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# EFFECT OF HEALTH EDUCATION INTERVENTION PROGRAMME ON PRACTICE OF DENTAL CARIES PREVENTION STRATEGIES AMONG ADULTS IN ZARIA-METROPOLIS, KADUNA STATE, NIGERIA.

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**Abstract**
Dental caries is one of the most prevalent oral disease; it is refer to as a multifactorial oral disease initiated by acid-producing bacteria that attack and damage dental hard tissues. This condition can also be described as a microbial imbalance within the oral cavity in association with factors such as saliva, fluoride exposure, and diet. Practice of the preventive strategies in dental caries has been a challenge for the population over a long period of time. A multifaceted approach, the involvement of all dentists, health educators, and policy makers, as well as research studies that evaluate the results of the paradigm of caries prevention strategies and adjust it as necessary are all necessary for moving forward with practice and implementation. The current estimated population in 2022 at a 2.5% annual increase is 601,300 and 430,500 for Sabon-Gari and Zaria LGA respectively. With these the estimated total population for the area of study will be 1,031,800, which is the total population for Zaria Metropolis. The sample size for this study consists of sixty (60) adults (male and female) that will be drawn from population of Zaria metropolis in Kaduna State, Nigeria. A multi-stage sampling technique was used. The instrument that was used for data collection in this study is a researcher-structured close-ended questionnaire. The questionnaire was divided into four sections: Section A and B. Section A contains five (5) items on demographic characteristics of the respondents. Section A contains ten (10) items on practice of dental caries prevention strategies among adults. The effect of health education intervention programme on practice of dental caries prevention strategies among adult in Zaria metropolis of Kaduna State, Nigeria posttest is significant ($p = 0.000$). The difference between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme on knowledge among adult in Zaria metropolis of Kaduna State, Nigeria is significant ($p = 0.000$). Given the significant improvement, extend the intervention to other regions or states to broaden its impact on dental caries prevention. Implement regular follow-up sessions to ensure sustained application of the prevention strategies learned by participants.

## Introduction

Dental Caries is seen as chronic disease that can alter our normal physiology as we grow at any age. The term “caries” indicates both the dental disease process and its associated consequences, that is, the destruction attributed by the process of the disease (Gupta et al., 2014). Dental caries is one of the most prevalent oral disease; it is refer to as a multifactorial oral disease initiated by acid-producing bacteria that attack and damage dental hard tissues. This condition can also be described as a microbial imbalance within the oral cavity in association with factors such as saliva, fluoride exposure, and diet (Radwan et al., 2020). The term “dental caries” is used to the results, signs, and symptoms of a localized chemical demineralization of the mineralized teeth surfaces initiated by metabolic events that take place in the dental plaque (biofilms) that cover the affected teeth area (Kawashita et al., 2011).

The Global burden of diseases study recently estimated that the prevalence rates of untreated dental caries decreased by only 4% globally in the last decade, that the marked decline observed over the past 30 years has slowdown. Furthermore, dental caries can lead to missed work and school days (Sampaio et al., 2021). World Health Organization (WHO, 2022) estimated that oral diseases affect close to 3.5 billion adults worldwide, with 3 out of 4 adult affected living in middle-income countries.

In developed countries, the prevalence of dental caries is declining due to advanced dental facilities and the increased knowledge of oral hygiene. However, an unprecedented increase in prevalence in developing countries due to the growing consumption of sugary foods, poor tooth brushing habits, and the absence of adequate dental services. In developing countries, especially sub-Saharan Africa, the prevalence of dental caries varies according to the population group and socioeconomic status. The prevalence rates were 40.98% in Ethiopia, 52.4% in Sudan, 50.3% in Kenya, and 40.2% in Tanzania (Amare et al, 2021). In Nigeria, caries prevalence varies between 4% and 40% and mean DMFT varies between 0.5 and 3.5. The only information available relates to adult patients in dental hospitals who have had caries (Braimoh *et al.*, 2014).

Practice of the preventive strategies in dental caries has been a challenge for the population over a long period of time. A multifaceted approach, the involvement of all dentists, health educators, and policy makers, as well as research studies that evaluate the results of the paradigm of caries prevention strategies and adjust it as necessary are all necessary for moving forward with practice and implementation. Delaying or avoiding preventive dental care may lead to the need for more extensive and expensive treatments. Untreated cavities can cause pain and discomfort, especially when eating or drinking hot, cold, or sweet foods and beverages (Pitts & Zero, n.d.).

The practice of dental caries prevention strategies is a serious issue of concern involves inadequate various measures to reduce the risk of tooth decay and cavities. While many adults are aware of the importance of dental hygiene and preventive measures, this knowledge does not consistently translate into practice. The adherence to preventive practices such as regular brushing, flossing, the use of fluoride products, and routine dental visits is often suboptimal. This in practice is influenced by various factors, including socioeconomic status, access to dental care, cultural beliefs, and individual attitudes towards oral health. The inconsistency in practicing dental caries prevention strategies contributes significantly to the high incidence of tooth decay in the community.

Dental caries continues to pose a substantial health challenge in Zaria metropolis, where adults exhibit behaviour that indicates lack of knowledge and insufficient adoption of preventive strategies. The problem at hand involves a perceived gap in knowledge, attitudes, and practices related to dental caries prevention strategies, which motivated the researcher to carry out this study on effect health education intervention programme on the preventive strategies for dental caries. It is based on these issues stated above that the researcher intend to conduct this research.

**Methodology**

Quasi-experimental study design was adopted for the study in which a pre-test-post-test control group design was use. A quasi-experimental design aims to establish a cause-and –effect relationship between an independent and dependent variable. However, unlike a true experiment, a quasi-experiment does not rely on random assignment. Instead, participants are assigned to groups based on non-random criteria (Thomas, 2020). Rogers & Revesz, (2020) stated that pre-test-post-test control group design, are well suited to investigate effects of educational interventions are common in educational research. It is a design in which a researcher finds two group of adult to test, a study and control which are assigned non-randomly. The two groups was given pre-test after which the researcher introduces a manipulation. This design was suitable for this study since it attempt to find out the effect of health promotion intervention programme on practice of health education intervention programme on dental caries prevention strategies among adult in Zaria metropolis, Kaduna state.

The population for the study consist the entire Adult across Zaria metropolis, Kaduna State. Zaria metropolis comprises of two local government which are; Zaria and Sabon-Gari LGA. The current estimated population in 2022 at a 2.5% annual increase is 601,300 and 430,500 for Sabon-Gari and Zaria LGA respectively. With these the estimated total population for the area of study will be 1,031,800, which is the total population for Zaria Metropolis. The study is design to determining the effect of health education intervention programme on practice on dental caries prevention strategies among adult in Zaria metropolis Kaduna state.

The sample size for this study consists of sixty (60) adults (male and female) that will be drawn from population of Zaria metropolis in Kaduna State, Nigeria. This selection relies on Cohen and Manion (2001), suggestion that a minimum of twenty (20) participants are required for experimental research to produce a desirable effect. Therefore, for the purpose of this study, sixty (60) participants was used as sample size, thirty (30) experimental group and thirty (30) control group for the purpose of generalization. A multi-stage sampling technique was used that involve the follows;

**Stage I:** Stratified sampling technique was used for stratification of the Zaria metropolis into the two already existing local government areas (Zaria and Sabon Gari LGAs). Both Local Government Areas were selected for the study.

**Stage II:** Simple random sampling technique of fishbowl method was used to select four wards (4), two (2) wards each Local Government Area within Zaria metropolis. Two containers was used each one representing a local government. The name of the wards are written on a piece of paper, folded and dropped into the corresponding container. The four selected wards are; Tudun-Wada, Kwarbai 'A', Bomo and Jama'a.

**Stage III**: Purposive sampling was used to form participants of the two (2) groups for the study which are experimental and control group, selecting across both Local Governments Area within the metropolis. Jama'a and Tudun Wada wards from Sabon Gari and Zaria L.G.A respectively serve as control group while Bomo and Kwarbai 'A' Wards from Sabon Gari and Zaria L.G.A respectively serve as experimental group. The two wards each are allocated with 30 participants making the total sample size 60 adults in Zaria Metropolis.

**Stage IV**: A Systematic sampling was used to select adults in the sampled wards. In this procedure all available adults where be seated at the venue. The total population present where divided by the sample size. With this the interval of sample was identified and use to select the respondent. This procedure was used for both the experimental and control group. This technique was used to give equal chance of selection among all respondent. This was done to give equal chance to everyone.
The instrument that was used for data collection in this study is a researcher-structured close-ended questionnaire. The questionnaire was divided into four sections: Section A and B. Section A contains five (5) items on demographic characteristics of the respondents. Section A contains ten (10) items on practice of dental caries prevention strategies among adults. Therefore, any mean score of response that is 2.5 or above is regarded as positive, while any mean score of response less than 2.5 will be regarded negative.
The researcher-developed instrument tagged "Effect of Health Education Intervention Programme on Practice on Dental Caries Prevention Strategies among Adult Questionnaire" (HEIPKAPDCPSAAQ) in Zaria metropolis Kaduna state. The face and contents validity was checked and validated.

The researcher and four trained assistants will engage community leaders and religious figures to recruit participants for a dental caries prevention study, using announcements and town criers in the selected wards. Systematic sampling will be conducted during the second visit, and participants will be divided into control and experimental groups, with their information recorded for follow-ups. The six-week health education intervention will involve weekly 60-minute sessions focused on prevention strategies, with data collected from both groups before and after the program. Post-intervention follow-ups, including phone reminders, will continue for two months, with posttest data collected eight weeks after the intervention.

After collecting and sorting out copies of the questionnaire, a coding scheme was developed and each questionnaire was reviewed and coded into a computerized database using a Microsoft Excel spreadsheet. One sample and dependent t-test was used to analyze the data generated for the study. A descriptive statistic of frequencies and percentages, mean and standard deviation was used to analyze the demographic characteristics of the respondents and research questions respectively.

One sample t-test was used to test the following three hypotheses 1 which are; the effect of health education intervention programme on practice of dental caries prevention strategies among adult in Zaria metropolis of Kaduna State, Nigeria is not significant at 0.05 level of significance. Paired t-test was used for the three hypotheses 2; there is no significant relationship between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme among adult in Zaria metropolis of Kaduna State, Nigeria.

**Results**

**Descriptive analysis of the participants' socio-demographic characteristics**

The total number of thirty (30) participants were selected from each of the group none of the participants in either groups could not meet all the required information. Therefore, thirty (30) participants each completed the study in the experimental and control group. Among the socio-demographic characteristics of the respondents selected for the analysis along their expressed responses were: age, gender, marital status, educational qualification, and occupation. These variables are categorized into ranges and presented in frequency and percentages in table 1

**Table 1 Participants' Socio-demographic Characteristics**

| Variable | Variable Options | Experimental | | Control | |
|---|---|---|---|---|---|
| | | **Freq.** | **Percent** % | **Freq.** | **Percent** % |
| Age | 18 – 24 Years | 9 | 30.0 | 12 | 40.0 |
| | 25 – 31 Years | 11 | 36.7 | 7 | 23.3 |
| | 32 – 38 Years | 6 | 20.0 | 8 | 26.7 |
| | 39 – 45 Years | 3 | 10.0 | 3 | 10.0 |
| | 46 – above | 1 | 3.3 | 0 | 0.0 |
| | **Total** | **30** | **100.0** | **30** | **100.0** |
| Gender | Male | 16 | 53.3 | 13 | 43.3 |
| | Female | 14 | 46.7 | 17 | 56.7 |
| | **Total** | **30** | **100.0** | **30** | **100.0** |
| Marital status | Married | 5 | 16.7 | 9 | 30.0 |
| | Divorced | 7 | 23.3 | 6 | 20.0 |
| | Widow | 4 | 13.3 | 3 | 10.0 |
| | Single | 14 | 46.7 | 12 | 40.0 |
| | **Total** | **30** | **100.0** | **30** | **100.0** |
| Educational Qualification | Non-formal Education | 3 | 10.0 | 1 | 3.4 |
| | Primary Education | 5 | 16.7 | 7 | 23.3 |
| | Secondary Education | 14 | 46.7 | 15 | 50.0 |
| | Tertiary Education | 8 | 26.6 | 7 | 23.3 |
| | **Total** | **30** | **100.0** | **30** | **100.0** |
| Occupation | Civil servant | 10 | 33.3 | 7 | 23.3 |
| | Farming | 8 | 26.7 | 4 | 13.3 |
| | Trading | 12 | 40.0 | 19 | 63.4 |
| | **Total** | **30** | **100.0** | **30** | **100.0** |

*Source: Field survey, 2024*

Table 1 showed that on age distribution for experimental group 18 – 24 Years has 9 (30.2%); 25 – 31 Years has 11(36.5%); 32 – 38 Years, has 6 (20%), 39 – 45 Years, has 3 (10%); and 46 – above has 1 (3.3%). Making the age distribution of 25-31 years to be higher while 46-above is lowest. For the control group 18 – 24 Years with 12 (40.0%) is the lower while 46 – above with no respondent. The distribution on gender showed in experimental group Male 16 (53.3%) while Female has 14 (46.7%) indicating that Male respondents are higher. In control group Male 13 (43.3%) while Female has 17 (56.7%) indicating that Female respondents are higher.

The distribution on marital status showed that in experimental group; Married has 5 and (16.7%), Divorced has 7 (23.3%), widow has 4 (13.3%), and single has 14 (46.7%). Single has the highest while Widow has the lowest participants'. The distribution on educational qualification showed that in experimental group; Non-formal Education has 3 (10.0%), Primary Education 5 (16.7%), Secondary Education, 14 (46.6%); and Tertiary Education 8 (26.6%). Secondary Education has the highest frequency while non-formal education has the lowest. In control group Non-formal education has the lowest with 1 (3.4%) and Secondary Education has 15 (50.0%). The distribution on occupation showed that in experimental group; civil servant has 10 (33.3%), Farming has 8 (26.7%) and trading has 12 (40.0%). Trading has the highest frequency while farming has the lowest. In control group trading has the highest with 9 (63.4%) while farming is the lowest with 4 (13.3%).

**What is the effect of health education intervention programme on practice of dental caries prevention strategies among adult in Zaria metropolis of Kaduna State, Nigeria?**

To determine the effect of six weeks health education intervention on practice of preventive strategies for dental caries, the two groups' rated responses on items relating to practice of dental caries prevention strategies were computed and compared using mean scores and standard deviation. The benchmark mean was fixed at 2.50 as the midpoint average of the 4 point scale used for the measurement. The summary is presented in Table 2

**Table 2 Mean score and Standard deviation on Practice of Dental Caries Prevention Strategies for experimental and control group among Adult.**

| S/N | Practice of Dental Caries Prevention Strategies among Adult | Status | Experimental | | Control | |
|---|---|---|---|---|---|---|
| | | | Mean | Std. Dev. | Mean | Std. Dev. |
| 1 | I use to consistently brush my teeth at least twice a day as part of my routine. | Pre-test | 2.44 | 0.851 | 2.01 | 0.590 |
| | | Post-test | 3.13 | 0.539 | 1.68 | 0.198 |
| 2 | I use to regularly use dental floss to clean between my teeth. | Pre-test | 1.59 | 0.971 | 2.85 | 0.007 |
| | | Post-test | 2.93 | 0.574 | 2.16 | 0.294 |
| 3 | I use to incorporate fluoride-based oral care products (toothpaste, mouthwash) into my daily dental hygiene routine. | Pre-test | 2.23 | 0.923 | 1.12 | 0.226 |
| | | Post-test | 3.57 | 0.479 | 1.22 | 0.711 |
| 4 | I use to attend regular dental check-ups and cleanings as recommended. | Pre-test | 2.01 | 0.992 | 1.96 | 0.196 |
| | | Post-test | 3.33 | 0.658 | 2.28 | 0.255 |
| 5 | I use to actively follow a low-sugar diet as a preventive measure against dental caries. | Pre-test | 1.97 | 0.944 | 2.85 | 0.313 |
| | | Post-test | 2.20 | 0.841 | 1.93 | 0.782 |
| 6 | I use to adhere to professional advice, such as dental sealants, to prevent caries. | Pre-test | 2.21 | 1.146 | 2.15 | 0.311 |
| | | Post-test | 2.77 | 0.940 | 2.28 | 0.255 |
| 7 | I use to chewing stick to prevent dental caries | Pre-test | 2.38 | 0.862 | 2.96 | 0.196 |
| | | Post-test | 3.07 | 1.048 | 2.14 | 0.439 |
| 8 | I use to involve my family and friends in dental care practices to prevent caries. | Pre-test | 2.28 | 0.749 | 2.96 | 0.196 |
| | | Post-test | 2.97 | 0.718 | 2.17 | 0.458 |
| 9 | I use to see the connection between salt and charcoal with caries prevention. | Pre-test | 2.25 | 0.833 | 1.85 | 0.643 |
| | | Post-test | 3.67 | 0.479 | 1.58 | 0.915 |
| 10 | I use to eat self-cleansing foods like sugarcane to prevent dental caries. | Pre-test | 2.25 | 0.833 | 2.96 | 0.196 |
| | | Post-test | 3.60 | 0.563 | 2.17 | 0.402 |
| | **Aggregate** | **Pre-test** | **2.22** | **0.811** | **2.37** | **0.287** |
| | | **Post-test** | **3.09** | **0.684** | **2.01** | **0.477** |

*(Decision mean 2.5)*

The rating of the two groups in Table 4.4 revealed a positive response of participants in pre- test of experimental together with pre and post-test of control group on practice of dental caries prevention strategies. The participants in pre-test of experimental group have negative practice of dental caries prevention strategies with a mean and standard deviation of 2.22 and 0.811 respectively, while participants in post-test of same group had improved on practice of dental caries prevention strategies with a mean and standard deviation of 3.09 and 0.684 respectively. The participants in control group showed an aggregate mean of 2.37 and 2.01 with standard deviation of 0.287 and 0.477 respectively.

All questions has a mean higher than 2.50 making them all agreed in post intervention for experimental; I use to consistently brush my teeth at least twice a day as part of my routine (3.13), I use to regularly use dental floss to clean between my teeth (2.93), I use to incorporate fluoride-based oral care products (toothpaste, mouthwash) (3.57), I use to attend regular dental check-ups and cleanings as recommended (3.33), I use to actively follow a low-sugar diet as a preventive measure against dental caries (2.20), I use to adhere to professional advice, such as dental sealants, to prevent caries (2.77), I use to chewing stick to prevent dental caries (3.07), I use to involve my family and friends in dental care practices to prevent caries (2.97), I use to see the connection between salt and charcoal with caries prevention (3.67) and I use to eat self-cleansing foods like sugarcane to prevent dental caries (3.60) while lower for all pre-test. The control group had positive knowledge on pre-test; I use to regularly use dental floss to clean between my teeth (2.85), I use to attend regular dental check-ups and cleanings as recommended (2.85), I use to chewing stick to prevent dental caries (2.96), I use to involve my family and friends in dental care practices to prevent caries (2.97), and I use to eat self-cleansing foods like sugarcane to prevent dental caries (2.96) all others are negative. The positive knowledge were not maintained in post-test.

**What is the difference between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme among adult in Zaria metropolis of Kaduna State, Nigeria?**

To determine the difference in six weeks health education intervention on practice of preventive strategies for dental caries, between control and experimental groups. The two groups' rated responses on items relating to practice of dental caries prevention strategies were computed and compared using mean scores and standard deviation while both differences were computed. The benchmark mean was fixed at 2.50 as the midpoint average of the 4 point scale used for the measurement. The summary is presented in Table 3

**Table 3 Differences in Mean between experimental and control group on Practice of Dental Caries Prevention Strategies among Adult.**

| Variables | Group | N | Test | Mean | Standard Deviation | Mean Difference |
|---|---|---|---|---|---|---|
| **Practice of Dental Caries Prevention Strategies** | Experimental | 30 | Pre-test | 2.22 | 0.811 | 0.87 |
| | | 30 | Post-test | 3.09 | 0.684 | |
| | Control | 30 | Pre-test | 2.37 | 0.287 | 0.36 |
| | | 30 | Post-test | 2.01 | 0.477 | |

*(Decision mean 2.5)*

The rating in table 4.7 indicates that in experimental group a mean of 2.22 and 3.09 for pre and post-test with standard deviation of 0.811 and 0.684 respectively. The mean difference is 0.87. In pre-test the aggregate mean for experimental group indicate below 2.50, while posttest is above the benchmark mean fixed. It shows increase in practice of the participants. In control group a mean of 2.37 and 2.01 for pre and post-test with standard deviation of 0.287 and 0.477 respectively. The mean difference is 0.36. In pre and posttest the aggregate mean for control group indicate below 2.50 the benchmark mean fixed. The mean difference is significant.

**Test of Hypothesis**

The hypotheses formulated to give statistical validation to the solution proffered for the research questions in establishing effect of health education intervention for the preventing of dental caries among adults are tested here at the fixed probability level of 0.05. The hypotheses were tested with one sample t-test and Paired sample t-test procedure to determine the difference between pre-test and post-test scores of the two groups after the intervention. The hypotheses were tested as follows:

**Hypothesis I:** The effect of health education intervention programme on practice of dental caries prevention strategies among adult in Zaria metropolis of Kaduna State, Nigeria is not significant.

This hypothesis was tested with the scores of the experimental and control group at both pre-test and post-test stages of the experiment. The one sample t-test procedure was used for the test because of the need to determine the effect of intervention on the outcome of the experiment. The result of the one sample t-test is summarized in the table 4

**Table 4: One sample t-test on practice of dental caries prevention strategies among adults in Zaria-Metropolis**

| Variable | Test | N | Mean | Std. Dev. | Std. Error | t-value | df | p-value |
|---|---|---|---|---|---|---|---|---|
| **Practice of dental caries prevention** | Post-test | 30 | 3.09 | 0.684 | 0.0223 | | | |
| | | | | | | 5.115 | 29 | 0.000 |
| Test Mean | | 30 | 2.50 | 0.000 | 0.000 | | | |

*(T-critical = 1.98, p <0.05)*

The test revealed that the observed mean score of 3.09 for practice of dental caries prevention strategies by adults' post-test was significantly higher than 2.50 used as the test mean. The observed t-value for the test (5.115) obtained at 29 degree of freedom (df) is higher than the critical value indicated at the bottom of the table. The p-value for the test was 0.000 ($p < 0.05$). There observations provided sufficient evidence for rejecting the null hypothesis. The null hypothesis that effect of health education intervention programme on practice of dental caries prevention strategies among adult in Zaria metropolis of Kaduna State, Nigeria is not significant is therefore rejected. The result show that the adult have significant practice of dental caries prevention strategies in the study area before and after intervention.

**Hypothesis II:** There is no significant difference between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme on knowledge among adult in Zaria metropolis of Kaduna State, Nigeria.

This hypothesis was tested with the scores of the experimental and control scores at the pre-test and post-test stages of the experiment. The paired t-test procedure was used for the test because of the need to determine the difference of pre-test on the outcome of the experiment. The result of the paired t-test is summarized in the table 5

**Table 5: Paired sample t-test on difference between control and experimental group on practice of dental caries prevention strategies before and after intervention among adults in Zaria-Metropolis**

| Variable | Test | N | Mean | Std. Dev. | Mean Diff. | t-value | df | p-value |
|---|---|---|---|---|---|---|---|---|
| **Practice of dental caries prevention** | Pre-test | 60 | 2.30 | 0.584 | | | | |
| | | | | | 0.25 | 5.002 | 59 | 0.000 |
| | Post-test | 60 | 2.55 | 0.581 | | | | |

*(t-critical = 1.96, df=59, p <0.05)*

The test result for the hypothesis revealed in table 4.14 that there is no significant difference in pre and post-test of experimental and control group. The mean score for pre-test of 2.30 and post-test of 2.55 respective while the difference is 0.25. The mean value for pre-tests show that it is below and posttest is above the benchmark mean of 2.50. While the standard deviation value for pre-test of 0.584 and post-test of 0.581 respective. The analysis further shows that p-value of 0.000 is lower than 0.05 (0.000<0.05) and t-value of 5.002 is greater than 1.96. These observations provided enough evidence for rejecting the null hypothesis. Thus,

with this result we can conclude that the null hypothesis: There is no significant difference between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme among adult in Zaria metropolis of Kaduna State, Nigeria is retained. The mean difference of 0.25 indicates a slight difference. It means that there is a significant difference between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme among adult in Zaria metropolis of Kaduna State, Nigeria.

**Summary of Tested Hypothesis**

The major observations from the effect of health education intervention programme on knowledge, attitude and practice of dental caries prevention strategies among adults in Zaria Metropolis Kaduna State Nigeria are summarized before:

1. The effect of health education intervention programme on practice of dental caries prevention strategies among adult in Zaria metropolis of Kaduna State, Nigeria posttest is significant ($p = 0.000$).
2. The difference between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme on knowledge among adult in Zaria metropolis of Kaduna State, Nigeria is significant ($p = 0.000$).

**DISCUSSIONS**

This study examine the effect of health education intervention programme on practice of dental caries prevention strategies among adults in Zaria Metropolis Kaduna State Nigeria. To achieve the objectives of this study, the study was structured along with seven purposes, research questions and hypotheses which were all tested respectively.

Hypothesis One test revealed that null hypothesis that effect of health education intervention programme on practice of dental caries prevention strategies among adult in Zaria metropolis of Kaduna State, Nigeria is not significant is therefore rejected. The observed t-value for the test (5.115) obtained at 29 degree of freedom (df) is higher than the critical value indicated at the bottom of the table. The p-value for the test was 0.000 ($p < 0.05$). There observations provided sufficient evidence for rejecting the null hypothesis. The result showed that the adult have significant practice of dental caries prevention strategies in the study area after health education intervention.

The findings agrees with previous research by Zahra, Suryanti, and Putri (2024) on practice of the preventive strategies. It was an interventional studies with a p-value of 0.000. The studies revealed an increase in practice of the preventive measures.

The findings agrees with previous research by Khushbu and Satyam (2016) on practice of the preventive strategies. It was an interventional studies with a p-value of 0.000. The studies revealed an increase in practice of the preventive measures.

Hypothesis Two test result revealed that null hypothesis there is no significant difference between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme on practice among adult in Zaria metropolis of Kaduna State, Nigeria is retained. The analysis further shows that p-value of 0.000 was less than 0.05 ($0.000<0.05$) and t-value of 5.002 is greater than 1.96. These observations provided enough evidence for rejecting the null hypothesis. It means that there is a significant difference between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme on knowledge among adult in Zaria metropolis of Kaduna State, Nigeria.

The findings agrees with previous research by Pradhan, Pruthi, Sharma, Chavan, and Verma (2024) on difference in pre and posttest in practice of the preventive strategies. It was an interventional studies with a p-value of 0.001. It differs with the current study as it is done for children and chi-square was used. The studies revealed statistical significance difference in practice of the preventive measures pre and posttest.

**Conclusion**

From the findings of the examination of the effect of health education intervention programme on practice of dental caries prevention strategies among adults in Zaria Metropolis Kaduna State Nigeria, the researcher wishes to conclude as follows:

1. Health education intervention programme on practice of dental caries prevention strategies among adult in Zaria metropolis of Kaduna State, Nigeria is effective.
2. There was difference between control and experimental group in practice of dental caries prevention strategies before and after the health education intervention programme among adult in Zaria metropolis of Kaduna State, Nigeria.

**Recommendation**

The study has the following recommendations:

1. Given the significant improvement, extend the intervention to other regions or states to broaden its impact on dental caries prevention. Implement regular follow-up sessions to ensure sustained application of the prevention strategies learned by participants. Introduce refresher courses or community workshops to reinforce the dental health practices taught, ensuring they become part of daily routines.
2. Use the experimental group's success to create tailored interventions for different demographic groups, ensuring the content of the health education is accessible to various audiences. Establish this program as a benchmark for future health interventions, as the significant differences demonstrate the effectiveness of the educational approach. Apply the successful model used in dental caries prevention to other health issues (e.g., oral hygiene**,** dietary habits) to broaden the scope of public health improvement.

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