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The prevalence of sleep disorders among elderly females complaining of subjective cognitive decline

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Abstract

Background: Subjective cognitive decline (SCD) is one of the early warning signs of objective cognition impairment, and dementia and is associated with higher rates of sleep disorders across various cross-sectional and longitudinal cohort studies.

Aim: To assess the prevalence of sleep disorders in elderly females complaining of subjective cognitive decline.

Methods: A cross sectional study involving 207 elderly females attending outpatient clinics and memory clinics at Ain Shams university hospitals. Demographic data of the participants were collected. Screening of SCD was done first using Alzheimer Dementia 8 item scale (AD8) and followed by assessment of cognition by Addenbrooke's cognitive Examination III (ACE III) for literate personnel and Rowland Universal Dementia Assessment Scale (RUDAS) for illiterate personnel and sleep disorders using Pittsburgh sleep quality index (PSQI).

Results: screening of SCD was done by AD8 and participants with cut off score ≥2 indicating SCD were included in the study. Further assessment revealed that 31.2% & 54.6% of the studied sample (literate and illiterate respectively) who reported SCD had MCI. There was a statistically significant negative impact of sleeping problems on cognitive functions of participants (P value 0.04). Of those with SCD and MCI 91.6% complained of sleeping problems, with sleep quality index (8.4±1.9). While those with SCD and normal cognition complaining of sleep problems were 76.8% of this group with sleep quality index of (7.5±2.2).

Conclusion: SCD is significantly associated with sleep disorders. A reciprocal relation is present between sleep disorders and SCD.

Key words: Subjective cognitive decline, mild cognitive impairment, elderly females, depression, anxiety, sleep disorders.

1- Introduction

The prevalence of cognitive impairment is rapidly increasing in our current time, and has its effect on both families and health care systems in aging societies. Dementia is simply identified as those with cognitive decline causing impairment in activities of daily living. Dementia has affected approximately 46.8 million patients globally in 2015 and is increasing by 7,7 million new cases per year and is expected to be 74.7 million by 2030 [(1)]. The economic burden for the treatment of Alzheimer disease in 2020 is estimated at $305 billion, with the cost expected to increase to more than $1 trillion as the population ages [(2)].

Mild cognitive impairment (MCI) is a cognitive disorder that describes individuals with cognitive deficits beyond the expected for normal aging without detected impairment in activities of daily living thus not fulfilling the criteria for diagnosing dementia [(3)]. Various longitudinal cohort studies showed extremely varying rates of conversion of MCI cases into AD from 1.85% to 60.5% every year [(4)]. Other outcomes include conversion to other forms of

dementia [5], constancy of cognitive deficits and retrieval to normal cognition [6].

Subjective cognitive decline (SCD) is one of the early warning signs of MCI [7]. Subjective cognitive decline (SCD), subjective memory decline (SMD) or subjective memory complaints (SMC) all are various terms and implications to a common problem that elderly complain of, which the Centers for Disease Control and Prevention (CDC) defined it simply as the "self-reported feeling of being worse or more frequent confusion or memory impairment" [8].

The scientific interest for studying SCD has several reasons. First, individuals with greater cognitive concerns may be at an increased risk for future objective decline in domains of cognitive performance, including the development of mild cognitive impairment (MCI) and Alzheimer's disease (AD) as a type of dementia for example. Second, greater SCD may negatively affect the mental health of older adults. The perception of cognitive problems can precipitate worry about AD, withdrawal from positive health behaviors, such as physical and social activity engagement, and increase affective symptoms [9]. Third, underlying non cognitive deficits as depression, anxiety and insomnia which need to be assessed are proposed to be predictors of SCD. Individuals with higher levels of sleep disorders and neuroticism have more memory complaints than those with low levels on the same scales [10]. Based on literature review, SCD, depression, sleep quality, quality of life, and health-promoting lifestyle are all correlated and affect lives totally [7].

Sleep disorders, daytime sleepiness, and forgetfulness are three descriptions commonly reported together by patients. Sleep affects a number of psychological functions, as well as cognitive function [11]. Sleep deprivation has long been known to reduce concentration and job performance [12]. Chronic sleep disorders lead to poor subjective and objective cognitive performance [13].

Community research on older adults discovered that people with poor sleep quality are prone to develop cognitive impairment in the long term [14]. Recent studies indicated that individuals with SCD exhibit poor sleep quality and low overall quality of life, which are consistent with the conclusions of a recent meta-analysis stating that individuals with severe SCD are prone to have a relatively low quality of life [15].

Therefore, the aim of this work was to study the prevalence of sleep disorders among elderly females complaining of subjective cognitive decline, in order to direct more attention to this problem and promote the importance of screening and possible interventions to counteract the negative impact of that problem on the cognitive functions of elderly.

2- Materials and Methods

Using PASS11 program for sample size calculation and assuming prevalence of depression = 10-20% (15% ± 5%), and at 95% confidence level, a sample size of 200 women were recruited. They were recruited from outpatient / memory clinics attendees at Ain Shams university hospitals.

All participants were interviewed after giving informed consent. Comprehensive geriatric assessment which included demographic data, past medical history and drug history was done regarding demographic criteria, past medical history, family history and reviewing their medication list.

Elderly females aged 60 years old and above, accepting to participate in the study and complaining from cognitive impairment or Replying "Yes" to the direct memory question were included in the study. While those who were known dementia patients or with delirium / receiving antipsychotics / in acute medical illness / recently diagnosed with major depression/ replying "No" to the direct memory question or refusing to participate in the study were excluded from the study.

Memory assessment included at first a direct question about their memory during the past year [do you have a sustained memory disorder which had progressed within the last year?]. According to their answers the participants were grouped into those with SMD or without. Then those who answered "Yes" were subjected to the Alzheimer's dementia 8-items questionnaire (AD8) [16].

Cognition assessment was done using the Egyptian Arabic Addenbrooke's cognitive Examination III [17] for educated participants and the illiterate were cognitively assessed using the Arabic version of the Rowland Universal Dementia Assessment Scale (RUDAS) [18].

Sleep disorders were assessed firstly using a direct question [Do you have problems with sleeping?] and participants with a positive response were assessed with the Pittsburgh index, an Arabic validated version was used [18].

2.1. Statistical Analyses

Data were tabulated and statistically analyzed using SPSS, version 20 (SPSS Inc., Chicago, IL). Quantitative data were described as mean and standard deviation (minimum – maximum). Independent t test and ANOVA test were used for comparing quantitative variables between groups. Qualitative data were expressed as frequencies (n) and percentage (%). Fisher exact test and chi square test were used to test the association between qualitative variables. Pearson correlation coefficient was used to correlate between quantitative variables. P-value ≤ 0.05 was considered significant.

2.2. Ethical considerations

The study was performed in adherence to the principles established by the Declaration of Helsinki and the study methodology was reviewed and approved by Ethical Committee of Scientific research and the Research Review Board of the Geriatrics and Gerontology Department, Faculty of Medicine, Ain Shams University. Informed verbal consent was obtained from all the participants because some of the participants were illiterate and could not provide signed consent. The ethics committee approved using verbal consent.

3- Results

The current study is a cross-sectional study. The study sample finally included 207 elderly Egyptian females aged 60 years old and above with the mean age being 69.4±7.9 years with the majority of them living in Cairo (46.9%), married (56.5%) and living with their families (79.2%). Almost all of them were non-smokers. Regarding the level of education: the illiterate group accounted for (62.8%) (table 1).

The most prevalent comorbidities were cardiovascular diseases (63.8%) then diabetes mellitus (42%) and malignancies (18.8%). Anemia, thyroid diseases and chronic respiratory diseases were among the least prevalent diseases among the studied sample (table 2).

Among the literate group in the studied sample 31.2% had MCI (scored 79-81 on ACEIII), and among the illiterate group 54.6% had MCI (scored 19-22 on RUDAS). Sleep problems assessment revealed that 83.8% of the studied sample responded positively to the direct question about sleep problems and when subjected to PSQI test 75.7% of them had poor sleep (PSQI ≥6 indicates poor sleep) (table 3).

There is a statistically significant negative association of sleep problems on cognitive functions of elderly (P-value 0.04). Among the participants with SCD and MCI (n=95 counting 45.8% of the study sample) 82.8% of them had poor sleep with PSQI mean score 8.4±1.9. And among the other group with SCD but no MCI (n=112 or 54.1% of the studied sample) 68.8% had poor sleep with PSQI mean score 7.5±2.2 (table 4).

There was a highly significant statistical association between poor sleep and not working amongst the group of elderly females participating in the study. 80.4% of the unemployed group had sleep problems (p value 0.004). Poor sleep is highly prevalent among females who were living alone (84.6% of this group have sleep problems) and who were not married either single, widowed or divorced (table 5).

Table (1). Distribution of demographic data in the studied female population sample (n=207)

		N (%) / mean ± SD (min – max)
Age		69.4±7.9(60-90)
Governorate	**Menofia**	13(6.3)
	Cairo	97(46.9)
	Giza	24(11.6)
	Al Qalyubia	51(24.6)
	Helwan	9(4.3)
	Others	13(6.3)
Occupation	**Employed**	41(19.8)
	Unemployed	166(80.2)
Marital status	**Single**	8(3.9)
	Married	117(56.5)
	Widow	79(38.2)
	Divorced	3(1.4)
Living arrangement	**Alone**	43(20.8)
	with others	164(79.2)
Education	**Literate**	77(37.2)
	Illiterate	130(62.8)
Education years		12.1±3.7(6-16)
Years of education	**< 6**	130 (62.8)
	6 – 12	49 (23.7)
	> 12	28 (13.5)
Special habits	**Smoker**	0(0)
	non-smoker	206(99.5)
	ex-smoker	1(0.5)

Table (2). Distribution of comorbidities in the studied sample.

Current comorbidity		**N (%)**
CVD	**No**	75(36.2)
	Yes	132(63.8)
DM	**No**	120(58)
	Yes	87(42)
Chronic lung. disease	**No**	199(96.1)
	Yes	8(3.9)
Chronic liver disease	**No**	180(87)
	Yes	27(13)
Chronic renal disease	**No**	170(82.1)
	Yes	37(17.9)
Malignancy	**No**	168(81.2)
	Yes	39(18.8)
Anemia	**No**	201(97.1)
	Yes	6(2.9)
Thyroid disease	**No**	199(96.1)
	Yes	8(3.9)
others	**No**	193(93.2)
	Yes	14(6.8)

*Abbreviations: CVD (cardiovascular disease), DM (diabetes mellitus)

Table (3). Tools

		N (%)
AD8 (for SCD)	**2 or more**	207(100)
ACE (cognition in literate)	**79 - 81 (MCI)**	24(31.2)
	More than 81 (Normal)	53(68.8)
RUDAS (cognition in illiterate)	**less than 19 (dementia)**	0(0)
	19 - 22 (MCI)	71(54.6)
	More than 22 (Normal)	59(45.4)
sleeping problem	**no**	34(16.4)
	yes	173(83.6)
Poor sleep	**no**	42(24.3)
	yes	131(75.7)

Table (4). Comparison between normal and MCI participants in the studied sample regarding sleep problems.

		Normal	MCI	Test	P
sleeping problem	no	26(23.2)	8(8.4)	8.194	.004*
	yes	86(76.8)	87(91.6)		
PSQI score		7.5±2.2	8.4±1.9	2.594	.010*
Poor sleep	no	27(31.4)	15(17.2)	4.713	.030*
	yes	59(68.6)	72(82.8)		

Table (5). Association between poor sleep and demographic characteristics of the studied sample.

		Poor sleep		Test	P
		No	Yes		
occupation	**working**	15(42.9)	20(57.1)	8.239	.004*
	not working	27(19.6)	111(80.4)		
marital status	**single**	1(12.5)	7(87.5)	4.851	.145
	married	28(31.5)	61(68.5)		
	widow	13(17.8)	60(82.2)		
	divorced	0(0)	3(100)		
living	**alone**	6(15.4)	33(84.6)	--	.202
	with others	36(26.9)	98(73.1)		
education	**literate**	18(30)	42(70)	1.636	.201
	illiterate	24(21.2)	89(78.8)		
special habits	**smoker**	0(0)	0(0)	--	1.000
	non-smoker	42(24.4)	130(75.6)		
	ex-smoker	0(0)	1(100)		

4- Discussion

Regardless of the absence of evidence for objective cognitive impairment, the subjective decline in cognitive function experienced by individuals might become increasingly important for clinicians, because the number of individuals with such concerns who seek medical help and advice is growing. In 2014, the expression subjective cognitive decline (SCD) was conceived by researchers to describe this condition, which has received increasing attention because of evidence of its association with an increased risk of future objective cognitive decline **(20)**.

The current work results showed the characteristics of female adults aged ≥60 years who reported subjective cognitive decline (SCD) which revealed that the mean age of the studied sample is 69.4±7.9 years with the majority living in Cairo, married and living with their families, and non-smokers. Regarding the level of education: the literate group with at least 6 years of education accounted for (37.2%), and illiterate were (62.8%) (This high level of illiteracy reflects the actual percentage of illiteracy among elderly females in Egypt being 68.2 % (21)

The current study demonstrated that 31.2% 54.6% of the studied sample (literate and illiterate respectively) who reported SCD had MCI. This agrees with a meta-analysis conducted by Mitchell and colleagues of longitudinal epidemiological studies of cognitively unimpaired individuals with SCD (with at least 4 years of follow-up data) which found a future decline to dementia in 14% of individuals and a future decline to MCI in 27% of individuals (22).

It was found that 83.8% of the studied sample reported sleep problems and 75.7% of them were evaluated to have poor sleep. In accordance to our results Wei and colleagues revealed that SCD, depression, sleep quality, quality of life, and health-promoting lifestyle are all correlated and affect lives holistically (7).

In addition, a statistically significant negative association of sleeping problems on cognitive functions of participants (P-value=0.04) was demonstrated. Among the participants with SCD and MCI (n=95 counting 45.8% of the study sample) 82.8% of them had poor sleep with PSQI mean score 8.4±1.9. And among the other group with SCD but no MCI (n=112 counting 54.1% of the studied sample) 68.8% had poor sleep with PSQI mean score 7.5±2.2.

This concurs with a community-based study done on older adults which discovered that people with poor sleep quality are prone to develop cognitive impairment in the long term **(14)**. Recent studies indicated that individuals with SCD exhibit poor sleep quality and low overall quality of life, which are consistent with the conclusions of a recent meta-analysis stating that individuals with severe SCD are prone to have a relatively low quality of life (15).

Wei and colleagues also reported that the PSQI results indicated that the overall sleep quality of the SCD- group (PSQI_total = 7.2 ± 4.1) was inferior to that of the non SCD-group (PSQI_total = 5.8 ± 3.7), with $p < 0.01$. The percentages of high sleep quality (defined as PSQI_total ≤5, PSQI_good) in SCD cases and non-SCD cases were 40.2 and 58.1%, respectively ($p < 0.01$). More detailed analysis of sleep quality revealed that the non-SCD-group performed more favorably than the SCD group in terms of subjective sleep quality (PSQI_QUAL; SCD+_50: 1.6 ± 0.9; SCD–_50: 1.3 ± 8.2; $p < 0.01$) (7).

In agreement with our results Xu and colleagues reported a similar relationship between SCD and sleep quality. They concluded that poor sleep quality was positively correlated with SCD symptoms (r=0.362, P<0.001) **(23)**.

The study by Bubbico and colleagues evaluated if objective sleep actigraphy recording differed between SCD and non-SCD subjects, by analyzing meaningful group differences in sleep pattern at the baseline stage and after 2 years. The results provided compelling evidence of Total Sleep Time differences between groups. Sleep alteration remained significantly different even considering states of anxiety and depression as a covariate in the statistical model which was used. At the follow-up stage 2 years later, the SCD group showed a significant reduction in sleep duration whereas the non-SCD group showed an increase in sleep duration **(24)**.

In light of the reciprocal relationship between SCD and sleep problems, early intervention at any point of this cycle will help preserve the cognitive abilities of those elderly or at least delay their progression to objective cognitive decline. Recent research is commencing to move away from a limited focus on treatment of dementia to early detection of persons in the preclinical stage or SCD phase. The purpose

being to establish preventive interventions before significant clinical symptoms are manifest [(254)].

5- Conclusion

This study shows a statistically significant impact of sleep disorders on cognitive functions among elderly females with SCD, which highlights the importance of interventions, either pharmacological or non-pharmacological, for those elderly to decrease the rate of conversion into MCI or dementia. In addition, early identification of the first manifestations of the disease can enable early diagnosis and therapeutic intervention. Assessment of other psychological factors such as depression and anxiety is important to determine the most suitable method of intervention. This can also help in decreasing the social and economic burden of dementia and the associated caregiver stressors.

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