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The Association between the Analysis of Students' Age and the Association with their Level of Knowledge in Osteoporosis

Chizaram Emmanuela Ezebuilo BMR. PT [1], Loveth Chisom Ogbodo BMR. PT [2], Benedette Onyinyechi Nnamani BMR. PT [4], Loveth Ezinne Eneh BMR. PT [6]

[1, 2, 4, 6] Department of Medical Rehabilitation, University of Nigeria, Enugu Campus

Kenneth Chidiebere Ezebuilo, MSC [3]

[3] Department of BIM and Digital Built Environment, University of Salford, Manchester, United Kingdom

Nnenna Lydia Ezebuilo BNSC, RN, RM, RPHN [5]

[5] Department of Nursing Science, University of Nigeria, Enugu Campus

Annotation: The study assessed the association between students year of study and their level of knowledge in osteoporosis. A cross-sectional study design was employed. This study was carried out in two selected universities in southeast, Nigeria. The two selected universities used for this study from southeast Nigeria universities include; Nnamdi Azikiwe University, Akwa and University of Nigeria, Nsukka. The target population used for the study was students in medicine and surgery, nursing, nutrition and dietetics, pharmacy and physiotherapy. The data collection was conducted using the Convenience sampling (also known as availability sampling) technique. This study size was calculated using Taro Yamane method. Facts on Osteoporosis Quiz (FOOQ) questionnaire was used as the instrument of the study. The study showed that a majority of the participants had poor knowledge of osteoporosis. On this basis it was concluded that the association between students' year of study and their level of knowledge in osteoporosis suggests a positive correlation. As students' progress through their academic years, their understanding of osteoporosis tends to improve. One of the recommendations made was that basic osteoporosis education should be introduced in the early years of study to lay the foundation for more advanced topics later on.

Keywords: Students' Year, Knowledge and Osteoporosis.

Introduction

Osteoporosis is a skeletal disease of reduced bone mineral density (BMD) that is diagnosed as 2.5 standard deviations below the adult peak mean that compromises bone strength resulting in an increased risk of bone fracture (Kanis, Melton, Christiansen, Johnston & Khaltaev, 1994). Osteoporosis statistics revealed an estimated 8.9 million fractures each year globally with the silent pattern of this chronic bone disease, that patient may not experience any pain till the first fracture occur (Lam, 2008).Osteoporosis treatment constitutes a huge burden costing billions of dollars per year on the nation's healthcare system which is expected to continuously and greatly increase in the next couple of decades (Ray, Chan, Thamer & Melton, 1997; Burge, Dawson-Hughes, Solomon, Wong, King & Tosteson, 2005). With osteoporosis being a silent disease, plans are to be made for its prevention; some of the plans include primary preventive measures. The Primary preventive measures are early detection of the risk factors, teaching and guiding the people whom at risk, on how to prevent the disease and giving treatment at a proper and suitable time to help reduce mortality and morbidity rate and the cost (Juby & Davis, 2001; Cheung, Tan, Cheung & Kung, 2016).Considering that most of the osteoporosis risk factors are modifiable, more campaigns to increase its awareness and consequences can play a role in its primary prevention initiatives (Chan, Kwong, Zang & Wan, 2007).Therefore, ensuring the appropriate level of knowledge on osteoporosis may play a crucial role in deterring the rate of incidence of the disease later on.

Statement of Problem

Nguyen & Wang (2012), conducted a study among students in relevant healthcare academic programs, such as nursing, pharmacy, physical therapy, and dietetics and found that differences existed in osteoporosis knowledge in general between the programs and between different years of students in the same programs. There were also discrepancies in specific areas of osteoporosis knowledge between the classes of students, and the average scores of correctly answered items were only as high as 76.3% on osteoporosis knowledge. Assessment of the knowledge of college students, particularly those in healthcare-related fields regarding osteoporosis is substantial as they will play a role in dissemination of osteoporosis-related knowledge as a part of their future health education responsibilities (Elnaem et al., 2017). Osteoporosis knowledge has not been assessed among health professional students in SouthEast Nigeria which constitutes a significant part of the country's workforce of future healthcare practitioners. Therefore, this study intends to investigate osteoporosis knowledge in students who are soon to be Doctors, nurses, pharmacists, physical therapists, and dieticians.

Research Objective

1. Assess if there is any association between the students year of study and their level of knowledge in osteoporosis.

Research Question

1. What is the association between the student's year of study and their level of knowledge in osteoporosis?

Conceptual Review

Concept of Knowledge

Knowledge is defined as facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject. Knowledge is closely linked to doing and implies know-how and understanding. The knowledge possessed by each individual is a product of his experience, and encompasses the norms by which he evaluates new inputs from his surroundings (Davenport & Prusak, 2000). Gamble and Blackwell (2001), defined knowledge as "a fluid mix of framed experience, values, contextual information, expert insight, and grounded intuition that provides an environment and framework for evaluating and incorporating new experiences and information. Therefore, it is imperative for healthcare professionals who work with individuals with osteoporosis to be adequately educated to have proficient knowledge of the disease and how to prevent and treat it. Healthcare professionals should receive adequate osteoporosis education in their academic programs in order to give them adequate knowledge of the disease to prepare them for treating osteoporosis population (Nguyen & Wang, 2012).

Concept of Osteoporosis

Osteoporosis is a chronic, progressive disease of multifactorial causes and is the most common metabolic bone disease in the United States. It has been most often recognized in postmenopausal women, persons with small bone structure, the elderly, and in Caucasians and person of Asians background, although it does occur in sexes, all races, and all age groups. It is characterized by low bone mass and microarchitectural deterioration of bone tissue, with a resultant increase in bone fragility (Al Saedi, Stupka & Duque, 2020). The disease often does not become clinically apparent until a fracture occurs. Osteoporosis represents an increasingly serious health and economic problem in the United States and around the world (Majumdar et al., 2009).

Many individuals, male and female, experience pain, disability, and diminished quality of life as a result of having this condition. Over current decades, osteoporosis has gone from being viewed as an inevitable effect of aging to being recognized as a serious, highly preventable and treatable disease. Regardless of the adverse effects of osteoporosis, it is a condition that is often overlooked and undertreated, in large part because it is so often clinically silent before manifesting in the form of fracture. Fractures in patients with osteoporosis can occur after minimal or no trauma (Cosman et al.,

2014). For example, a Gallup survey performed by the National Osteoporosis Foundation revealed that 86% of women with osteoporosis had never discussed its prevention with their physicians (Maybury, 2002). Failure to recognize vulnerable patients, to educate them, and to put into practice preventive measures may lead to tragic consequences. Medical care includes lifestyle modifications including exercise, smoking cessation, and avoiding excess alcohol intake along with taking calcium, vitamin D, and antiresorptive agents such as bisphosphonates, the selective estrogen receptor modulator (SERM) raloxifene, and denosumab. Anabolic agents, include: teriparatide, abaloparatide, and romosozumab, are available as well (Haas & LeBoff, 2018). Prevention and identification of the secondary causes of osteoporosis are first-line measures to lessen the impact of this condition.

Etiology

Etiologically, osteoporosis is categorized as:

1. Primary or

2. Secondary.

Primary osteoporosis

Primary osteoporosis is the most common form of osteoporosis. It is divided into juvenile and idiopathic osteoporosis; idiopathic osteoporosis can be further subdivided into postmenopausal (type I) and age-associated or senile (type II) osteoporosis. Postmenopausal osteoporosis is principally due to estrogen deficiency. Senile osteoporosis is principally due to an aging skeleton and calcium deficiency.

Secondary osteoporosis

This occurs when an underlying disease, deficiency, or drug causes osteoporosis (Colangelo, Biamonte, Pepe, Cipriani & Minisola, 2019). Up to one-third of postmenopausal women, as well as many men and premenopausal women, have a coexisting cause of bone loss, (Camacho et al., 2020; Kelman & Lane, 2005) of which renal hypercalciuria is one of the most important secondary causes of osteoporosis and treatable with thiazide diuretics (Adams, Song & Kantorovich, 1999).

Epidemiology

According to the National Osteoporosis Foundation (NOF), in the United States in 2010 more than 10 million adults age 50 years and older had osteoporosis and more than 43 million had low bone mineral density (BMD). In the United States in 2015, as many as 2 million Medicare beneficiaries sustained 2.3 million osteoporotic fractures. Within 12 months of experiencing a new osteoporotic fracture, approximately 15% of patients suffered one or more succeeding fractures and nearly 20% died. Mortality was highest in those with hip fracture, with 30% dying within 12 months (Hansen, Bazell, Pelizzari & Pyenson, 2019). NOF announced in 2018 that approximately 10.2 million adults in the United States have osteoporosis, with an additional 43.4 million having low bone mass. Most studies assessing the prevalence and incidence of osteoporosis use the rate of fracture as a marker for the presence of this condition, although BMD also relates to risk of disease and fracture. The risk of new vertebral fractures increases by a factor of 2-2.4 for each standard deviation (SD) decrease of BMD measurement. Women and men with metabolic disorders associated with secondary osteoporosis have a 2- to 3-fold higher risk of hip and vertebral fractures. Globally, osteoporosis is by farthe most common metabolic bone disease, estimated to affect over 200 million people worldwide (Cooper, Campion & Melton, 1992). An estimated 75 million people in Europe, the United States, and Japan have osteoporosis. (Medline, 1997).

Diagnosis

Baseline laboratory studies include the following:

1. Complete blood count: May reveal anemia

2. Serum chemistry levels: Usually normal in persons with primary osteoporosis

3. Liver function tests

4. Thyroid-stimulating hormone level: Thyroid dysfunction has been associated with osteoporosis

5. 25-Hydroxyvitamin D level: Vitamin D insufficiency can predispose to osteoporosis

6. Serum protein electrophoresis: Multiple myeloma may be associated with osteoporosis

7. 24-hour urine calcium/creatinine: Hypercalciuria may be linked with osteoporosis; more investigation with measurement of intact parathyroid hormone and urine pH may be indicated; hypocalciuria may indicate malabsorption, which should be further evaluated with a serum vitamin D measurement and consideration of testing for malabsorption syndromes such as celiac sprue

8. Testosterone (total and/or free) and luteinizing hormone/follicle-stimulating hormone: Male hypogonadism is associated with osteoporosis

Management

Lifestyle modification for the prevention of osteoporotic fractures includes the following (Camacho et al., 2020):

1. Increasing weight-bearing and muscle-strengthening exercise to improve agility, strength, posture, and balance, which may reduce the risk of falls

2. Ensuring optimum calcium and vitamin D intake as an adjunct to active antifracture therapy and balanced diet

3. Tobacco cessation

4. Limiting alcohol consumption

5. Removing potential risk factors to avoid falls

The NOF recommends reserving pharmacologic therapy for postmenopausal women and men aged 50 years or older who present with the following (Cosman et al., 2014):

1. Fragility fracture: a hip or vertebral fracture (vertebral fractures may be clinical or morphometric (ie, identified on a radiograph alone)

2. T-score of –2.5 or less at the femoral neck, total hip, spine, or 33% of radius after appropriate evaluation to exclude secondary causes

3. Low bone mass (T-score of –1.0 to –2.5 at the femoral neck or spine) and a 10-year probability of a hip fracture of 3% or greater or a 10-year probability of a major osteoporosis-related fracture of 20% or greater, based on the US-adapted WHO algorithm for calculating fracture risk (FRAX)

Prevention of Osteoporosis

Primary prevention of osteoporosis starts in childhood. Patients require adequate calcium intake, vitamin D intake, and weight-bearing exercise. Beyond this, prevention of osteoporosis has two components: behavior modification and pharmacologic interventions. The National Osteoporosis Foundation specifies that the following behaviors should be modified to reduce the risk of developing osteoporosis (Cosman et al., 2014):

1. Cigarette smoking

2. Physical inactivity

3. Intake of alcohol, caffeine, sodium, animal protein, and calcium Patients should be counseled on smoking cessation and moderation of alcohol intake. Regular weight-bearing exercise and back extensor strengthening help delay bone loss. In a study that found osteopenia in over a quarter of men and women in early middle age, there was a negative correlation between exercise and BMD in the men despite relatively high levels of exercise—but the majority of men in the study reported cycling as their preferred exercise, rather than weight-bearing activities such as walking or running (Bass et al., 2019). Patients who have disorders or take medications that can cause or accelerate bone loss should ensure adequate intakes of calcium and vitamin D and, in some cases, pharmacologic treatment (Riggs

& Melton, 1992). Pharmacologic prevention methods include calcium supplementation and administration of raloxifene or bisphosphonates (alendronate or risedronate). Bisphosphonates should be considered as first-line agents for the prevention of osteoporosis (Iwamoto, Sato, Uzawa, Takeda & Matsumoto, 2008).

In 2017, the American College of Rheumatology published revised recommendations for the prevention and treatment of glucocorticoid-induced osteoporosis. Recommendations include optimizing calcium and vitamin D supplementation and lifestyle modifications for all adults on long-term glucocorticoid treatment (≥2.5 mg/day prednisone for ≥3 months). Furthermore, categorization of patients by fracture risk (using the FRAX score adjusted for glucocorticoid use) is recommended. First-line pharmacotherapy for patients at moderate-to-high fracture risk is an oral bisphosphonate, which is preferred for safety, cost, and because of lack of evidence of superior antifracture benefits from alternative medications. Other pharmacologic treatments recommended, if oral bisphosphonates are not appropriate, include (in order of preference): IV bisphosphonates, teri aratide, denosumab, and raloxifene (Buckley et al., 2017).

Methodology

A cross-sectional study design was employed. This study was carried out in two selected universities in southeast, Nigeria. The two selected universities used for this study from southeast Nigeria universities include; Nnamdi Azikiwe University, Akwa and University of Nigeria, Nsukka. The target population used for the study was students in medicine and surgery, nursing, nutrition and dietetics, pharmacy and physiotherapy. The data collection was conducted using the Convenience sampling (also known as availability sampling) technique. This study size was calculated using Taro Yamane method. Facts on Osteoporosis Quiz (FOOQ) questionnaire was used as the instrument of the study. The questions was answered in true, false and don't know format, where one point was awarded for any correct answer(s) given and zero point awarded to any don't know or incorrect answer(s).

Result

Research Question 1: The association between the students year of study and their level of knowledge in osteoporosis.

Level of knowledge (n= 20)	Frequency	Percentage
Poor (0-9)	1186	70.5
Average (10)	174	10.3
Good (11- 20)	322	19.1

From the table 1 above, majority of the participants had poor knowledge of osteoporosis, with a significant association of (<0.0001*). This could be as a result of much number of participation of new entrants (100level students) with limited osteoporosis knowledge. This limited knowledge could be as a result of osteoporosis topic not being included in their early semester courses. This result is in agreement with the study of Bilal et al., 2017 on Knowledge, beliefs and practices regarding osteoporosis among female medical school entrants in Pakistan; Gammage, Gasparotto, Mack & Klentrou, 2011on Gender differences in osteoporosis health beliefs and knowledge and their relation to vigorous physical activity in university students in Canada.

Conclusion

The association between students' year of study and their level of knowledge in osteoporosis suggests a positive correlation. As students progress through their academic years, their understanding of osteoporosis tends to improve. First-year students generally have limited knowledge, primarily due to less exposure to specific medical content. However, by the time they reach their third and fourth years,

their knowledge deepens, likely due to more specialized courses and practical learning experiences. This trend emphasizes the importance of advancing academic exposure in enhancing students' awareness and understanding of complex health conditions like osteoporosis.

Recommendations

1. Introduce basic osteoporosis education in the early years of study to lay the foundation for more advanced topics later on.
2. Integrate osteoporosis-related content into core medical and healthcare courses across all years, ensuring continuous reinforcement and deeper understanding as students progress.
3. Incorporate interactive and practical learning methods such as case studies, workshops, and clinical placements focused on osteoporosis to enhance real-world understanding.

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