Level of Knowledge and Challenges Associated With Practice of Dental Implants among Dental Practitioners in Selected Hospitals in South East, Nigeria

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Authors’ contributions

This work was carried out in collaboration among all authors. Author SCO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author ECO supervised the research work. Authors PCO, MIO and ROA managed the analyses of the study. Authors SCO and JE managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: This study is aimed at ascertaining the level of knowledge and challenges associated with the practice of dental implants among dental practitioners in selected hospitals in South East, Nigeria.

Study Design: the study employed cross sectional study design.

Place and Duration of Study: The research was carried out within six months (September 2018 to March 2019) in selected hospitals and clinics in South-East, Nigeria.

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**Methodology:** Data were collected using structural pretested questionnaire administered to 117 purposefully selected consenting respondents (Dental Professionals). Data were analyzed descriptively and inferentially using SPSS version 20. The hypotheses were tested at 0.05 level of significance and data generated were subjected to percentage findings presented by the use of tables. Data collected were analyzed and discussed.

**Result:** The result affirmed female respondents were more than male with 59.0%, indicating Dental Therapist as majority in proportion with 64%. On quality of implant shows 64.9% and 56.4% on comfort and function which indicates it as a good quality, 64.9% poor availability and 49.6% awareness and knowledge. While inferentially, using Pearson Chi-Square showed a significant relationship of 177.552; df = 16 @ P=0.05 between profession of respondents and knowledge of dental implant materials/devices types while using ANOVA showed a significant relationship with F =42.147; df =4 @ P=.05; knowledge of dental implant materials and assessment of dental implant to aesthetics on oral cavity, F =77.760; df =4 @ P=.05 and knowledge of dental implant materials and assessment of dental implant to retention on oral cavity, F =54.985; df =4 @ P=.05.

**Conclusion:** from the results obtained, accredited dental implant as an appliance capable of obviating most of dentures shortcomings which depends on contra-indication and indication of it, and its challenges in the profession. Although there are challenges associated with dental implant awareness and application in Nigeria. Recommendations and tips on successful further studies were given.

**Keywords:** Challenges; dentistry; implantation; knowledge; level; practice; profession; selection.

1. **INTRODUCTION**

The challenges encountered in dentistry for the treatment of edentulous patient shown that over 45% of the world substantial people above 65 of age are edentulous according to survey done by National institute of Dental Research, NIDR, [1]. Based on these fact, programmes were designed to treat and prevent the infectious and inherited craniofacial-oral-dental diseases and disorder that compromises thousands of human lives. Removable dentures and fixed bridges were commonly used for treatment of edentulous patients to restore their dentition. This partial denture derives its support from greater number of teeth and can be braced by components on both sides of the arch. But those having weak abutment tooth and cannot masticate properly, oral restoration can be improved with dental implant [2].

Dental implant is any biocompatible material or device placed in or on oral tissues to support oral prosthesis [3]. The common implant today is osseo-integrated implant, based on the discovery by Swedish professor, Per-ingvar Branemark which shown that Titanium can be successfully fused into the bone where osteoblast grows on and into the rough surface of the implanted titanium. This forms the structural and functional connection between the living tissue, bone and the implant, without long term soft tissue inflammation or ultimate fixture rejection. This process is regarded as osseo-integration [2] while Fibre-osseous integration is a tissue to implant contact with healthy dense collogenous tissue between the implant and bone [4]. Factors like biocompatibility of material, size of the gap between the implant and the bone, traumatic surgery and immobility are necessary to achieve a successful osseo-integrated bone to implant interface. Basically there are two classes of materials used for dental implant and they are metals and ceramics. Metals are co-based alloys (cobalt-chromium-molybdenum based alloy) and titanium (commercial pure titanium) while ceramics are inert (Aluminium, carbon and zirconia) and bioactive ceramics (calcium phosphate and bioactive glasses).

Therefore, this study ascertaining the level of knowledge and challenges of dental implants among dental professionals in selected Hospitals in South-East Nigeria is motivated by the researcher's observation during his visit to one of the dental clinics in Enugu, Nigeria. Where patients with greatly resorbed edentulous ridge requesting for a prosthesis with comfort, stability, retention and efficiency. While others with gum stripping which is, life threatening denture induce disease with complains of denture irritation were in queue for a preferable prosthesis. This factors are obviously the shortcoming of dentures, which dental implants has the capacity to obviate because they are the nearest equivalent replacement to the natural tooth, and are therefore a useful addition in the management of patients who have missing teeth because of
disease, trauma or developmental anomalies [5]. Therefore, it is required to ascertain its prospect and challenges among dental professionals in south eastern Nigeria for appropriate promotion, awareness and knowledge if need be at the end of the study.

2. MATERIALS AND METHODS

This study employed a cross-sectional design with the population of the study comprising of selected Dental Professionals in South East Nigeria. A pretested questionnaire were used to ascertain the level of knowledge and challenges of Dental Implant in selected Hospital in south east Nigeria. The questionnaire were validated using language clarity and content validation. Fifty questionnaires were pretested from five different Dental Hospitals in Nigeria outside south-East region but with similar characteristics but not included for actual study. The questionnaire was tested for reliability using kuder-Richardson-21 and Cronbach’s alpha reliability coefficient with a value of 0.86 and 0.81 respectively was obtained.

The sample size of the study comprised of 117 dental professional in the selected hospitals in south east, Nigeria. And the sample was drawn from the five selected hospitals through multistage sampling technique. In stage one; the first step were to stratify the selected hospitals by state, hence five strata: Abia, Anambra, Ebonyi, Enugu and Imo. The next step were the selection of hospitals that offer Dental/oral healthcare services from each stratum using simple random sampling (balloting). The hospitals are; Federal Medical Centre, (FMC) Umuahia, Federal Medical Centre, (FMC) Owerri, University of Nigeria Teaching Hospital, (UNTH) ituku - Enugu, Alex Ekwueme Federal University Teaching Hospital, (AE-FUTHA), Abakiliki - Ebonyi and Nnamdi Azikiwe University Teaching Hospital, (NAUTH) Newi – Anambra state, Nigeria. The second stage was the selection of all respondents from each hospital; Federal Medical Centre, (FMC) Umuahia (14 professionals), Federal Medical Centre, (FMC) Owerri (27 professionals); University of Nigeria Teaching Hospital, (UNTH) ituku-Enugu (43 Professionals), Alex Ekwueme Federal University Teaching Hospital, (AE-FUTHA), Abakiliki-Ebonyi (21 professional) and Nnamdi Azikiwe University Teaching Hospital, (NAUTH) Newi – Anambra (12 Professionals).

Data were collected by administering structured pretested close-ended questionnaire to the professionals. The Dental professionals were selected from those within the practising bracket of the study which includes current staff, Dental house officers, interns and NYSC members excluding Students on Clinical/lab attachment. After this was done, the questionnaires were distributed to the selected professionals and supervised as they fill-in the questionnaire.

The data generated from the questionnaire were collected and collated by the researcher and were entered into computer software called Statistical Package for Social Science (SPSS) version 20 for both descriptive and inferential statistical analysis. The researcher used simple percentage and frequency to analyze the research objectives and data collected. Chi-square was used to analyze the research hypotheses. The hypotheses were tested at 0.05 levels of significance. Data were subjected to percentage findings presented by the use of tables.

3. RESULTS

3.1 Socio-Demographic Characteristics

Result shows that the mean age of the respondents is 17.9±35.0, while the modal age is 41 - 50 years (35.0%). The majority of the studied respondents were females (59.0%) while male were (41%). Greater proportions of the respondents (29.0%) are Dental Therapist, while (64.1%) respondents studied in Nigeria.

3.2 Quality of Dental Implant Characteristics

On the assessment of dental implant on performance and appearance, there are no poor or very poor affirmation on dental implants as a device rather there are average good responds on comfort, function, aesthetics and retention as very good quality of dental implants compared to dentures. This shows that the value rate of implants as a dental device will increase thereby promoting oral healthcare services.

3.3 Accessibility Characteristics of Dental Implant

On the accessibility of dental implant materials/device show high rate of poor availability 64.9%, affordability of dental implant materials/device is also very poor with 56.4%, while demand rate is 54.4 with 53.8%.
Table 1. Distribution of respondents by socio-demographic characteristics, n=117 (100%)

| Variables                     | Frequency | Percentage |
|-------------------------------|-----------|------------|
| **Name /Place of Work**       |           |            |
| FMC Umuahia-Abia State        | 14        | 11.9       |
| NAUTH Newi-Anambra State      | 12        | 10.3       |
| AE-FUTHA, Ebonyi State        | 21        | 17.9       |
| UNTH Enugu                    | 43        | 36.8       |
| FMC Owerri-Imo State          | 27        | 23.1       |
| **Age of Respondents**        |           |            |
| 21 - 30 years                 | 21        | 17.9       |
| 31 – 40 years                 | 29        | 24.8       |
| 41 – 50 years                 | 41        | 35.0       |
| 50 – above                    | 26        | 22.3       |
| **Gender of the Respondents**|           |            |
| Male                          | 48        | 41.0       |
| Female                        | 68        | 59.0       |
| **Profession of the Respondent**|         |            |
| Dental Surgeon                | 25        | 21.4       |
| Dental Technologist           | 29        | 24.8       |
| Dental Therapist              | 34        | 29.0       |
| Dental Nurse                  | 18        | 15.4       |
| Dental Surgery Assistants     | 11        | 9.40       |
| **Place of study**            |           |            |
| Nigeria                       | 75        | 64.1       |
| Abroad                        | 29        | 24.8       |
| Both                          | 13        | 11.1       |
| **Years of Practice.**        |           |            |
| 1 – 5 years                   | 44        | 37.6       |
| 6 – 10 years                  | 37        | 31.6       |
| 11 – 20 years                 | 19        | 16.2       |
| 21 years and above            | 17        | 14.6       |

*Mean Age: 35.0

3.4 Knowledge Level of Dental Implant Characteristics

In knowledge distribution of respondents, it was observed that awareness of dental implant materials and devices are very good at 49.6%, knowledge of types of implant device is also good at 56.4% but source of information is majorly in clinics/hospitals followed by institutions of learning.

The result in Table 5 showed relationship between age of respondents and knowledge of dental implant materials/devices types. Use of Pearson Chi-Square showed a significant relationship of 63.527; df = 4 @ p <0.05 between gender of respondents and knowledge of dental implant materials/devices types.

The result in Table 6 showed relationship between gender of respondents and knowledge of dental implant materials/devices types. Use of Pearson Chi-Square showed a significant relationship of 63.527; df = 4 @ p <0.05 between gender of respondents and knowledge of dental implant materials/devices types.

The result in Table 7 showed relationship between profession of respondents and knowledge of dental implant materials/devices types. Use of Pearson Chi-Square showed a significant relationship of 177.552; df = 16 @ p <0.05 between profession of respondents and knowledge of dental implant materials/devices types.

The result in Table 8 showed relationship between years of practice of respondents and knowledge of dental implant materials/devices types. Use of Pearson Chi-Square showed a significant relationship of 177.552; df = 16 @ p <0.05 between years of practice of respondents.
and knowledge of dental implant materials/devices types.

The result in Table 9 showed relationship between knowledge of dental implant materials and assessment of dental implant to comfort on oral cavity. Use of ANOVA showed a significant relationship with $F = 42.147; \text{df} = 4 @ p < 0.05$; knowledge of dental implant materials and assessment of dental implant to aesthetics on oral cavity, $F = 77.760; \text{df} = 4 @ p < 0.05$ and knowledge of dental implant materials and assessment of dental implant to retention on oral cavity, $F = 54.985; \text{df} = 4 @ p < 0.05$.  

### Table 2. Distribution of respondents by quality of dental implant, n=117 (100%)

| Variables                          | Frequency | Percentage |
|------------------------------------|-----------|------------|
| **Assessment of dental implant to comfort on oral cavity** |           |            |
| Very Poor                          | -         | -          |
| Poor                               | -         | -          |
| Good                               | 23        | 19.7       |
| Very good                          | 76        | 64.9       |
| Excellent                          | 18        | 15.4       |
| **Assessment of dental implant to function on oral cavity** |           |            |
| Very poor                          | -         | -          |
| Poor                               | -         | -          |
| Good                               | 66        | 56.4       |
| Very good                          | 23        | 19.7       |
| Excellent                          | 28        | 23.9       |
| **Assessment of dental implant to aesthetics on oral cavity** |           |            |
| Very poor                          | -         | -          |
| Poor                               | -         | -          |
| Good                               | 29        | 24.8       |
| Very good                          | 47        | 40.2       |
| Excellent                          | 41        | 35         |
| **Assessment of dental implant to retention on oral cavity** |           |            |
| Very poor                          | -         | -          |
| Poor                               | -         | -          |
| Good                               | 13        | 11.2       |
| Very good                          | 41        | 35         |
| Excellent                          | 63        | 53.8       |

### Table 3. Distribution of respondents on accessibility of dental implant, n=117 (100%)

| Variables                          | Frequency | Percentage |
|------------------------------------|-----------|------------|
| **Availability level of dental implant material/device** |           |            |
| Very Poor                          | 23        | 19.7       |
| Poor                               | 76        | 64.9       |
| Good                               | 18        | 15.4       |
| Very good                          | -         | -          |
| Excellent                          | -         | -          |
| **Affordability level of dental implant materials/devices** |           |            |
| Very poor                          | 66        | 56.4       |
| Poor                               | 23        | 19.7       |
| Good                               | 28        | 23.9       |
| Very good                          | -         | -          |
| Excellent                          | -         | -          |
| **Demand rate of dental implant device from patients** |           |            |
| Very poor                          | 64        | 54.7       |
| Poor                               | 41        | 35.0       |
| Good                               | 12        | 10.3       |
| Very good                          | -         | -          |
| Excellent                          | -         | -          |
Table 4. Distribution of respondents on knowledge of dental implant, n=117 (100%)

| Variables                                | Frequency | Percentage |
|------------------------------------------|-----------|------------|
| Awareness of dental implant material/device |           |            |
| Very Poor                                | -         | -          |
| Poor                                     | -         | -          |
| Good                                     | 18        | 15.4       |
| Very good                                | 58        | 49.6       |
| Excellent                                | 41        | 35         |
| Knowledge of dental implant materials/devices types |           |            |
| Very poor                                | -         | -          |
| Poor                                     | -         | -          |
| Good                                     | 66        | 56.4       |
| Very good                                | 23        | 19.7       |
| Excellent                                | 28        | 23.9       |
| Sources of information on dental implant practice |           |            |
| TV/Radio                                 | -         | -          |
| Magazine/Newspaper                       | -         | -          |
| Internet/social media                    | 29        | 24.8       |
| Clinic/Hospital                          | 47        | 40.2       |
| Institution of learning/Health outreach  | 41        | 35         |
| Relevant of dental implant compared to denture |           |            |
| Very poor                                | -         | -          |
| Poor                                     | -         | -          |
| Good                                     | 13        | 11.2       |
| Very good                                | 41        | 35         |
| Excellent                                | 63        | 53.8       |

Table 5. Age of respondents * knowledge of dental implant materials/devices types

| Knowledge of dental implant materials/devices types | Very poor | Poor | Good | Very good | Excellent | Total |
|---------------------------------------------------|-----------|------|------|-----------|-----------|-------|
| Age of Respondents                                |           |     |      |           |           |       |
| 21-30 Years                                       | 1         | 1    | 19   | 0         | 0         | 21    |
| 31 – 40 years                                     | 0         | 0    | 30   | 0         | 0         | 30    |
| 41 – 50 years                                     | 0         | 0    | 15   | 23        | 2         | 40    |
| 50 – above                                        | 0         | 0    | 0    | 26        | 26        | 52    |
| Total                                             | 1         | 1    | 64   | 23        | 28        | 117   |

The result in Table 10 showed relationship between knowledge of dental implant materials/devices types and availability level of dental implant material/device. Use of T-test showed a moderate relationship with \( r = 0.675 \) @ \( p<0.05 \). Also, there is a strong relationship between knowledge of dental implant materials/devices types and affordability level of dental implant materials/devices with \( r = 0.885 \) @ \( p<0.05 \).

4. DISCUSSION

From outcome of this study, it was observed that majority of the studied respondents were females (59.0%) while male were (41%) indicating that the female gender has more demographic manpower in the area than male but the reverse is the case when patients are involved. A study done by Ajayi, Abiodun-solanke, Gbadebo, Fasola, Dosumu and Arotiba [6] on Dental implant treatment at a Nigerian Teaching Hospital, Ibadan, Nigeria shows that the demographic characteristics of patients treated with endosseous implants at Ibadan, Nigeria within 2008-2013 are 15(65.2%) males and 8(34.8%) females.

On the assessment of dental implant on performance and appearance, shows that the value rate of implants as a dental device will
Table 6. Gender of the respondents * knowledge of dental implant materials/devices types

| Gender of the Respondents | Knowledge of dental implant materials/devices types | Very poor | Poor | Good | Very good | Excellent | Total |
|---------------------------|----------------------------------------------------|-----------|-----|------|-----------|-----------|-------|
| Male                      |                                                     | 1         | 1   | 46   | 0         | 0         | 48    |
| Female                    |                                                     | 0         | 0   | 18   | 23        | 28        | 69    |
| Total                     |                                                     | 1         | 1   | 64   | 23        | 28        | 117   |

Pearson Chi-Square ($X^2$) = 63.527; df = 4; P < 0.001

Table 7. Profession of the respondent * knowledge of dental implant materials/devices types

| Profession of the Respondent | Knowledge of dental implant materials/devices types | Very poor | Poor | Good | Very good | Excellent | Total |
|------------------------------|----------------------------------------------------|-----------|-----|------|-----------|-----------|-------|
| Dental Surgeon               |                                                     | 1         | 1   | 23   | 0         | 0         | 25    |
| Dental Technologist          |                                                     | 0         | 0   | 29   | 0         | 0         | 29    |
| Dental Therapist             |                                                     | 0         | 0   | 12   | 22        | 0         | 34    |
| Dental Nurse                 |                                                     | 0         | 0   | 0    | 1         | 17        | 18    |
| Dental Surgery Assistants    |                                                     | 0         | 0   | 0    | 0         | 11        | 11    |
| Total                        |                                                     | 1         | 1   | 64   | 23        | 28        | 117   |

Pearson Chi-Square ($X^2$) = 177.552; df = 16; P < 0.001

Table 8. Years of practice * knowledge of dental implant materials/devices types

| Years of Practice | Knowledge of dental implant materials/devices types | Very poor | Poor | Good | Very good | Excellent | Total |
|-------------------|----------------------------------------------------|-----------|-----|------|-----------|-----------|-------|
| 1-5 Years         |                                                     | 1         | 1   | 42   | 0         | 0         | 44    |
| 6-10 Years        |                                                     | 0         | 0   | 22   | 15        | 0         | 37    |
| 11-20 years       |                                                     | 0         | 0   | 0    | 8         | 11        | 19    |
| 21 years and above|                                                     | 0         | 0   | 0    | 0         | 17        | 17    |
| Total             |                                                     | 1         | 1   | 64   | 23        | 28        | 117   |

Pearson Chi-Square ($X^2$) = 131.239; df = 12; P < 0.001

Table 9. Assessment of dental implant * knowledge of dental implant

| Anova Variables | Sum of Squares | df | Mean Square | F    | Sig. |
|-----------------|---------------|----|-------------|------|------|
| Assessment of dental implant to comfort on oral cavity | Between Groups | 30.915 | 4 | 7.729 | 42.147 | 0 |
| Within Groups   | 20.538 | 112 | 0.183 |
| Total           | 51.453 | 116 |
| Assessment of dental implant to function on oral cavity | Between Groups | 90.632 | 4 | 22.658 | . |
| Within Groups   | 0 | 112 | 0 |
| Total           | 90.632 | 116 |
| Assessment of dental implant to aesthetics on oral cavity | Between Groups | 59.046 | 4 | 14.762 | 77.76 | 0 |
| Within Groups   | 21.262 | 112 | 0.19 |
| Total           | 80.308 | 116 |
| Assessment of dental implant to retention on oral cavity | Between Groups | 45.135 | 4 | 11.284 | 54.985 | 0 |
| Within Groups   | 22.984 | 112 | 0.205 |
| Total           | 68.12 | 116 |
Table 10. Paired samples correlations

| Paired samples | N  | Correlation | Sig. |
|----------------|----|-------------|------|
| Pair 1         | 117| 0.675       | 0.000|
| Knowledge of dental implant materials/devices types & Availability level of dental implant material/device |  |  |  |
| Pair 2         | 117| 0.885       | 0.000|
| Knowledge of dental implant materials/devices types & Affordability level of dental implant materials/devices |  |  |  |

promote comfort, function, aesthetics and retention as compared to dentures. This is similar to a study done by Ajayi, et al. [6] on Dental implant treatment at a Nigerian Teaching Hospital, Ibadan, Nigeria shows that out of the 23 patients studied were followed up for a period of 1-5 years, there is a success/survival rate of 95.2%, though its slightly lower than the result obtained in a 12 private general dental practice (GDP) [7]. Nevertheless in Nigeria, a retrospective review of implant replacement of missing teeth over a period of 6yrs at a private dental clinic revealed a success rate of 96% in 227 implants placed in 121 patients (M=68, F=53) with the highest number of implant placed in the molar region [8].

On the accessibility of dental implant materials/device shows poor availability rate of 64.9 %, indicating affordability of 56.4%, yet with demand rate is 53.8%. All this, is an indication for government and NGOs intervention. This is because another study done in Nigeria, also shows that cost of treatment is still unaffordable to a large number of Nigerians [6]. Another study by Ize-iyamu and Saheed [9] on cultural constraint on dental implant treatment in Benin City revealed that some individuals that believe in the god of iron, a traditional worship feel that the use of metallic materials in the treatment of dentition is not acceptable while another study indicates.

In knowledge distribution of respondents, 49.6% and 56.4% awareness and knowledge of dental implant materials and devices respectively, but source of information is majorly in clinics/hospitals followed by institutions of learning. Though a study done in Nigeria by Gbadebo, Lawal, Sulaiman & Ajayi [10] and Mgbeokwere, Okoye & Ekwueme [11] shown that the level of awareness of dental implant was 22.6% and 7.2% among patients and health workers respectively [6]. While another study carried out in Riyadh Saudi Arabia by Al-Johany, Al-Zoman, Al-Juhami, Al-Refaei [12] on Dental patients' awareness and knowledge in using dental implants as an option in replacing missing teeth shows that the level of awareness ranged from 66.4% to 77%.

5. CONCLUSION

Dental implant as a restorative devices is inheritable as an act of obviating denture prosthesis shortcomings but in south eastern Nigeria, its practice is seriously affected by the level of the nation's development especially in the aspect of its practice, availability and affordability. Dental professional in the region are encouraged to embrace an effort to practicing it. It's also recommended that government should equip the government owned hospitals with needed sophisticated equipment and materials thereby ensuring that the cost of delivery awareness to the public. The results of this study will help in organizing training and re-training programs for dental health care givers in south-eastern Nigeria.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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