A Comprehensive Review on Materials Used in Various Specialized Areas and Disciplines of Dentistry: Analyzing Their Economic Feasibility and Biocompatibility.

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Abstract

The initial phase of digestion involves the crucial process of mastication, where teeth play a pivotal role. Beyond their functional significance in breaking down food, teeth are intricately tied to human articulation, speech, and facial aesthetics. Well-maintained teeth contribute to facial symmetry, attractiveness, and self-assurance, impacting an individual's overall well-being. Dental health not only boosts confidence but also stimulates the jawbone during chewing, enhancing bone density and strength. This interconnection between dental health and various aspects of life underscores the fundamental importance of maintaining healthy teeth. Dentistry, as a response to this imperative need, has evolved into specialized branches such as prosthodontics, oral and maxillofacial surgery, endodontics, periodontics, and orthodontics. Each branch relies on specific materials tailored to its requirements, emphasizing the ongoing development of cutting-edge materials. This comprehensive review delves into the extensive array of materials used across dental specialties, exploring their properties, applications, and the critical considerations of biocompatibility and economic feasibility. The importance of choosing materials that offer long-term value while considering economic implications is highlighted. Biocompatibility assessments ensure materials are compatible with the human body. In summary, this review provides a detailed examination of dental materials, emphasizing their merits and demerits in light of biocompatibility and economic considerations. It serves as a valuable resource for policymakers, practitioners, and patients in selecting materials that ensure the sustainability and accessibility of dentistry for all. The exploration of these pivotal concepts contributes to shaping the future landscape of dental care.

Keywords
Dentin adhesives, Orthodontics, Prosthodontics, Smart materials, Biocompatibility.

1. Introduction
Human teeth are crucial for the consumption of food and are also interconnected with human speech and facial aesthetics. Undeniably, teeth have a significant impact on our everyday existence. Dental conditions such as tooth decay, the partial or complete loss of tooth tissue, and other negative consequences resulting from accidents or the aging process are inevitable. Consequently, artificial dental materials have been created and are presently employed to address and rectify issues affecting human teeth (Zhou and Zheng 2002). Dental science is developing at a young age due to the need to maintain healthy teeth. We can see how dentistry has developed over time from the table below. Numerous specialist parts are being produced daily as dentistry develops. Orthodontics, periodontics, prosthodontics, oral and maxillofacial surgery, and other specialized fields are included. All of them utilized various materials, including metal, ceramics, composites, nanomaterials, smart materials, and others. Therefore, we must acquire the necessary expertise to select the appropriate material for a certain term. In this essay, we cover these topics in terms of their applications. The historical trajectory of dentistry is venerable and far from nascent. Its evolutionary progression can be discerned conspicuously through a comprehensive exposition encapsulated within Table 1.

Table 1.Majumdar (2002) and Krishnan and Davidovitch (2021) describe the development of modern dentistry. This table shows how dental knowledge gradually increased between 1778 to 1900.

Discovered By	Year	Discovery
John Hunter	1778	One of the first dental textbooks was written
Levi Spear Parmly	1820	Revealed that the first gap in the enamel is so small that it cannot be seen until it is specifically searched for.
Charles Gaine of Bath	1858	Authored the first book devoted solely to dental abnormalities.
Norman William Kingsley	1880	A book named "Oral Deformities" was released."
John Nutting Farrar	1887	An investigation investigating physiological and pathological changes in animal tissues in regulating teeth was published in an article.
Edward Hartley Angle	1900	First orthodontics specialty course was given

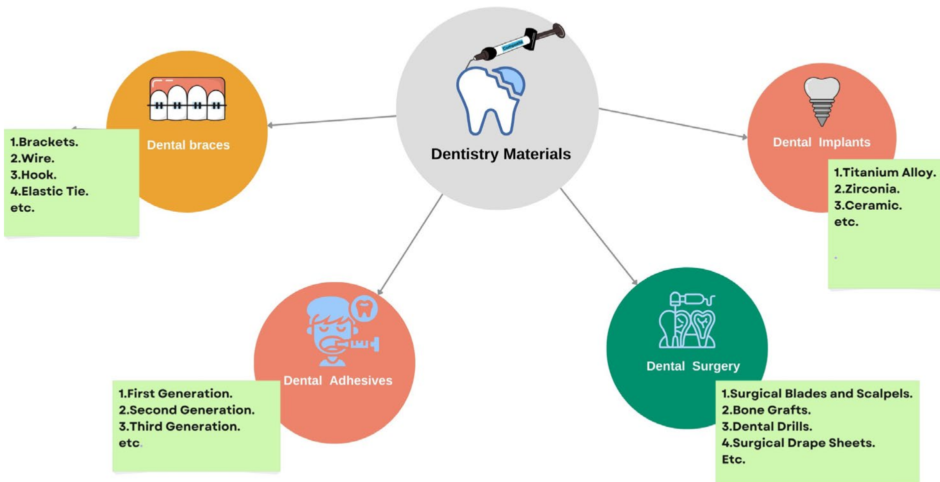

Figure 1. Different areas of dentistry and their respective materials.

Within Figure 1, diverse domains of dentistry and the materials employed therein are delineated. A prerequisite for judicious material selection lies in an intimate understanding of their inherent properties contingent upon their intended applications.

2. Types of Dental Materials

2.1 Dentin Adhesives

Dentin bonding has only recently become trustworthy after over 20 years of successful and widespread usage of enamel bonding in dentistry. Dentin/enamel adhesives come in a variety that is now offered on the market. Currently, total-etch and self-etch are the two main methods for bonding resin to dentin. In dentistry, the word "dentin adhesion" is more significant (Swift et al. 2002).

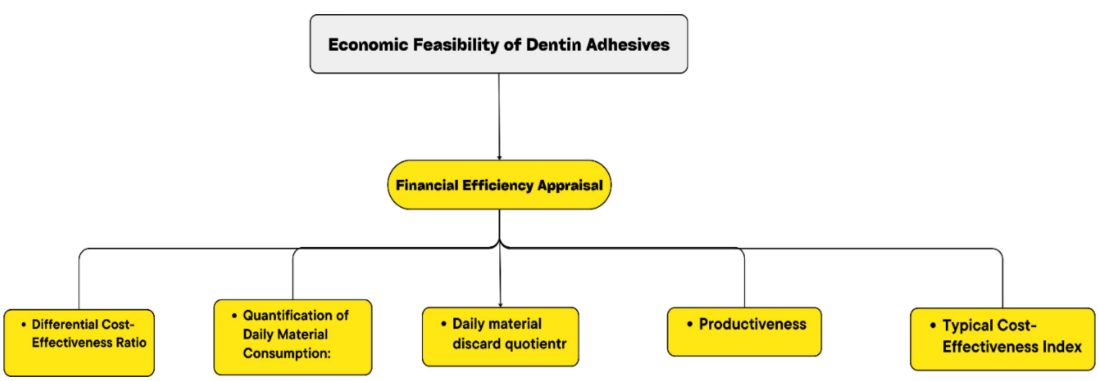

Figure 2. Economic Feasibility Parameters of Dentin Adhesives.

Table 2. There are a total of eight generations of dentin adhesives, according to Navyasri et al. (2019) and Swift Jr (1998). The table lists the characteristics, benefits, drawbacks, and commercial products of these eight generations.

Generation	Composition	Advantages	Limitations	Commercial products Name
1st	Cyanoacrylates with glycerol phosphoric acid dimethacrylate resin	Boosts hydroxyapatite's association with calcium ions	Subpar clinical outcomes	Scotch bond, Cervident, Palakov
2nd	Halophosphorous esters of unfilled resins like HEMA or Bis-GMA	Ionic bonds with Ca for dentin adhesion	Weak and unre-liable dentin bond strength	Clearfil, Prisma Universal Bond
3rd	Conditioner, Mirage bond, Gluma bonding system	Alters or eliminates smear layer for resin to reach dentin	Uncertain perfor-mance, even in lab studies	Scotchbond 2, Gluma, Tenure
4th	Resin-dentin composite with acid-resistant poly-mer	More bonding agents compared to previous generations	Pulpal irritation from dentin etch-ing by phosphoric acid	PermaQuick, Ultradent, ProBond
5th	BIS-GMA, HEMA, GPDM, ethanol, glass, sodium, silica, quinone	One-step process applying primer and adhesives	Collagen network after phosphoric acid treatment lacks hydroxy-apatite	One-Coat Bond, Prime and bond
6th	20% phenyl-p in 30% HEMA solution in water	Combined etching and priming reduce working time	Limited endurance and bond strength compared to recent genera-tions	Adper Prompt L, One-Up Bond F
7th	G-BOND, Clearfil S3, One Coat 7.0, Xeno V	Simple one-step process	Reduced bond strength and shelf life due to water permeability arou-nd resin tags	Ibond, Xeno IV, Optibond All-in-one
8th	Mixture of 4-META, MDP, MDTP without HEMA	Nano-fillers for deeper resin monomer penetration	Sensitive to nano-filler concentration and size.	G-Premio bond, All Bond Universal

Dentin adhesives by generation are shown in the table 2. It also includes the make-up of each generation. Additionally mentioned are advantages, restrictions, and the names of the brand-name products. Dentin adhesives are used in dentistry to fillings. One can choose their adhesive based on their needs using the information from the table.In assessing economic viability, we can examine the cost of dental adhesives. Pricing estimates originate from various brands, with fluctuations dependent on the specific brand. In addition, the variables influencing the economic viability are delineated in Figure 2, elucidating their intricate impact on feasibility. The analysis suggests that brand nomenclature significantly influences pricing rather than their generational classification. Examples of such brands include Single-Bond Universal (SB), Tetric N-Bond Universal VivaPen (TN), OptiBond All-In-One (OB), and G-Premio Bond (GP). A notable observation reveals that TN commands the highest price among its counterparts, while SB has the lowest financial requirements. When delving into the financial metrics in terms of USD per milliliter, the pricing is 16.5 for SB, 106.8 for TN, 16.8 for OB, and 19.2 for GP (Banjar and Nassar 2022).

By employing these parameters, one can easily evaluate the economic sustainability of dentin adhesives. These benchmarks offer a convenient method to measure the cost-effectiveness and financial aspects linked to the utilization of dental bonding materials. The use of these parameters streamlines the assessment of the economic feasibility of different dentin adhesives, ensuring a swift and effective analysis.

2.2 Orthodontic Treatment Materials:

Orthodontics is a scientific field that focuses on diagnosing, preventing, and treating dental issues such as misaligned jaws, unequal teeth, and irregular biting patterns. Dentofacial orthopedics, a specialty area of dentistry, aims to repair abnormalities in facial growth. Jaw and tooth misalignment are currently widespread issues. According to the American Association of Orthodontics (AAO), 50% of individuals have malocclusions that might greatly benefit from orthodontic treatment. To address this urgent issue in the field of orthodontics, researchers from several disciplines are working together to explore cutting-edge materials and approaches (Hassan et al., 2021). The procedural framework encompasses in figure 3 at a meticulous examination of scholarly literature, financial analysis, and contemplation of variables such as treatment duration, maintenance, and patient satisfaction. The orthodontist's preferences, insurance provisions, and the pivotal aspect of long-term durability contribute to a holistic evaluation of costs and benefits. The ultimate determination seamlessly incorporates fiscal deliberations, ensuring the selection of orthodontic treatment materials that are economically viable for optimal patient care.

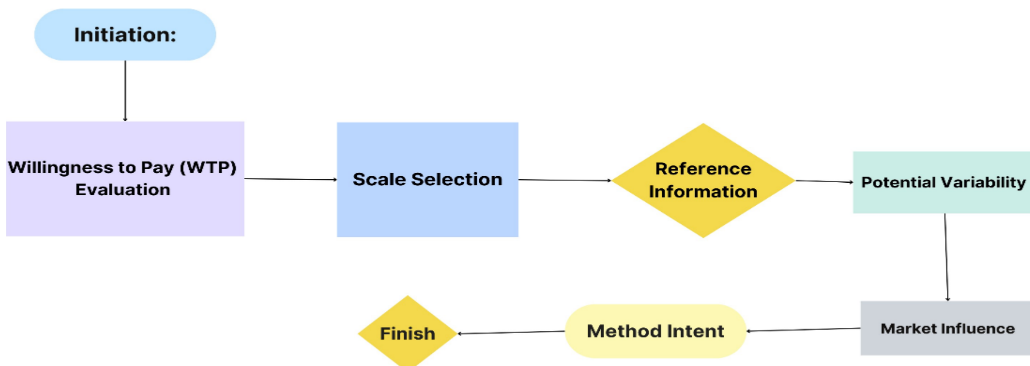

Figure 3. Workflow to Evaluate the Economic Feasibility of Orthodontics Treatment Materials.

Table 3. According to Zakrzewski et al. (2021), several kinds of materials are still being used in orthodontics nowadays. The table lists many types of materials along with their qualities and uses in orthodontics.

Materials	Property	Applications
Fullerene-like tungsten sulfide nanoparticles (IF-WS2).	Self-lubricating coatings.	Orthodontic stainless-steel wires.
SS, NiTi, and β-Ti alloy.	Non-precious metal alloys.	Orthodontic arches.
Shape memory polymers	Light-activated photoactive nanoparticles.	Orthodontic wires.
303, 304, 316, 317, 17-4 PH. Conventional type 316 L austenitic stainless steel.	Low cost, higher modulus of elasticity, and good biomechanical properties,	Orthodontic brackets.
Silver Nanoparticles (AgNPs) Coating	Preventing the growth of *Streptococcus mutans*	Orthodontic elastomeric modules, orthodontic brackets, and wires, and others.
Chitosan	Non-toxic, biodegradable, biocompatible, and has antibacterial properties.	Mouthwashes.
Nitrogen-Doped Titanium Dioxide	Antimicrobial activity,	Brackets.
Geckel	Biometric adhesives	Orthodontic appliances
Copper Oxide	Physically and chemically more stable.	Arch wires and brackets coating.

In our evaluation of orthodontic treatment materials, we employed the Willingness to Pay (WTP) method, which involves a cost-benefit analysis. The assessment of WTP was carried out using a payment scale method in a computer survey design, chosen instead of an open-ended format. The chosen scale ranged from \$0 to \$1500, taking into account the improbable situation of practices charging more than this for the represented appliances (Rosvall et al. 2009). Our goal was not to establish pricing but rather to disclose the perceived value of orthodontic appliances, with the aim of emphasizing differences within the same category for better comprehension by raters.

2.3 Prosthodontics dental materials:

Prosthodontic treatment aims to revolutionize smiles by utilizing long-lasting, non-removable artificial replacements to replace and restore teeth. This method guarantees a high degree of satisfaction for dental professionals and patients alike. Through the wonders of fixed prosthodontics, an uncomfortable and unhealthy bite can be transformed into a durable and enduring masterpiece, vastly improving the overall appearance of the smile. This approach ensures that both dental professionals and patients will be extremely satisfied (Rosenstiel et al. 2022). The examination of cost-effectiveness in prosthodontic materials encompasses a thorough evaluation of expenditures and advantages across diverse options, as illustrated in Figure 4. Crucial factors, including durability, aesthetics, maintenance, and patient satisfaction, play a pivotal role in gauging the economic viability of prosthodontic materials. This assessment directs the choice of materials that not only yield optimal clinical results but also prove cost-effective for both practitioners and patients.

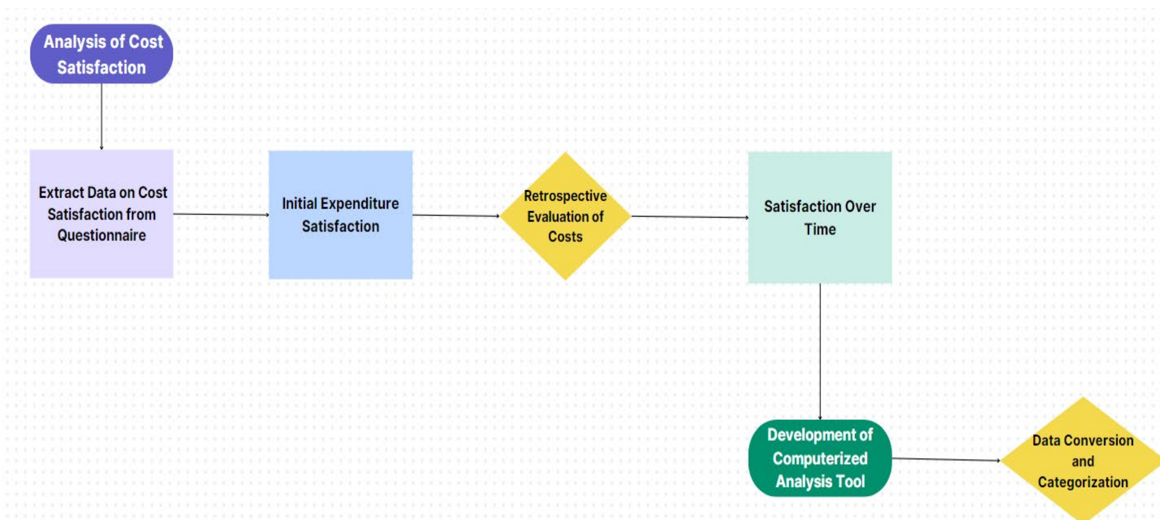

Figure 4. Cost-effectiveness analysis of Prosthodontics Materials.

Table 4. Wang et al. (2015) claim that numerous types of nanomaterials are utilized in prosthodontics. The table lists the various types of nanomaterials and their useful characteristics for prosthodontic applications.

Materials	Property	Materials	Property
ZrO2	Possesses better elastic modulus, flexural strength, and hardness than titanium alloys and HA, and has good abrasion resistance, physiological corrosion resistance, and biocompatibility.	Cobaltchromium-molybdenum alloy	Its mechanical characteristics and resistance to corrosion are superior to those of stainless steel or gold alloy.
Alumina, YAG.	High-transparency ceramics	Titanium alloys	Exceptional qualities that resemble those of real human bones
Nano-TiO2 ceramics.	Ceramics made of nano- TiO2 have a 13,000 kN/mm2 hardness.	TiN, ZrO2/Al2O3, Si3N4 / TiO2, and ZrO2 /SiO2	More resistant to wear than Ti alloy.
Carbon nanotubes (CNTs)	Omechanical and electrical characteristics.	Nanostructured bilayered ZrO2/Al2O3-13TiO2 on biomedical Ti13Nb-13Zr alloy.	Show 200 and 500 times more wear resistance than monolayers of Al2O3-13 TiO2 and ZrO2respectively.

Polymethyl methacrylate (PMMA).	High hardness, stiffness, discontinuous deformation, biological qualities, aesthetic properties, and ease of processing are examples of good mechanical properties.	Ti, Ti6Al4V, and CoCrMo.	Enhanced adherence of osteoblasts.

It has been acknowledged that the advancement of materials science will determine how prosthodontic technology develops in the future. Nanomaterials have proven essential in the advancement of prosthodontics' clinical technology and fundamental scientific knowledge. However, these materials require some sort of property. All of these fixed prosthodontic materials must meet the requirement that they remain in the mouth cavity permanently for an extended period of time without the patient's capacity to remove them. Therefore, it is crucial to understand how biocompatible dental alloys are. The technical word for these materials is cytotoxicity. For this area of dentistry, it should be advised to use inert and biocompatible materials (Elshahawy and Watanabe 2014).

2.4 Oral and Maxillofacial Surgery Materials:

Surgery is a term that can refer to a variety of manual techniques, although it is most frequently used to describe practical treatments that include severing, mending, and dressing living tissues. Although the word" oral" refers to the mouth, even in the 1950s and 1960s, those who established oral surgery as a subspecialty of dental surgery in the UK did not limit themselves to conditions affecting the mouth or procedures performed there. The diagnosis, treatment, and management of disorders affecting the jaw, face, and neck are all included in the specialty of surgery known as maxillofacial surgery. The phrase" maxillofacial surgery" denotes a wider spectrum of surgical specialties (Pedlar and Frame 2007). Any irregularities or issues with the facial region can have a substantial negative influence on a patient's entire quality of life because the maxillofacial region is so important to human health. Researchers are extensively studying biodegradable polymers as potential bone scaffolds due to their excellent biocompatibility and established ability to stimulate bone generation. However, restrictions including insufficient mechanical strength, variable rates of disintegration, and immunological reactions brought on by the breakdown products of the polymers prevent the practical utilization of these polymers. Modern non-biodegradable materials are currently used in maxillofacial surgery for guided bone regeneration, dental implant treatments, and the stabilization of fractures or osteotomies in order to address these issues. The assessment of economic viability for materials employed in oral and maxillofacial surgery, illustrated in Figure 5, encompasses a thorough examination of expenses and advantages associated with diverse alternatives. Considerations such as durability, surgical efficacy, patient recuperation, and prolonged maintenance are instrumental in establishing the economic feasibility of these materials. This scrutiny directs the choice of surgical materials that not only yield optimal clinical outcomes but also prove cost-effective for both healthcare professionals and patients.

Table 5. There are numerous materials utilized in oral and maxillofacial surgery, according to Ngo et al. (2021) and Pacifici et al. (2016). The table lists many types of materials along with their uses, drawbacks, and benefits.

Materials	**Applications**	**Limitations**	**Advantages**
u (Hydroxyapatite) HA-poly L-lactide (PLLA)	Orthopedic surgery, oral and maxillofacial surgery, plastic and reconstructive surgery, neurosurgery, and thoracic surgery.	Not enough mechanical strength	Particularly, mechanical strength and deterioration time.
Vitallium /CoCrMo	Usage to replace the midface bone.	Its use is not advised without firm fixation.	Its use is not advised without firm fixation.
Stainless steel (Iron-Chromium-Nickel Based Alloys)	Uses for maxillofacial implants.	Corrosion and implant failure with late-onset.	It is affordable and simple to produce.
Gold implants	Middle ear and upper lid closure in lagophthalmos brought on by facial nerve paresis.	Extrusion, allergies, and migration.	Has enough vigor and resistance to corrosion,
Titanium	Reconstruction of the maxillofacial skeleton.	Expense, and perhaps due to aesthetic concerns with titanium's gray tint.	Stiff internal fixation.

The table 5 shows the various types of maxillofacial procedures, such as orthopedic surgery, thoracic surgery, oral surgery, plastic and reconstructive surgery, and neurosurgery, as well as the rebuilding of the maxillofacial skeleton. These operations are frequently performed. In addition to titanium, these surgeries also use Vitallium stainless steel, gold implants, etc. owing to the advanced characteristics of these materials.
To confirm the economic viability of materials used in oral and maxillofacial surgery, one can utilize the outlined steps. Validating these steps enables the selection of appropriate materials tailored to specific purposes.

2.5 Materials in Periodontics:

Periodontics can be defined as the field of study focused on the tissues that support the teeth. These tissues include the alveolar bone, root, cementum, periodontal ligament (supporting tissues), and gingiva (investing tissue), collectively known as the periodontium. Within dentistry, there is a specialized branch that specifically deals with the diseases associated with these tissues, known as periodontics (Reddy 2017).

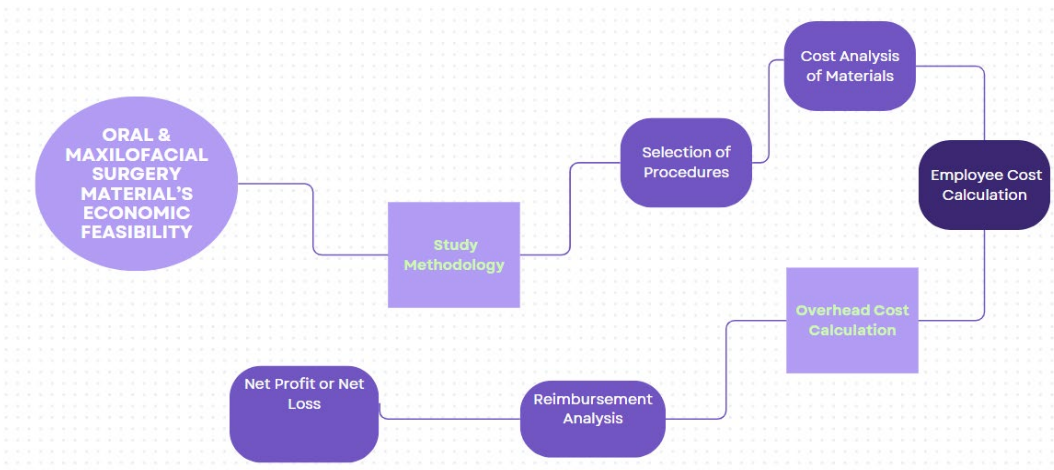

Figure 5. Oral and Maxillofacial Surgical Material's Economic Feasibility Analysis.

From the table 6 that shows several types of nanoparticles are employed in periodontics. For example, triclosan-loaded nanoparticles, silver nanoparticles (AgNPs), zinc oxide (ZnO) nanoparticles, as well as nanohydroxyapatite (n-HAP), and various other types. These are employed in bone grafts, various periodontal disorders, and other significant applications. An array of dental materials assumes bespoke roles in oral maintenance. Chlorhexidine valiantly contends with the menace of plaque, Nano-Hydroxyapatite gracefully facilitates the intricate process of bone grafting, and Zinc Oxide Nanoparticles, with finesse, curtail bacterial proliferation sans detriment to human cellular integrity. Chitosan-laden Tripolypeptide diligently addresses the nuances of periodontal maladies, while Silver Nanoparticles, ensconced in resinous armor, elegantly engage in a skirmish against Streptococcus mutans. The versatile Triclosan-loaded Nanoparticles, with judicious adaptability, orchestrate a symphony of regulated medication release, collectively constituting an opulent tapestry of avant-garde dental health strategies.

The in-depth scrutiny of the economic ramifications of periodontics materials encompasses a holistic assessment, taking into account elements such as cost-effectiveness, prolonged sustainability, and influence on patient results. This evaluation serves to discern the economic viability of periodontics materials, providing guidance for practitioners and decision-makers in the judicious selection of materials that harmonize clinical efficacy with fiscal prudence, as delineated in Figure 6.

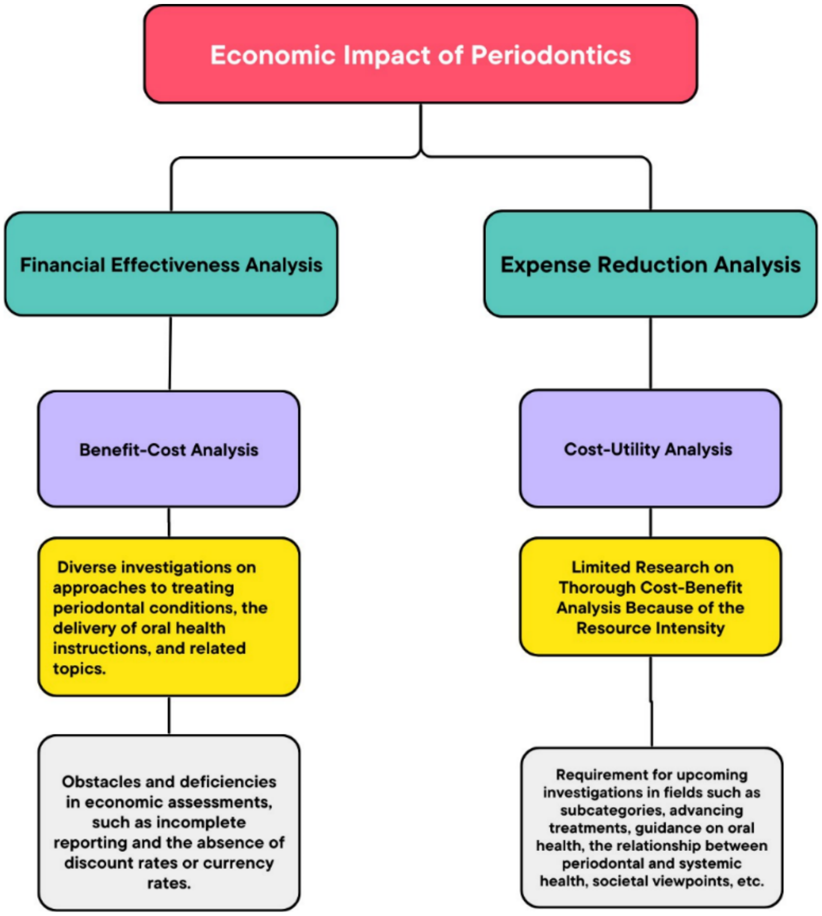

Figure 6. Economic Impact Analysis of Periodontics Materials.

Table 6. Different types of materials are being used in periodontics according to Jayakaran and Arjunkumar (2013), Gouthami Avula et al. (2019), and Bapna (2021) depending on their properties. The table lists some of the materials used in periodontics along with their intended uses.

Materials	Applications	Materials	Applications
Chlorhexidine	It prevents the buildup of plaque.	Nano-HAP (n-HAP)	Bone graft
Zinc Oxide (ZnO) Nanoparticles:	Utilized to modify surfaces diminish viable bacteria, and these bacteria have no harmful effects on human mesenchymal cells or osteoblasts.	Chitosan loaded-Tripolypeptide (TPP)	used as a local treatment for period-ontal disease
Silver Nanoparticles (AgNPs)	Used to treat Streptococcus mutans in vitro when they were coated with methacrylate resins for antibacterial purposes.	Triclosan loaded Nanoparticles	Utilized extensively for regulated medi-cation release.

2.5 Smart Materials Used in Dentistry:

Smart materials have qualities that can be changed in a controlled way by stimuli like stress, temperature, moisture, pH, electric or magnetic fields, according to definition and universal agreement. The capacity to revert to the initial state following the removal of the stimulus is a crucial component of intelligent behavior (McCabe et al.2011)

Table 7. Different smart materials utilized in contemporary dentistry were described by Badami and Ahuja (2014) and Sandhu, Bansal, and Jafari (Sandhu et al.). The table details these smart materials, their smart behavior, and their use in dentistry

Materials	**Applications**	**Smart behaviour**
Nickel Titanium smart alloy	Orthodontic wires.	“Superelasticity” and “shape memory.”
Amorphous calcium phosphate (ACP)	Bases/liners, orthodontic adhesives, as pit and fissure sealants, and as endodontic sealers.	This response includes composites related to pH.
Glass-ionomer cements	Restorative materials	GICs respond actively to their surroundings.
Polyethylene glycols	Can be applied to wounds to apply pressure using pressure bandages.	The process of shrinking involves giving a material a basic memory and making it such that it will contract when it is in contact with liquids.
Zirconia	Most current innovation in the dental ceramic’s family, utilized in dental crowns	Transformation toughening.

The tabular presentation comprehensively delineates an array of dental materials, delineating their specific applications and distinctive intelligent functionalities. The Nickel Titanium smart alloy, applied in orthodontic wires, manifests both "Superelasticity" and the capacity for "shape memory." Amorphous calcium phosphate, employed in bases, orthodontic adhesives, sealants, and endodontic sealers, illustrates a proclivity for responsiveness to pH-associated composites. Glass-ionomer cements, serving as restorative materials, proactively engage with their surrounding milieu. Polyethylene glycols, utilized in pressure bandages for wound care, manifest a memory-induced contraction process prompted by contact with liquids. Zirconia, a state-of-the-art dental ceramic employed in crowns, is distinguished by its "Transformation toughening." This succinct recapitulation accentuates the versatile applications and unique attributes of these dental materials across diverse clinical contexts.

3. Biocompatibility of Dental Materials:

The oral and maxillofacial environment is intricate and diverse, featuring distinct demands and biocompatibility concerns contingent on specific applications. While most areas in the body where biomedical materials are utilized maintain a relatively constant temperature and chemical composition under normal conditions (absent infection or inflammation), the oral environment presents notable variations in temperature, pH levels, and the chemical composition of ingested food. These temperature extremes, ranging from the cold of ice cream (0°C) to the heat of hot coffee (90°C), can give rise to compatibility issues, including thermal expansion, alterations in mechanical properties, or the breakdown of bonding. The pH levels in the microenvironment surrounding bacteria responsible for dental caries may drop as low as 2.2, whereas gastric secretions exhibit pH values ranging from 1.0 to 3.5, with stomach acid registering at 0.8. Despite being outside the normal physiological conditions, the exposure of intraoral materials to gastric contents due to reflux or regurgitation stemming from medical conditions or bulimia poses a distinctive biocompatibility challenge that may necessitate consideration under certain circumstances (John 2007). The assessment of biocompatibility in dental materials encompasses an in-depth analysis of their harmonious interaction with living tissues. This evaluation encompasses scrutinizing characteristics such as cytotoxicity, genotoxicity, immunogenicity, and the propensity for allergic responses. The implementation of these assessments guarantees that dental materials adhere to rigorous safety standards, averting potential harm to patients and fostering the advancement of dental solutions that are not only biocompatible but also patient-centric, as depicted in the accompanying figure 7.

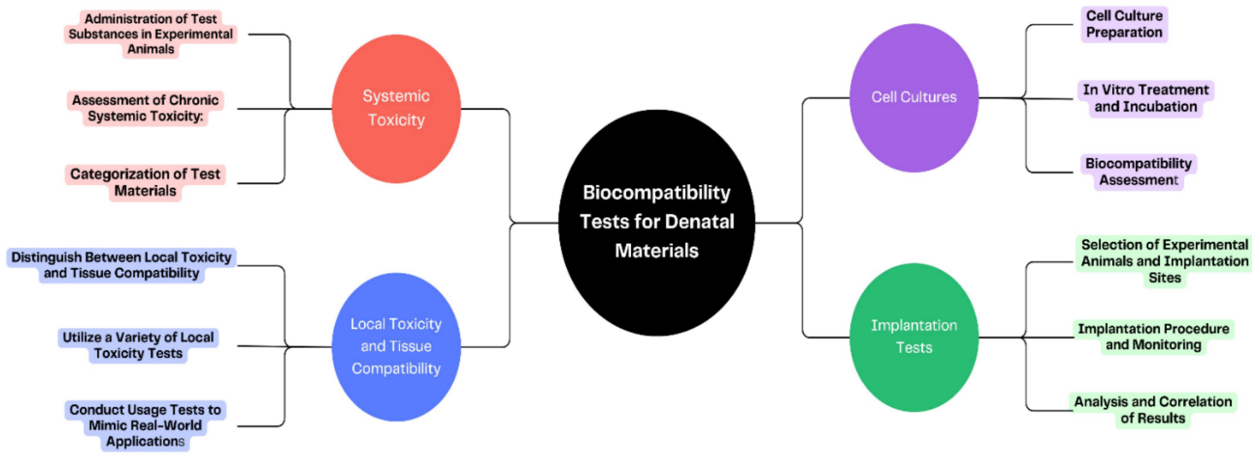

Figure 7. Biocompatibility Tests of Dental Materials Including Features.

Henceforth, dental materials must function adeptly in order to endure these challenging conditions. These materials must undergo rigorous testing protocols to assess their compatibility within this exceedingly demanding environment. The International Organization for Standardization (ISO) is a global coalition comprising national standards bodies, recognized as ISO member bodies. Currently, there are established national standards for assessing the biocompatibility of materials. ISO guidelines such as ISO 7405 and ISO 10993 provide recommended standard procedures for the biological evaluation of dental materials. In essence, these guidelines stipulate that it is the responsibility of the dental material manufacturer to choose suitable tests based on the material's intended use and the known or assumed toxicity profile of the material or its components. Additionally, manufacturers may opt for one cytotoxicity test over another due to factors like cost, experience, or other considerations. The testing process involves four levels: new materials should undergo initial cytotoxicity and secondary tissue screening tests before progressing to extensive animal experimentation and clinical trials. Ultimately, the interpretation of test results should consider the manufacturer's intended use for the material (Murray et al. 2007).

4. Results and Discussion

The curation of materials stands as a pivotal undertaking within the realm of dentistry. In our comprehensive analysis, an ample reservoir of data has been provided to facilitate the streamlining of selection processes for individuals within this professional domain. The nuanced comprehension of diverse mechanical properties assumes paramount significance in elucidating the criteria governing such selections. Ensuring dental materials harbor a baseline of mechanical fortitude becomes imperative for their resilience in the dynamic oral environment. Table 8 furnishes an illustrative comparative portrayal of the tensile and mechanical attributes inherent in dental materials.

Table 8. Characteristics inherent to various dental substances encompass their mechanical attributes (Fraunhofer and Anthony 2013).

Dental Material	**Tensile Strength (Mpa)**	**Compressive Strength (Mpa)**
Dental Amalgam	54.7	318
Dentin	51.7	297
Enamel	10.3	384
Porcelain	24.8	149
Composite	45.5	237
Die Stone	7.7	48
Ca(OH)2	1	10.3
Glass Ionomer	18	150

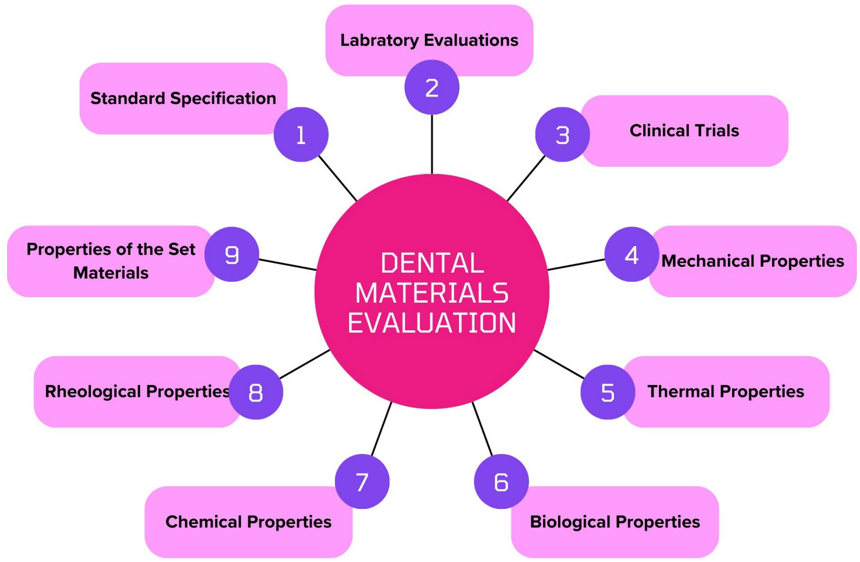

Figure 8. Different Ways to Evaluate Dental Materials.

In the assessment of dental materials, various examinations are conducted to scrutinize their qualities. These tests serve as a discerning mechanism, providing valuable insights for an accurate screening process. Figure 8 elucidates a conceptual framework for the evaluation of dental materials through a diverse array of examinations.

5. Conclusions

The evaluations undertaken in this analysis have thoroughly explored the unique characteristics, applications, benefits, and drawbacks of a varied range of materials. Armed with the insights gleaned from this all-encompassing examination, individuals can skillfully navigate the selection process, opting for materials tailored to specific dental requirements. The integration of nanotechnology in contemporary dentistry has catalyzed the advancement of state-of-the-art materials, representing a notable leap forward in dental innovation. The accompanying data table's user-friendly nature expedites the compilation of a curated list of recommended readings, streamlining the assimilation of relevant knowledge. Furthermore, the review encompasses valuable materials, with their utilization steadily growing day by day. Given the extensive assortment of choices, the meticulous selection of the most suitable material emerges as a crucial task in today's dentistry landscape. Therefore, it becomes imperative for practitioners to comprehend the intricate characteristics inherent in each material for well-informed decision-making in the continually evolving field of dental care.

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