

PEDODONTICS AND ITS SCOPE- A COMPREHENSIVE REVIEW

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Abstract- Absolutely! Pediatric dentistry, often referred to as pedodontics, is indeed a crucial branch of dentistry that focuses on the oral health of children and adolescents. Its scope includes preventive care, early detection, and treatment of dental issues specific to this age group. It's not just about treating dental problems but also about educating parents and caregivers about proper oral hygiene practices for children, as well as addressing the unique needs of children with special healthcare requirements. The goal is to ensure that children develop and maintain healthy teeth and gums from infancy through adolescence, setting the foundation for good oral health throughout their lives.

Index Terms: Pedodontics, Scope, Oral Health, Child.

INTRODUCTION:

The history of pediatric dentistry as we know it today is usually considered to have started in the latter part of the nineteenth century. It's fascinating how the roots of pediatric dentistry extend back centuries, isn't it? Robert Bunon's work in 1743 was truly groundbreaking, emphasizing the importance of maternal diet on the dental health of children and highlighting the impact of infectious diseases on dental development. His insights laid a foundation for understanding pediatric dental care.

John Greenwood's efforts in the late 18th century in New York, offering reduced fees for children's dental treatment, demonstrate an early recognition of the importance of specialized care for young patients. Similarly, C.F. Delabarre's work in Parisian orphanages around 1800 during wartime underscores the need for dental care, especially in vulnerable populations.

The proposal for a regular dental care program for children by A.-F. Talma in 1851, which advocated for routine examinations for children between 5 and 12 years old, marks a pivotal moment in the formalization of pediatric dental care.⁽¹⁾ This proposal, and similar ones in other countries, laid the groundwork for structured approaches to pediatric dentistry that continue to evolve and improve today.

- Pedodontics = pedo + dontics
- Word pedodontic is made up of 2 words.
 1. Pedo- Derived from Greek word 'pais means child
 2. Dontic - means study of tooth

DEFINITIONS^(2,3)

STEWART ,BARBER ,TROUTMAN AND WEI (1982)

It's the practice and teaching of comprehensive preventive and therapeutic oral health care of child from birth to adolescence. It also includes care for special patients who show mental, physical and emotional problems.

AMERICAN ACADEMY OF PEDIATRIC DENTISTRY (1985)

Pediatric dentistry also known as pedodontics and as dentistry for children and adolescence is that type of dentistry deals with preventive and therapeutic oral health care of children from birth to adolescence. It also includes special care for special patients beyond the age of adolescence who shows mental, physical and emotional problems.

BOUCHER (1993)

Type of dentistry includes having a child to accept the dentistry. Prevention, Detection Restoration of Primary and permanent dentition, Applying preventive measures for periodontal therapy, dental caries prevalence, intercepting and correcting the areas of malocclusion.

AMERICAN ACADEMY OF PEDIATRIC DENTISTRY (1999)

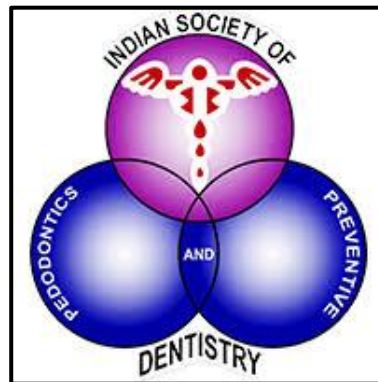
It's defined as an age related dentistry which deals with primary and comprehensive, preventive and therapeutic oral health care of infants and children through adolescence including those with special oral health care needs.

HISTORY⁽²⁾

- **1563-64 – Eustachius-** Illustrated the permanent and deciduous dentition

- **1737 - Gerouldy** -Explained theories of tooth eruption and exfoliation
 - **1763 - Joseph Hurlock**-Published 1st book on child dentistry
 - **1764 -Robert Bunon** Known as ‘Father of pedodontics’ explained importance of deciduous teeth.
 - **1900** - Few children were treated in dental office with little or no instructions for postoperative care
 - **1926 - Dr Samuel Harris** Formed Detroit study club
 - **1927** - To promote child dentistry, Detroit study club was renamed as American Society for the promotion of Dentistry for children.
 - **1932** - American society for the promotion of dentistry for children stated that in 1928, 15 dental schools provided no clinical experience with children and 22 schools had no idea in this area.
 - **1935** - 6 graduates and 8 postgraduates programmes were started in pedodontics
 - **1940** - The American society for promotion of dentistry for children changes its name to American society of dentistry for children.
 - **1941** – Children’s dental health day was celebrated at Cleveland and children’s dental health week was celebrated at Ohio.
 - **1942** - Effect of topical fluoride application was described and the council of dental education recommends that all dental schools have pedodontics as part of curriculum.
 - **1945** – First artificial water fluoridation plant was started at Michigan
 - **1947** - American academy of pedodontics was formed for scientific focused organization concerned with dental health of children
 - **1948** – The council of American dental association formally recognized the American board of pedodontics which certified candidates in the practice of dentistry for children
 - **1949** – 1st week of Feb. was designed as National children’s dental health week
 - **1960** – 18 graduates and 17 postgraduates’ programmes were started in pedodontics.
 - **1964** – “ Crest” became first fluoridated tooth paste approved by American dental association
 - **1967** – International symposium on child dental health was held at London
 - **1969** – International academy of dentistry for children was established
 - **1974** – The international workshop on fluorides and dental caries reduction stated that fluoride supplementation should be started at 6 month of age after birth.
 - **1981** – February was declared as National children’s dental health month
 - **1984** – American academy of pedodontics was renamed as American academy of pediatric dentistry
 - **1995** – A new definition was adopted for the specialty of pediatric dentistry
 - **2003** – American academy of pediatric dentistry established policy statement on oral health risk assessment timing and establishment of a dental home
 - **1920**- Calcutta dental college & hospital, 1st dental college started by Dr. Rafiuddin Ahmed “ Father Of Dentistry In India”
 - **1925**- “The Indian dental journal”
 - **1926**- Dentistry as a subject was changed to 3 yr course
 - **1927**- “All India dental association”
 - **1935** – B.D.S Licentiate in dental science becomes bachelor in dental surgery
 - **1948**- The dentist act
 - **1949**- Indian dental association (IDA) dental council of India
 - **1950** – Pedodontics started in India. Government Dental College , Amritsar starts Pedodontics as a specialty
 - **1978**- Pedodontics for undergraduate. Pedodontics is introduced as a specialty for undergraduates
 - **1978**- PGI (Chandigarh) introduced pedodontics
 - **1979** – On 24th November, Indian society of Pedodontics & preventive dentistry, the association of Indian Pedodontics holds the 1st conference. Dr.B.R.Vacher is made the “Father of Pedodontics in India”
 - **1982**- GDC Mumbai starts the specialty
 - **1985**- CODS Manipal starts the specialty
 - **1982** – Indian Society of Pedodontics and Preventive Dentistry becomes an affiliate member of IADC.
 - **1988**- As per DCI rules it is started treating as different entity
 - The association of Indian pedodontists held its first conference on the **24 November 1979** where it was named as the Indian society of pedodontics and preventive dentistry (ISPPD)
- **INDIAN SOCIETY OF PEDODONTICS AND PREVENTIVE DENTISTRY (ISPPD)^(5,7)**
- Its constitution was drafted by Dr. Amrit tewari.
 - Contributions by Dr.B.R.Vacher made him unanimously made the life patron of society.
 - M.I.Gauba was elected first president of society.

- Dr. Amrit Tewari - first general secretary and Dr.H.S.Chawla - first editor of journal



Emblem of ISPPD

- It is the national society specifically concerned with the oral health of children in India. It aims to improve oral health in children and encourage the highest standards of clinical care.
- The emblem is based on the famous triad of Keyes (1960). One circle represents the tooth, the other the bacteria and the third diet. The shaded area of inter-section of the circles represents dental caries. The Stress given is that for caries to develop all the three factors are essential; caries cannot occur if one factor is missing. Incidentally, this area of inter section of circles takes the form of Triangles. The triangle connotes two aspects
 - (i) It represents delta, which is the sign of dentistry,
 - (ii) It depicts the Pedodontic triangle as given by Wright (1975).

The three corners of triangles are indicative of-

- (a) Child,
- (b) Mother (parent) and
- (c) Dentist.

This triangle represents 1:2 transactions for the management of children. The top circle of keys in the emblem carries symbols of the emblem of the Indian dental Association (IDA) - Staff of Aesculapius with wings of serpents encircling around it. The staff of Aesculapius stands of captor of authority and represents the professional authority of association. The serpents show the power of healing since serpents ages back have been used for healing. Hippocrates adopted this symbol and we have adopted it with two serpents entwined around the staff in opposite directions. The wings on the staff represent the spread of knowledge. The wings have 6 small and 3 large divisions as in the IDA emblem.

THE AMERICAN ACADEMY OF PEDIATRIC DENTISTRY –

The American Academy of Pediatric Dentistry (AAPD) is the membership organization representing the specialty of pediatric dentistry. It's 7,000 members work in private offices, clinics and hospital settings and serve as primary care providers for millions of infants, children, adolescents and patients with special health care needs.

The AAPD serves and represents its membership in the areas of professional development and governmental and legislative activities.



Emblem Of The American Academy Of Pediatric Dentistry

AIMS OF PEDIATRIC DENTISTRY⁽⁵⁾

- To promote best physical, mental and dental health of the child.
- To recognize, prevent and treat dental diseases.
- To encourage dental profession at all limits to utilize every means at its disposal
- To ensure that each new generation of children in future will require less dental treatment than its predecessors and such treatment can be carried out simply and easily.

OBJECTIVES OF PEDIATRIC DENTISTRY⁽⁵⁾

- Main Objective is Prevention.
- To guide child step by step to gain positive attitude

3 groups of responsibilities.

- Towards Patient
- Towards Community
- Towards himself/herself

RESPONSIBILITY TOWARDS PATIENT⁽³⁾

- He should use good judgment in planning and executing a good and accurate treatment.
- Treatment should be performed to the best of his abilities and a fair fee should be charged.
- Must be able to handle the children well. Inability to manage them may defeat all attempts to perform high quality dentistry.
- Emphasis must be placed on prevention
- Must convey the value of good dentistry and that good dentistry for children is an investment in future health.
- He/she should be able to answer patient and parent inquiries intelligently with correct factual knowledge.
- Must give instructions regarding proper oral hygiene, adequate diet, carbohydrate restriction etc.
- Children's dentistry demands the use of diagnostic aids as well as correct interpretation of the findings both in emergency and routine problems.
- Pedodontist should have a good relationship with the paediatricians and physicians practicing in the same area so that he/she can refer the patient in case of any medical problem.

RESPONSIBILITY TOWARDS COMMUNITY⁽³⁾

- He should instill in people a better appreciation for the value of dentistry by educating children and parents about dental health through public dental health programs.
- He/she should be the instigator and key worker in all community programs dealing with children's dental health.
- Programs should be continuous whether preventive or corrective and should be repeated periodically.
- Children's dental health day or week should be celebrated once a year, though it is effective but for long lasting impact, people should be reminded more frequently.
- To meet the needs of those who cannot afford private dentistry programs must be established.
- Community dental program should embody two types of service:

1. PREVENTIVE

2. CORRECTIVE

PREVENTIVE PROGRAMS⁽³⁾

EMPHASIZING NEEDS-

- The need for community dental care as expressed by the prevalence of dental caries, periodontal disease and malocclusion must be presented to community leaders.
- The sequelae of dental neglect must be emphasized.

TEACHING PREVENTIVE METHODS-

- Oral hygiene- the importance of oral hygiene and home care including proper tooth brushing should be demonstrated which should be followed by children's participation.
- Dietary factors- the role of carbohydrate in producing dental caries must be stressed. Importance of balanced diet and limiting carbohydrate usage between meals should be stressed too.

FLUORIDE PROPHYLAXIS-

Need for topical fluoride applications should be presented to the public, community water fluoridation in the fluoride deficient water supply should be executed by proper campaigning.

PREVENTION OF MALOCCLUSION-

The public must be educated about the deleterious effect of occlusion due to early loss of primary teeth unless remedial measures are taken.

SOURCES OF EDUCATIONAL MATERIALS-

- Many agencies whether local or national can offer varying types.
- There are many ways in approaching the public in an educational program-
- Talks before small group
- School projects
- Poster essays and other types of contests.
- Free X-rays or examination in large gatherings.
- Posters and advertisements on public places.
- Newspaper articles, radio and T.V. programs.
- Moving pictures and puppet shows.

CORRECTIVE PROGRAMS

- Corrective programs generally imply the treatment of dental caries.
- Habit breaking appliances.
- Myofunctional appliances.
- Some dental programs should be started in schools, public health buildings etc.
- Stress should be given on treating and preserving the first permanent molars.
- A large scale program should include treatment of preschool children as well.

RESPONSIBILITY TOWARDS HIMSELF/HERSELF

Dentist should acquire two desirable attributes-⁽³⁾

1. ego
 2. humility
- EGO should make him proud of his chosen profession. A profession that has contributed to the alleviation of pain and suffering.
 - Realization of this fact should give him the confidence necessary for his professional career.
 - This in turn should give him dignity to assume his rightful place in community
 - He should have sufficient humility to realize that with increased ability comes increased responsibility.
 - A dentist can never stop learning. His skills and knowledge should continue to grow.
 - He should be honest to himself and render service to the best of his ability.
 - An effort should be there to establish liaison with public school and private schools, teachers and administration.
 - He has the responsibility towards his family to earn a comfortable livelihood from it.

SPECIFIC DIFFERENCES B/W CHILD AND ADULT PATIENT- PHYSIOLOGICAL AND ANATOMIC DIFFERENCES-⁽⁵⁾

- Body size
- Body fluids
- Respiratory system
- Cardiovascular system
- Urinary system

BODY SIZE

- Lesser drug is needed to reach an effective plasma level and less is needed to produce toxicity in children due to small body size
- Height and weight of children are less as compared to adults. Their proportion also differs than adults.
- Child weight increases by about 20 times from birth to adulthood and height by about 3 and a half times.
- Ratio of body surface area to body weight is almost 7 times greater in neonates than adults.
- Smaller the patient, higher the basal metabolic rate oxygen consumption and fluid requirements

BODY FLUIDS

- Child's TBW (total body water) is 80% of body weight and an adult's is 50-60%. This has direct bearing on pharmacokinetics of water soluble medications. Because these drugs are distributed to a relatively larger volume once absorbed, a larger dose is necessary to achieve a therapeutic effect in a small child.

Total body fat also varies.

- Premature infant-1% of body weight is fat
- Normal newborn-16% of body weight is fat
- 1yr old-22% of body weight is fat
- 4yr old- 12% of body weight is fat.
- 10-11yr- 18-20% of body weight is fat

Lipid soluble drugs such as barbiturates and diazepam are distributed to the fat tissues. Therefore decreasing their effective plasma levels. The child with the smaller % of body fat thus requires a smaller dose of lipid soluble drug.

RESPIRATORY SYSTEM

- Relatively large head, narrow nasal passage,
- Smaller diameter of glottis and trachea
- Increased risk of airway obstruction.
- Tongue is proportionally larger. Large mass of lymphoid tissue, more copious secretions and loose glottic tissue further compromising airway
- Makes difficult to manage child during sedation,
- General anaesthesia or respiratory emergency.
- Smaller bony thorax and soft sternum provides a less stable base for the ribs and intercostal muscles.
- Ribs are more horizontal than in adults and do not allow much chest expansion as do the more vertically curved adult ribs.
- A child cannot compensate as readily as an adult by increasing ventilatory volumes by increasing the chest expansion. So a child is more dependent on the diaphragm as the primary muscle of respiration.
- Thus care should be taken not to impede diaphragm movement, which might occur when the child is made to lie supine or with head low because the abdominal contents will place gravitational force on the diaphragm.
- BMR in children is double that of an adult thus requiring greater oxygen consumption and CO₂ production.
- Respiratory rate is higher due to immature alveolar system and higher metabolic rate.

RESPIRATORY RATES-

Newborn – 30 to 60/min

1 yr – 20 to 35/min

5 yr – 20 to 25/min

15 yr – 15 to 20/min

Adult – 12 to 20/min

CARDIOVASCULAR SYSTEM

- Relative blood in children is greater in children at birth and decreases with age.

Newborn-85ml/kg

Adult- 70ml/kg

- Heart rate is highest in infants.
- Parasympathetic tone is more pronounced in children due to immaturity of sympathetic nervous system.
- In a newborn peripheral circulation is very much poorly developed. So uptake of intramuscular injections are low.
- About 40% of the cardiac output in children contributes to the cerebral blood flow, compared to only about 29% in adult.

HEART RATE-

Newborn-115-170/min

1yr- 90-135/min

5yr- 80-120/min

15yr- 70-100/min

Adult- 70/min

SYSTOLIC B.P-

60-75mm/hg

96mm/hg

100mm/hg

120mm/hg

120-125mm/hg

URINARY SYSTEM

- Level of urine concentration by the kidneys is very much low in neonates. Therefore infants require more free water per day. Infant and young child may become rapidly dehydrated.
- GFR of an infant is 30-50% of an adult due to less mature glomeruli and lower blood pressure.
- Reaches adult level by 3-6 months.

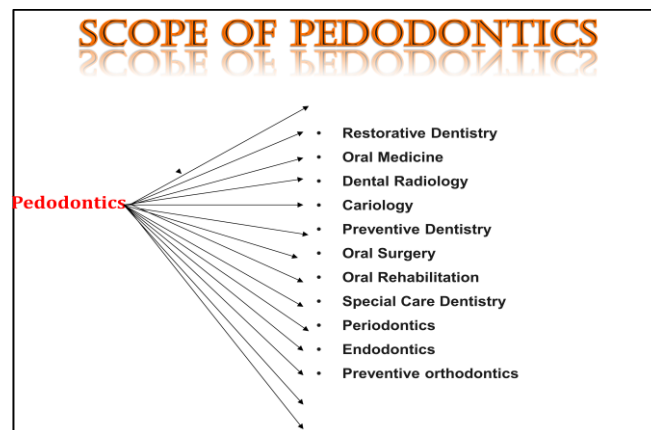
- Tubular reabsorption and tubular secretion also vary and mature to adult levels during the first few months of life.

EMOTIONAL DIFFERENCE⁽⁴⁾

- The major difference b/w treatment of children and an adult is the treatment relationship.
- Treatment relationship b/w dentist and adult patient is one to one whereas in case of child patient is one to two with the child being the focus of attention of the dentist as well as parents.
- This is represented by the PEDODONTIC TRIANGLE as given by WRIGHT.
- Child occupies the apex of triangle as in focus of both dentist and parent.
- All the three are inter related
- Recently society has been added, meaning that the influence of the society on the child has to be considered affecting the treatment modalities.

DIFFERENCE

- Children exhibit a fear of unknown.
- They do not to rationalize
- Behavior management modalities differ.
- Children have less concentration time. Treatment should be restricted to not more than 20-30mins and preferably during morning and avoided during their nap time.



- Pedodontics encompasses a variety of disciplines, techniques, procedures and skills that logically share a common basis with other specialties, but are modified, transformed or adapted to the special needs of children and adolescence and those with special health care needs.
- Paediatric dentistry concentrates on the integration of appropriate didactic and clinical knowledge from various specialties into a framework of quality oral health care for children.
- It deals with parents in their formative years, exhibiting rapid growth and development. Therefore a pedodontist is in an excellent position to alter the growth pattern and resistance of oral tissues to diseases.
- Pediatric dentists have extended services to fulfill the needs of the special child including the physically, mentally and medically handicapped.
- They also have the good fortune of being important team member in the children's hospital and in the management of cleft lip and palate patients and other such ailments.

PRESENT TRENDS DEAL WITH:-⁽⁶⁻⁹⁾

- Preventive dentistry
- Child psychology and management
- Child abuse and neglect
- Special care dentistry

CHALLENGES OF PEDIATRIC DENTISTRY IN 21ST CENTURY-⁽²⁾

- Preventive dentistry including understanding the caries process as it relates to such factors as nutrition, sealants, water fluoridation, topical fluorides, fluoridated toothpastes and home care.
- Infant oral health
- Acid itch techniques, sealants and composite resins.
- Dentistry for disabled patient and other children with special needs.
- Early orthodontic diagnosis and treatment.

- Expanding problem with fluorosis
- More sophisticated modalities of pain and anxiety control such as sedation techniques.
- Sophistication of radiographic techniques and machinery.
- Eating disorders and their dental implications.
- Informed consent and risk management.
- Infection control
- Early predisposing factors to TMJ problems in adolescents and adults.

LASERS-

Laser is an acronym for light amplification by stimulated emission of radiation.

- The process of laser occurs when an excited atom can be stimulated to emit a photon before the process occurs spontaneously.
- Two delivery systems are used in dental lasers-
- Flexible hollow wave guide
- Glass fiber optic cable

Types of lasers-

- Hard laser- longer wavelength laser producing thermal effect.
- Soft laser- provide cold thermal low energy wavelength

Application of laser in pedodontics-

- Caries detection by laser induced fluorescence
- Caries removal
- Prevention of enamel and dental caries
- Pit fissure sealants
- Bleaching of vital and non vital tooth
- Etching and bonding agents
- Curing light activated resins
- Cavity preparation and pulp therapy.

NANODENTISTRY-

Nanodentistry will make possible the maintenance of comprehensive oral health by involving the use of nanomaterials, biotechnology (including tissue engineering) and, ultimately, dental nanorobotics (nanomedicine).

RESULTS: When the first micrometer-sized dental nanorobots can be constructed within 10 to 20 years, these devices will allow precisely-

- controlled oral analgesia,
- dentition replacement therapy using biologically autologous whole replacement teeth manufactured during a single office visit, and
- Rapid nanometer-scale precision restorative dentistry.

CLINICAL IMPLICATIONS: New treatment opportunities may include-

- Dentition renaturalization,
- Permanent hypersensitivity cure,
- Complete orthodontic realignments during a single office visit,
- Covalently bonded diamondized enamel and
- Continuous oral health maintenance through the use of mechanical dentirobots.

AIR ABRASION-

(Micro abrasion or kinetic cavity preparation) it is a method of tooth structure removal that is considered to be an effective alternative to the standard dental drill.

- In 1943 Dr.Black began his pioneering.
- Air abrasive technique is the use of compressed air to propel aluminum oxide particles with such force as to be able to cut tooth structure in simple terms it is a simple sandblaster.
- Clinical uses are class I, II, III, IV and V cavity preparation. Sealants and preventive restorations.
- Removal or composite and amalgam, repair of composite and porcelain veneer margins.

RADIOVISIOGRAPHY-

This is recently developed dental imaging dental radiographic system first described by Dr.Francis Mouyen, a french dentist.

Comprises four basic components-

- DPU-display processing unit
 - A printer
- Very recently developed is stand alone and PC version.

ADVANTAGES-

- Substantial dose reduction,
- Production of instantaneous images,
- Control of contrast, edge and image enhancement.
- No need for developing,etc

CONCLUSION:

Indeed, Pediatric dentistry is a specialized field that goes beyond traditional dental care to address the unique needs of children. Its scope includes various disciplines aimed at ensuring the oral health and well-being of young patients. Here's a breakdown of some key aspects which includes Behavior Guidance, Care of Patients with Medical Conditions and Disabilities, Supervision of Orofacial Growth and Development, Caries Prevention, Sedation and Pharmacological Management, Hospital Dentistry. By addressing these diverse aspects, Pediatric dentists play a vital role in promoting oral health and ensuring positive dental experiences for children, setting the foundation for a lifetime of healthy smiles.

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