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# PATTERNS OF DENTAL IMPLANT UTILIZATION AND CLINICAL OUTCOMES AMONG ELDERLY PATIENTS IN A NIGERIAN TERTIARY HEALTH INSTITUTION

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**Abstract**

As the global population ages, the demand for dental implant therapy among the elderly has risen significantly. This study explores the patterns of dental implant utilization and clinical outcomes among elderly patients in a Nigerian tertiary health institution. Aging brings about biological and physiological changes in the oral environment, leading to tooth loss and periodontal diseases. Dental implants have emerged as a viable treatment option for geriatric patients, but they come with unique challenges.

The challenges of providing dental implants to the elderly in developing economies are multifaceted. Firstly, advancing age can impact healing times, bone quality, and local bone conditions, affecting the success of implant procedures. Additionally, the presence of chronic systemic diseases further complicates treatment planning. The extended treatment duration and multiple appointments required for implant therapy may pose logistical challenges for older patients, particularly in a developing country context where financial constraints and dependence on caregivers are prevalent.

Moreover, the scarcity of clinical knowledge and expertise in dental implantology in Nigeria, coupled with the high cost of treatment and limited access to advanced technology, present significant barriers to widespread adoption. The study emphasizes that decisions regarding implant placement in geriatric patients should not be solely based on age but should consider a combination of economic, local, and systemic factors.

In conclusion, while challenges exist, implant treatment for elderly patients in developing countries is feasible with careful consideration of these factors. This research sheds light on the complexities of dental implant utilization in the geriatric population and highlights the need for improved education, accessibility, and affordability of implant therapy in developing economies.

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## 1. Introduction

Aging is a natural process that results in biological and physiological changes in the body. The oral environment is not spared of this natural sequence of events that sometimes result in loss of teeth [1-3] and periodontal diseases.[1] Tooth loss is never a pleasant outcome no matter the age. The resultant impact of tooth loss such as modifier of normal physiology with associated bone loss, impaired mastication, functional and sensory deficiencies of the oral mucosa, musculature and salivary glands [4] as well as the trauma, lowered self-esteem, dissatisfaction with appearance, and altered self-image often manifest in psychological and social problems that require readjustment [5]. The non-acceptance of edentulism and the widespread dissatisfaction with the traditional removable prostheses may have been pivotal in the growing research for more natural tooth replacement options. As the advancement in dentistry continues to spread rapidly, more options are becoming available to patients who seek a replacement for missing teeth. Dental implants and implant-retained prostheses are viable treatment options for dental patients, including older patients [6-9]. Dental Implant is an artificial root that is surgically implanted into the jawbone to support a single tooth replacement, fixed partial or complete denture, or maxillofacial prosthesis [10]. Available evidence seems to suggest a heightened acceptance rate of dental implants as permanent replacement options for missing teeth among geriatric patients [9].

However, geriatric dental patients pose unique challenges that are not routinely seen in younger patients. The difference in bone size, density, shape, and quality present unique opportunities for clinicians to consider when planning for implant replacement therapies in the geriatric patient. Besides, older patients presenting to the dental clinics may often have a constellation of medical, dental, social, and peculiar issues that can challenge the diagnostic and therapeutic capabilities of the dentist.[6]

Despite these setbacks, the popularity of implants in dentistry has risen in recent times and more clinicians and patients see the potentials for oral rehabilitation among the geriatric population. Consequently, there is a need to weigh the costs against the inherent advantages of implant therapy. Currently, there is a paucity of literature on geriatric implantology especially in developing economies. This article attempts to appraise the challenges associated with provision of dental Implants to the older age group, particularly in developing economies.

Description of the Geriatric population [11]

- Patients aged 65-74 are described as young elderly and are relatively healthier and active.
- Patients aged 75-84 years are the old or mid-old, vary in health status, and manage an array of chronic diseases.
- People 85 years and older are the oldest-old and are comparatively frailer

## 2. Challenges in Providing Dental Implant for the Geriatric Population in Developing Ecconomies

Although, dental care of the geriatric patient is similar to that of younger persons, it is modified by ageassociated changes, chronic diseases and medications [9]. The challenges of implant placement in developing countries are unique given the peculiarities of the environment. For geriatric patients, the argument may take a different dimension. In addition to the advancement in age and failing health usually seen in geriatric patients, the paucity of dental health care financing, costs, implant availability, inadequate clinical skills and skilled laboratory technologists all conspire to deny the geriatric population a more permanent dental prosthetic option.

### 2.1. Advancement in Age

Age itself is not a contraindication for implant placement, [12] as dental implants have been successfully placed in the elderly with good clinical and socio-economic outcomes [8] even in developing countries [13, 14]. While aging in itself does not preclude the clinician from restoring a patient's dentition with implants, it does present some challenges that are worthy of consideration. As a prognostic factor in implant success, age has been discussed by several researchers [9, 15, 16]. Older patients potentially have longer healing times, more systemic

health factors, and the likelihood of poorer local bone conditions [17] Clinical human studies on delayed bone healing with increased age have attributed a reduction in the number of osteogenic stem cells, reduced proliferation and differential potentials, and reduced local and systemic blood flow. The reduction in bone mass density associated with post-menopausal estrogen depletion confounds this problem, especially for women.

Moy and colleagues studied a total of 4, 480 implants in 1140 patients and concluded from the analysis that patients between 60-79 years (18% failure) had a significantly higher risk of implant failure compared to patients younger than 40 years (9% failure) [18].

Furthermore, reduced dexterity especially with dental prophylaxis seen in this age group may precipitate the worsening periodontal health already affected by age changes, and the advent of peri-implantitis as a natural sequela sets in [19, 20],. These considerations are reported findings that subject clinicians into considering alternative dental replacement options for geriatric patients.

### 2.2. Presence of Systemic Diseases

Specific endocrine and metabolic changes have been shown to be associated with aging. Decreased bone density, seen in osteopenia and osteoporosis, are both associated with aging and also cause bone loss [21].

It has been reported that older persons tend to have chronic comorbidities such as hypertensive cardiac disease, Cerebrovascular disease and diabetes [22, 23].

Caution has been advocated in the treatment of patients with questionable cardiovascular history especially with the use of local anaesthetic containing epinephrine [24]. Moreover, in the placement of implants, uneventful healing is desired. Older patients, theoretically, have potentially longer healing times, [25] even as the negative influence of chronic debilitating diseases in the healing of implants after surgery has been reported [26]. Clinicians must therefore subject the clinical decision of sinking an implant in patients with compromised health to a scale. Where necessary, dental implant treatment must be designed to address the needs of patients with peculiar challenges.

### 2.3. Treatment Duration

Implant procedures are usually not done within a short period or single appointment. They often require long periods and several appointments to complete. Older persons may not be very tolerant of long procedures or repeated appointments. In developing countries, the dependence on children at old age has been culturally established. Presumptions about the best care for elders and the source of financing are contingent upon social and historical models of family dependence [27]. Multiple visits for implant therapies often translate to more cost, hospital time, and reduced work hours on the parts of caregivers/children who accompany these older persons for clinic appointments. This obscures the need and desire for dental implants among older patients who are often apprehensive about the surgery required for the implants and are wary about the consequences on their already frail health. Andreescu [9] reported that older patients preferred the use of dentures over the placement of implants following an explanation of procedures. They also prioritized the treatments of other chronic medical conditions over dental implants.

### 2.4. Bone Quality

Bone quality is a principal reason for the differences in implant success at various sites in the mouth. It is the most important local factor for the successful treatment of implants in the mouth. By bone quality, bone density is implied. Bone quality is related to osseointegration while bone quantity affects the length of the implant which is important for stability and longitudinal success [15]. Theoretical evidence suggests that bone quantity and quality decline with increasing age. Mandibular cortical porosity has been reported following micro-radiographic studies in patients over 50 years of age [28]. This results in decreased bone quality available for osseointegration. Similarly, discrepancies in the horizontal dimension between the residual ridge of one jaw and the residual ridge

or teeth of the opposite jaw have been noted as common findings in the older population. This also presents a unique challenge in implant placement [21]. Long term denture users also have labial and buccal bone resorption that poses significant problems in prosthetic rehabilitation.

### 2.5. Clinical Knowledge and Expertise

Despite growing trends of dental implantology worldwide, dentists in Nigeria and most parts of sub-Saharan West Africa are significantly deficient in knowledge, skills, and expertise involved in dental implant therapy. Akeredolu, *et al.* [29] studied the knowledge and proficiency of dental implant treatment amongst dentists in Nigeria and reported that 98.7% of dentists had never used dental implants as a method of tooth restoration. A similar study that evaluated the practical knowledge of dentists reported similar findings. They noted that 71.8% of respondents reported the lack of practical experience as a significant barrier to practicing implant dentistry, [30] a fact that is given credence to by the largely theoretical based training, and little hands-on clinical experience undergraduate dental students are exposed to while in schoo.l [30, 31] While theoretical knowledge provides the instructional foundation for a clinical implantology [32], the need to complement this with clinical experience cannot be over emphasized; a deficiency which manifests in an apathetic approach to implant-based therapy by dental practitioners.

### 2.6. Cost of Treatment

Dental Implant restoration is not cheap. The cost borne on both patients and clinicians can sometimes be burdensome [29]. Health in Nigeria for instance is inadequately funded and considerably below average when juxtaposed with the health budgets of most countries with a similar population. The abrasive reality is that over 70% of total expenditure on health is financed by private individuals [33] and out of pocket expenses [34]. Geriatric patients who may already be plagued with managing multiple chronic illnesses may prioritize these over dental implants. Furthermore, the absence of a social welfare scheme for these “senior” citizens amplifies the obvious lapses in health access and care for these patients [35]. The dysfunctional public and private pension plan confound this problem as patients belonging to this age strata are denied the regular monthly remuneration of their entitlement, [33] which would ordinarily augment their health bills. Similarly, private entrepreneurial dentists who most times engage in the art and science of implant dentistry are discouraged by the expenses in the acquisition of implants kits. Ajayi [30] identified cost of implant kits and armamentarium amongst dental surgeons as principal reasons for not engaging in the practice of implants in Nigeria.

### 2.7. Technology

Current innovations in implantology have pushed the advancement of both surgical and prosthetic fronts, beyond the goals of restoring function [36]. Today, the standard is to provide function with long-term aesthetics that respects the parameters of hard and soft tissue biology and preserves the bony architecture around a functional implant [37]. Technological advancements like digital implant planning, computer guided implant surgery, CBCT technological software and digital impression software that dominate the implant space, are scarce in developing countries.

Furthermore, most dental equipment and consumables are produced and sourced from developed countries by clinicians in developing countries; the end users who are left with limited knowledge on the use of such technologies. Where there is knowledgeable manpower, it is only limited and relative. The plurality of this challenge is made evident when factors such as limited knowledge in operating and maintaining dental equipment, irregular power supply, and deficient manpower in the repair of these equipment. Moreover, the constant evolution of implant technology requires updated knowledge by both the clinician and laboratory technologist [38]. Frankly, this luxury may not be affordable to public hospital management and private practitioners who may prioritize other relatable daily expenses to cut cost and settle for the next best skill.

Acquiring knowledge of use of modern technology in developing countries is also not an easy feat. Occasionally, however, when the manpower and equipment is available, the desired complementing skills may be lacking, especially when challenging cases present, with dearth in know-how on the technician's part on how to effectively solve the issue result in unsatisfied patients and disgruntled clinicians from unsatisfactory prostheses. This deficiency is highlighted by poorly designed and aesthetically unsatisfactory prostheses, which results in dissatisfied patients and disgruntled clinicians.

Furthermore, in developed climes, support and incentives are made available by the implant companies to dental clinics, with regular and periodic training provided, and clinicians can horn their skills to meet contemporary demand [39]. These companies typically offer discounted prices to clinicians and provide hands on support to dentists. Developing countries, where the implant market is fledgling, do not have similar support and practitioners are forced to acquire implant kits and armamentarium in bulk purchase.

## 3. Conclusion

The challenges of implant treatment in developing countries remain enormous but not insurmountable. As implant treatment for dental prosthesis in developing countries gains popularity amongst geriatric patients, clinicians must balance this treatment choice on the overall desire and health of the patient, while evaluating his clinical and laboratory competence. Decision on whether or not to place an implant in the mouth of a geriatric patient should not be made on the background of age, but on a cocktail of economic, local and systemic factors.

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