

Full Length Research Paper

Sleep quality and physical activity level of community dwelling older adults in Lagos State: A cross-sectional study

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The potentially complex relationship between sleep and physical activity has been characterized as difficult to answer. This study was to determine the relationship between Physical Activity (PA) and Sleep Quality (SQ) among community dwelling older adults in Idi-Araba, Lagos-State. A cross-sectional study of older adults aged 55 years and above. The participants' PA level and SQ were measured using the Physical Activity Scale for the Elderly (PASE) and Pittsburgh Sleep Quality Index (PSQI) respectively. The data was summarised using mean, frequency and percentage. Spearman Correlation, Mann-Whitney, Kruskal-Wallis and chi-square test were also employed. Level of significance was set at $p < 0.05$. Majority of the older adults (62%) reported poor sleep quality. There was a significant relationship between PA and SQ among the participants, higher level of physical activity correlated with a lower score on the sleep quality. Age had significant influence on PA as there was a decline in PA with increasing age, though gender had no significant influence on PA. Age and gender had no significant influence on SQ. Older adults should be encouraged to participate in more physical activity to improve their sleep.

Key words: Sleep quality, physical activity, older adults.

INTRODUCTION

Aging is characterized by several physiological, and functional changes, including, loss of muscle mass, peak oxygen uptake (VO_{2peak}), and an increase of the incidence of pathologies, such as obesity and arthritis (Baer et al., 2016; Bauman et al., 2016; Beard et al., 2016). Furthermore, aging induces changes in sleep with increased night-time awakenings and decrease in deep sleep (Dam et al., 2008). In addition, there can be

reduction in rapid eye movement (REM) sleep, augment sleep fragmentation, decreased total sleep time and sleep efficiency and increase in the incidence of sleep disturbances, such as apnea and insomnia (Chasens et al., 2007; Ancoli-Israel, 2009). Approximately 50% of older adults reported sleep disturbances (Reid et al., 2010), thus aging has the tendency to affect sleep quality. Sleep time is reduced in the elderly, however,

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other studies have reported no change or even an increase in sleep time. Sleep problems have important consequences (Jeon and Redecker 2016). Poor sleep the night before has been compared to impaired cognitive performance the following day (Moul et al., 2002; Yaffe et al., 2014).

Another factor that frequently accompanies aging is a sedentary life style (Harvey et al., 2013; McPhee et al., 2016). The sedentary lifestyles that predominate in older age results in premature onset of ill health, disease and frailty. Despite the highly publicized benefits of physical activity, the overwhelming majority of older people in the United Kingdom do not meet the minimum physical activity levels needed to maintain health. Regular physical activity helps to improve physical and mental functions as well as reverse some effects of chronic disease to keep older people mobile and independent (McPhee et al., 2016). The effects promoted by physical activity are intensity, and duration dependent (Petersen and Pedersen, 2005). Among older adults, regular physical activity such as walking or swimming can reduce the risk of chronic diseases (e.g. coronary heart disease, cancer, diabetes), improve mental and physical health, increase energy levels, help maintain a healthy body weight, and enhance physical functioning (Benloucif et al., 2004; Dye and Wilcox, 2006; Chasens et al., 2007; Benedetti et al., 2008; Reid et al., 2010). The benefits include improved strength, flexibility, balance, and coordination, which are particularly important for older adults who commonly face declines in mobility and functional ability with advanced age (Dye and Wilcox, 2006).

The potentially complex relationship between sleep and physical activity has been characterized as difficult to answer from the literature (Driver and Taylor, 2000). Physical activity may be an option of non-pharmacological treatment for sleep disorders, especially in older individuals (Santos et al., 2007; King et al., 2008). Thus, engaging in regular physical activity is a critical component of healthy aging. This study was therefore designed to provide answers to the following questions: 1) What is the quality of sleep and physical activity among the elderly population? 2) Is there a relationship between physical activity and sleep quality in the elderly? 3) What is the association between socio-demographic characteristics and each of quality of sleep and physical activity of the elderly?

MATERIALS AND METHODS

The STROBE guidelines for presenting cross-sectional studies were adopted for this study, which was carried out in the sub-urban town of Idi-Araba in Lagos State.

Participants

Using a convenient sampling technique, a total number of 184

community dwelling older adults, aged 55 years and above, were recruited into this cross-sectional study. The study was carried out in the sub-urban town of Idi-Araba in Lagos State. The required sample size calculation at a confidence interval of 1.96 for confidence rate and the prevalence value set at 0.05 yielded 150.4 participants. The participants were apparently healthy and literate in English language. Individuals with cognitive deficit were excluded from the study. Ethical approval was sought and obtained from the Health Research and Ethics Committee of the College of Medicine of the University of Lagos, Idi-Araba, Lagos (CMUL/HREC/06/17/186). Informed consent was obtained from the participants as only those who gave their consent and signed the consent form participated in the study.

The participants were recruited in person from worship centers and pensioners association meetings. One hundred and ninety-three questionnaires were administered, 9 were incomplete. The completed 184 questionnaires (95.3% response rate) were analyzed. The aims and objectives of the study, as contained in the informed consent form, were carefully explained to all the subjects. Copies of the questionnaire were administered to willing and consenting participants that satisfied the criteria for the study and the completed copies of the questionnaire were retrieved. The questionnaires were self-administered by the older adults and were returned upon completion, which took an average of 20 mins. Physical activity and sleep quality were assessed with Physical Activity Scale for the Elderly (PASE) and Pittsburgh Sleep quality index (PSQI) respectively. Conscious efforts were made to vary the sequence of admitting the questionnaires with some of the participants filling PASE first while others filled PSQI first.

PASE is a brief and easily scored survey designed specifically to assess physical activity in epidemiological studies of older persons. The PASE score combines information on leisure, household and occupational activity. A study showed there was a statistically significant Spearman correlation coefficient of 0.43 ($p < 0.01$) between Actigraph data and total PASE scores, thus showing good validity even when compared with digital technologies. The PASE test-retest reliability coefficient (0.75) exceeded those reported for other physical activity surveys (Dinger et al., 2004; Washburn et al., 1999). In primary insomnia patients, the overall PSQI global score correlation coefficient for test-retest reliability was 0.87. Validity analyses showed high correlations between PSQI and sleep log data and lower correlations with polysomnography data. A PSQI global score > 5 resulted in a sensitivity of 98.7 and specificity of 84.4 as a marker for sleep disturbances in insomnia patients versus controls (Backhaus et al., 2002).

Statistical analyses

Data collected was analyzed using the Statistical Package for Social Sciences (SPSS)(version 22). The data was summarised using mean, frequency and percentages. The results were presented in tables and pie charts. Spearman rho correlation test was used to find the relationship between physical activity and sleep quality. The association between quality of sleep and each of age and marital status was assessed using chi-square test. The participants were classified into four age groups and a Kruskal-Wallis test was used to find the differences between the quality of sleep scores across the four age groups and marital status of the participants. The Mann-Whitney test was used to find the differences between the quality of sleep scores of the male and female participants. The level of significance was set at $p < 0.05$.

RESULTS

There were 72(39.1%) males and 112 (60.9%) females

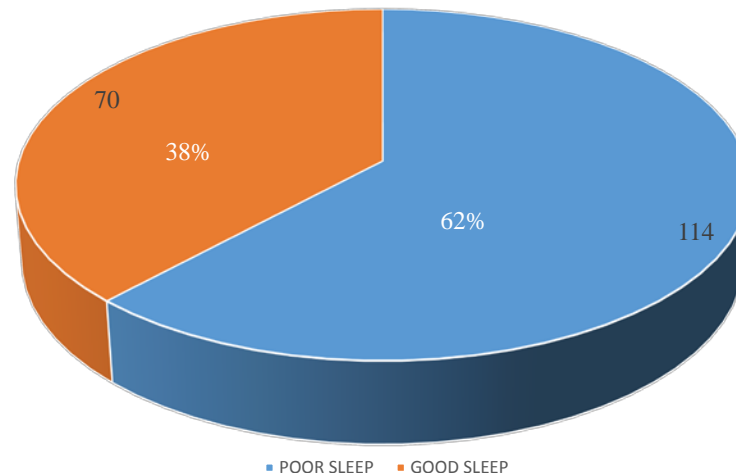


Figure 1. Sleep quality distribution of participants.

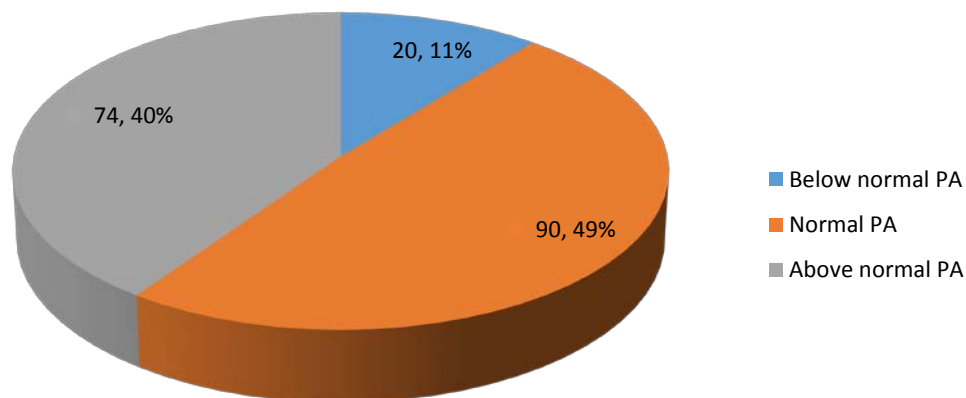


Figure 2. Physical activity levels of participants.
Key: PA= physical activity.

among the 184 participants. The 184 participants represented a response rate of 95.3% among the eligible participants who willingly volunteered to be involved in the study. Nine of the participants did not properly complete their questionnaires, hence they were excluded. The mean age of the participants was 63.7 ± 8.7 years; the older adults between 55 and 60 years were the most with 90 (48.9%) of them participating in this study. A larger percentage of the participants still held an active occupation either working privately or as civil servants (63.9%).

Relationship between physical activity and sleep quality

The mean physical activity score was 145.5 ± 53.5 and the mean sleep quality score was 6.33 ± 2.81 . The sleep quality scores were classified as good sleep and poor

sleep (Figure 1) with 62% of the older adults scoring higher than 5 on the PSQI. The physical activity levels of participants were classified as below normal physical activity level, normal physical activity level and above normal physical activity level (Figure 2). There was a significant relationship between physical activity and sleep quality ($p = 0.04$, $r = -0.15$); higher level of physical activity correlated with a lower score on the sleep quality. This means that poor sleep quality was found to be associated with lower physical activity level.

Quality of sleep and socio-demographic characteristics

There was no significant difference between sleep quality scores across the age groups. There was also no significant difference between the sleep quality scores of both gender ($p = 0.64$), although the female participants

Table 1. Association between sleep quality and age, gender and marital status.

	Groups	Poor sleep	Good sleep	χ^2	p- value
Age	≤60	53	37	5.23	0.16
	61-65	18	17		
	66-70	13	6		
	≥71	30	10		
Marital Status	Single	7	0	7.14	0.13
	Married	88	61		
	Separated/ Divorced	8	5		
	Widowed	11	4		

Table 2. Differences between physical activity scores across the age groups and marital status.

	Groups	N	PASE score	H	p value
Age	55-60	90	165.7± 90.3	4.19	0.007*
	61-65	35	145.7± 83.4		
	66-70	19	110.3± 72.0		
	>70	40	116.8± 84.2		
Marital status	Single	7	81.1±56.8	2.181	0.07
	Married	149	152.1±60.0		
	Separated	11	153.6±18.1		
	Divorced	2	52.4±12.9		
	Widowed	15	116.6±84.1		

Key: N = number of participants, *p-value = level of significance set at 0.05, H= Kruskal Wallis.

had a higher proportion of poor sleepers than the males. There was, similarly, no significant difference among the sleep quality scores across the various marital status ($p=0.13$) despite a higher proportion of poor sleepers among participants in all the age groups. The >70 years group had the highest proportion of poor sleepers. However, there was a significant difference among the sleep quality scores across the occupational status ($p=0.04$), where participants who were still engaged in an occupation had a higher sleep quality score than every other category.

Physical activity level and socio-demographic characteristics

There was a significant difference in the physical activity level scores of the participants across the age groups. The mean score was highest in the 55-60 years group (165.7±90.3) while the lowest was in the 66-70 years group (110.3±72.0) (Table 1). A post-hoc assessment showed that the significant difference was between the 55-60 and >70 years age group (Table 3). Although the females had a mean physical activity level score of 153.6± 93.7 as against 133.0±84.0 for males, there was

no significant difference between the physical activity level scores of the male and female participants ($p=0.12$). Table 2 also shows the difference in the physical activity level of elderly across different marital status.

DISCUSSION

This cross-sectional study was aimed at determining the relationship between physical activity and quality of sleep among apparently healthy community dwelling older persons. The study also investigated the association between selected socio-demographic characteristics and each of physical activity and quality of sleep. The mean PASE score of the participants from Lagos, Nigeria obtained in this study was 145.53 which is higher than that reported in Chinese 104.4 (Ngai et al., 2012), American 102.9 (Washburn et al., 1993) and Japanese 114.9 (Hagiwara et al., 2008). The mean PASE score for men was 133.0 and for women 153.6. This is higher than what was reported in a Dutch study (men: 71.9; women: 97.9) (Schuit et al., 1997).

In this study, poor sleep quality were rather prevalent among the elderly, this may arouse a suspicion of the

Table 3. Post Hoc Assessment showing where the significant difference in the physical activity across the age range.

AGE	AGE	MD	Std. Error	p value
	61-65	19.95	17.13	0.65
55-60	66-70	55.33	21.71	0.06
	≥71	48.91	16.34	0.02*
61-65	66-70	35.38	24.51	0.47
	≥71	28.96	19.91	0.47
66-70	≥71	-6.41	23.96	0.99

Key: Std. Error = Standard Error, MD = Mean difference, p-value = Significance level set at 0.05.

older adults having significant problems with sleep (Bloom et al., 2009; Dzierzewski et al., 2014; Holfield and Ruthig 2014). However, Vitello et al. (2004) reported 3.14% of older adults with sleep disorder. The study showed a negative correlation between physical activity and sleep quality. Poor sleep quality, a common problem in older adults, is likely to erode both the propensity for, and tolerance of, physical activity (Chasens, 2007). Reid et al. (2010) reported improvements in sleep quality, specifically with moderate aerobic physical activity, among older adults. The reciprocity in the relationship between physical activity and sleep quality scores was also observed in Dzierzewski et al. (2014). Holfield and Ruthig (2014) reported that initial physical activity level did not predict later sleep quality in a longitudinal study. However, this current study was a cross-sectional study.

There was no significant difference between sleep quality scores across the age groups. The oldest age group in this study had the highest proportion of participants with poor sleep, however, the current study did not show a defined pattern of change. Sleep patterns are known to change across the lifespan in various ways, including decreases in quality of sleep (D'Ambrosio and Redline, 2014) with up to 50% of older adults report difficulties initiating and/or maintaining sleep (Crowley, 2011). Contrary to the current findings, Unruh et al. (2008) reported that sleep problem increased with age. Gadie et al. (2017) also found that sleep quality generally decreased across the lifespan, most strongly for sleep efficiency.

Baldwin et al. (2001) and Hayashino et al. (2007) found no significant association between sleep quality and gender which are in agreement with the outcomes of this study. A major observation from this study was the higher proportion of female participants with poor sleep than their male counterparts (63.4% v. 59.7%). This outcome slightly differs from the findings of Vitello et al. (2000) who reported a prevalence of 54% women and 33% men with sleep problem. Being occupied at present conferred a higher chance of better quality of sleep with retired

participants having a poorer quality of sleep. Going outdoor and participating in work are reflective of higher level of physical activity among participants that still held a form of occupation at the time of the study compared to retired individuals.

This study shows a significant difference among physical activity level across the different age groups. This is consistent with the study by Owoeye et al. (2013) where physical activity was reported to decrease with increasing age. Physical activity levels were not significantly different between the male and female participants, although the female participants had a higher physical activity scores. This differs from findings of previous study by Lee (2005) which showed women were less active with increasing age. Despite the knowledge that being active throughout the majority of one's lifetime has an important influence on overall health and well-being, increasing age seems to affect activities among women negatively to a higher extent than men (Sjrogen and Stjernberg, 2010). This observation by Sjrogen and Stjernberg (2010) is not applicable to female participants in the current study. The reason for the disparity could be that women are becoming more involved in the performance of bread-winner roles which may mean that they will have to also carry out more ambulatory activities in the course of accomplishing these duties, both at work as well as commuting using various means of transportation. A higher involvement during household chores might also result in increase in physical activity (Matthews et al., 2004).

Limitations of the study

The apparently healthy status of the participants were determined by relying on the history taken from the participants thus making it somewhat difficult to exclude those with possible underlying conditions that may influence their sleep quality. The subjective nature of the measure of physical activity level could be combined with

a more objective measure such as the use of an accelerometer.

Conclusion

Poor sleep was common amongst the elderly population surveyed in this study (62%). A very high percentage (about 90%) of older adults had a physical activity level within the normal or above normal range. There was a significant relationship between physical activity and sleep quality among the elderly. Poor sleep quality was found to be associated with lower physical activity level. There was a decline in physical activity with increasing age. Older adults should be encouraged to participate in more physical activity to improve their sleep, by encouraging and allowing them to do more physical activity. Health professionals, especially physiotherapists, to carry out intervention programmes and formulate strategies to promote sufficient physical activity and discourage sedentary behaviour among the elderly. Further research is needed to directly examine potential mediating factors, such as physical energy and alertness associated with sleep quality that may influence the likelihood of older adults engaging in physical activity. There can also be research to examine relationship between sleep quality and physical activity level in a cohort sample of older adults.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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