treatment plan. It is a well-known fact that calculus is itself not an inducing agent for pathological changes that occur in gingival tissues; instead it is covered by a layer of unmineralized plaque which is proven to be the key etiological agent involved in these pathogenic mechanisms. But, attributing to the porosity of calculus and its ability to retain bacterial antigens makes it an important contributing factor in initiating and accentuating periodontal disease progression. In this review, we made an attempt to discuss various aspects of calculus composition, its formation, and its etiological significance in periodontal disease progression. [(9)]

- *Dental Plaque*

Dental plaque is an oral microbial biofilm that is found on exposed tooth surfaces in the mouth. It has a large diversity of species and consists of densely packed bacteria embedded in a matrix of organic polymers of bacterial and salivary origin. Dental plaque is the causal agent of dental caries in the presence of sugar and time. In the oral cavity, the formation of dental plaque on the tooth surface follows a similar sequence to that of biofilms in other natural ecosystems. A biofilm is formed by bacteria sticking to each other and, often, adhering to a surface. The bacteria are embedded within a self-produced matrix of extracellular polymeric substance. In dental biofilm, streptococcus mutans is a major bacterium producing the extracellular polysaccharide matrix in dental biofilms. The bacterial cells growing in a biofilm are physiologically distinct from planktonic cells which float or swim in a liquid medium. Bacteria in the plaque biofilm can respond to many factors, such as cellular recognition of specific or non-specific attachment sites on a surface and nutritional signals. Marsh and Martin divided the formation and growth of oral biofilm into five stages. [(10)]

➢ *Historical Glance*

People have been practicing dentistry since ancient Egypt, Greece, and Rome. Thankfully, caring for teeth looks a lot different today than it did back then! Alongside improved techniques and materials, one of the most important advancements in dentistry was the development of pediatric dentistry. Specialized dental care for children first came about in the early 1900s, and has since gone through a variety of changes to get to where it is today. In the past, children simply went to the same general dentist that their parents did. That is, if they went to the dentist at all! Then, in 1909, a trained dentist named Minnie Evangeline Jordon opened up the first dental practice that was just for kids. With experience, research, and a true heart for the wellbeing of children, she contributed major developments in the world of pediatric dentistry. She presented lecture, wrote papers, and even published the first pediatric dentistry textbook! Thanks to Minnie Jordon, the “pioneer of pedodontics,” the movement for children’s dentistry began. Thanks to Jordon’s outstanding efforts and findings, the American Dental Association officially recognized pediatric dentistry as its own specialty in the 1940s. Now that children’s dentisty was endorsed by such a well-known and respected organization, pediatric oral healthcare was finally in the spotlight. In fact, it prompted a 50% increase in children visiting the dentist annually. A decade later, the Pediatric Dentistry Training Program was founded to boost the number of dentists trained and able to treat children. [(11)]

The next big moment of recognition for pediatric dentistry was in the late 1900s, when the Secretary of Health and Human Services published a national report on the importance of children’s oral health. All over the nation, more and more parents learned about how the wellbeing of their child’s teeth influenced their general health. The American Dental Association began to develop more best practices regarding children’s dental products and techniques, and they officially began to recommend that children get their first dental checkups by their first birthdays. Nowadays, we are well aware that children have unique oral healthcare needs as they grow. From frenectomies in infants, to cavities in baby teeth, to wisdom teeth in teenagers, modern pediatric dental care is designed to meet children every step of the way as their smile develops. Plus, in addition to clinical knowledge, pediatric dentists are specially trained in dealing with tantrums, tears, and fears. Thanks to the history of pediatric dentistry, little one can get the specialized oral healthcare they deserve. [(12)]

➢ *Justification and Importance of Project Implementation*

There are a number of points that must be adhered to:

- It is important that they be aware of the prevention of oral disease that begins early in life. The aim of this is to diminish the existing ambiguity among Pediatric dentistry and children regarding oral disease and its prevention.
- Education concerning development and prevention of dental disease and also demonstration of oral hygiene procedures in children.
- Educating parents about the care and hygiene of their children's teeth.
- Activate a project dental home to the ongoing relationship between the dentist and the patient, includes all aspects of oral health, and is delivered in a comprehensive, continuously accessible, coordinated, and family-centered way.
- Awareness about the dangers of dental caries in children and the importance of caring for them until adulthood.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

- This best practice presents recommendations regarding perinatal and infant oral health care, including caries risk assessment, anticipatory guidance, preventive strategies, and therapeutic interventions. Oral healthcare providers play an invaluable role in optimizing the oral health of infants, particularly through the establishment of a dental home, caries prevention, and management of common oral conditions.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

CHAPTER TWO
LITERATURE REVIEW

➢ *Prevalence*

Periodontal disease is the most common oral condition of human population. The prevalence and incidence statistics of periodontal diseases vary because of bias, case misclassification, and the number of teeth and the sites examined. According to the Canadian Health Measures Survey 2007-2009, the measurement of loss of periodontal ligament attachment is considered the gold standard in reporting the prevalence of periodontal disease. National Health and Nutrition Examination Survey (NHANES) determined the attachment loss (AL) and probing depth (PD) at six sites of all teeth (excluding third molars) for the estimation of periodontal disease in the U.S. [(13)]

Gingival inflammation (GI) is a common clinical feature detected in children and adults. It is characterized by swelling, redness, and bleeding at the gums and it is described as an inflammatory reaction upon the pro-inflammatory cytokines that modulate the balance between humoral and cell-associated immune responses. This clinical feature is characteristic of both gingivitis and periodontitis. GI is considered to be one major class of periodontal conditions, and is recognized to result from the increase in supragingival plaque and the ensuing interactions between the microbiota of biofilm and host response. Consequently, the prevention of plaque accumulation and early treatment of GI reduce the risks associated with the development of the more destructive periodontal disease, which has also been associated with systemic conditions. [(14)]

The prevalence of periodontal diseases varies in different regions of the world according to the definition of periodontitis and study population, and there are indications that they may be more prevalent in developing than in developed countries . The National Health and Nutrition Examination Survey III (NHANES III) conducted in the United States (USA) between 1988-1994 has demonstrated that 50% of the adult population has gingival inflammation. A national survey in the US has estimated that 19.9% of subjects aged 30 years, and 7.3% of those aged 90 years had clinical attachment level (CAL) $\geq$ 5 mm and 7 mm, respectively. A national survey in the United Kingdom estimated that 42% of 35 - 44 years old and 70% of 55-64 years old had CAL > 3.5 mm, indicating presence of periodontitis . The prevalence of AgP in the US ranges between 0.6% in Whites and 2.6% in African-Americans . [(15)]

➢ *Promoting Oral Health*

Oral health is critically important to the overall health and well-being of infants, children, and adolescents. It covers a range of health promotion and disease prevention concerns, including dental caries; periodontal (gums) health; proper development and alignment of facial bones, jaws, and teeth; other oral diseases and conditions; and trauma or injury to the mouth and teeth. Oral health is an important issue requiring continued health supervision from the health care professional. Childhood caries is a preventable and transmissible infectious disease caused by bacteria (eg, Streptococcus mutans or Streptococcus sobrinus) that form plaque on the surface of teeth. The bacteria interact with sugar in foods and beverages, turning them into acids that dissolve tooth enamel, causing caries. Caries is one of the most common chronic diseases in children—5 times more common than asthma.1 Left untreated, pain and infection caused by dental caries can lead to problems in eating, speaking, and learning. [(16)]

Twentythree percent of children aged 2 to 5 years and 56% of children aged 6 to 8 have caries, and many school hours are lost each year because of dental problems related to caries. Dental caries is a complex disease with individual-, family-, and community-level influences. Several population groups are particularly vulnerable to caries. For example, children and youth with special health care needs are at increased risk. National surveys also have demonstrated that children in low- and moderate-income households are more likely to have caries and more decayed teeth than are children from more affluent households. Even within income levels, children of color are more likely to have caries than are white children. Thus, sociodemographic status should be viewed as an initial indicator of risk. [(17)]

➢ *Responsibilities of the Dental Home*

According to the AAPD, the dental home should provide: [(18)]

- Comprehensive oral health care, including acute care and preventive services, in accordance with AAPD periodicity schedules.
- Comprehensive assessment for oral diseases and conditions.
- An individualized preventive dental health program based on a caries risk assessment and a periodontal disease risk assessment.
- Anticipatory guidance about growth and development issues (ie, teething, thumb- or finger-sucking behaviors, or pacifier habits).
- A plan for responding to acute dental trauma.
- Information about proper care of the child's teeth and gingivae. This would include prevention, diagnosis, and treatment of disease of the supporting and surrounding tissues and the maintenance of health, function, and esthetics of those structures and tissues.
- Dietary counseling.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

- Referrals to dental specialists when care cannot directly be provided within the dental home.
- Education regarding future referral to a dentist knowledgeable and comfortable with adult oral health issues for continuing oral health care. Referral at an age determined by patient, parent, and pediatric dentist.

As children and adolescents mature into adulthood, a dental home also can ensure that they receive oral health education and counseling, preventive and early intervention measures, and treatment, including treatment for periodontal care, orthodontic services, trauma, and other conditions. Efforts to establish a dental home offer an opportunity for partnerships and foster a connection with the community. A partnership among health care professionals in primary care, dental health, public health, early care and education (including child care and home visiting), and school settings can help ensure access to a dental home for each child during the early childhood, middle childhood, and adolescent years. [18]

- *Brushing and Flossing*

Dental hygiene should begin when child is a baby. Start using a soft child-size toothbrush around the age of 1 or 2. should brush child's teeth with water at least twice a day. also can add a small dab of toothpaste that doesn't have fluoride in it. This type of toothpaste is safe for child to swallow. Once child is old enough to spit out the toothpaste, can switch to one that has fluoride. Only use a small amount. Teach child to spread it among their teeth, gums, and tongue. Have doctor or dentist show the right way to brush child's teeth. child likely will need help brushing their teeth until they are 7 or 8 years old. Around this time, they can start using a larger sized toothbrush. should switch out toothbrushes every 3 to 6 months or when the bristles look worn. Children should brush their teeth for 2 minutes. Flossing is another key part of child's oral care routine. Teach child to floss at least once a day. can buy floss that comes on a handle to make it easier. [19]

➢ *Periodontal Disease*

Periodontal diseases consists of a wide range of inflammatory conditions which causes degeneration of Periodontium and affects all supporting structures of teeth such as gingiva, periodontal ligament, cementum and alveolar bone etc. followed by teeth loss. WHO had reported about 10-15% of the world population is suffering from severe periodontal condition. It is complex infectious disease caused by aggressive microbial growth on teeth. The pathophysiology of periodontal disease is associated with dental plaque, microbial biofilm formation and immunogenicity of the host cell. The severity of this disease depends upon risk factors and chronological stages. Prevention is attained by daily maintenance of oral hygiene. Various surgical and non-surgical treatments are available to control the formation of microbial biofilm. Daily maintenance and periodic management of this disease control worsening of condition and shows definite improvement in oral health.[19]

Gingivitis is a non-destructive disease that causes inflammation of the gingiva. The most common form of gingivitis, and the most common form of periodontal disease overall, is in response to bacterial plaque that is attached to tooth surfaces, termed plaque-induced gingivitis. Gingivitis is reversible with good oral hygiene; however, without treatment, gingivitis can progress to Periodontitis, in which the inflammation of the gums results in tissue destruction and bone resorption around the teeth. Periodontitis can ultimately lead to tooth loss.[19]

➢ *Oral Hygiene and Feeding Practices that Promote Oral Health*

Even before the baby's birth, parents and other caregivers should make sure their own mouths are as healthy as possible to reduce transmission of caries-causing harmful bacteria from their saliva to the newborn's mouth. Health care professionals should educate family members in the following ways to promote the adult's oral health and prevent the transmission of caries-causing bacteria from adult to infant: [20]

- Practice good oral hygiene and seek oral health care.
- Do not share utensils, cups, spoons, or toothbrushes with the infant.
- Do not put the child's pacifiers in their own mouths. Clean pacifiers with mild soap and water.
- Consult with an oral health professional about the use of xylitol gum or lozenges (if the adult's oral health is a concern). This gum may have a positive effect on oral health by decreasing the bacterial load in an adult's mouth.

The primary teeth begin to erupt at different ages during the first year of life. An infant is susceptible to tooth decay as soon as the first teeth come into his oral cavity if he has a sufficient bacterial load already present in his mouth and prolonged exposure to sugars. Chalky white areas on the teeth are the first sign of dental decay. Both inadequate oral hygiene and inappropriate feeding practices that expose teeth to natural or refined sugars for prolonged periods contribute to the development of early childhood caries. [21]

To help prevent early childhood caries, parents also should take advantage of this developmental stage to establish lifelong nutritious eating patterns for the family that emphasize consumption of vegetables, fruits, whole grains, lean meats, and dairy products and that minimize consumptions of foods and beverages containing added sugars. [22]

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

➢ *Oral Health Risk Assessment*

Since 2003, the American Academy of Pediatrics (AAP) has recommended that health care professionals conduct an oral health risk assessment when an infant is 6 months of age. In 2012, the AAP refined the risk factors and developed an Oral Health Risk Assessment Tool for caries risk determination of the health care professional asking parents about their and the child's oral health practices and examining the child's mouth to assess the risk of caries. Fluoride varnish may be applied in the primary care medical home every 6 months, beginning when the first tooth erupts until age 5 years. The AAP recognizes that, even today, some children live in communities that lack pediatric dentists or general dentists who are able to see infants and young children. Therefore, health care professionals who care for these children may have to continue to perform periodic oral health risk assessments even after 6 to 12 months of age. [23]

- *Role of Oral Health Providers in Perinatal and Infant Oral Health Care*

The perinatal period is the period beginning with the completion of the 20th to 28th week of gestation and ending one to four weeks after birth. The infant period extends to the child's first birthday. Oral health providers have an important role in perinatal and infant oral health care, particularly regarding the establishment of a dental home, educating new parents, and the timing of a child's first dental visit. Oral health providers need to be knowledgeable regarding the perinatal period and first year of a child's life with respect to common oral conditions, anticipatory guidance, and early dental caries preventive care including oral cleaning, dietary recommendations, and optimal fluoride exposure. [24]

➢ *Oral Hygiene in Pediatric Dentistry*

Cavities (also known as caries or tooth decay) are one of the most common chronic diseases of childhood in the United States. Untreated cavities can cause pain and infections that may lead to problems with eating, speaking, playing, and learning. Children who have poor oral health often miss more school and receive lower grades than children who don't: [25]

- More than half of children aged 6 to 8 have had a cavity in at least one of their baby (primary) teeth.
- More than half of adolescents aged 12 to 19 have had a cavity in at least one of their permanent teeth.
- Children aged 5 to 19 years from low-income families are twice as likely (25%) to have cavities, compared with children from higher-income households (11%).

Fig 1 Dental Problems in Children

The good news is that cavities are preventable. Fluoride varnish can prevent about one-third (33%) of cavities in the primary (baby) teeth. Children living in communities with fluoridated tap water have fewer cavities than children whose water is not fluoridated. Similarly, children who brush daily with fluoride toothpaste will have fewer cavities. [26]

Dental sealants can also prevent cavities for many years. Applying dental sealants to the chewing surfaces of the back teeth prevent 80% of cavities. [27]

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

➢ *Special Care for Children's Teeth*

Oral health care should begin with the very first tooth that grows in baby's mouth. Even though these teeth will fall out within a few years, baby teeth hold a space for child's permanent ones, and it's important that child has a healthy mouth when those permanent teeth arrive. Without proper care, even baby teeth can decay and cause a host of problems, including: [27]

- Painful teeth and gums
- Difficulty chewing, eating, and sleeping
- Gum disease and inflammation
- Embarrassment when talking and smiling

➢ *Risk Factors*

Child's chance of getting periodontal disease can be higher if: [29][28]

- Family members (older brothers, sisters, or parents) have cavities.
- They eat and drink a lot of sugary foods and drinks, like soda, especially between meals.
- They have special health care needs.
- They wear braces or orthodontics or oral appliances.

If any of these apply to child, be sure to talk with dentist, pediatrician, or family doctor to make sure are taking extra steps to protect child's teeth.

➢ *Steps to Proper Oral Hygiene*

Oral hygiene routine has a significant impact on the condition of teeth. The best method to take when it comes to oral health is always prevention, which is why it is so important to follow an effective oral hygiene procedure to most effectively care for teeth: [30]

- *Teach Child how to Brush*

Children are usually ready to learn how to brush their teeth by age two or three, but should still help brush the hard-to-reach spots because children usually don't have the dexterity to "go solo" until about age seven. Make brushing a daily routine, but keep it enjoyable. Use a pea-size amount of toothpaste and make sure the child does not swallow the paste.

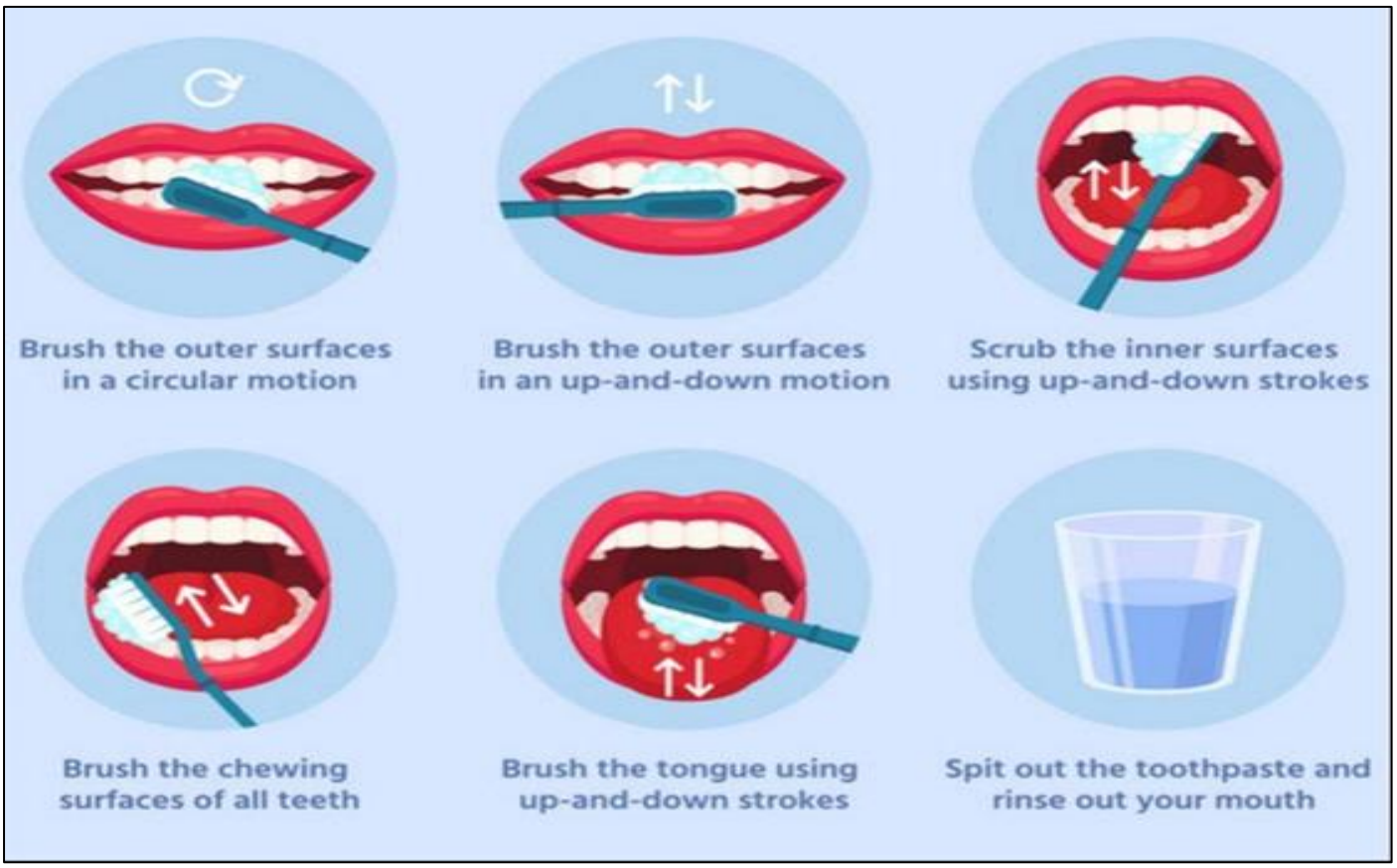

Fig 2 Brush for Child

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

- *Regular Dental Visits*

Oral hygiene Regular dental visits are incredibly important to effectively protect teeth. Dental cleanings are the only way to remove certain substances, such as tartar, from the surface of your teeth. When get regular dental cleanings, can regularly remove these substances from teeth and keep them in better condition. Additionally, regular dental visits will allow dentist to find potential issues in the early stages.

- *Proper Nutrition*

Nutrition has a significant impact on the health of teeth. Sugary foods and beverages can significantly damage the teeth, as bacteria uses sugar to create the acids that cause harm to the teeth. Reducing sugar consumption can prevent these acid attacks from impacting teeth. Chewing crunchy fruits and vegetables in between meals can help to stimulate saliva production. Saliva production can help to wash food particles from teeth, which can ensure that they remain in better condition.

- *Prevent Nursing Bottle Syndrome*

Tooth decay can occur when a baby is given a bottle filled with milk, formula, or fruit juice at bedtime or for long periods during the day. Extended exposure to the sugar in these liquids can cause teeth to discolour and decay. To prevent this, clean child's teeth after each feeding and at bedtime give a bottle filled only with water.

- *Protect Child's Teeth with Sealants*

When child's permanent molars come in (the first ones usually appear at age six or seven), consider protecting them with sealants. Sealants are clear plastic coatings that form a barrier to keep food and bacteria out of tiny grooves in the tooth; they are nearly 100 percent effective in preventing decay in back teeth.

- *Establishing the Best Oral Hygiene Routine for Children*

Here are some tips to help keep child's teeth healthy and strong starting at age 3: [31]

✓ Use a pea-sized amount of fluoride toothpaste and make sure child spits it out after brushing
✓ Be sure child brushes for at least 2 minutes twice a day
✓ Start flossing as soon as teeth touch, or even earlier to help build good habits.
✓ Help child brush and floss, and remind him or her to pay attention to the back teeth.
✓ Visit the dentist every 6 months.

Fig 3 Images of Serious Tooth Decay in Children

➢ *Dental Calculus*

Teeth tartar, also called dental calculus, is a crusty deposit that can trap stains on the teeth and cause discoloration. It creates a strong bond that can only be removed by a dental professional. Tartar formation may also make it more difficult to remove new plaque and bacteria. Individuals vary greatly in their susceptibility to plaque and tartar on teeth. For many of us, these deposits build up faster as we age. [32]

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

Fig 4 Stages of Teeth Calculus Formation

- *Types of Dental Calculus*

There are two basic types of dental calculus that patients should know about: supragingival and subgingival. The difference mostly has to do with the location of the calculus relative to the gumline: [33]

✓ Supragingival Calculus: can form both along the gumline, where it is referred to as supragingival ("above the gum"), and within the narrow sulcus that exists between the teeth and the gingiva, where it is referred to as subgingival ("below the gum").
✓ Subgingival calculus: refers to calculus below the crest of the marginal gingiva which is not readily visible upon oral examination. It is usually dense and hard, dark- brown or green-black in color, flint-like in consistency, flattened in shape, and firmly attached to the tooth sur face (s).

- *Calculus Detection*

✓ *Visual Examination*

Good lighting helps us to easily visualize supra- and subgingival calculus just below the gingival margin. When light deposits of supragingival calculus are wet with saliva they are frequently difficult to visualize. Supragingival calculus can be dried using compressed air until it is readily visible and chalky white. Air may also be directed into the pocket in steady stream to visualize the subgingival deposits by deflection of gingival margin away from the tooth surface. [34]

✓ *Tactile Exploration*

Requires the skilled use of fine pointed explorer or probe. The explorer is held with light but stable modified pen grasp. The pads of the thumb and the middle finger should perceive the slight vibration conducted through the shank. Fine-pointed explorer or probe is used for tactile sensation and is held with light but stable modified pen grasp. Slight vibrations are perceived by pads of the thumb and the middle fingers through the shank. Method: First, a stable finger rest is established and then the instrument tip is inserted to the pocket depth. In a vertical direction light exploratory strokes are activated. On contact with the calculus, the tip of probe is advanced more apically till the termination of calculus is felt on root surface. Generally, 0.2 to 1.0 mm is the distance appreciated between apical edge of calculus and bottom of the pocket. Proximal surfaces when explored with an instrument tip, it should be extended at least halfway across the surface past the contact area. [34]

✓ *Radiographs*

Interproximal calculus, a highly calcified deposit, can readily be detected as radiopaque projections protruding into the interdental space. The apical location of plaque is not sufficiently calcified to be visible on radiograph, so the calculus location does not indicate bottom of periodontal pocket. Hence, conventional oral radiography was a poor diagnostic method for the detection of calculus. [34]

- *Treatment*

Using a hand-held metal scaler (a device with a hook-like end), your dentist or dental hygienist will scrape away tartar. If you have an excessive amount of tartar that has caused gum disease, your dentist may recommend a deep cleaning that involves scaling and root planing. The acetic acid in white vinegar has antibacterial properties and promotes demineralization of tooth enamel, making it effective in removing tartar and plaque. Add half a teaspoon of salt to half a cup of water and add two teaspoons of white vinegar to it. Stir it well and gargle the mixture twice a day. [35]

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

- *Prevention*

The American Dental Association (ADA) recommends these steps to keep your mouth healthy and tartar-free: [36]

- ✓ Brush your teeth thoroughly twice a day with a toothpaste containing fluoride: Make sure you spend a full 2 minutes brushing each time, too.
- ✓ Clean between your teeth every day: This step, known as interdental cleaning, can include flossing or the use of another tool to clear away the debris that might hide between your teeth.
- ✓ Limit sugary drinks and snacks: If you cut back on sugary items, there will be fewer opportunities for the bacteria in your mouth to mingle with the sugar that's left behind and form plaque on your teeth.
- ✓ See a dentist regularly for a checkup: A dentist can carefully monitor your teeth and gums for signs of gum disease, like gingivitis or receding gums, and tooth decay. They can also learn your habits and make recommendations for strategies that may help you stick to a regular routine.

➢ *Dental Plaque*

Dental plaque is a structurally- and functionally-organized biofilm. Plaque forms in an ordered way and has a diverse microbial composition that, in health, remains relatively stable over time (microbial homeostasis). The predominant species from diseased sites are different from those found in healthy sites, although the putative pathogens can often be detected in low numbers at normal sites. In dental caries, there is a shift toward community dominance by acidogenic and acid-tolerating species such as mutans streptococci and lactobacilli, although other species with relevant traits may be involved. Strategies to control caries could include inhibition of biofilm development (e.g. prevention of attachment of cariogenic bacteria, manipulation of cell signaling mechanisms, delivery of effective antimicrobials, etc.), or enhancement of the host defenses. Additionally, these more conventional approaches could be augmented by interference with the factors that enable the cariogenic bacteria to escape from the normal homeostatic mechanisms that restrict their growth in plaque and out compete the organisms associated with health. Evidence suggests that regular conditions of low pH in plaque select for mutans streptococci and lactobacilli. Therefore, the suppression of sugar catabolism and acid production by the use of metabolic inhibitors and non-fermentable artificial sweeteners in snacks, or the stimulation of saliva flow, could assist in the maintenance of homeostasis in plaque. Arguments will be presented that an appreciation of ecological principles will enable a more holistic approach to be taken in caries control.[37]

- *Development of Dental Plaque Biofilms*

Dental plaque forms via an ordered sequence of events, resulting in a structurally- and functionally-organized, species-rich microbial community. Distinct stages in plaque formation include: acquired pellicle formation; reversible adhesion involving weak long-range physico-chemical interactions between the cell surface and the pellicle, which can lead to stronger adhesin-receptor mediated attachment; co-adhesion resulting in attachment of secondary colonizers to already attached cells ; multiplication and biofilm formation (including the synthesis of exopolysaccharides) and, on occasion, detachment. The increase in knowledge of the mechanisms of bacterial attachment and co-adhesion could lead to strategies to control or influence the pattern of biofilm formation . Analogs could be synthesized to block adhesin-receptor attachment or co-adhesion, and the properties of the colonizing surfaces could be chemically modified to make them less conducive to microbial colonization. However, cells can express multiple types of adhesin so that even if a major adhesin is blocked, other mechanisms of attachment may be invoked. Furthermore, although adhesion is necessary for colonization, the final proportions of a species within a mixed culture biofilm such as dental plaque will depend ultimately on the ability of an organism to grow and outcompete neighboring cells. [37]

Once formed, the overall composition of the climax community of plaque is diverse, with many species being detected at individual sites. Molecular ecology approaches, in which 16S rRNA genes are amplified from plaque samples, have identified >600 bacterial and Archae taxa, of which approximately 50% are currently unculturable . Once plaque forms, its species composition at a site is characterized by a degree of stability or balance among the component species, in spite of regular minor environmental stresses, e.g., from dietary components, oral hygiene, host defenses, diurnal changes in saliva flow, etc. This stability (termed microbial homeostasis) is not due to any biological indifference among the resident organisms, but is due to a balance imposed by numerous microbial interactions, including examples of both synergism and antagonism . These include conventional biochemical interactions such as those necessary to catabolize complex host glycoproteins and to develop food chains, but in addition, more subtle cell-cell signalling can occur. This signalling can lead to coordinated gene expression within the microbial community, and these signalling strategies are currently being viewed as potential targets for novel therapeutics. [37]

- *Classification of Dental Plaque*

The dental plaque is differentiated into two categories by Pavel Godoroja and Olga Dulghieru 2004 [38], namely: supra-and sub-gingival.

- ✓ Supra-gingival plaque at and above the dentogingival junction is most commonly found at: Gingival third of the crown of the tooth, Inter-proximal areas, Pits and fissures and also on other such surface with irregularities.
- ✓ Sub-gingival plaque below the dento-gingival junction is usually divided into: Tooth adherent zone, Epithelial adherent zone, Non adherent zone. [38]

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

- *Identification*

Identification of the supra-gingival dental plaque is difficult for both patient and dentist, because of the color similarity between the tooth surface and dental plaque. Plaque identification may be done either by screening the plaque directly from the tooth surface, changing its color with a disclosing solution , or by using the ability of natural teeth to fluoresce under blue light. Disclosing dyes work by changing the color of dental plaque so that it contrasts with the white tooth surface. Dental plaque has the ability to retain a large number of dye substances which can be used for disclosing purposes. This property is related to interaction, because of the polarity difference between the components of the plaque and the dyes . The particles are bound to the surface by electrostatic interaction (proteins) and hydrogen bonds (polysaccharides). Over the years, different staining agents have been used.[39]

The first chemical reported to stain plaque was iodine but, over the time, a variety of dyes have been used, such as: fuchsine, erythrosine , merbromin , methylene blue , brilliant blue , crystal violet , gentian violet , fluorescein .[39]

- *Control*

" Plaque control means the regular removal and prevention of accumulations of the dental plaque on the teeth and adjacent gingival surfaces."

✓ *Objectives of Plaque Control*

The two most important objectives of plaque control are: [40]

- Prevention of gingivitis and marginal periodontitis.
- Prevention of dental caries.

✓ *Classification of Plaque Control*

Plaque control is broadly classified in to two groups: [40]

- Mechanical plaque control.
- Chemical plaque control.

Several classification systems exist in literature and compiled in Tables 1-1 and 1-2 . [40]

Table 1 Classification of Mechanical Plaque Control

1.Tooth brushes	2.Interdental aids	3.Aids for gingival stimulation	4.Others	5.Aids for edentulous & partially edentulous patients
a) Manual tooth brush. b) Electric tooth brush.	a) Dental floss. b) Triangular tooth pics. -Hand-held triangular toothpics. -Proxapic. c)Interdental brushes. -Proxabrush system -Bottle-brushes. -Single-tufted brushes (flat or tufted). d) Yarn. e) Superfloss. f) Perio-Aid. b) Pipe cleansers.	a) Rubber tip Stimulator. b) Balsa wood edge.	a) Gauze strips. b) Pipe cleansers c) Water irrigating device.	a) Denture & partial clasp brushes. b) Cleansing solutions. 10

Table 2 Classification of Chemical Plaque Control

First generation antiplaque agents	Second generation antiplaque agents	Third generation antiplaque agents
This may reduce the plaque to 20-50%. They have low mouth retention. E.g., Antibiotics, phenols, quaternary ammonium compounds and sanguanarine.	The plaque decrease is about 70-90% overall and is better preserved than the first generation. They demonstrate improved oral tissue retention and slow release characteristics E.g.,. Bisbiguanides (chlorhexidine).	They block microorganisms' binding on or against the tooth. In contrast to second generation chlorhexidine, they have low retention capability. E.g., Delmopinol.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

CHAPTER THREE
MATERIAL AND METHODS

A. Material and Methods

➢ *Material : Probe , Mirror , Gloves , Cheek Retractor .*

Four focus group interviews were conducted , study including 35 patients of 6-11 year old children , who were come to pediatrics dental clinic of collage of dentistry / ibn sina University of medical and pharmacological scientists . For determination of the OHI - index we used the Simplified Oral Hygiene Index of Greene and Vermillion has a debris index (DI - S) for plaque which measure the extension of plaque the scores can be used singly to provide a plaque index provide an oral hygiene index.

The DI - S, the plaque portion of the index, is a numeric assessment of plaque and other debris on the teeth. As representative of the entire dentition, six selected teeth are scored: all surfaces of the right maxillary first molars, left mandibular first molars, and all aspects of the right maxillary and mandibular left lateral incisors, also all aspects of max. left first premolar , mand. Right first premolar . Scoring criteria are as follows: **(41)**

- 0 = No debris or stain on the tooth surface.
- 1 = Soft debris covering as much as one third of the tooth surface or extrinsic stain without debris.
- 2 = Soft debris covering one third to two thirds of the tooth surface.
- 3 = Soft debris covering more than two thirds of the surface.

The debris score for the individual is obtained by adding the scores for all surfaces and dividing by the number of surfaces scored. **(41)**

An average score across the population can be determined by adding the debris scores for each individual and dividing by the number of individual's.

➢ *The Criteria for Classifying DI - S Scores of 0-3 was as Follows: (41)*

- Oral cleanliness was considered " very good " if the DI - S score was ≤0.2.
- " Good " if the DI - S score was 0.3-0.6.
- " Fair " when it showed 0.7-1.8.
- " Poor " when the score ranged between 1.9 and 3.0.

➢ *The Greene–Vermillion index – calculus component*

- Examination include : buccal and lingual surfaces of upper right first molar , right central incisor and left first premolar . In mand. Left first molar , left central incisor and right first premolar.

➢ *Criteria*

- 0 = No calculus present.
- 1 = Supra-gingival calculus covering not more than one third of the exposed tooth surface.
- 2 = Supra-gingival calculus covering more than one third but not more than two thirds of the exposed tooth surface, or the presence of individual flecks of sub-gingival calculus around the cervical portion of the tooth or both.
- 3 = Supra-gingival calculus covering more than two thirds of the exposed tooth surface, or a continuous heavy band of sub-gingival calculus around the cervical portion of the tooth, or both.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

CHAPTER FOUR
RESULTS

➢ *Result:*

- *Plaque Index*

A total of 35 child aged 6–11 years comprising 37.1% female and 62.9% male participated in the survey. it was not significantly different between girls and boys. In less than a half of the studied subjects (14.3%), oral hygiene was fair, in 0.0% – poor, in 40.0% good and in 45.7% very good, It is the highest percentage.

Table 1 Shows Distribution of Oral Hygiene Group (2022)

status Oral hygiene state	Total	Total status no by %	Male	Male status of each group to the total number of male by %	Female	Female status of each group to the total number of female by %
Very good	16	45.7%	9	40.9%	7	53.8%
Good	14	40.0%	9	40.9%	5	38.5%
Fair	5	14.3%	4	18.2%	1	7.7%
Poor	0	0%	0	0%	0	0%
Total	35	100%	22	100%	13	100%

Table 2 Shows Distribution of Oral Hygiene Group (2021)

Oral hygiene state	Total	Total status no by %	Male	Male status of each group to the total number of male by %	Female	Female status of each group to the total number of female by %
Very good	3	9.09 %	2	10%	1	7.69 %
Good	6	18.18 %	4	20%	2	15.38 %
Fair	16	48.48 %	9	45%	7	53.84 %
Poor	8	24.24 %	5	25%	3	23.07 %
Total	33		20		13	

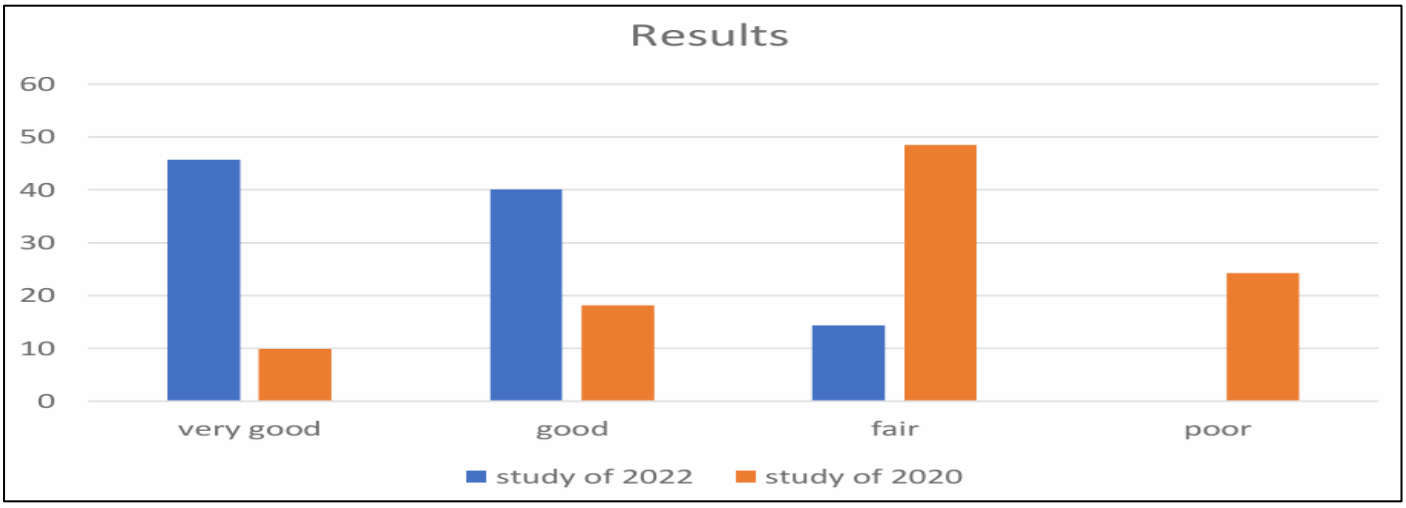

Chart 1 Comparison of Results with the Study of (2021)

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

The standard deviation values of the first and second studies are (23) and (42) respectively , which shows that the second had significantly better results.

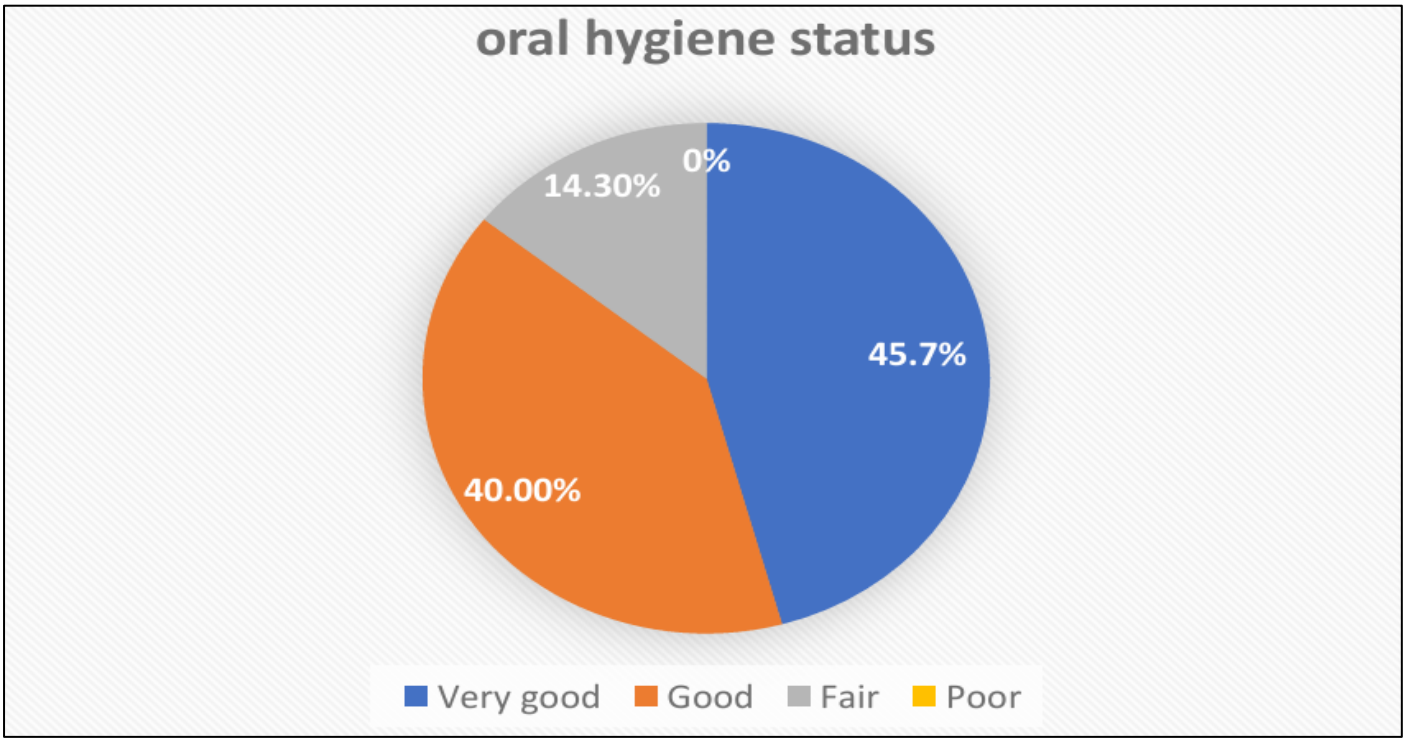

Chart 2 Illustrate the Oral Hygiene Status of Total Sample

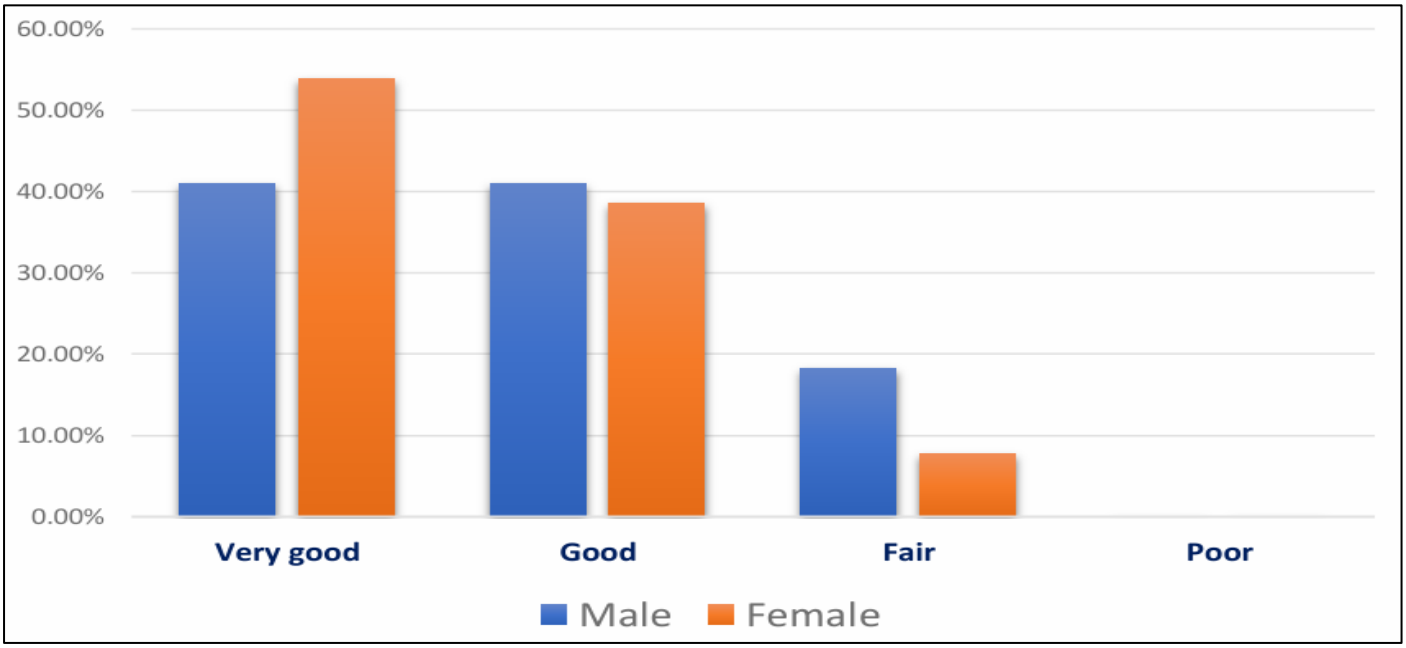

Chart 3 Illustrate the Oral Hygiene Status Comparing the Male and Female Ratio by %

- *Calculus Index*

From 13 female and 22 male only 4 female and 11 male have calculus that represent 42% of simples have calculus however , No mean score greater than 0.3 have been record that mean the result is good of all children who have calculus . one child had score 2 on surface the remain have only score 1 From criteria of (CI – S) component of (OHI-S). unfortunately the previous year group haven't measure CI-S and sum of CI-S and DI-S so we can't compared these result.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

CHAPTER FIVE
DISCUSSION

➢ *Discussion*

Firstly we used the oral hygiene index to evaluate the overall oral health of pediatric patients the results are , (45.7%) very good , (40%) good and (14.3%)fair. Through the results of this study it is seen that the girls had overall better oral hygiene than boys . This may be due to the fact that girls tend to pay more attention to their personal hygiene and tend to practice better oral hygiene than boys .

As proven by the standard deviation values of both studies , (23) for the first study and (42) for the second study, this study has better results than its predecessor this may be attributed to some of the following factors :

- Firstly due to the pandemic and the restrictions that were enforced , especially The quarantine , children Spent more time under parental supervision meaning they were more likely to maintain good oral health.
- The samples were of children from middle class families many of them attended private schools , these private schools had oral health routines , for example one of the schools required the students to brush their teeth in the second recess.
- Other patients when their parents were interviewed the parents said that they allowed their children to have only two snacks throughout the day and they made sure their children brushed their teeth.
- The majority of the children were very much familiar with oral hygiene measures the simplest of them being brushing.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

CHAPTER SIX
CONCLUSION

➢ *Conclusion*

- The findings from the study showed that most of the children had adequate knowledge about causes and prevention of dental caries and gingival disease.
- It appears to that there is an increase in public awareness towards dental oral hygiene as observed through the samples that we collected
- This also revealed that males with a poor knowledge were associated with poor oral hygiene practice .
- Regarding dental visits, 52% of males visiting while 62% of females reported visiting a dentist .

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

REFERENCES

[1]. Jackson SL, Vann WF, Jr, Kotch JB, Pahel BT, Lee JY. Impact of poor oral health on children's school attendance and performance. Am J Public Health. 2011;101(10):1900–6.
[2]. Arnlaugsson S, Magnusson TE. Prevalence of gingivitis in 6-yearolds in Reykjavik, Iceland. Acta Odontol Scand. 1996;54(4):247–250.
[3]. Leous P, Palianskaya L, Leous L. Oral hygiene and gingival inflammation in 6–8-year-olds from a junior school in Minsk who participated in a supervised oral hygiene programme. Oral Health Dent Manag. 2009;7:27–30.
[4]. U.S. Department of Health and Human Services, (2000). Oral Health in America: A Report of the Surgeon General. National Institute of Dental and Craniofacial Research, National Institutes of Health. Rockville, MD.
[5]. Usha C, R S. Dental caries - A complete changeover (Part I). J Conserv Dent. 2009 Apr;12(2):46-54.
[6]. Jeffcoat, M. K. et al. Periodontal disease and preterm birth: results of a pilot intervention study. J. Periodontol. (2003). 74, 1214–1218 .
[7]. Sawyer, Susan M.; McNeil, Robyn; Francis, Kate L.; Matskarofski, Juliet Z.; Patton, George C.; Bhutta, Zulfiqar A.; Esangbedo, Dorothy O.; Klein, Jonathan D. (1 November 2019). "The age of paediatrics". The Lancet Child & Adolescent Health. 3 (11): 822–830.
[8]. Claydon NC (2008). "Current concepts in toothbrushing and interdental cleaning". Periodontology 2000. 48: 10–22.
[9]. A Comprehensive Review on Dental Calculus 1Suchetha Aghanashini, 2Bhavana Puvvalla, 3Darshan B Mundinamane, 4SM Apoorva, 5Divya Bhat, 6Manjari Lalwani, Journal of Health Sciences & Research, July-December 2016;7(2):42-50.
[10]. Marsh, P.; Martin, M. Chapter 5: Dental plaque. In Marsh and Martin's Oral Microbiology, 6th ed.; Elsevier: Edinburgh, UK; New York, NY, USA, 2016; pp. 81–111.
[11]. Carver, Rebecca B. (2016-04-29). "Promoting health literacy among non-science undergraduates". Science & Education. 25 (5–6): 737–740.
[12]. Saleha Shah, Paediatric dentistry- novel evolvement, Ann Med Surg (Lond), Consultant Paediatric Dentist, 2018 Jan; 25: 21–29.
[13]. Muhammad A.Prevalence of periodontal disease, its association with systemic diseases and prevention .Int J Health Sci . 2017 Apr-Jun; 11(2): 72–80.
[14]. Carvajal, P., Gómez, M., Gomes, S., Costa, R., Toledo, A., & Solanes, F. et al. (2016). Prevalence, severity, and risk indicators of gingival inflammation in a multi-center study on South American adults: a cross sectional study. Journal Of Applied Oral Science, 24(5), 524-534.
[15]. Ababneh, K.T., Abu Hwaij, Z.M.F. & Khader, Y.S. Prevalence and risk indicators of gingivitis and periodontitis in a Multi-Centre study in North Jordan: a cross sectional study. BMC Oral Health 12, 1 (2012).
[16]. Jackson SL, Vann WF Jr, Kotch JB, Pahel BT, Lee JY. Impact of poor oral health on children's school attendance and performance. Am J Public Health. 2011;101(10):1900-1906.
[17]. Fisher-Owens SA, Gansky SA, Platt LJ, et al. Influences on children's oral health: conceptual model. Pediatrics. 2007;120(3):e510-e520.
[18]. American Academy of Pediatric Dentistry Council on Clinical Affairs. Policy on the dental home. Pediatr Dent. 2015;37(6) (Reference Manual):24 -25.
[19]. Schätzle M, Löe H, Bürgin W, Anerud A, Boysen H, Lang NP. Parameter on Plaque-Induced Gingivitis". Journal of Periodontology. (2000) 71 (5): 851–2.
[20]. Weintraub JA, Prakash P, Shain SG, Laccabue M, Gansky SA. Mothers' caries increases odds of children's caries. J Dent Res. 2010;89(9):954 -958.
[21]. Laitala ML, Alanen P, Isokangas P, Söderling E, Pienihäkkinen K. Long-term effects of maternal prevention on children's dental decay and need for restorative treatment. Community Dent Oral Epidemiol. 2013;41(6):534 -540.
[22]. Wright JT, Hanson N, Ristic H, Whall CW, Estrich CG, Zentz RR. Fluoride toothpaste efficacy and safety in children younger than 6 years: a systematic review. J Am Dent Assoc. 2014;145(2):182-189.
[23]. Hale KJ; American Academy of Pediatrics Section on Pediatric Dentistry. Oral health risk assessment timing and establishment of the dental home. Pediatrics. 2003;111(5 pt 1):1113-1116.
[24]. Stearns SC, Rozier R, Kranz AM, Pahel BT, Quiñonez RB. Cost-effectiveness of preventive oral health care in medical offices for young Medicaid enrollees. Arch Pediatr Adolesc Med. 2012;166(10):945-951.
[25]. Centers for Disease Control and Prevention. Oral Health Surveillance Report: Trends in Dental Caries and Sealants, Tooth Retention, and Edentulism, United States, 1999–2004 to 2011–2016. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2019.
[26]. Dye BA, Xianfen L, Beltrán-Aguilar ED. Selected Oral Health Indicators in the United States 2005–2008. NCHS Data Brief, no. 96. Hyattsville, MD: National Center for Health Statistics, Centers for Disease Control and Prevention; 2012.
[27]. Marinho VCC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews. 2013; Issue 7. Art.
[28]. Capozza, L. E., & Bimstein, E. (2012). Preferences of parents of children with autism spectrum disorders concerning oral health and dental treatment. Pediatric Dentistry, 34(7), 480–484.
[29]. Ahovuo-Saloranta A, Forss H, Walsh T, Hiiri A, Nordblad A, Mäkelä M, Worthington HV. Sealants for preventing dental decay in the permanent teeth. Cochrane Database of Systematic Reviews. 2013; Issue 3. Art.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1319

[30]. Cardon, T. A., & Wilcox, M. J. (2011). Promoting imitation in young children with autism: A comparison of reciprocal imitation training and video modeling. Journal of Autism and Developmental Disorders, 41(5), 654–666.
[31]. Tinanoff N, Palmer C. Dietary determinants of dental caries in preschool children and dietary recommendation for preschool children. J Pub Health Dent 2007; 60(3):197-206.
[32]. Jin Y, Yip HK (2002). "Supragingival calculus: formation and control" (PDF). Critical Reviews in Oral Biology and Medicine. 13 (5): 426–41.
[33]. Metcalf JL, Ursell LK, Knight R (April 2014). "Ancient human oral plaque preserves a wealth of biological data". Nature Genetics. 46 (4): 321–3.
[34]. Aghanashini S, Puvvalla B,Mundinamane DB, Apoorva SM, Bhat D, Lalwani M. AComprehensive Review on Dental Calculus. J Health Sci Res 2016;7(2):42-50.
[35]. Folwaczny M., Mehl A., Haffner C., Benz C., Hickel R. Root substance removal with Er:YAG laser radiation at different parameters using a new delivery system. J. Periodontol. 2000;71:147–155.
[36]. Jepsen S, Deschner J, Braun A, Schwarz F, Eberhard J (February 2011). "Calculus removal and the prevention of its formation". Periodontology 2000. 55 (1): 167–88.
[37]. Marsh, P.D. Dental plaque as a biofilm and a microbial community – implications for health and disease. BMC Oral Health 6, S14 (2006).
[38]. Godoroja P, Dulghieru O. Propedeutics and preventive dentistry. Chisinau: CEP Medicina 2004, p. 99.
[39]. Chetrus, Viorica; Ion, I R. DENTAL PLAQUE-CLASSIFICATION, FORMATION, AND IDENTIFICATION. . International Journal Of Medical Dentistry, 2013;3(2), 139-143.
[40]. Vyas, T., Bhatt, G., Gaur, A., Sharma, C., Sharma, A., & Nagi, R. . Chemical plaque control - A brief review. Journal Of Family Medicine And Primary Care, 2021;10(4), 1562.
[41]. Greene JC, Vermillion JR. The simplified oral hygiene index. J Am Dent Assoc. 1964;68:7–12.