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Original Article

ASSESSING PUBLIC KNOWLEDGE, ATTITUDE AND PERCEPTION OF ANTIOXIDANT SUPPLEMENTS IN CURTAILING OXIDATIVE STRESS-RELATED DISORDERS IN NIGERIA

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ABSTRACT

Background: Oxidative stress-related diseases, such as cancer, diabetes, and cardiovascular disease, are major public health concerns worldwide. Antioxidant supplements have been touted as a potential strategy for preventing these diseases. However, the effectiveness and safety of antioxidant supplements are still debated. An investigation was conducted to organize the public's facts and concept of antioxidant supplements as a therapy or preventive measure for oxidative stress-associated issues in Akwa Ibom State, Nigeria. This was due to the fact that oxidative stress-related ailments, like cancer and cardiovascular disease, are more common and it is associated with the growing interest in antioxidant supplements, which are thought to lower oxidative damage and improve health of the general public. Despite the growing interest in antioxidant supplements, there is a lack of studies examining public awareness/knowledge, attitude and perception of these supplements in preventing oxidative stress-related diseases. This scoping review aims to fill this knowledge gap by examining the existing literature on public awareness and perception of antioxidant supplements.

Methods: The study was a cross-sectional study involving 100 respondents from a variety of demographic backgrounds in Uyo senatorial district of the state. The

interviews utilizing an organized questionnaire to assess their information, knowledge, attitudes, and sources of information about antioxidants. The Statistical Package for Social Sciences [SPSS] was used to analyze the results and presented in charts and tables.

Results: About 47% of respondents opined that antioxidants had incorrect roles in the prevention of sickness, while 43% of respondents knew nothing about these substances. Additionally, 63% of respondents depend on friends, social media, and amateur sources in addition to other sources, raising concerns about the quality of facts being publicized. However, eighty per cent of respondents expressed a need for more correct health information, underscoring the need for targeted education campaigns.

Conclusion: This work advances our understanding of nutrition and public health by emphasize the critical duty reliable data play in the persuasive treatment of problems associated with oxidative stress in community health initiatives.

Keywords: public knowledge, attitude, antioxidants**,** Supplements, Perception

INTRODUCTION

Oxidative stress is a crucial factor in the carcinogenesis process and while cancer therapy outcomes have improved, cancer remains a systemic sickness after a certain point (Ali SS,at al). Because the complete recovery of cancer patients following a particular treatment is challenging, a multidisciplinary strategy including surgery, chemotherapy, radiation, and immunotherapy is commonly employed· (Ali SS,at al). The severity of oxidative stress in public health is worrying and has increased. Antioxidants, such as vitamins A, C, E, selenium, zinc, copper, and manganese, help reduce the detrimental effects of oxidative related stress in nutrition and human health by trapping and counteracting free radicals. Studies have shown that the public has a limited understanding of antioxidant supplements and their role in preventing oxidative stress-related diseases. (Ahsan H,at al). A survey conducted in the United States found that only 22% of respondents had heard of antioxidant supplements, and only 12% reported using them. Another study conducted in Australia found that 70% of respondents believed that antioxidant supplements were effective in preventing chronic diseases, but only 30% reported using them.

Oxidative stress has an important role in the onset and in the progression of several diseases, and in particular, in cardiovascular diseases. Oxidative stress is caused by the overproduction of reactive oxygen species (ROS), which include both the free radicals and their non-radical intermediates, such as superoxide anion ($O_2^{\bullet-}$), hydroxyl ion ($OH^{\bullet}$), hydrogen peroxide (H_2O_2), and peroxyl radicals ($ROO^{\bullet}$), alkoxyl ($RO^{\bullet}$), singlet oxygen ($^1O_2$), and ozone (O_3) (Bjørklund G. and Chirumbolo S at al). The burst of ROS is associated with an imbalance between the generated ROS and the antioxidant defense systems. Evidence shows that oxidative stress plays an important role in the

progression of various cardiovascular diseases, such as atherosclerosis, heart failure (HF), cardiac arrhythmia, and myocardial ischemia-reperfusion (I/R) injury. A lot of work has been devoted to the studies of antioxidants therapies in the prevention and treatment of these cardiovascular diseases. While some clinical trials have shown positive results, others are controversial. Green tea, strawberries, eggplant, garlic, ginger, and other foods are essential and has anti-oxidative properties in food, which have been showed to have a variety of pharmacological actions too, as well as the treatment of lipid metabolic anomalies. Obesity being a disease of body mass index more than $25kg/m^2$ is widely recognized to produce oxidative stress via several methods and in different ways. The first procedure is mitochondrial and peroxisomal fatty acid disintegration, which can produce reactive oxygen species (ROS) in oxidation reactions, while another is oxygen overconsumption, which produces free radicals in the mitochondrial respiring chain and guides oxidative phosphorylation in mitochondria (Bjørklund G. and Chirumbolo S at al).

Reversing the impact of corpulence on oxidative stress and swelling is essential to lessening the disastrous impacts of corpulence. The pretended designs of antioxidants differ, and they may be classified as hydrophilic (dissolved in water) or hydrophobic (soluble in fat). While fat-dissolved antioxidants are more inclined insulate cell membranes from ROS-mediated lipid peroxidation, water-dissolved antioxidants usually respond with ROS inside cells or body fluids (blood antitoxin, extracellular fluid, seminal plasma) Polyphenols contained in pigmented rice may play a crucial role in focusing certain therapeutic pathways in obesity-related oxidative stress and inflammation, Like every other location in Nigeria, the population in this study area may lack enough knowledge and could perceived substances regarding the antioxidant supplements at low rate, thus Preventing Oxidative Stress-Related Diseases; consequently, knowing the antioxidants and the supplements helps in successful health treatments (Garvin, T., & Szostak, R).

Oxidative Stress and Its Implications: Oxidative stress has been powerfully implicated in the pathogenesis of traumatic brain injury (TBI). Mitochondrial ferritin (Ftmt) is reported to be closely related to oxidative stress. However, whether Ftmt is involved in TBI-induced oxidative stress and neurological deficits remains unknown. Increasing evidence shows that oxidative stress induced by abnormal accumulation of reactive oxygen species (ROS) plays an main role in the pathogenesis of TBI, in accordance with Wang, Excessive levels of oxidative stress can cause protein, nucleic acids and lipids damage, leading to neurological dysfunction, additionally, [17] stated that Vascular calcification is closely related to cardiovascular morbidity and mortality and also indicated that oxidative stress is associated with dysfunction of differing organs, along with cardiovascular ailments in incessant kidney ailment (CKD), Excessive production of oxidative stress results in various deleterious occurrences by irrevocable modification of biomolecules, including lipids, proteins, and DNA. Regarding diabetes,

raised ROS and hyperglycemia damage the pancreatic β-cells and consequently induce type 1 DM

Antioxidants: Excessive oxygen free radicals can lead to ageing, cancer, and other ailments. Therefore, searching for productive antioxidants to scavenge oxygen-free radicals has become the focus of modern medicine stated that natural antioxidants in ingested foods include tocopherols, ascorbic acid, carotenoids, flavonoids, amino acids, phospholipids, and sterols. They serve a main function in scavenging free radicals and non-radical oxidants and protecting cells from oxidative stress and damage. The evidence that oxidative damage is immediately linked to various disorders, including cancer, neuro-degeneration, and diabetes, stresses the need for antioxidants. (Callcott E. T., Blanchard C. L., Snell P., and Santhakumar A. B)

Several ways to improve human health and lifespan incorporate dietary antioxidants into diets and fortified foods . Antioxidants also help to hold food fresher for longer. Fortified or designer meals that are enhanced with antioxidant nutrients and the exercise of microorganisms as probiotics are suitable and more accessible in the market as fitness foods., According to a study, antioxidants are classified into two types established by their method of operation: (i) deterrent antioxidants, which interfere with the start process by delaying or staying the formation of radical class, and (ii) chain-breaking antioxidants, that hinder autoxidation by playing with propagation reactions; that is, they respond with radicals faster than the oxidizable substrate. In addition to these direct antioxidants, substances that do not hold antioxidant activity but can advance and boost the efficiency of the endogenous antioxidant defences in biological systems, are usually categorized as indirect antioxidants.

Antioxidants Supplementations: **Which Are the Most Effective in Clinical Practice?**

The term “antioxidants” defines chemical substances that slow down the damage caused by oxygen to organisms. Antioxidants are one of the mechanisms that the body uses to fight against oxidative stress with the role to balance the negative effects of oxidant agents and protect cells from oxidative damage. We can identify two macro groups of antioxidants: Those who are produced by the body itself (i.e., endogenous antioxidants) and those that derive from dietary sources (i.e., exogenous antioxidants). Endogenous antioxidants can be divided into two classes: Enzymatic and non-enzymatic antioxidants. Some enzymatic antioxidants are catalase (CAT) that degrades hydrogen peroxide (H_2O_2) to water and oxygen, glutathione reductase (GRx), glutathione peroxidase (GPx) that catalyzes the reduction of H_2O_2 by the reduced form of glutathione (GSH), creating a glutathione bridge with another glutathione molecule (GSSG), and superoxide dismutase (SOD) that catalyzes the dismutation of superoxide anion radical (O_2^-) into H_2O_2 and oxygen (O_2)

The non-enzymatic antioxidants include nutrients that are not produced by the body, and thus need, to be included through the diet. Nutrient antioxidants are found in fruits, vegetables, and fish, and are extremely important because each one of them has a role in oxidative stress neutralization. According to their role in reducing oxidative stress-mediated cardiovascular risk, these exogenous molecules can represent a useful tool in clinical practice. Specifically, natural extracts, such as polyphenols, exert an antioxidant activity that includes suppression of ROS formation by either inhibition of enzymes involved in their production, like NOX2, scavenging of ROS, or up-regulation or protection of antioxidant defenses.

The most widely used antioxidants include:

Vitamins E and C

Vitamin E is a strong antioxidant, is dissoluble in fat, and presents eight stereoisomers. Just one, α-tocopherol, is bioactive in humans. The main function of vitamin E is to protect the body against lipid peroxidation. It has been shown that high-dosages (≥400 IU/day or more for at least 1 year) can be dangerous and can increase the risk of death. Moreover, a dose-response analysis showed a statistically significant relationship between vitamin E dosage and all-cause mortality, with an increased risk of dosages greater than 150 IU/day. (Fernández-Sánchez A., Madrigal-Santillán E., Bautista M) The effect of Vitamin E supplementation in the prevention of cardiovascular diseases is controversial. The analyses of sixteen randomized controlled trials of vitamin E treatment showed that, compared to controls, vitamin E given alone significantly decreased myocardial infarction (R.R.: 0.82; 95% C.I., 0.70–0.96; p = 0.01). Supplements containing vitamin E significantly reduced cardiovascular mortality risk (RR: 0.88; 95% CI: 0.80, 0.96). However, the analyses of 15 trials reporting data on 188,209 participants showed that antioxidant vitamin supplementation (vitamin E, β-carotene, and vitamin C) has no effect on the incidence of major cardiovascular events, myocardial infarction, stroke, total death, and cardiac death.

Vitamin C, or ascorbic acid, is a water-soluble antioxidant with a fundamental role in quenching various ROS and reactive nitrogen species (RNS). The antioxidant activity of vitamin C supplementation resulted in positive effects when administrated in concentrations that ranged from 500 to 2.000 mg/day. In the case of high consumption, vitamin C and its metabolites, such as dehydroascorbic acid, 2,3-diketogulonic acid, and oxalic acid, are excreted via the kidneys in humans. Vitamin C is generally non-toxic, but at high doses (2–6 g/day) it can cause gastrointestinal disturbances or diarrhea. However, these side effects are generally not serious and can be easily reversed by reducing its intake. Several lines of evidence suggest that Vitamin C may be associated with a favorable impact on the risk of cardiovascular disease. Vitamin C dose greater than 500 mg/day was associated with beneficial effects on endothelial

function with stronger effects in those at higher cardiovascular disease risk, such as in atherosclerotic, diabetic, and heart failure patients. (Evans, J. A., Shim, J., & Ioannidis, J. P)

The analyses of thirteen trials involving 1956 patients after cardiac surgery showed that vitamin C significantly reduced the incidence of postoperative atrial fibrillation (RR: 0.68, 95% CI: 0.54, 0.87, p = 0.002) and the risk of adverse events (RR: 0.45, 95% CI: 0.21, 0.96, p = 0.039).

Finally, the effects of Vitamins E and C are strictly correlated. Indeed, in patients with coronary artery disease, supplementation with 2 g of vitamin C with 600 mg of vitamin E orally significantly enhanced endothelium-dependent vasodilatation in the radial circulation.

Omega-3 and Omega-6 Fatty Acids

These kinds of fatty acids, characterized by a long aliphatic chain, are essential for human health. They cannot be synthesized, so they must be taken through food. Omega-3 fatty acids are divided into three different types: Eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and alpha-linolenic acid (ALA). The EPA and DHA are present in fish and can be used by the body without been changed. ALA, which is present in large quantities in nuts, must be converted to EPA and DHA. Omega-3 fatty acids are involved as an anti-inflammatory countering the process of chronic diseases. Although the ideal amount to take is not firmly established, evidence from prospective secondary prevention studies suggests that intakes of EPA + DHA ranging from 0.5 to 1.8 g per day (either as fatty fish or supplements) significantly reduce the number of deaths from heart disease. Intervention trials with omega-3 fatty acid supplements have reported no serious adverse reactions at the doses administered. The more common adverse effects of fish oil preparations, particularly in higher dosages, include nausea, fishy belching, and loose stools. Moreover, the administration at high doses has been shown to prolong bleeding time. There are much clinical evidence supporting the beneficial effects of EPA and DHA supplementation on cardiovascular health. Treatment of patients with acute myocardial infarction with four 1g capsules per day containing ethyl esters of EPA (465 mg) and DHA (375 mg) was associated with a reduction of adverse left ventricular remodeling, non-infarct myocardial fibrosis, and serum biomarkers of systemic inflammation. In patients with acute coronary syndrome assigned to receive 1800 mg/day of EPA after PCI, death from a cardiovascular cause were significantly reduced. In adults at high cardiovascular risk, omega-3 fatty acids (1800 mg/day for 12 weeks) administration improved arterial stiffness and endothelial function. The supplementation with omega-3 ethyl-ester (1.86 g of EPA and 1.5 g of DHA daily) to subjects with stable coronary artery disease attenuates the fibrous plaque progression compared to placebo. The administration of

2 g twice daily of icosapent ethyl, which is a highly purified and stable EPA ethyl ester, to patients with established cardiovascular disease or with diabetes and other risk factors, significantly reduced the risk of ischemic events, including cardiovascular death compared to placebo. Moreover, in statin-treated patients at increased cardiovascular risk, icosapent ethyl 4 g/day significantly reduced triglycerides, total cholesterol, oxidized LDL, hsCRP, and other atherogenic and inflammatory parameters. The analyses of fourteen randomized controlled trial (71,899 subjects) showed an 8.0% lower risk for cardiac death in long-chain omega-3 polyunsaturated fatty acids arms versus controls.

For ALA, a total intake of 1.5 to 3 g per day seems beneficial, although definitive data from prospective, randomized clinical trials are still needed.

Polyphenols

Polyphenols are natural compounds synthesized exclusively by plants with chemical features related to phenolic substances. Epidemiological studies suggest that diets rich in polyphenols may be associated with reduced incidence of cardiovascular disorders, due to their antithrombotic, anti-inflammatory, and anti-aggregative properties. Polyphenols can be simply classified into flavonoids and non-flavonoids (Gios, L)

Non-Flavonoids

Non-flavonoids include phenolic acids, stilbenes, and lignans. Among non-flavonoids, resveratrol is a stilbenoid that exhibits a plethora of therapeutic benefits, including anti-inflammatory and antioxidant properties, anti-platelet, anti-hyperlipidemic, immuno-modulator, cardioprotective, vasorelaxant, and neuroprotective effects. It has been shown that doses of resveratrol lower than 0.5 g per person may be sufficient to decrease blood glucose levels, improve insulin action, and generate cardioprotective effects and other favorable effects. A review of the research on resveratrol in the last 10 years showed that a repeated and moderate administration of resveratrol is better than the administration of a single, higher dose. A safe and efficient dose is 1 g or more per day; however, resveratrol intake is safe at a dose of up to 5 g (Ito T, Urushima H, Sakaue M)

Flavonoids

Flavonoids, a family of polyphenolic compounds, are potent antioxidants present in most plants and are classified into seven classes. They can be divided into several subgroups corresponding to different classes of plants, which have multiple effects on the human body. There are thousands of flavonoids that can be found in plants in different amounts and combinations. At this time, the totality of evidence suggests long-term consumption of flavonoid-rich foods may be associated with a lower risk of fatal and non-fatal ischemic heart disease (IHD), cerebrovascular disease, and total

CVD. The toxicity of flavonoids is very low. However, as a precaution, doses less than 1 mg per adult per day have been recommended for humans. At higher doses, flavonoids may act as mutagens, pro-oxidants that generate free radicals, and as inhibitors of key enzymes involved in hormone metabolism.

Carotenoids

β-carotene is a member of the carotenoids, a family of provitamins that can be converted into vitamin A and are naturally found in abundance in vegetables and fruits. Carotenoids are strong antioxidants as they can scavenge the free oxygen radicals from the body. Moreover, carotenoids with oxygen in the structure like fucoxanthin and astaxanthin have proved to suppress the expression of cytokines IL-6, TNF-α, and IL-1β and act like pro and anti-inflammatory compounds. Several epidemiological reports have shown a correlation between elevated dietary carotenoid intake and the prevention of CVD. A safer profile for non-provitamin A carotenoids (up to 20 mg/day for lutein and 75 mg/day for lycopene) and 2–4 mg/day β-carotene has been suggested. However, for β-carotene, serious adverse effects have been reported in large-scale prospective randomized trials: Four years of supplementation with 20 to 30 mg β-carotene per day was associated with increased risk of lung cancer and cardiovascular disease among smokers and workers exposed to asbestos.

Selenium

Selenium is an essential dietary mineral that can be found in very low concentrations in seafood, meat, soil, some vegetables, and liver. Selenium is a cofactor of enzymes, such as glutathione peroxidase (GSH-Px), which is a potent antioxidant enzyme. The recommended dietary allowance for selenium that is estimated to be sufficient to meet the nutritional needs of nearly all healthy adults is 55 μg/day. Selenium toxicity can occur with acute or chronic ingestion of excess selenium. An excess of selenium in the diet (>400 μg/day) will result in selenosis, i.e., poisoning by selenium. Symptoms of selenium toxicity include nausea, vomiting, nail discoloration, brittleness, hair loss, fatigue, irritability (Lazzarino G., Listorti I., Bilotta G., Capozzolo T)

The cardioprotective effect of selenium is still controversial, probably due to the limited trial evidence that is available to date. In observational studies, a 50% increase in selenium concentrations was associated with a 24% reduction in coronary heart disease risk. In a clinical study, patients with congestive heart failure, 200 μg/day of selenium for 12 weeks had beneficial effects on insulin metabolism, and markers of cardio-metabolic risk. However, the meta-analyses of twelve trials that included 19,715 participants randomized to selenium supplementation showed that were no statistically significant effects of selenium on all-cause mortality, CVD mortality, or all CVD events (fatal and non-fatal).

Lipoic Acid

Lipoic acid is an organosulfur component produced from plants, animals, and humans. It has a dual role in the body as it is an antioxidant and a cofactor for enzymes involved in the 2-oxoglutarate dehydrogenase complex. It is synthesized by the human at a low number, but the quantities produced are not enough to fulfill the energy requirement of the cell. Thus, it is mostly obtained from the diet, especially from meat, vegetables, and fruits. The lipoic acid in humans, supplemented at the therapeutic range from 200 to 1800 mg/day, has numerous clinically valuable properties. For example, studies supported the potential use of lipoic acid in diabetes, as the major risk factor for developing several human diseases, including atherosclerosis, hypertension, heart failure, and myocardial infarction.

Coenzyme Q10

Coenzyme Q10 a naturally occurring, lipid-soluble, vitamin-like substance involved in the mitochondrial electron transport chain, and it is, thus, essential to produce energy in the body. It is essentially present in the heart and in the liver, and it can be assimilated through meat, some fruit and vegetable, and soybean. The risk assessment for CoQ10, based on various clinical trial data, indicates that the safety level is 1200 mg/day/person suggesting that CoQ10 is highly safe for use as a dietary supplement. Recent data indicate that Coenzyme Q10 has an impact on the expression of many genes involved in metabolism, cellular transport, transcription control, and cell signaling, making CoQ10 a potent gene regulator. Therefore, coenzyme Q10 supplementation is useful in diseases associated with CoQ10 deficiency, which includes diabetes mellitus, mitochondrial diseases, and cardiovascular disease. Patients with moderate to severe heart failure randomized to CoQ10 (300 mg daily) in addition to standard therapy, after two years showed reduced major adverse cardiovascular events, all-cause mortality, cardiovascular mortality, hospitalization, and improvement of symptoms. The daily dosage of CoQ_{10} supplement ranged from 60 to 300 mg also resulted in a net increase in ejection fraction of 3.67% (95% CI: 1.60%, 5.74%) in patients with congestive heart failure. The analyses of eight trials (267 participants) showed that taking CoQ10 by patients with CAD significantly decreased total-cholesterol and increased HDL-cholesterol levels. The choice of the type of antioxidant supplementation that best affects cardiovascular disease is still a challenge. The results of several antioxidant supplementations in different cardiovascular diseases are disparately ranging from possibly beneficial to many futile to some harmful effects. The different results may be due to several reasons, including the different concentrations used—also taking into account that high concentrations have negative effects. Moreover, for some supplements, there are no clinical data or data relating to small trials, so it is of importance investigating patient-relevant outcomes as embedded in Ohishi T., Fukutomi R., Shoji Y., Goto S., and Isemura M.

Specific Objectives:

1. To assess the level of public knowledge about antioxidant supplements and their role in preventing oxidative stress-related disorders in Nigeria.
2. To examine the attitudes of Nigerians towards the use of antioxidant supplements in preventing oxidative stress-related disorders.
3. To investigate the perception of Nigerians regarding the effectiveness and safety of antioxidant supplements in curtailing oxidative stress-related disorders.
4. To identify the socio-demographic factors that influence public knowledge, attitude, and perception towards antioxidant supplements in Nigeria.

Research Questions

1. What is the current level of public awareness and understanding of antioxidant supplements?
2. What are the perceived benefits and risks of antioxidant supplements among the general public?
3. What factors influence public perception and use of antioxidant supplements?

MATERIALS AND METHODS

Study Area: This study was carried out in the Uyo senatorial district of Akwa Ibom State. Akwa Ibom State is one of the oil-producing states in Nigeria has 3 senatorial districts, Uyo, Ikot Ekpene and Eket. Akwa Ibom State is located in the coastal southern part of the country with Uyo as the state capital. It lies between latitude $48^{o}32$N and $5^{o}25$E and longitude $7^{0}25$N and $8^{0}25$E. The people of Akwa Ibom State are predominantly Christians and the main economic activities of the people are fishing for riverine and coastal dwellers, farming mostly for upland dwellers, trading, artisanship and civil services. Uyo senatorial district of the state is vast and blessed with rich foods and cultural heritage.

Study Design

The study was a descriptive cross-sectional study

Study Population

The target population was 18 years old and above and lived in the Uyo senatorial district for at least a year.

Sample size determination:

Sample size was estimated using William Cochran's method for cross sectional survey

Sample size $\mathbf{n = \frac{Z^2PQ}{D^2}}$ …[32]

n = Sample size
Z = Standard normal deviation set at 1.96 to correspond to 95% confidence interval.
P = highest Prevalence of the condition under study from related studies.
Q = **1-P**
D = Degree of precision at a confidence level of 95% (Error margin allowed from study which is a measure of level of accuracy)
Z = 1.96
P = 20.5 = 0.25 (highest prevalence of stress related disease from literature review
d = 0.05
From the formula; $n = \frac{Z^2PQ}{D^2}$

$n = \frac{(1.96)^2 \times 0.25 \times 0.3)}{(0.05)^2}$

$n = \frac{3.8416 \times 0.059}{0.0025} = \frac{0.6592}{0.0025}$

Minimum sample size, n = 92.10
Adding a non-response rate of 10%, the study sample size would be 101, approximately 100 participants.
Study Sample size used in this study = 100

Sampling technique:

Multistage sampling technique was used for this survey.
Stage I: Uyo LGA was selected by convenience sampling to be used as study area
Stage II: Wards and villages were selected using simple random sampling technique (balloting method).
Stage 111: Participants were selected using simple random sampling technique (balloting method).

Study Instruments:

A semi structured, questionnaire was used. This paper based, semi-structured questionnaire survey instrument was derived based on study objectives and also from previous surveys, studies or reviews pertaining to Public awareness/ knowledge, attitudes and perception of antioxidant supplements in preventing oxidative stress-related diseases. The questions were in simple English language, short and direct to prevent misunderstanding. The questionnaire was divided into four sections:

SECTION A: socio-demographic characteristics of the participants
SECTION B: knowledge/awareness of antioxidant supplements in preventing oxidative stress-related diseases.
SECTION C; attitudes of respondents towards antioxidant supplements in preventing oxidative stress-related diseases.
SECTION D; perception of antioxidant supplements in preventing oxidative stress-related diseases.
Pretesting: A pretest study was done with 10% of study sample size to establish reliability, clarity, inclusion of relevant information and good consistency in the words, they that were not selected to be part of the survey. Modifications was made on the questionnaire based on feedback received from pretest.
Method of Data Collection:

The structured questionnaire was used to collect data on public knowledge of antioxidant supplements, as well as their position and conviction, judgment, and methods for reducing oxidative stress disorders. Respondents were contacted and asked where they obtained the antioxidant information. The structured questionnaire was created to be basic and easy to understand. The collection of data was carried out for a period of 2 months. A Research assistant was trained within a month on how to administer consent form, collect, analyze and interpret data. An information sheet, ethics approval and written consent form (which was read out) was provided to each respondent. There was confidentiality and anonymity of data of respondents.

Data Management

***Measurement Variables*:** The questionnaire checked the Public knowledge, attitude and perception of antioxidant supplements in preventing oxidative stress-related diseases and were measured and categorized as yes or no response.

***Statistical Analysis*:** Responses or feedback gotten from survey was transcribed from paper into electronic database using the software Statistical Package for Social Sciences (SPSS) software version 26.0 [SPSS Inc; Chicago, IL, USA] and presented in the form of numerical, tabular presentations. Descriptive statistics were employed to characterize the demographic characteristics of the respondents and their level of awareness. Percentages and frequencies were determined.

Ethical Considerations: Ethical approval for the study was obtained from Ministry of Health Research and Ethics Committee Akwa Ibom State. A written informed consent was obtained from the respondents before questionnaires were administered. Information given was treated with utmost confidentiality. There was also provision for translation of consent form for participants who can't read or write.

Before distributing the questionnaire to respondents, demographic information such as educational level, age, gender, and socioeconomic position were assessed. The responders were picked at their discretion, and their confidentiality was maintained.

Limitation of the study: Although the goal is to assess public awareness and perception of antioxidant supplements, there are limitations in that self-reporting may be biased, as respondents may overestimate their knowledge and awareness. As a result, future studies might benefit from a bigger representative sample and better inclusion procedures.

RESULTS:

One hundred (100) respondents participated in the study and provided responses to all the questions. The results obtained are shown below:

Table 1: Demographic Characteristics of respondents

Demographic variable	Frequency(n =100	Percentage (%)
Age Group		
18-25 years	20	20.0
26-35 years	25	25.0
36-45 years	30	30.0
46 years and above	25	25.0
Gender		
Male	45	45.0
Female	55	55.0
Education Level		
No formal education	10	10.0
Primary education	25	25.0
Secondary education	35	35.0
Tertiary education	30	30.0
Occupation		
Student	20	20.0
Employed	50	50.0
Unemployed	30	30.0

Their ages ranged from 18-46 years Majority of the respondents were females 55%, Greater percentage, 35%, of the respondents had educational status (Secondary education)

Table 2: Awareness/ knowledge of Antioxidants among respondents

Awareness Level	Frequency (n)	Percentage (%)
Aware of Antioxidants	43	43.0
Not Aware of Antioxidants	57	57.0
Misconceptions about Antioxidants	47	47.0
Correct Understanding	53	53.0

43% of participants were aware of the possible health advantages of antioxidants. majority of respondents (47%) had false beliefs about the contribution of antioxidants to the prevention of illness.

The overall knowledge level of the respondents was good since more than half (43%) of them had good score when the overall knowledge score was generated (figure 2.1). grade as Good/ Poor

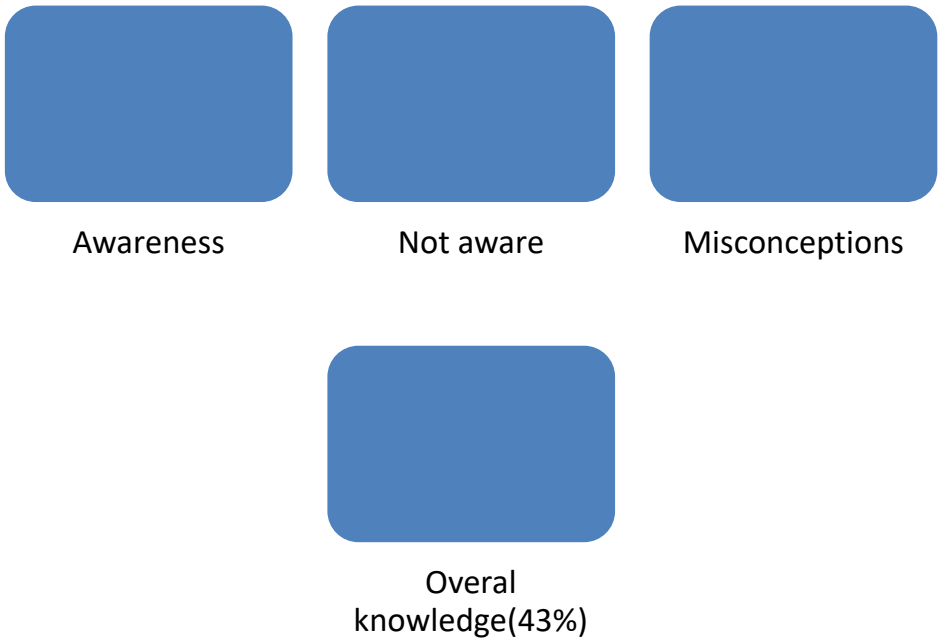

Fig 2.1 shows the overall knowledge level of the respondents

Table 3: Attitudes towards Antioxidant Supplementation

Attitude Statement	Frequency (n)	Percentage%)
Interested in Accurate Health Information	80	80.0
Believe Antioxidant Supplements Prevent Diseases	65	65.0
Skeptical About Efficacy	35	35.0

The survey investigated respondents' opinions regarding antioxidant supplementation. Majority of the respondents 80% expressed a desire to obtain more precise health information on antioxidants while 35% of respondents were doubtful about the effectiveness of antioxidant supplements and 65% of respondents thought they may help prevent illnesses of life.

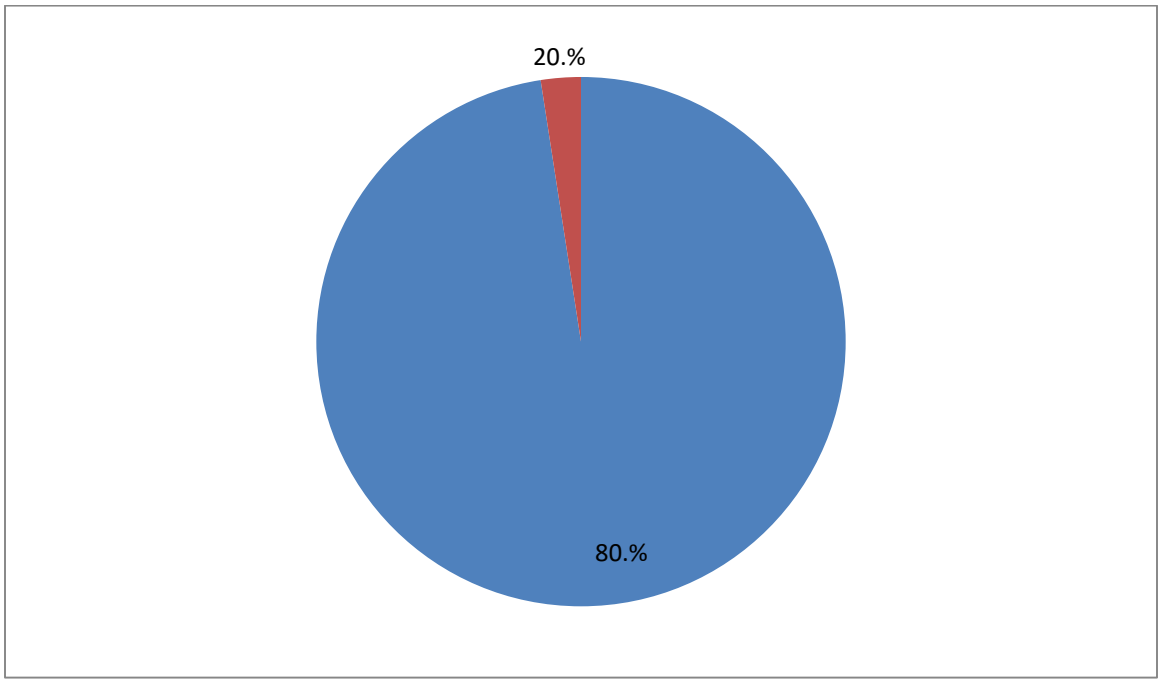

Fig 3.1 shows the attitude on the use of anti-oxidant use among the respondents.

80.00% of the respondents had an overall good attitude of on the use of anti-oxidants

Table 4: Sources of Information on Antioxidants

Source of Information	Frequency (n)	Percentage (%)
Professional Health Sources	37	37.0
Non-Professional Sources	63	63.0
Social Media	40	40.0
Friends and Family	23	23.0

The findings showed that although just 37% of respondents looked for information from reputable health sources like doctors and dietitians, the majority (63%) relied on non-professional sources

DISCUSSION

The study's findings provide vital insights into public understanding and perception of antioxidant supplements in the Uyo LGA of Akwa Ibom State, Nigeria. A sizable proportion of respondents (43%) were aware of antioxidants; yet, an alarming 47% had misunderstandings about their function in disease prevention. The modest level of awareness about antioxidants is similar to earlier research, which found various degrees of public understanding about dietary supplements. The significant amount of misunderstandings (47%), indicates that many people may not completely comprehend the scientific foundation for antioxidant health claims.

This is per research that illustrates how false information is frequently spread by relying on uncertain sources, such as social media and conversations among peers. The majority of facts on antioxidants emanate from non-professional sources (63%) which raises questions about the veracity and integrity of the facts being shared. It is exclusively troubling when people depend on deceptive sources for health facts because this might bring about the proliferation of myths and deception regarding antioxidant supplements. According to earlier studies, those who get their health facts from informal sources are more likely to misunderstand dietary supplements. The study's findings highlighted the need for increased health literacy campaigns that emphasize the significance of seeking reliable information on dietary supplements from certified health providers. The survey also found that the vast majority of respondents (80%) wanted more precise health information on antioxidants. Furthermore, 65% of respondents believe antioxidant supplements might help avoid illnesses, indicating a potential market for educational programs aiming at explaining their function in health promotion.

There is an obvious need for focused teaching campaigns that dispel myths about antioxidants and give evidence-based information on their efficacy and safety. To reach a larger audience, such programs might be delivered through community workshops, health fairs, and online platforms. Furthermore, healthcare practitioners should be encouraged to engage in talks with patients about dietary supplements, therefore dispelling myths and providing factual information· While this study provides useful information, it is important to recognize its limitations. The use of a convenience sample strategy may reduce the findings' generalizability to the larger population. Future studies should investigate using a more representative sample technique and investigating qualitative methodologies to acquire a better understanding of public views and attitudes about antioxidants. Longitudinal studies might also assist examine changes in knowledge and attitudes over time, especially after educational interventions

CONCLUSION

This study contributes to the broader discourse on public health nutrition and emphasizes the importance of integrating reliable information into community health initiatives and fostering a better understanding of antioxidants and their role in health, it is possible to mitigate the risks associated with oxidative stress-related diseases and promote overall well-being in the Uyo Local Government Area and beyond.

CONFLICT OF INTEREST: We hereby declare zero conflict of interest in the study

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