



### RESEARCH ARTICLE

#### THE IMPACT OF VARIOUS FACTORS ON THE SURVIVAL OF DENTAL IMPLANTS - A REVIEW

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#### Abstract

The most promising treatment choice now available in dentistry in order to replace a missing tooth is dental implant. Survival of an implant to a greater extent depends on the local, systemic conditions and also on certain habitual influences of the patient. Hence, for an implant treatment to be successful, it is very crucial to choose patients who do not possess any local or systemic contraindications to this therapy. Treatment planning for dental implants involves the assessment of patient-related risk factors, prior to the formulation of a treatment plan. The clinician must have thorough knowledge and understanding on the risk factors involved in the process, in order to advise patients who are considering implants as their treatment options. This paper presents a summary from all the obtainable resources of the literatures demonstrating the factors influencing the survival of dental implants, which might help in better understanding of the factors necessary for the success of dental implants.

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#### Introduction:-

Edentulous Individuals can be treated with a fixed or removable prosthesis. These types of prosthesis are not convenient for a significant number of individuals. Dental implants are a boon in such cases. Nowadays dental implants are used as a treatment modality in majority of patients. In future, they will be significantly used for oral rehabilitation. A dental implant supports the dental prosthesis like a crown, bridge, denture or facial prosthesis in order to act as a bone anchor.<sup>1</sup>

Dental implants were first introduced by Branemark in the 1970s. Since then, it has become a common choice of interest among the treatment options for missing teeth rehabilitation. However, these dental implants have several limitations, with former reports of failure rates ranging from about 1% to 19%.<sup>2</sup> Based on the time when the abutment was connected, these failures could be classified into early failure and late failure. The early failures occur before the application of functional loading. The early complications of implant include symptoms like bleeding, infection, and pain near the implant site. Late failures occur after the application of occlusal load or during the removal of the provisional restoration given in cases of immediate implant loading. The late failures display lack of osseointegration, infection of the peri-implant tissue, infection, and pain.

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There are few indications and contraindications for implant placements. The implant placement is contraindicated in patients with epilepsy, endocarditis, history of osteoradionecrosis, smokers, diabetic patients, children and adolescents. In patients with history of myocardial infarction, cerebrovascular accident, bleeding, heart transplant, immune suppression, active treatment of malignancy, psychiatric illness and in drug users, this treatment is absolutely contraindicated. Treatment planning for dental implants involves the valuation of patient-related risk factors preceding to formulation of a treatment plan.<sup>3</sup> This paper reviews about the effect of several local and systemic factors on the survival of dental implants.

#### **Local Factors**

1. Bone quality and quantity,
2. Implant shape,
3. Implant surface macro-structure Implant micro-structure (roughness)
4. Material biocompatibility

#### **Systemic Factors Diabetes Osteoporosis<sup>4</sup>**

1. Human Immunodeficiency Virus
2. Cardiovascular Disease and Antihypertensive Medications 3. Neurologic Disorders
4. Hypothyroidism.
5. Rheumatoid Arthritis Selective Serotonin Reuptake Inhibitors
6. Proton Pump Inhibitors

Medical contraindications of dental implant therapy are of two types:

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#### **Absolute contraindications**

#### **Relative contraindications:**

The simple presence of a disease, does not essentially preclude implant therapy or affect the long-term outcomes. When controlled, some disorders allow the implant survival that match with healthy patients.

<b>ABSOLUTE CONTRAINDICATIONS</b>	<b>RELATIVE CONTRAINDICATIONS</b>
Recent Myocardial Infarction	Adolescence
Valvular prosthesis surgery	Aging
Cerebrovascular accident	Osteoporosis
Immunosuppression	Smoking
Bleeding disorders	Diabetes
Active treatment of malignancy	Human Immunodeficiency virus positive
Psychiatric illness	Cardiovascular disease
Intravenous use of bisphosphonate	Hypothyroidism

#### **Local Factors Bone Quality And Quantity**

Bone quality denotes the amount and topographic relationship of both cortical and cancellous bone. A diagnostic tool is used to evaluate whether the bone tissue is sufficient for the implant placement and a prognostic tool is used to predict the probability of success or failure of the treatment.

Several factors have been reported to play a crucial role in obtaining osseointegration which can result in subsequent success of the implants. Higher rates of implant failure are observed in cases where the implant is placed in bone having low quality. Implants placed in posterior maxillary region have lower survival rates compared to the implants placed in the mandibular arch. This occurs mainly due to the difference in the bone quality among the two arches.

The posterior maxilla consists of thin cortical bone in combination with thicker trabecular bone. The hard cortical bone has low blood supply and the trabecular bone has low density, hence, they fail to provide a favourable host condition required for the good prognosis of dental implants.<sup>4,6</sup>

### ***Implant Shape***

The shapes of dental implants have evolved from traditional root forms to blade and subperiosteal designs. It has been one of the most contested aspects of design among the endosseous systems and may have an impact on implant biomechanics.

Implants can be parallel straight or tapered walled. The tapered type implants have better primary stability than parallel type, as they provide compression of the bone laterally and increases the stiffness of the interface bone.<sup>4,7</sup>

### ***Implant Length And Diameter***

Implant diameter is the dimension measured from the peak of the widest thread to the same point on the opposite side of the implant. They measure the dimensions of the thread. Implant diameter is not identical to the implant platform. The implant platform is measured at the interface of the implant connected with the abutment.

The use of wider diameter implants results in over instrumentation and generation of heat. The implants of diameter less than 5.0 mm can result in the lower heat production in the drilling process. The amount of heat released and distributed upon placement of an implant is unknown. The increased heat released by an implant of larger diameter gets distributed over a large osseous surface and the amount of heat received by each unit area of bone might be similar to that created from an implant of regular or narrow diameter. Studies show that implants with diameter of 5.0mm have high risk of failure compared to implants with diameter ranging from 3.75 – 4.0 mm.<sup>4,7</sup>

### ***Implant Length***

Implant length is the dimension from platform to the apex of implant. The larger implants have greater success rates and good prognosis. Hence, there exist a linear relationship between the length and the success rates of dental implants. Implants with 7mm length display higher risk of failure. The implant with short lengths are not recommended due to the occlusal load that must be transmitted and spread over greater surface area of the implant in order to prevent excessive stress at the interface. On long-term research, it was found that a dramatic increase in failures of implants was seen in cases with length shorter than 7 mm.<sup>4,7</sup>

### ***Implant Surface Macrostructure (Threads)***

It has been observed that, the surrounding bone experiences remodelling and makes woven bone in cases where the implants receive an optimal functional load. However, if the implant experiences extreme adverse stresses, then microfractures may occur in the alveolar bone inducing “osteoclastogenesis”. The bone formation required to fill in the damage takes time, meanwhile, the defect worsens, causes severe bone loss and eventually results in implant failure. It is very difficult to attain an optimal stress distribution and if the stress induced is too little or high, it can result in bone resorption. Hence, implant threads should be designed in such a way that the delivery of optimal favourable stresses is maximised and the amount of extreme adverse stresses to the bone implant interface is minimised. In addition, implant threads should provide better stability and more implant surface contact area.

Implants may be threaded or smooth surfaced, to improve primary stability. There are various thread designs available like “V”, square, buttress, reverse buttresses, spiral etc. and among all “V”, square or reverse buttresses shows better primary stability. Studies conducted by Stegna and colleagues on animals have proved that effect of thread type on peri-implant bone formation; Implants with square thread design has more bone implant contact and greater reverse torque movements.<sup>4,8,9</sup>

### ***Implant Microstructure***

In the field of implantology, surface treatment has shown incredible upsurge in the implant success rate. These methods are mostly performed in a condition different from that of natural condition. Hence, the tissue reaction towards this surface treatment should be learned thoroughly. The long-term success rate of an implant is determined by the surface and design of the implant. Thus, we can improve osseointegration by changing the implant surface topography.

According to the study conducted by Bruser et al on the bone to implant contact with different surface modifications in an histomorphologic analysis, it was found that SLA (Sand blast, large grit and Acid etched surfaces) treated implants showed bone to implant contact (50-60 %) in comparison to various other surface modifications like titanium plasma spray (30- 40 %) or electro polished implants (20- 25%). The acid etch implants and its

biomechanical properties are thereby improved with sandblasting. From the studies conducted by Lieat it was observed that SLA implants have higher removal torque values when compared to machined and acid etched implants.<sup>4,10</sup>

### ***Implant Material***

The implant material can be bio-inert or bioactive. Bioinert impression materials include CP Ti (commercially pure titanium) and Ti alloys. The bioactive materials contain ceramics such as hydroxyapatite, tri and tetra calcium phosphate, and bio-glass. Ti is the most commonly used material in dental implants over the past five decades. It is mainly due to its biocompatible property. Now, with advancements in technology, ceramic materials are used as implant substrates because Yt-stabilised tetragonal zirconia polycrystalline has improved mechanical properties like superior wear and corrosion resistance. It also has a higher flexural strength. Hence, their superior properties make them an alternative to Titanium.<sup>4</sup>

### ***Abutment Implant Connection***

Abutments can be connected to the implant in two ways, either internal or external. According to the conclusions from in vitro studies (Sailer, Sailer, Stawarczyk, Jung & Hammerle, 2009; Truninger et al., 2012), internally connected abutments showed greater stability. This biomechanical advantage seems clinically beneficial in terms of lower incidence of abutment screw loosening for internally connected abutments (1.5%) compared to the externally connected abutments (7.5%) (Gracis et al., 2016)

Implant in function is connected with prosthesis or restoration, the connection may be internal or external. In internal connection, the implant is inserted into the access hole in the implant plate form meanwhile, in external connection, protrusion located above the implant plate form is inserted into the recess in the apical part of the abutment. In internal hex design, the occlusal load is transferred through the implant body and the screw is protected from load. Hence, internal hex design is preferred over external hex design.<sup>4,11</sup>

### ***Systemic Factors Diabetes***

Characteristic nature is high blood glucose levels. In long run, proinflammatory cytokines and mediators like TNF $\alpha$ , IL 6 are released, creating a rise, this brings down osteoblast- osteoclast coupling, the two essential cells required for implant osseointegration. Similarly, diabetes also act on the ratio of receptor activator of nuclear factor  $\kappa$ -B ligand (RANKL) and osteoprotegerin (OPG), which are the prime regulators of osteoclast function. This ratio is destroyed and amplifies bone resorption in the case of hyperglycemia. Ultimately, these patients are liable to both systemic and localized infections, and hence are at a dangerous risk for osseointegration collapse due to infection.

Overall, these changes might be the reason for implant failure in diabetic patients. Therefore, diabetic control is estimated by determining the levels of glycosylated haemoglobin, haemoglobin A1c (HbA1c). In fact, dental measures exist for patients with uncontrolled diabetes, and the positioning of dental implants as well as non-emergency surgical procedures are limited by most clinicians.

Physicians measure hemoglobin A1C (HbA1C) levels every 3 months to estimate blood sugar level over preceding 2-3 months. The American Diabetes Association recommends an A1C level of 7.0% in patients with type II diabetes; goals, however, must be individualized.

Based on one of the study, which dealt with osseointegration rates in patients with uncontrolled diabetes, it was found that there was no major difference between patients with high or low HbA1c. Another research that involved 23 patients, who had around of 70 implants placed, with HbA1c ranging from 6 to 13.9, it was observed that there was no distinction in osseointegration among these groups. In both studies, implant existence rates were comparable, with no statistical differences among groups. However, with low sample sizes, it is tough to draw up definite opinion for implants in patients with poorly controlled diabetes. Osseointegration rates in all groups were similar, with no statistically remarkable differences. Even though these results are inspiring for osseointegration and short-term implant survival, marginal bone loss and long-lasting implant survival may be affected by diabetic status of the patient. This emphasises the importance to closely attend these patients for conservation and potential problems.<sup>4,5,12,13</sup>

***Osteoporosis***

Osteoporosis is a type of bone disorder with reduced bone mass, increased bone delicacy, and they are highly prone to fracture. The thin cortical bone and enlarged trabecular spacing is considered to impart higher implant failure. With age, the prevalence of osteoporosis increases. According to the epidemiological studies, it was observed that the bone loss arises after the fourth or fifth decade in both men and women. Osteoporosis is mostly seen in postmenopausal women on hormone replacement therapy. The bone density is low especially in maxillary (type IV) bone. The major apprehension about osteoporosis with respect to implant placement is the possibility that the disease may modify its bone quality, formation, or healing to an extent that osseointegration is improbable or incredible. In human histological studies, the osteoporotic bone displays reduced mechanical strength, alterations in trabecular architecture, lower mineral content, higher crystallinity, and increased carbonate-to-phosphate ratios.

Osteoporosis treatment generally includes an antiresorptive medication such as a bisphosphonate (BP) or denosumab (Dmab). Bisphosphonate and denosumab hinder osteoclast differentiation and function, reduces bone resorption and remodelling. However, most researches have failed to demonstrate its adverse effect on implant osseointegration or survival rates after bisphosphonate therapy. In patients with osteoporosis, osteonecrosis of the jaw (ONJ) and alveolar bone loss have been observed after the placement of dental implant. With the likely destructing effects of osteonecrosis of the jaw, accepted treatment guidelines should be followed, including avoiding non-emergency positioning of dental implants in patients on antiresorptive therapy for malignancies. Thoroughly informed consent is required from in patients on antiresorptive treatment for osteoporosis.<sup>4,5,12,13</sup>

***Human Immunodeficiency Virus***

Major changes in immune function is observed in patients infected with the human immunodeficiency virus (HIV). With the progress in disease, the patient may exhibit acquired immunodeficiency syndrome (AIDS)-related signs and symptoms, which include oral lesions and infections. The advances in therapy over the past 20 years have drastically changed survival rates for people with HIV. Even then, this disease remains a leading cause of death worldwide. Individuals who are HIV-positive survive much longer and have healthy lives. The regular causes of illness and death in people with HIV are alike to those of non-HIV patients, which includes heart disease, kidney disease, liver disease, diabetes, depression, and cancer. However, there is a practical connection between HIV-positive individuals and alterations seen in bone metabolism. Rationale for this are low calcium/vitamin D intake, low testosterone, alcohol and opiate abuse, smoking, depression, physical inactivity, and HAART (Highly Active Anti-Retroviral Therapy).

Up to the present time, there is very little evidence of the effect of HIV, and more specifically Highly Active Anti-Retroviral Therapy (HAART) therapy on osseointegration and long-term success and survival of dental implants. However, the authors inferred that prophylactic antibiotic treatment, the administration of highly active antiretroviral therapy, and control of the CD4+ T lymphocyte counts are the effective management and treatment for these patients.<sup>4,5,12</sup>

***Cardiovascular Disease And Antihypertensive Medications***

Heart disease is considered as the chief reason for death among men and women. Coronary heart disease is the frequent type of heart disease causing death of annually an average of around 370,000 people. The other types of cardiovascular disease, hypertension, atherosclerosis, vascular stenosis, coronary artery disease, and congestive heart failure directly effects peripheral blood supply, which in turn leads to deficient oxygen supply to local tissues, resulting in reduced fibroblast activity, collagen formation, capillary growth, and macrophage activity. This will have direct effect on bone healing and osseointegration. In a retrospective study analysis of nearly 7,000 implants, Alsaadi and co-workers observed the impact of local factors and systemic factors on the incidence of dental implant failures, up to abutment connection. They found that, factors such as cardiac diseases, coagulation problems, hypertension, or hypercholesterolemia, did not lead to the incidence of early implant failures.<sup>4,5,12,13</sup>

***Recent Myocardial Infarction / Cerebrovascular Accident***

Ischemia to the heart or the brain generates necrosis and functional deficits for an ample amount of time. Patient stability occurs with intervention and an ameliorating period of roughly 6–12 months after preliminary care. It is essential to avoid any stress, including any surgical procedures which could trigger post-ischemic complications for 3–6 months after initial stability. The dentist must wait until preliminary stabilization to avoid the high risk of complications following a myocardial infarction or cerebrovascular accident. The patient should follow up for dental care only if at least 6 months have passed since the ischemic incident and if they obtain the medical clearance. The

health care professional must be aware of any anticoagulant or thrombolytic therapy administered and understand that the desire for oral implants does not necessarily validate interruption of a therapeutic international normalized ratio (INR). Implant surgery is contraindicated in patient who have suffered a cardiac infarction within the previous six months. while undergoing implant surgery, patients with a history of angina should have glyceryl trinitrate tablets or sublingual sprays with them.<sup>5,12,13</sup>

### ***Valvular Prosthesis Placement***

Valvular heart disease is seen when the heart's valves do not respond in the expected way. Prosthetic valves restore function in patients with progressive congestive heart failure, systemic emboli, or endocarditis, but they are prone to microbial infections. Three forms of prosthetic valve exist: bio prostheses, mechanical valves, and homograft's or autografts. Except autograft all forms fall subject to endocarditis, as well as regurgitation, stenosis, and degeneration. The prevalence of prosthetic valve endocarditis hovers around 1% to 3%, and the greatest risk occurs within the first 3 months. By 6 months, the prosthetic valve endocarditis rate drops to 0.4%. With prosthetic valve replacement, stability occurs at least 6 months to 1 year after cardiac surgery. Invasive periodontal procedures should be absolutely avoided in order to prevent bacteraemia and possible subsequent valve loss. Depending on the type of valve used (mechanical or bio prosthesis [porcine]), the patient requires different drug regimens (anticoagulants or plasma volume elevators, respectively). Any dental treatment must take such medications into consideration. Once again, valvular heart disease does not directly affect implant outcome; however, the heightened risk of infection needs to be recognized.<sup>4,5,13</sup>

### ***Neurologic Disorders***

Since earlier times, the patients experiencing neurologic diseases have been considered as unsuitable candidates for dental implants. The prime reason for the exclusion has been associated with their negative approach to maintain oral health care, poor oral hygiene, oral parafunctions such as bruxism, harmful habits, and behavioural problems. The development in technology and improvised medications have allowed an enhancement in patient care and personal satisfaction, including the patients suffering from neurologic disorders. This enhancement in patients' emotional and social well-being has been a crucial factor in the reinstitution of dental implants, allowing them to work alike to their natural dentition. Unfortunately, there is lack of documentation, to contribute the use of dental implants in patients affected by neurologic disorders. In a prospective study, Ekfeldt et al evaluated the medium- to long-term outcome of dental implant therapy in patients suffering from neurologic disabilities. Twenty-seven patients with different disabilities and in need of prosthodontic treatment were treated with various implant-supported prostheses. Nonetheless, the authors concluded that implant therapy can be considered as a genuine treatment option for the rehabilitation of patients having neurologic disorders.<sup>4,5,12,13</sup>

### ***Hypothyroidism***

Hypothyroidism is a common endocrine disorder. It usually affects women of advanced age. As many organs have receptors for thyroid hormone, its inadequacy impedes with vast number of the body's metabolic processes. In addition to regulating temperature, generalized energy, metabolism, skin moisture, gastrointestinal motility, muscle metabolism, mental and memory ability, libido, and menstrual cycle, they also disturb bone metabolism. Thyroid hormone regulates adult bone mass and revives the production of insulin-like growth factor (IGF-1). This increases osteoblast formation and differentiation, and bone remodelling. Hypothyroidism causes retardation of bone regeneration, it proliferates fracture risk, and impairs fracture repair. Treatment for hypothyroidism includes prolonged use of levothyroxine, which has correlation with accentuated risk for osteoporosis and delayed healing of fracture in animal studies. Hence, this makes the condition and its therapy a cause for concern in patients seeking dental implants. Studies that investigated the survival rates of implants in patients with hypothyroidism did not demonstrate a suggestively higher rate of failure in comparison to the control patients.<sup>4,5,12</sup>

### ***Rheumatoid Arthritis***

Rheumatoid arthritis is an autoimmune disease in which the body's immune system produces inflammation that causes the synovium to stiffen, developing oedema and pain in and around the joints, gradually destroying the bone itself. Rheumatoid arthritis is usually followed by osteoporosis as a result of increased systemic bone turnover and anti-inflammatory or combined anti-immune treatment regimens. Even though the etiology of rheumatoid arthritis is idiopathic, there is documentation that states that genetics, hormones, and environmental factors are involved in the process. Genes associated to Rheumatoid arthritis include: STAT4, a gene which plays crucial role in the controlling and renewing of the immune system; TRAF1 and C5, two genes relevant to chronic inflammation; and PTPN22, a gene associated with both the development and progression of Rheumatoid arthritis. Individuals with

Rheumatoid arthritis with or without concomitant corticosteroid treatment will develop localized osteopenia and generalized osteoporosis in 30% to 50% of all cases. However, there is not enough documentation on the effect of Rheumatoid arthritis on osseointegration and dental implant. In a case series, Weinlander et al evaluated implant and prosthodontic treatment results of patients suffering from rheumatic disorders such as rheumatoid arthritis and connective tissue diseases (CTDs). The authors concluded that a high implant and prosthodontic success rate can be anticipated, even for patients with autoimmune rheumatic disorders such as rheumatoid arthritis and connective tissue diseases.<sup>4,5,14</sup>

#### ***Selective Serotonin Reuptake Inhibitors***

Selective serotonin reuptake inhibitors are the most advised antidepressants which accentuates the levels of serotonin in brain. They stop the uptake of 5-Hydroxy tryptamine (5HT) by inhibiting 5HT transporter. According to the recent studies, it was observed that there was a wider role for the Selective serotonin reuptake inhibitors, as 5-HT plays an active role in numerous pathways including that of bone metabolism. The results of this research suggested that Selective serotonin reuptake inhibitors may lead to an increase in the rate of osseointegration failure, although not reaching statistical significance. Osseointegration of implants is highly dependent on the quality of the recipient bone (Wong et al., 1995), and as Selective serotonin reuptake inhibitors seem to have a negative effect on bone formation (Battaglini et al., 2004; Gustafsson et al., 2006; Diem et al., 2007), the treatment may have a drawback on titanium implant osseointegration and survival rate.<sup>4,15</sup>

#### ***Proton Pump Inhibitors***

The proton pump inhibitors enable the elimination and therapy of acid-related conditions such as oesophageal, duodenal, stomach ulcers, NSAID-associated ulcer, gastroesophageal reflux disease (GERD) and Zollinger-Ellison syndrome. They are used along with antibiotics to prevent *Helicobacter pylori*, a bacterium in combination with acid which causes ulcers in stomach and duodenum. The prolonged use of Proton pump inhibitors can result in potential adverse effects, due to the effect of chronic acid suppression on the absorption of vitamins and nutrients. The gastric acid secretion can disturb the absorption of a number of nutrients, drugs, and vitamins, particularly Vitamin B12, iron, calcium, and magnesium. Recent researches displayed a possible connection between the use of chronic Proton pump inhibitors and increased incidence of bone fractures, caused possibly due to the decreased absorption of calcium. The most widely assumed mechanism is that, long-term use of Proton pump inhibitors results in reduced intestinal absorption of calcium, causing negative calcium balance leading to increased risk of osteoporosis, development of secondary hyperparathyroidism, increased bone loss and fractures. Although evidence exists on the negative effects of Proton pump inhibitors on bone, there is no sufficient proof on their effects on osseointegration and dental implants. Statistical analysis discovered that the failure rates were greater (6.8%) for people using Proton pump inhibitors as compared to nonusers (3.2%). Thus, the authors in their conclusion suggested that the intake of PPIs might increase risk of dental implant failure.<sup>4,16</sup>

#### ***Bleeding***

An elective surgery must not take place in cases where there is no appropriate haemostasis. Volume replacement is required with loss of 500 mL of blood. Uncontrolled haemorrhage occurs from a multitude of conditions, including platelet and clotting factor disorders. However, it is observed that it often initiates from drug therapy. Patients taking oral anticoagulants (e.g., aspirin, warfarin, clopidogrel, among others) for cardiovascular diseases must receive careful supervision of bleeding time and INR. Little risk of significant bleeding following dental surgical procedures in patients with a prothrombin time of 1.5–2 times is normal. Fazio and Fang recommends an INR of 2.2 or lower for surgical procedures. Lack of platelets due to infection, idiopathic thrombocytopenia purpura, radiation therapy, myelosuppression, and leukaemia may lead to bleeding disorders during or after surgery as well. The normal platelet count has a wide range, between 100,000 and 500,000/mm<sup>3</sup>. Mild thrombocytopenia, or 50,000–100,000/mm<sup>3</sup>, may produce abnormal postoperative bleeding. Levels below 50,000/mm<sup>3</sup> may lead to major postsurgical bleeding. The spontaneous bleeding of mucous membranes occurs below 20,000 cells/mm<sup>3</sup> and these patients often require transfusion before surgery. For most dental patients, the haematocrit is crucial to outpatient care only when values drop to roughly 60% of low normal range.<sup>5,17</sup>

#### ***Active Cancer Therapy***

The ionizing radiation and chemotherapy disrupt host defense mechanisms and haematopoiesis, although hits required to destroy rapidly dividing malignant cells. The patient on such regimens cannot mount an appropriate response to wounding from surgery, hence, implantation is prohibited. The total dose of ionizing radiation for cancer treatment ranges from 50 to 80 Gy. Very few researches have been conducted on chemotherapeutic effects and its effect on

implant survival. The Case reports on subjects with dental implants who then underwent cancer chemotherapy shows conflicting and adverse results.<sup>5,18</sup>

### ***Psychiatric Disorders***

In patients who will fail to comprehend and anticipate dental treatments logically, it is better not to advise implant as treatment option. Usually, mental illnesses are undiagnosed or unreported. Blomberg identified several conditions as incongruous with implant placement. These include psychotic disorders (e.g., schizophrenia), severe character disorders (hysteroid and borderline personalities), dysmorphophobia, cerebral lesions, and presenile dementia, as well as alcohol and drug abuse. There exist no biological reasons for patients with most of the above disorders to lose the implants (at least none that have been determined), however, certain case reports blame and dissatisfaction, removal of Osseo integrated fixtures, based on psychiatric factors. A patient who abuses alcohol or drug abuser may suffer from delayed healing as well as inability to recognize or accept realistic treatment outcomes.<sup>5,18</sup>

### ***Adolescence***

According to World Health Organization age groups within 10 to 19 comes under adolescents. In a growing individual, an implant may cause sequelae similar to that of an ankylosed tooth. It has been evident in a study conducted in pig model. Such teeth submerge during growth since they are unable to erupt to compensate for vertical growth of the alveolar process. Hence, a major apprehension in placing implants in adolescents is the possibility of relocation or displacement with time with respect to natural dentition. The placement of a rigid, implant-borne prosthesis might constrain the growth activity. According to the researches, it has been found that, the maxilla changes in all 3 planes of space. Hence, it is impossible to predict the implants behaviour in this situation. To prevent future complications and in order to enhance predictability, it is best to wait until cessation of growth before placement of an implant in young individuals.<sup>5,19</sup>

### ***Aging***

The elder individuals tend to have greater occurrence of local (xerostomia, ridge resorption) as well as systemic diseases (osteoporosis, diabetes), and may experience difficulty with muscular adaptation to prostheses. Alterations in mineral composition, collagen, bone morphogenetic protein content, and bone conformation takes place as one gets older. Delayed fracture healing and less tissue regeneration may occur as well. However, in majority of clinical investigations, it was observed that age does not correlate with implant failure after adjustment for other factors. Smith et. al., failed to associate age with implant failure in a retrospective study of 313 implants in 104 patients up to 88 years of age. Various studies shows that implant failure due to aging alone happens very rarely. Investigations observe comparable success rates between different age groups, and hence concluded that aging, by itself, does not affect survival of implants.<sup>5,20</sup>

### ***Smoking***

Cigarette by-products like nicotine, carbon monoxide, and hydrogen cyanide provoke toxic biological responses. In clinical dentistry, it was found that, smokers experience a number of problems. The blood fill in extraction sockets will be typically less in smokers, especially in the maxillary region, resulting in localized alveolar osteitis. Patients who smoke have less success rate after surgical procedures and they may even experience refractory periodontitis. During the maintenance phase, pocket depths increase, and clinical attachment levels tend to decrease. Several researches implicate that the use of tobacco can result in implant failure as well. More recent studies examine the effect of smoking in patients with treated periodontal disease. The results remain mixed. Smoking seems to have its primary negative effects on machined surface implants, on implants placed in less dense bone, and on implants placed in bone developed by bone grafting, such as a sinus or ridge augmentation procedure. Overall, smoking appears to diminish the implant success rate in maxilla. It was noted that smoking cessation prior to implant rehabilitation, helps to improve results. There is preliminary evidence suggesting the use of surface-modified fixtures, which might help in reducing the risk of implant failure in smokers.<sup>5,21</sup>

### ***Conclusion:-***

Dental implants are widely used and is considered as one of the best treatment option to replace the missing teeth. They are used effectively to replace single or multiple missing teeth as well as a completely edentulous jaw. Proper case selection and appropriate healing response is required, for an implant therapy to be successful. Not all edentulous cases provide good candidates for an implant therapy. Absolute medical contraindications exist and must be adhered to, in order to prevent any infection, implant failure, or even patient death. But there are cases where



medical conditions, if stabilized, does not interfere with healing; they are relative contraindications to elective oral surgery. Hence, thorough knowledge on dental implants and associated factors necessary for the survival of dental implants plays a crucial role in the success of dental implants.

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