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Effects of Yoga in Health and Aging: A Knowledge-Based Descriptive Study of Health Educators in Universities of Nigeria

Ofuebe Justina Ifeoma[1], Ugwu Cosmas Uchenna[1,2,*], Ene Osmond Chukwuemeka[1]

[1]Department of Human Kinetics and Health Education, Faculty of Education, University of Nigeria, Nsukka
[2]Department Health and Physical Education, University of Nigeria, Nsukka
*Corresponding author: uchennacos.ugwu@unn.edu.ng

Abstract Yoga, a mind-body practice, is a potentially promising physical activity that has positive effects in human health and aging. A complete knowledge of these effects remains a prerequisite for attaining optimum health and functional aging. The study determined the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria. The study was guided by five research questions and four null hypotheses. Relevant literature on the effects of yoga in health and aging was properly reviewed and documented. Using descriptive method, a total of 300 health educators was conveniently sampled and studied. Data collection was done using a four-point knowledge scale questionnaire. The descriptive statistics was employed for qualitative data analysis. The result showed that the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria was adequate. The study also showed that the quality of knowledge of the above phenomenon differed based on demographic variables of gender, location, years of working experiences and educational qualification. Statistically, it was found that significant differences exist between variables of gender and educational qualification while none existed on location and years of working experiences. In conclusion, the quality of knowledge possessed by health educators in diverse fields of health and aging promotion as well as lifestyle modification is indeed reflecting in all domains via: cognitive, affective and psychomotor. This however, defined the worth of the training, skills, exposures and professional competences as well as programmes and prospects put in place for their professional development.

Keywords: *yoga, health, aging, health educators, knowledge*

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1. Introduction

Yoga is a mind-body practice that combines physical posture, breathing, exercise, meditation, and a distinct philosophy [1]. It is highly effective in promoting optimum health and functional aging particularly in advanced age. In a broadest sense, yoga has many styles (i.e. Ananda, Anusara, Ashtanga, Bikran, Iyengar, Kripalu, Kundalini, and Viniyoga) which intend to increase relaxation, balance the mind, body, and the spirit [1]. Available studies have shown the effectiveness of yoga on cardiorespiratory function in men and women older than 60 years of age [2]; cardiovascular and behavioural effects in healthy older men and women [3]; as well as effects on reducing risk of falls in elderly patients [4]; and seniors [5]. Further research showed that yoga is effective in improving sleep quality, depression state, and health status of older adults [6]; self-rated sleep in a geriatric population [7]; gait in the elderly [8]; and cognition, and quality of life [9].

Relevant studies also indicated that yoga is an effective therapy for chronic back pain [10]; mindfulness, perceived stress, and physical fitness [11]; countermeasure of bone loss [12]; as well as cardiorespiratory endurance, muscular strength and endurance, and flexibility [13]. Intensive yoga program enhanced rapid stress reduction and anxiolysis among distressed women [14]. Similar research further revealed that a 12-week Iyengar yoga program improved balance and mobility in older community-dwelling people [15].

Nonetheless, yoga has also been found effective in improving the quality of health of individuals with chronic conditions. For instance, Bosch, Traustadottir, Howard, and Matt [16] highlighted functional and physiological effects of yoga in women with rheumatoid arthritis. Donesky-Cuenco, Nguyen, Paul, and Carrieri-Kohlman [17] found that yoga is therapeutic in decreasing dyspnea-related distress and improving functional performance in people with chronic obstructive pulmonary disease. Research evidence exist that yoga is effective in the management of hypertension [18]. A good number of scholars have also found that yoga is effective in the

prevention and control of Type 2 diabetes [19,20]. In 2010, Telles, Naveen, Balkrishna, and Kumar [21] established short term health impact of a yoga and diet change program on obesity. Related research also showed the beneficial effect of yoga lifestyle on reversibility of ischaemic heart disease [22]. Other researchers such as Vempati, Bijlani, and Deepak [23], showed the efficacy of comprehensive lifestyle modification programme based on yoga in the management of bronchial asthma. Furthermore, Cade, Reeds, Mondy, Overton, Grassino, Tucker, Bopp, Laciny, Hubert, Lassa-Claxton, and Yarasheski [24] found that yoga lifestyle intervention reduced blood pressure in HIV-infected adults with cardiovascular disease risk factors. Additionally, Grisbrook, Wallman, Elliot, Wood, Edgar, and Reid, [25] showed the effect of exercise training on pulmonary function and aerobic capacity in adults with burn.

A growing body of literature equally provided comprehensive review on the effects of yoga in health and aging [26,27,28]. Indeed, substantial evidence abounds that yoga is a potentially promising physical activity for older adults [6,28,29,30,31,32]. This is because yoga improves health-related quality of life [9], [33]; enhances walking and balance [6,8,34]; cardiovascular health [3,22,35]; blood pressure [3,18,22]; control of chronic condition [36]; promote functional efficacy [37]; muscle strength [5,6]; sleep [6,7]; and functioning of other systems [10,16,17,19,21].

Based on the literature reviewed, there is reliable emperical evidence that yoga is effectiveness in improving health and promoting functional aging. Surprisingly, none of the reviewed studies focused on the quality of knowledge of these enormous and pronounced effects of yoga in health and aging as possessed by experts such as health educators in universities. Health educators are health promotion experts with positive attitude towards their profession [38]. They are trained with unique skills and competences in diverse areas of health promotion including yoga (physical activities). Indeed, the quality of knowledge of a particular phenomenon remains a prerequisite for its usage and application, thus, showing the strong link between cognitive and psychomotor domains. The present study was borne out of the quest to establish the quality of knowledge of effects of yoga in health and aging among health educators in universities. With the prevailing evidence of the effectiveness of yoga on health and aging, the researchers deemed it expedient to fill this wide research gap.

1.1. Statement of the Problem

The problem for the study is specifically stated as follows: - Knowledge of effects of yoga in health and aging among health educators in universities of Nigeria.

2. Review of Related Literature

A good number of related literature exists on the effects of yoga in health and aging. Those relevant to the present study were reviewed and properly documented. For instance, in 1989, Blumenthal, Emery, Madden, George, Coleman, Riddle, McKee, Reasoner, and Williams [3] investigated the cardiovascular and behavioral effects of aerobic exercise training in healthy older men and women. Their study demonstrated that 4 months of aerobic exercise training produced an overall 11.6% improvement in peak VO2 and a 13% increase in anaerobic threshold. In contrast, the yoga and waiting list control groups experienced no change in cardiorespiratory fitness. Other favorable physiological changes observed among aerobic exercise participants included lower cholesterol levels, diastolic blood pressure levels, and for subjects at risk for bone fracture, a trend toward an increase in bone mineral content. Similarly, in 2009, Bosch, Traustadottir, Howard, and Matt [16] carried out a gender specific pilot study on "Functional and physiological effects of yoga in women with rheumatoid arthritis". The study revealed that yoga resulted in a significantly decreased health assessment questionnaire disability index, decreased perception of pain and depression, and improved balance. The study further indicated that yoga did not result in a significant change in awakening or diurnal cortisol patterns (P = .12). In 1991, Blumenthal, Emery, Madden, Coleman, Riddle, Schniebolk, Cobb, Sullivan, and Higginbotham [2] investigated the effects of exercise training on cardiorespiratory function in men and women older than 60 years of age. Interestingly, the results indicated that subjects generally exhibited a 10 to 15% improvement in peak oxygen consumption after 4 months of aerobic exercise training, and a 1 to 6% improvement in aerobic power with additional aerobic exercise training. On the other hand, subjects, especially men, continued to have improvements in submaximal exercise performance (i.e., anaerobic threshold). In addition, aerobic exercise was associated with an improved lipid profile; subjects participating in aerobic exercise for up to 14 months exhibited increased levels of high-density lipoprotein cholesterol. Maintenance of regular aerobic exercise for an extended time interval is associated with greater cardiovascular benefits among older adults than has been reported previously.

In 2014, Sangiorgio, Mukherjee, Lau, Mukherjee, Mukhopadhyay and Ebramzadeh [12] carried out a study in United State of America on "Optimization of physical activity as a countermeasure of bone loss involving a sample size of nine females. The study revealed that premenopausal women at follow-up showed mean increased bone mineral density -BMD at the femoral neck (6.6% ± 5.5%), total hip (2.0% ± 3.8%), and lumbar spine (1% ± 4.7%). It was also found that premenopausal women at follow-up showed mean decrease in BMD at the femoral neck (-6.0% ± 6.6%), total hip (-8.1% ± 6.1%), and lumbar spine (-5.6% ± 9.1%). Chen, Chen, Chao, Hung, Lin, and Li [6] conducted a cluster randomized trial study on "Sleep quality, depression state, and health status of older adults after silver yoga exercises. The study indicated that most of the mental health indicators of the participants in the experimental group had significantly improved after the silver yoga interventions, and many of the indicators improved after 3 months of intervention and were maintained throughout the 6 months study. The mental health indicators of the participants in the experimental group were all better than the participants in the control group (all $p<.05$). Manjunath, and Telles [7] carried out a study on "Influence of yoga and Ayurveda on

self-rated sleep in a geriatric population". The study revealed that the yoga group showed a significant decrease in the time taken to fall asleep (approximate group average decrease: 10 min, P<0.05), an increase in the total number of hours slept (approximate group average increase: 60 min, P< 0.05) and in the feeling of being rested in the morning based on a rating scale (P<0.05) after six months. The other groups showed no significant change.

In 2004, Yogendra, Yogendra, Ambardekar, Lele, Shetty, Dave, and Husein [22] carried out a study on "Beneficial effect of yoga lifestyle on reversibility of ischaemic heart disease". Their study found that at the end of one year of yoga training, statistical significant changes (P<0.05) were found in serum total cholesterol (reduction by 23.3% in study group patients as compared to 4.4% in controls); serum LDL cholesterol (reduction of 26% in study group patients as compared to 2.6% in the control group), regression of disease (43.7% of study group patients v/s 31% control group on MPI and 70.4% of study group v/s 28% of control group on angiography) arrest of progression (46.5% study group v/s 33.3% control group on MPI) and progression (9.9% of study group vs 35.7% of controls on MPI, 29.6% of study group v/s 60.0% of controls on angiography). At the end of the study improvement in anxiety scores was concordant with the improvement seen in the MPI. No untoward effects of the therapy were observed. Donesky-Cuenco, Nguyen, Paul, and Carrieri-Kohlman [17] carried out a pilot study on "Yoga therapy decreases dyspnea-related distress and improves functional performance in people with chronic obstructive pulmonary disease". The study showed that yoga training was safe and feasible for patients with COPD. While yoga training had only small effects on DI after the 6MW test (effect size [ES], 0.20; p = 0.60), there were greater reductions in DD in the yoga group compared to UC (ES, 0.67; p = 0.08). Yoga training also improved 6MW distance (+71.7 +/- 21.8 feet versus -27.6 +/- 36.2 feet; ES = 0.78, p = 0.04) and self-reported functional performance (ES = 0.79, p = 0.04) compared to UC. There were small positive changes in muscle strength and HRQoL. Province, Hadley, Hornbrook, Lipsitz, Miller, Mulrow, Ory, Sattin, Tinetti, and Wolf [4] investigated the effects of exercise on falls in elderly patients in 1995. As found in the study, using the Andersen-Gill extension of the Cox model that allows multiple fall outcomes per patient, the adjusted fall incidence ratio for treatment arms including general exercise was 0.90 (95% confidence limits [CL], 0.81, 0.99) and for those including balance was 0.83 (95% CL, 0.70, 0.98). No exercise component was significant for injurious falls, but power was low to detect this outcome. In 1975, Patel, and North [18] conducted a randomized controlled trial of yoga and bio-feedback in management of hypertension. Methodologically, 34 hypertensive patients were assigned at random either to six weeks' treatment by yoga relaxation methods with bio-feedback or to placebo therapy (general relaxation). The study showed that both groups showed a reduction in blood-pressure (from 168/100 to 141/84 mm. Hg in the treated group and from 169/101 to 160/96 mm Hg in the control group). The difference was highly significant. The control group was then trained in yoga relaxation, and their blood-pressure fell to that of the other group (now used as controls).

Lau, Yu, and Woo [13] conducted a controlled clinical trial study on "Effects of a 12-week hatha yoga intervention on cardiorespiratory endurance, muscular strength and endurance, and flexibility in Hong Kong Chinese adults". The study showed that compared to controls, the yoga group achieved significant improvements in VO_{2max} (maximum oxygen intake) ($p < 0.01$), curl-up ($p < 0.05$) and push-up ($p < 0.001$) tests, and the MBS left and right leg tests (both) in both genders. Significant change was also found for resting HR between groups in women ($p < 0.05$) but not in men. Further analysis comparing participants between younger and older subgroups yielded similar findings, except that the older participants in the yoga group failed to improve resting HR or the curl-up test versus control. Adherence (89%) and attendance (94%) were high. No serious adverse events occurred. In 2005, DiBenedetto, Innes, Taylor, Rodeheaver, Boxer, Wright, and Kerrigan [8] carried out an exploratory study on "Effect of a gentle Iyengar yoga program on gait in the elderly". The study revealed that the peak hip extension and stride length significantly increased (F1,18=15.44, P<.001; F1,18=5.57, P=.03, respectively). The study also showed a trend toward reduced average pelvic tilt (F1,18=4.10, P=.06); adjusting for the modifying influence of frequency of home yoga practice strengthened the significance of this association (adjusted F1,17=14.30, P=.001). It was further indicated that both the frequency and duration of yoga home practice showed a strong, linear, dose-response relationship to changes in hip extension and average pelvic tilt. In 2006, Oken, Zajdel, Kishiyama, Flegal, Dehen, Haas, Kraemer, Lawrence, and Leyva [9] conducted a randomized, controlled, six-month trial of yoga in healthy seniors to determine the effects on cognition and quality of life. The study revealed that the yoga intervention produced improvements in physical measures (e.g., timed 1-legged standing, forward flexibility) as well as a number of quality-of-life measures related to sense of well-being and energy and fatigue compared to controls.

Innes, and Vincent [27] carried out a systematic review study on "The influence of yoga-based programs on risk profiles in adults with type 2 diabetes mellitus" and found that yoga may improve risk profiles in adults with DM 2, and may have promise for the prevention and management of cardiovascular complications in this population. Similarly, Sharma, and Knowlden [20] investigated the role of yoga in preventing and controlling type 2 diabetes mellitus. In 2009, Skoro-Kondza, Tai, Gadelrab, Drincevic, and Greenhalgh [19] carried out an exploratory randomized controlled trial study on "Community based yoga classes for type 2 diabetes". The study found that despite broad inclusion criteria, around two-thirds of the patients on GP diabetic registers proved ineligible, and 90% of the remainder declined to participate. Mean age of participants was 60 +/- 10 years. Attendance at yoga classes was around 50%. Nobody did the exercises regularly at home. Yoga teachers felt that most participants were unsuitable for 'standard' yoga exercises because of limited flexibility, lack of basic fitness,

co-morbidity, and lack of confidence. There was a small fall in HbA1c in the yoga group which was not statistically significant and which was not sustained six months later, and no significant change in other outcome measures. Telles, Naveen, Balkrishna, and Kumar [21] conducted a study on "Short term health impact of a yoga and diet change program on obesity". The study revealed that following the 6-day residential program, participants showed a decrease in BMI (1.6 percent), waist and hip circumferences, fat-free mass, total cholesterol (7.7 percent decrease), high density lipoprotein (HDL) cholesterol (8.7 percent decrease), fasting serum leptin levels (44.2 percent decrease) and an increase in postural stability and hand grip strength ($p<0.05$, all comparisons).

Williams, Petronis, Smith, Goodrich, Wu, Ravi, Doyle, Gregory Juckett, Munoz Kolar, Gross, and Steinberg [10] investigated the effect of Iyengar yoga therapy for chronic low back pain. Multivariate analyses of outcomes in the categories of medical, functional, psychological and behavioral factors indicated that significant differences between groups existed in functional and medical outcomes but not for the psychological or behavioral outcomes. Univariate analyses of medical and functional outcomes revealed significant reductions in pain intensity (64%), functional disability (77%) and pain medication usage (88%) in the yoga group at the post and 3-month follow-up assessments. In United State of America, Hawett, Ransdell, Gao, Petlichkoff, and Lucas [11] conducted a study on "An examination of the effectiveness of an 8-week bikram yoga program on mindfulness, perceived stress, and physical fitness using a sample size of 51 comprising male and female participants. Their study revealed increased mindfulness ($p < 0.01$, $d = 0.89$), perceived stress ($p < 0.01$, $d = -0.79$), predicted VO_2 ($p < 0.01$, $d = 0.24$), flexibility ($p < 0.01$, $d = 0.63$), balance ($p < 0.01$, $d = 0.53$), correlation between mindfulness and perceived stress ($r = -0.43$, $p < 0.01$), and mindfulness and resting heart rate ($p = -0.30$, $p < 0.04$). Pate and Buono [40] carried out a study on "The physiological responses to bikram yoga in novice and experienced practitioners" in United State of America using 26 participants. It was found that the average overall VO_2 9.5mL/kg/min, average overall intensity 2.9 METS, average overall EE/session 286 kcal (179-478), and higher relative EE for more experienced practitioners.

Tiedemann, O'Rourke, Sesto, and Sherrington [15] carried out a pilot randomized controlled trial study on "A 12-week Iyengar yoga program improved balance and mobility in older community-dwelling people". Their study found that the intervention group significantly improved compared with control group on standing balance (mean difference = 1.52 seconds, 95% CI 0.10-2.96, $p = .04$), sit-to-stand test (mean difference = -3.43 seconds, 95% CI -5.23 to -1.64, $p < .001$), 4-m walk (mean difference = -0.50 seconds, 95% CI -0.72 to -0.28, $p < .001$), and one-legged stand with eyes closed (mean difference = 1.93 seconds, 95% CI 0.40-3.46, $p = .02$). Average class attendance was 20 of 24 classes (83%). No serious adverse events occurred. Kiecolt-Glaser, Christian, Preston, Houts, Malarkey, Emery, and Glaser [41] conducted a study on "Stress, inflammation and yoga practice". The study indicated that yoga session boosted participants' positive affect compared with the control conditions, but no overall differences in inflammatory or endocrine responses were unique to the yoga session. Importantly, even though novices and experts did not differ on key dimensions, including age, abdominal adiposity, and cardiorespiratory fitness, novices' serum interleukin (IL)-6 levels were 41% higher than those of experts across sessions, and the odds of a novice having detectable C-reactive protein (CRP) were 4.75 times as high as that of an expert. Differences in stress responses between experts and novices provided one plausible mechanism for their divergent serum IL-6 data; experts produced less lipopolysaccharide-stimulated IL-6 in response to the stressor than novices, and IL-6 promotes CRP production. In 2005, Michalsen, Grossman, Acil, Langhorst, Lüdtke, Esch, Stefano, and Dobos [14] carried out a gender specific study on "Rapid stress reduction and anxiolysis among distressed women as a consequence of a three-month intensive yoga program". The study found that women who participated in the yoga-training demonstrated pronounced and significant improvements in perceived stress ($P<0.02$), State and Trait Anxiety ($P<0.02$ and $P<0.01$, respectively), well-being ($P<0.01$), vigor ($P<0.02$), fatigue ($P<0.02$) and depression ($P<0.05$). Physical well-being also increased ($P<0.01$), and those subjects suffering from headache or back pain reported marked pain relief. Salivary cortisol decreased significantly after participation in a yoga class ($P<0.05$).

Cade, Reeds, Mondy, Overton, Grassino, Tucker, Bopp, Laciny, Hubert, Lassa-Claxton, and Yarasheski [24] carried out a study on "Yoga lifestyle intervention reduces blood pressure in HIV-infected adults with cardiovascular disease risk factors". The study found that Resting systolic and diastolic blood pressures improved more ($P=0.04$) in the yoga group (-5 +/- 2 and -3 +/- 1 mmHg, respectively) than in the standard of care group (+1 +/- 2 and+2 +/- 2 mmHg, respectively). However, there was no greater reduction in body weight, fat mass or proatherogenic lipids, or improvements in glucose tolerance or overall QOL after yoga. Immune and virological status was not adversely affected. Vempati, Bijlani, and Deepak [23] carried out a randomized controlled trial study on "The efficacy of comprehensive lifestyle modification programme based on yoga in the management of bronchial asthma". The study found that there was a steady and progressive improvement in pulmonary function, the change being statistically significant in case of the first second of forced expiratory volume (FEV_1) at 8 wk, and peak expiratory flow rate (PEFR) at 2, 4 and 8 wk as compared to the corresponding baseline values. There was a significant reduction in EIB in the yoga group. However, there was no corresponding reduction in the urinary prostaglandin D_2 metabolite (11β prostaglandin F2α) levels in response to the exercise challenge. There was also no significant change in serum eosinophilic cationic protein levels during the 8-wk study period in either group. There was a significant improvement in Asthma Quality of Life (AQOL) scores in both groups over the 8-wk study period. But the improvement was achieved earlier and was more complete in the yoga group. The number-needed-to-treat worked out to be 1.82 for the total AQOL score. An improvement in total AQOL score was greater than the minimal important difference and the same outcome was achieved for the sub-domains of the AQOL. The

frequency of rescue medication use showed a significant decrease over the study period in both the groups. However, the decrease was achieved relatively earlier and was more marked in the yoga group than in the control group.

Abel, Lloyd, and Williams [39] conducted a literature review on "The effects of regular yoga practice on pulmonary function in healthy individuals" and found that Yoga improved pulmonary function, as measured by maximum inspiratory pressure, maximum expiratory pressure, maximum voluntary ventilation, forced vital capacity, forced expiratory volume in 1 second, and peak expiratory flow rate, in all (N=9), but 1, study. Grisbrook, Wallman, Elliot, Wood, Edgar, and Reid [25] investigated the effect of exercise training on pulmonary function and aerobic capacity in adults with burn. The study found that burn injured participants had significantly lower PF (FEV(1)/FVC ratio) than the healthy controls both prior to and following the exercise intervention ($F(1,16)=8.93$, $p=0.009$). Exercise training did not improve PF in either group, however both groups had a significant improvement in their Vo(2peak), maximal minute ventilation, and work achieved on a graded exercise test ($F(1,16)=19.325$, $p<0.001$), ($F(1,16)=51.417$, $p<0.001$) and ($F(1,16)=36.938$, $p<0.001$), respectively, following the exercise training. Gregg, Pereira, and Caspersen [26] conducted a review of the epidemiological evidence study on "Physical activity, falls, and fractures among older adults". The study found that Observational epidemiologic studies and randomized clinical trials evaluating the effectiveness of physical activity programs to prevent falls have been inconclusive. However, many studies have lacked adequate statistical power, and recent trials suggest that exercise, particularly involving balance and lower extremity strength training, may reduce risk of falling. There is consistent evidence from prospective and case-control studies that physical activity is associated with a 20-40% reduced risk of hip fracture relative to sedentary individuals. The few studies that have examined the association between physical activity and risk of other common osteoporotic fractures, such as vertebral and wrist fractures, have not found physical activity to be protective. Innes, Bourguignon, and Taylor, conducted a systematic review on "Risk indices associated with the insulin resistance syndrome, cardiovascular disease, and possible protection with yoga". Their study identified 70 eligible studies, including 1 observational study, 26 uncontrolled clinical trials, 21 nonrandomized controlled clinical trials, and 22 RCTs. Together, the reported results of these studies indicate beneficial changes overall in several IRS-related indices of CVD risk, including glucose tolerance and insulin sensitivity, lipid profiles, anthropometric characteristics, blood pressure, oxidative stress, coagulation profiles, sympathetic activation, and cardiovagal function, as well as improvement in several clinical endpoints.

2.1. Significance of the Study

The professional ethics of health education as a profession has indeed gone beyond teaching and mare consultancy in preventive health matters. Interestingly, their roles cover all areas of health promotion including physiotherapy, human kinetics, physical exercise applications, disease preventions, restoration and rehabilitation of deformities as well as health maintenance. This realization, no doubt, has helped to clear a huge misconception and obvious definition of the professional duties and roles of health educators in schools, communities and universities at large. In universities of Nigeria, health educators are defined as health promotion professionals/ experts who possess comprehensive understanding of all the components of health promotion activities with little interest in exercise.

An extensive review by the researchers revealed that there was a dearth of literature regarding the quality of knowledge of effects of yoga in health and aging as possessed by health educators. This vacuum has maintained its status for a decade and thus remained unanswered question to experts such as health educators in the areas of health promotion. Knowledge is a key that has the potential to gain entrance into different areas of life. Indeed, health educators have the key which usually reflect barely in all domains via: cognitive, affective and psychomotor. A complete knowledge is desired in order to function optimally in health education profession while ignorance remains a dent or setback.

The result from the present study is significant to other professionals (such as gerontologist, physiotherapists, psychologists); educational institutions and government. This result is crucial in that it will help to establish a collaborative responsibility with other professionals in achieving a global goal of optimum health and functional aging. The finding will also help the educational institutions to develop measures and appropriate strategies on how to improve and sustain the quality of knowledge possessed by health promotion professionals regarding this phenomenon. The educational policies on the other hand, can be strengthened by the government through the findings of the present study through the provision of multiple prospects and opportunities for professional development of health educators for effective service delivery in the universities.

Interestingly, this quantitative survey did not restrict its scope on the statistical results regarding the quality of knowledge, but also showed the demographic differences within variables of gender, location, years of working experience and educational qualifications. Knowledge is refers to a comprehensive awareness, and adequate understanding of phenomenon. It is in this regard that the researchers considered it very crucial to review relevant literature and further establish the status of knowledge of effects of yoga in health and aging by health educators in universities of Nigeria. Since the present is the first descriptive survey focusing on knowledge of health educators regarding effects of yoga in health and aging, it is hoped that this study will be able to make some significant contributions in the field of health education as a discipline and education at large.

2.2. Purpose of the Study

The purpose of this study was to determine the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria and further verify differences within variables of gender,

location, years of working experience and educational qualification.

2.3. Research Questions

The following research questions guided the study:

1. What is the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria?
2. What is the difference between the quality of knowledge of effects of yoga in health and aging as possessed by male and female health educators in universities of Nigeria?
3. What is the difference between the quality of knowledge of effects of yoga in health and aging as possessed by urban and rural health educators in universities of Nigeria?
4. What is the difference between the quality of knowledge of effects of yoga in health and aging as possessed by health educators having less than 10 and above 10 years working experience in university of Nigeria?
5. What is the difference between the quality of knowledge of effects of yoga in health and aging as possessed by health educators having first degree and higher degree qualification in universities of Nigeria?

2.4. Hypotheses of the Study

The following null hypotheses guided the study and were tested at 0.05 level of significance:

1. There is no statistically significant difference between the quality of knowledge of effects of yoga in health and aging as possessed by male and female health educators in universities of Nigeria.
2. There is no statistically significant difference between the quality of knowledge of effects of yoga in health and aging as possessed by urban and rural health educators in universities of Nigeria.
3. There is no statistically significant difference between the quality of knowledge of effects of yoga in health and aging as possessed by health having less than 10 and above 10 years teaching experience in universities of Nigeria.
4. There is no statistically significant difference between the quality of knowledge of effects of yoga in health and aging as possessed by health educators having first degree and higher degree qualification in universities of Nigeria.

2.5. Scope of the Study

The present study was delimited to all the health educators currently working as academic staff of universities of Nigeria. At the surface level, the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria was established through a well-structured questionnaire. The differences within variables of the respondents were verified and properly documented.

3. Method

The study falls within the paradigm of the descriptive survey research method.

3.1. Population of the Study

The population of the study comprised of all the health educators currently working as academic staff of universities in the South-eastern part (Enugu, Abia, Anambra, Imo and Ebonyi) of Nigeria with a total of 1240 staff.

3.2. Sample and Sampling Technique

A total of 300 health educators based on the criteria of Cohen, Manion, and Morrison [42] was conveniently sampled and used for the studied.

3.3. Instrument for Data Collection

A well-structured questionnaire developed by the researchers based on extensive literature review was used for data collection. The questionnaire was called Knowledge of Effects of Yoga in Health and Aging Questionnaire (KEYHAQ). It contained ten items with four point response options, that is to say that, each of the items on the KEYHAQ has four options for selection.

3.4. Statistical Technique

The descriptive statistics involving Mean Scores, Standard Deviation, and t-Test were employed to analyze the data and verify the null hypotheses of no significant difference. The cut-off point for the weighted mean was 2.50 accrued from the four-point response options, hence, any item that weighed 2.50 and above signifies adequate while any item less than 2.50 denotes inadequate knowledge of effects of yoga in health and aging by the respondents. However, the acceptance or rejection of any of the postulated null hypothesis was based on the criterion of 0.05 levels of significance at appropriate degree of freedom.

3.5. Data Analysis and Interpretation

The results of the present study are hereby organized and presented in two sections: data answering the research questions and data verifying the null hypotheses.

3.5.1. Answering Research Question One

Table 1. Showing the quality of knowledge of effects of yoga in health and aging by the respondents

Knowledge	N	Mean	S.D	Remark
Average Mean	300	2.68	.014	AK

AK=Adequate Knowledge; IK=Inadequate Knowledge; S.D= Standard Deviation.

From Table 1, it is found that the average mean score of 2.68 and standard deviation (.014) is above the cut-off

point of 2.50 implying adequate knowledge. Thus, this indicates that the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria is adequate. The finding of the study is a clear indication that the respondents possess complete understanding of health and aging effects of yoga.

Table 2. Presenting significant differences between variables

Variables		N	Mean	S.D	Dec.	tcal	Pv	RK
G	M	167	2.63	1.03	AK	-0.1	0.04	S*
	F	133	2.37	0.05	IK			
L	U	196	2.66	0.17	AK	-1.2	0.21	NS**
	R	104	2.44	0.09	IK			
YE	-10	109	2.42	0.51	IK	-.09	0.67	NS**
	10+	191	2.58	0.03	AK			
EQ	FD	90	2.13	0.41	IK	-7.0	0.03	S*
	HD	210	2.87	0.22	AK			

*Significant at .05 level, **Not Significant at 0.05 level; AK= Adequate Knowledge; IK= Inadequate Knowledge; G= Gender; L=Location; YE= Years of Working Experience; EQ= Educational Qualification; FD= First Degree; HD= Higher Degree; G= Gender; M= Male; F= Female; U= Urban; R= Rural; N= Number of Subjects; S.D= Standard Deviation; Dec= Decision; PV= P-value; RK= Remark.

3.5.2. Answering Research Question 2 and Testing $H0_1$

From Table 2, it is indicated that the average mean score of male health educators (2.63) is above the cut-off point of 2.50 while their female counterparts had (2.37) which is below the cut-off point. This implies that the quality of knowledge of effects of yoga in health and aging as possessed by male health educators was adequate while the females were inadequate.

Data in Table 2 also showed that $H0_1$ is not accepted since the P value of 0.04 is lower than 0.05 level of significance. That is to say that, there is statistically significant difference between the quality of knowledge of effects of yoga in health and aging as possessed by male and female health educators in universities of Nigeria.

3.5.3. Answering Research Question 3 and Testing $H0_2$

From Table 2, it is found that there is difference between the quality of knowledge of effects of yoga in health and aging as possessed by urban and rural health educators in universities of Nigeria. The Table showed the average mean scores on the quality of knowledge of effects of yoga in health and aging as possessed by urban (2.66>2.50) and rural (2.44<2.50) health educators in universities of Nigeria. Based on data analysis, it was found that the quality of knowledge of effects of yoga in health and aging as possessed by health educators in urban location is adequate while their rural counterparts is inadequate in universities of Nigeria.

The available data in Table 2 revealed that $H0_2$ was accepted since the P-value of 0.21 is greater than 0.05 level of significance. That is to say that, there is not statistically significant difference between the quality of knowledge of effects of yoga in health and aging as possessed by urban and rural health educators in universities of Nigeria.

3.5.4. Answering Research Question 4 and Testing $H0_3$

From Table 2, it is found that the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria differs significantly based on years of working experiences. The Table revealed that the health educators with less than 10 years working experience had average mean value (2.42<2.50), while those with 10 years of working experience and above had (2.58>2.50). This implies that the quality of knowledge of effects of yoga in health and aging as possessed by health educators having less than 10 years of working experience is inadequate while those having 10 years of working experience and above are adequate in universities of Nigeria.

From Table 2, it is shown that $H0_3$ is accepted since the P value of 0.67 is greater than 0.05 level of significance. That is to say that, there is no statistically significant difference on the quality of knowledge of effects of yoga in health and aging as possessed by health educators having less than 10 years and above 10 years of working experience in universities of Nigeria.

3.5.5. Answering Research Question 5 and Testing $H0_4$

From Table 2, it is indicated that there is difference between the quality of knowledge of effects of yoga in health and aging as possessed by health educators having first degree and higher degree qualification in universities of Nigeria. The Table showed the average mean score of health educators having first degree qualification (2.13>2.50) and those having higher degree qualification (2.87<2.50) in university of Nigeria. This implies that the quality of knowledge of effects of yoga in health and aging as possessed by health educators having first degree qualification is inadequate while those having higher degree qualifications are adequate in universities of Nigeria.

Available data in Table 2 also revealed that $H0_4$ is rejected since the P-value of 0.03 is less than 0.05 level of significance. That is to say that, there is statistically significant difference on the quality of knowledge of effects of yoga in health and aging as possessed by health educators having first degree and higher degree qualifications in university of Nigeria.

4. Discussion

The purpose of this descriptive analysis was to determine the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria. Based on data analysis, it was found that the quality of knowledge of effects of yoga in health and aging as possessed by health educators was adequate. Without any element of doubt to the present result, the researchers attributed this finding to the unique exposures, training, skills and professional competences as possessed by the respondents. It is quite overwhelming that the effect of yoga on health and aging is well-pronounced and has been drastically researched and properly documented by various scholars. For aging promotion in particular, evidence abounds that yoga is effective for older adults [6,28,29,30,31,32] and thus improves health-related quality of life [9,33]; enhances walking and balance [6,8,34]; cardiovascular health [3,22,35]; blood pressure [3,18,22]; control of chronic condition [36]; promoting functional efficacy [37]; muscle

strength [5,6,16]; sleep [6]; and functioning of other systems [10,16,17,19,21]. Aligning with the present study, the health educators are trained in the areas of health and aging promotion as well as improving the quality of life of individuals. In addition, the finding of this study could also be attributed to other health benefits of yoga as highlighted by renowned yoga scholars [16,18-25].

The present study showed differences on the demographic variables regarding the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria. From Table 2, it was found that the quality of knowledge of effects of yoga in health and aging as possessed by male health educators, those found in urban location, health educators having above 10 years of working experience and those having higher degree as highest educational qualifications was adequate while their counterparts were inadequate respectively. The Table further verified the null hypotheses of no significant differences regarding the quality of knowledge of yoga in health and aging among health educators in universities of Nigeria. Statistically, it was found that while there were no significant differences on the variable of location and years of working experiences, significant differences were shown on gender and educational qualifications at 0.05 level of significant. These findings were not surprising since individual differences can influence the quality of knowledge regarding any phenomenon. Of great importance was the finding that years of experience played significant role on the quality of knowledge of the respondents. However, conclusion could be drawn from the finding that years of experience influenced the quality of knowledge of the respondents. Interestingly, the location of the respondents influenced their quality of knowledge. Those living in urban setting were found to have added advantage over their counterparts in the rural area. These could be attributed to available social amenities which might have been supportive in improving research, exposures, and experiences. The assertion that the higher the educational qualification; the more the quality of knowledge possessed was reflected on the quality of knowledge of the respondents with higher degree qualification which was adequate.

The strength of the current study lies in the chosen methodology, researchers' expertise and descriptive nature. There are several limitations that need to be addressed. First, this study primarily focused on determining the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria using questionnaire. There is need to conduct future research using other statistical tools such as focus group discussion and interview to verify the quality of knowledge of the same population. This is very crucial for empirical generalization of research findings. Secondly, the present was restricted to four demographic variables of gender, location, years of working experience, and educational qualification. Future study should be carried out involving more variables like the religious affiliation, health status, socio-economic status and marital status, among others using same population in relation to knowledge of the phenomenon. Finally, the present study only focused on health educators in universities of Nigeria excluding colleges of education. There is need for a similar study to be conducted with a comprehensive expansion of the coverage to all the health educators in tertiary institutions where the services of health educators are pronounced.

5. Conclusion

The present study in its descriptive nature has convincingly provided statistical evidence on the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria. This reflects in diverse fields of health and aging promotion and in all domains via: cognitive, affective and psychomotor. In addition, it equally defined the worth of the training, skills, exposures and professional competences as well as programmes and prospects put in place for the professional development of health educators. With complete knowledge of a particular phenomenon, desirable practice is highly compromised. Indeed, this study is a clear indication that health educators are well-informed on the effects of yoga on health and aging. Although, the quality of knowledge of the above phenomenon differs based on socio-demographics, it however, suggests the need for constructive efforts towards advancing appropriate strategies for empowerment, improvement and sustenance among health educators in universities of Nigeria.

6. Educational Implications

1. The present study has shown that the quality of knowledge of effects of yoga in health and aging as possessed by health educators in universities of Nigeria is adequate. This suggests the need for collaborative efforts by health educators, human kinetics experts, physiologists, gerontologists, psychologists, physiotherapists and other experts in the fields of health promotion in unanimously improving optimum health and functional aging.
2. This study is very important in that it indicated the quality of knowledge of effects of yoga in health and aging as possessed by male and female; urban and rural; less than 10 and above 10 years of working experience; as well as first degree and higher degree health educators. Since the quality of knowledge differs based on demographic variables, there is need for effective representation of all variables in improving the quality of knowledge regarding the phenomenon in universities of Nigeria.

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Nil.

Competing Interest

The authors have no competing interests.

Authors' Contributions

Justina Ifeoma Ofuebe and Uchenna Cosmas Ugwu analyzed and interpreted the data and wrote the manuscript. Osmond Chukwuema Ene contributed to the study concept and design, acquisition of subjects and manuscript review. Uchenna Cosmas Ugwu drafted the manuscript and revising it critically for important intellectual content. All authors have read and approved the final version of the manuscript.

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