

## Factors Associated with Poor Sleep Quality among Older Adults

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### 1. ABSTRACT

**Background:** One of the most prevalent and poorly addressed issues with ageing is sleep disturbance and sleeping difficulties. It is estimated that approximately 67% of people over 60 reports having at least one sleep-related problem. **Aim:** to estimate the prevalence of poor sleep quality and its associated factors among older adults. **Method:** A descriptive search design was used through a sample of 245 older adults selected from the outpatient clinics of the Specialized Medical Hospital affiliated to Mansoura University. **Tools:** Data was gathered using five tools; Demographic characteristic and Factors Affecting Sleep Structured Interview Schedule, The Pittsburgh Sleep Quality Index, The Geriatric Depression Scale Short Form, Numerical Rating Pain Scale, and UCLAL one lines Scale. **Results:** Poor sleep quality was prevailing among 79% of studied older adults. A statistical significant relation found between poor sleep quality and sex ( $p=0.002$ ), marital status ( $p<0.001$ ), general health status ( $p=0.004$ ), obesity ( $p<0.001$ ), level of dependency ( $p<0.001$ ), medication, complaining of hyperacidity ( $p<0.001$ ), restless leg syndrome ( $p<0.001$ ), dyspnea ( $p=0.002$ ), nocturia ( $p=0.003$ ), snoring ( $p=0.005$ ), cough ( $p<0.001$ ), apnea ( $p=0.009$ ), frequent toileting at night ( $p<0.001$ ), taking naps ( $p=0.04$ ), presence of depression ( $p=0.036$ ), and feeling of loneliness ( $p=0.018$ ). **Conclusion:** More than three-quarter of the studied elderly have poor sleep quality, living condition, environmental factors, psychological factors, pain were the main predictors for poor sleep quality among the studied older adults. **Recommendation:** Educational program for elders about the factors associated with poor sleep quality to enhance sleep should be designed through emphasizing on the importance of sleep hygiene practice, behavioral and non-pharmacological interventions, and healthy lifestyle.

**Keywords:** Factors, Older Adults, Poor Sleep Quality

### 2. Introduction

Sleep is crucial for general physical health, as well as for maintaining optimal cognitive and emotional function, performance, and safety (DelRosso & Ferri, 2020). Cells are repaired, tissues are replaced, and energy is saved during the crucial process of sleep (Gulam, Xyrichis & Lee, 2020). Moreover, sleep is crucial for thermoregulation, homeostatic control of endocrine functions, maintaining the functions of vital organs by removing toxins, storing memories, and consolidating them (Shivalingaiah et al, 2021).

The increase in the aged population will result in an enormous load of sleep-related health issues (Gulia & Kumar, 2018). Aging is linked to decreased capacity to maintain sleep; increased number and duration of nocturnal awakenings, decrease nocturnal sleep duration, deep sleep, and reduction in slow-wave sleep (Li, Vitiello, & Gooneratne, 2018).

One of the most prevalent and poorly addressed issues with ageing is sleep disturbances and sleeping difficulties (Putri, 2019). Sleep difficulties are common in older people, with epidemiological data indicating that more than 50% of older people have one or more sleep disorders (Dzierzewski, Rodriguez Tapia & Alessi, 2017). The prevalence of sleep disturbance was 67.3% among the Chinese seniors in nursing homes (Zhu et al, 2020). In Egypt, the prevalence of insomnia was 62.1% among rural elderly in Mansoura District (El-Gilany, Saleh, Mohamed & Elsayed, 2017). The prevalence of insomnia was 33.6% amongst older adults existing in a community in Zagazig city (Abd Allah, Abdel-Aziz, & El-Seoud, 2014).

The physiologic changes brought on by sleep disruption have a connection with a wide variety of detrimental health effects. The short-term complications of sleep disturbance include bigger

stress reactivity, physical complications, a lower quality of life, emotional suffering, mood disorders, and other troubles with mental health. Also, it has an impact on cognition and performance in a variety of areas, such as judgment, executive function, memory, and attention (Medic, Wille & Hemels, 2017).

Later in life, poor sleep quality rises the danger of negative health effects, such as increased mortality and morbidity, cardiovascular disease, anxiety and depressive disorders, accidents and falls, injuries sustained at night, diminished daily performance, decreased cognitive function, and poor overall quality of life. On the other hand, elderly who notify well quality sleep with less disruptions are more likely to enjoy better health outcomes (MacLeod, Musich, Kraemer & Wicker, 2018; Liu, Liou & Jou, 2022). Patients of all ages frequently complain about having trouble sleeping, but older individuals are more susceptible. There are several changes that occur with age that can put elderly at risk for sleep disturbances, Age-related changes in various circadian rhythms, increased medication use, the occurrence of medical conditions, environmental changes, and lifestyle changes, which all significantly affect sleep pattern (Siddiqui et al, 2020). Hence, this study was conducted to estimate the prevalence of poor sleep quality and its associated factors among older adults.

### 2.1 Aim of the study

Estimate the prevalence of poor sleep quality and its associated factors among older adults.

### 2.2 Research question:

What is the prevalence of poor sleep quality and its associated factors among older adults?

## 3. Subjects and Method

### 3.1 Study Design

A descriptive cross sectional research design was utilized to accomplish this study.

### 3.2 Setting

This study was conducted at the outpatient clinics of the Specialized Medical Hospital affiliated to Mansoura University.

### 3.3 Subjects:

#### Sample size calculation

Based on data from the study of Park and Bae (2013), considering the calculation of the sample size with precision/absolute error of 5% and type 1 error of 5% the following formula is used: Sample size =  $[(Z_{1-\alpha/2})^2 * P (1-P)]/d^2$  Where,  $Z_{1-\alpha/2}$

is the standard normal variate, at 5% type 1 error ( $p < 0.05$ ) it is 1.96. P = the expected proportion in population-based on previous studies. d = absolute error or precision. So, sample size =  $[(1.96)^2 * X (0.643) * (1-0.643)] / (0.06)^2 = 245$ .

#### Sample technique

The study included a convenience sample of 245 older adults attending the previous mentioned setting and was selected according to the following criteria: aged 60 years and above, able to communicate, available at the time of data collection and willing to participate in the study.

#### 3.4 Tools of data collection:

Five tools were utilized to gather the relevant data:

##### Tool I: Demographic characteristic and factors affecting sleep Structured Interview Schedule: -

After reading related literature, this tool developed by the researcher and divided into four parts; **Part 1:** Demographic characteristics of the studied older adults: such as age, gender, marital status and living condition. **Part 2:** Medical history: It involved questions about general health status, chronic diseases, medication taken daily and problems with sleep, as experienced by older persons, such as: cough, dyspnea, apnea, snoring, hyperacidity, nocturia, restless leg syndrome, and restlessness during sleep and obesity. Measurement of body mass index using scale and measuring tape (Roland, 2021).

**Part 3:** Factors affecting sleep :This part was concerning with factors affecting sleep such as bad personal habits (drinking caffeine, smoking, feeling of hunger or eating fatty food and eating too close to bedtime, toileting, physical activity) and environmental factors (noise, light, relocation, room temperature and insects), social factors (having family problems, financial distress and use of social media) and psychological factors that affect sleep (fear, thinking about death, anxiety, nightmares).

##### Tool II: Katz and Akpom scale:

This scale was developed by Katz & Akpom, (1976) to assess physical functioning and mobility status as consistent quantitative indicators of the person's ability to carry out activity of daily livings (ADL) independently. A research conducted in Alexandria by Sorour, Khalil, Sharaan & El Geneidy, (2019) showed it to be a valid and reliable scale ( $r = 0.83$ ) after being translated into Arabic. The six different tasks are measured and rated based on how well each person performs these six daily living activities: bathing, clothing, feeding, transfers, continence, and ambulation. **Scoring**

**system:** The scale's overall score, which ranges from 6 to 18, is classified into three categories: independent (no more than 6 points), partially dependent (between 7 and 12 points), and totally dependent (between 13 and 18 points).

**Tool III: The Pittsburgh Sleep Quality Index (PSQI): -**

This scale was developed by Buysse, Reynolds III, Monk, Berman, & Kupfer, (1989). It was a useful tool for assessing the older adult's sleep patterns and quality during the last month. The translation into Arabic language was approved to be valid and reliable by (Rajoub, 2015). Test-retest reliability Spearman's correlation coefficient  $r=0.83$  was used to assess the tool reliability. By assessing seven domains, subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disruptions, usage of sleeping medications, and daytime dysfunction, it can distinguish between bad and good sleep. The patient rates themselves on each of these seven characteristics of sleep. On a Likert scale, the replies were graded from 0 to 3, with 3 denoting the extreme opposite of positive. The total score ranges from 0 to 21 and it can be obtained through adding the component scores together, higher scores imply poorer sleep quality. A total score of "5" or more is suggestive of poor sleep quality.

**Tool IV: The Geriatric Depression Scale (GDS) Short Form: -**

This tool was developed by Sheikh & Yesavage (1986). It was 15 items self-reported instrument, for depression and the general wellbeing assessment of older adults. After being translated into Arabic, the scale was approved to be valid and reliable by Elhusseini, (2013). The older adult chooses the best response either yes: one (1) or No: zero (0) for how he/ she has felt over the last week. Of the 15 questions, 10 questions were positively indicating the presence of depression, while the other (question numbers 1, 5, 7, 11, 13) were indicating depression when responded negatively. Scores range from zero to 15, items are summed for total scores. **Scoring system:** A score of zero to four denotes the absence of depression, mild depression is denoted by a score of (5 to 8), moderate depression is denoted by a score between (9 and 11) and severe depression is denoted by a score of (12 to 15).

**Tool V: Numerical Rating Pain Scale (NRPS): -**

It was adopted from (McCaffery & Beebe, 1989) to assess the level of pain based on patient sensation and perception. The rating scale was assessed on a range of 0 to 10, where 0 represents

no pain and 10 represents the worst possible pain. Scoring system: (Zero) score: referred to no pain, scores between (1-3): referred to mild pain, scores between (4-6): referred to moderate pain and scores between 7 and 10: denoted extreme pain.

**Tool VI: UCLA Loneliness Scale:-**

It was developed by Russell, Peplau & Cutrona (1996) and utilized to measure one's subjective feelings of loneliness and social isolation. It was translated into Arabic language by Ebraheem, et al (2012) and was tested for its validity and reliability by Elhusseini, (2013). This scale has 20-item including talking to people, turning to them, feeling alone and close to anyone. A 4-point Likert scale was used to score the responses as (1) never, (2) rare, (3) sometimes and (4) always; the score was inverted for the negative responses (1,5,6,9,10,15,16,19, and 20), with a total score of 80. The total score was divided into: Scores from  $20 < 40$ : **indicated low feeling of loneliness**, scores from  $40 < 60$ : **indicated mild feeling of loneliness** and scores from  $60 < 80$ : **indicated high feeling of loneliness**.

**3.5 Data collection process**

**Phase I: Preparatory phase: -**

- **Administrative stage:** An official letter was obtained from the Faculty of Nursing, Mansoura University and directed to the manager of the outpatient clinics at the Specialized Medical Hospital affiliated to Mansoura University to get his approval to carry out the study and was informed about the purpose of the study and the time of data collection. **Literature review;** scientific published articles, online searches, and textbooks were suggested for evaluating national and international literatures on the many components of older adults' sleep quality. This review was a guide for developing study tools. **The study tools** of data collection: Tool I; which consist of 3 parts was developed by the researcher based on review of related literature. **Content validity;** the study tools (tool I, tool II, tool III, tool IV, tool V and tool VI) were tested for its **content validity** by a jury of seven experts in the related fields of Gerontological Nursing. Accordingly, the necessary modifications were carried out and the final forms were used for data collection.
- **A pilot study** was carried out prior to data collection on 10% (24) of the older adults to test all tools for clarity, objectivity, relevance, feasibility, comprehensiveness, and applicability of the tools.

**Phase II: Operational phase:** -This phase lasted for 5 months, from the beginning of March 2021 to the end of July 2021. This phase consisted of the following steps: When the necessary approval was obtained, the researcher started data collection. The researcher used to spend five hours a day, three days a week, in the previously selected setting. The researcher tended to interview with each study subject who match sampling criteria and accept to participate in the study individually; then the researcher introduced herself and explained the purpose of the study to collect the necessary data using all study tools. Data collection was started by assessing demographic characteristics and factors affecting sleep, through interviewing with each subject using tool I (Demographic characteristic and factors affecting sleep Structured Interview Schedule). The researcher assessed quality and patterns of sleep in the older adult using study tools. The interview schedule needed to be filled in 40–45 minutes.

### 3.6 Ethical Considerations

Ethical consideration approval was obtained from the Research Scientific Ethical Committee of Faculty of Nursing, Mansoura University. Following an explanation of the study's purpose, verbal consent was obtained from each participant before the study. The researcher highlighted that the collected data was treated confidentially and only used for the study. Each older adult was given the assurance that participating in the study was voluntary and that they had the right to refuse to participate or withdraw from the study at any time without giving any reason, or penalty.

### 3.7 Data analysis:

The computer was fed with data, and IBM SPSS software version 22.0 was used to analyze it. Number and percentage were used to describe qualitative data. The acquired results' significance was assessed at the (0.05) level. **Qualitative data:** Chi-Square test to compare between 2 or more groups. To predicting the independent factors of a binary outcome, **binary stepwise logistic regression analysis** was utilized. Using the forward Wald technique and enter, significant predictors from the Univariate analysis were entered into the regression model. Calculated odds ratios with a 95% confidence interval were adjusted odds ratios.

## 4. Results:

**Table 1: Distribution of studied older adults according to their demographic characteristics.** It was observed that the age of the studied older adults ranged from 60 to 88, with a mean age of  $67.98 \pm 6.73$  years. Females were more prevalent in the studied group (58%), 53.1% of the studied older adults were married, illiteracy was prevailing among 35.1% of the studied older adults. It was observed that 56.3% were housewives, while 30.2% were non-governmental worker and only 14.3 % of the study older adults were still work after retirement. 51.4% of the studied older adults reported that their income was sufficient; lastly, 52.7% of the studied older adults were living with their family.

**Figure 1: Distribution of studied older adults according to their sleep quality using global Pittsburgh Sleep Quality Index.** It was found that 79 % of studied older adults had poor sleep quality while 21 % of them had good sleep quality.

**Table (2): bivariate and multivariate analysis for prediction of poor sleep quality.** It was observed from the table, in univariate analysis, sex, marital status, income, living condition, dependency level, GIT drugs, bronchodilators, vitamins, hypnotic, diuretics, laxative, anticholesterolemia, antihistaminic, cough, dyspnea, apnea, snoring, hyperacidity, nocturia, restless leg syndrome, and restlessness during sleep all were independent variables for poor sleep quality among older adults ( $p < 0.05$ ), while in multivariate analysis, it was found that income, living condition, hypnotic, antihistaminic, cough, hyperacidity and restlessness during sleep all were independent variables for poor sleep quality among older adults ( $p < 0.05$ ).

**Table 3: Relation between drugs intake and sleep quality of the studied elderly.** It displays that, there was a statistically significant relationship between poor sleep quality and Diuretics ( $P=0.038^*$ ), Anti-histaminic ( $P=0.001^*$ ), Bronchodilators ( $P=0.002^*$ ), Laxative ( $P=0.006^*$ ), Anticholesterolemia, Hypnotic and Cortisone ( $P < 0.05^*$ ).

**Table 4: Relation between personal habits affecting sleep and sleep quality of the studied older adults.**

It illustrates that, there was a statistically significant relationship between poor sleep quality and personal habits, regarding frequent toileting at night, taking naps, eating much food before bed time, drinking caffeinated fluids before bed time,

going to bed hungry, and smoking before bed time as (p-value> 0.001\*, 0.04\*, 0.028\*, 0.032\*, 0.006\*) respectively while no statistically significant relationship regarding watching TV, talking on the phone, reading in bed and exercising close to bed time (P= 0.072, 0.244, 0.068, 0.714) respectively.

**Table 5: Relation between external factors and sleep quality of the studied older adults.** It displays that, there is a statistically significant relationship between poor sleep quality and all environmental factors that affect sleep (P<0.001) including noise (P=0.001), room temperature (p<0.001), light (p<0.001), relocation (p=0.001) and insects (p=0.001). There was a statistically significant relationship between poor sleep quality and social factors that affect sleep (p=0.004), financial burden (p=0.004) including family problems (p=0.037). Also, there was a statistically significant relationship between poor sleep quality and psychological factors that affect

sleep (p=0.001) including anxiety (p<0.001), thinking about death (p=0.003), fear (p=0.012) and nightmares (p=0.006).

**Table 6: Relation between depression, pain, loneliness, and sleep quality of the studied older adults.** It illustrates that, a statistically significant relationship was found between poor sleep quality and depression level, pain level and feeling of loneliness as poor sleep quality was higher among elderly who had severe depression, sever pain and those with high feeling of loneliness (P=0.036,<0.001, 0.018) respectively.

**Table 7: Binary logistic regression significant independent predictors of poor sleep quality among studied subjects.** It represents that living condition, environmental factors, psychological factors, pain were the main predictors for the poor sleep quality among the studied older adults.

**Table 1:** Distribution of studied older adults according to their demographic characteristics.

Demographic Characteristics	N= 245	%
<b>Age (years)</b>		
60-	204	83.3
75+	41	16.7
<b>Mean ± SD (Min – Max)</b>	<b>67.98 ± 6.73 (60-88 year)</b>	
<b>Sex</b>		
Female	142	58.0
Male	103	42.0
<b>Marital status</b>		
Married	130	53.1
Unmarried <sup>a</sup>	115	46.9
<b>Educational level</b>		
Illiterate	86	35.1
Read and write	64	26.1
Basic education	45	18.4
Secondary education or diploma	38	15.5
Higher education	12	4.9
<b>Work before retirement</b>		
Housewife <sup>z</sup>	138	56.3
Non-governmental work	74	30.2
Governmental work	33	13.5
<b>Current work</b>		
No	210	85.7
Yes	35	14.3
<b>Monthly family income</b>		
Enough	126	51.4
Not enough	119	48.6
<b>Living condition</b>		
Family (wife / husband)	129	52.7
Sons	69	28.2
Alone	47	19.2

<sup>a</sup>unmarried denote Single (5), Widow (108), Divorced (2)

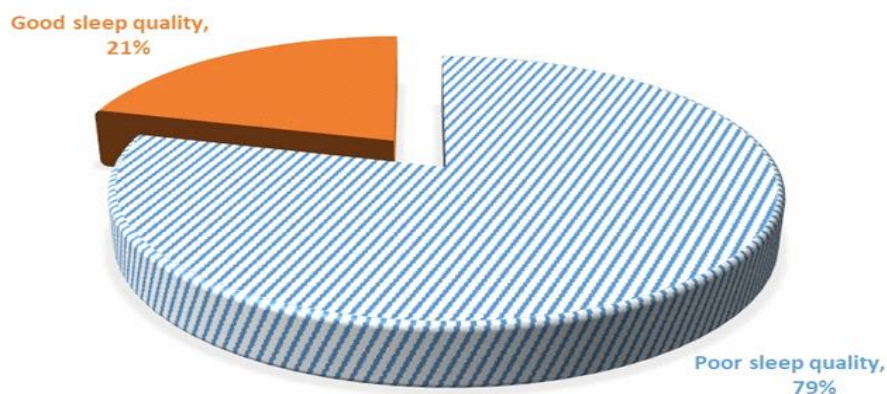


Figure 1: Distribution of studied older adults according to their global Pittsburgh Sleep Quality Index.

Table (2): bivariate and multivariate analysis for sociodemographic prediction of poor sleep quality

Predictors		Poor sleep quality n=194(%)	Univariate analysis		Multivariate analysis		
			P value	COR (95%CI)	$\beta$	P value	AOR (95%CI)
Age/years	60-(r)	160(78.4)	0.518	1			
	75-	34(82.9)		1.34(0.554-3.22)			
Sex	Male (r)	72(69.9)	0.002*	1	0.150	0.697	1
	Female	122(85.9)		2.63(1.39-4.95)			1.87(0.405-3.6)
Marital status	Unmarried (r)	101(87.8)	<0.001*	1	0.254	0.568	1
	Married	93(71.5)		0.348(0.177-0.685)			1.29(0.540-3.08)
Level of education	Illiterate	70(81.4)	0.235	2.19(0.586-8.17)			
	Read and write	54(84.4)	0.146	2.7(0.681-10.69)			
	Basic education	39(86.7)	0.106	3.25(0.743-14.22)			
	Secondary or intermediate	23(60.5)	0.702	0.767(0.196-3.00)			
	University or higher	8(66.7)		1			
occupation before retirement	Housewife	119(86.2)	0.053	2.01(0.98-4.13)			
	Employee	19(57.6)		0.436(0.183-1.04)			
	Non-governmental(r)	56(75.7)		1			
Current work	yes (r)	25(71.4)	0.222	1			
	no	169(80.5)		1.65(0.734-3.70)			
Income	Enough (r)	89(70.6)	0.001*	1	0.963	0.007*	1
	Not enough	105(88.2)		3.12(1.58-6.13)			2.62(1.29-5.29)
Living with	Spouse (r)	89(69.0)	0.014*	1	0.884	0.112	1
	Alone	41(87.2)	0.0001*	3.07(1.21-7.82)			2.42(0.81-7.19)
	Children	64(92.8)		5.75(2.15-15.38)			3.79(1.12-12.79)

**Factors Associated with Poor Sleep Quality .....**

**Table (3) Bivariate and multivariate analysis for clinical predictor of poor sleep quality.**

Predictors		Poor sleep quality n=194(%)	Univariate analysis		Multivariate analysis		
			P value	COR (95%CI)	$\beta$	P value	AOR (95%CI)
General health status	Excellent/V.good (r)	10(71.4)	0.944	1			
	Good	67(70.5)	0.238	0.957(0.278-3.31)			
	Fair	100(84.0)		2.11(0.598-7.42)			
	Poor	17(100.0)		undefined			
Presence of chronic disease	Yes (r)	191(79.9)	0.107	0.251(0.049-1.28)			
	No	3(50)					
BMI categories	underweight (r)	5(71.4)	0.173	1			
	normal weight	40(63.5)	0.324	0.696(0.125-3.88)			
	overweight	149(85.1)		2.29(0.422-12.45)			
Self-dependency	independent (r)	84(65.1)	<0.001	1	0.256	0.99	Undefined
	with assistance	82(93.2)	0.002	7.32(2.96-18.09)	1.25	0.99	Undefined
	dependent	28(100)		undefined			
Drugs	GIT drugs	34(60.7)	<0.001	3.57(1.83-6.95)	0.304	0.608	1.36(0.424-4.33)
	Cortisone	33(82.5)	0.572	1.28(0.534-3.11)			
	Bronchodilators	119(86.2)	0.002	2.67(1.41-5.05)	0.648	0.256	1.523(0.171-1.75)
	Antidepressant	14(93.3)	0.164	3.89(0.499-30.29)			
	Vitamins	176(81.5)	0.016	2.68(1.18-6.14)	0.744	0.184	2.10(0.701-6.31)
	Hypnotic	79(91.9)	<0.001	4.32(1.85-10.08)	1.26	0.005	3.51(1.46-8.44)
	Analgesic	137(82.5)	0.061	1.82(0.967-3.44)			
	Diuretics	143(82.7)	0.038	1.96(1.03-3.73)	0.325	0.546	1.722(0.251-2.08)
	laxative	114(85.7)	0.006	2.4(1.27-4.53)	0.018	0.969	1.02(0.404-2.56)
	anti-histaminic	131(86.2)	0.001	2.97(1.58-5.59)	1.21	0.018	3.37(1.24-9.17)

**Table (3) Continued: Bivariate and multivariate analysis for clinical predictor of poor sleep quality.**

Predictors	Poor sleep quality n=194(%)	Univariate analysis		Multivariate analysis		
		P value	COR (95%CI)	$\beta$	P value	AOR (95%CI)
Cough	111(90.2)	<0.001*	4.35(2.14-8.81)	1.41	0.001*	4.09(1.80-9.28)
Dyspnea	155(83.8)	0.002*	2.78(1.44-5.38)	0.682	0.052	1.98(0.993-3.95)
Apnea	67(89.3)	0.009*	2.84(1.26-6.38)	0.210	0.683	1.23(0.449-3.39)
Snoring	129(84.9)	0.005*	2.42(1.29-4.52)	0.169	0.720	1.18(0.469-2.99)
Hyperacidity	174(84.9)	<0.001*	5.61(2.71-11.63)	2.14	0.029*	8.53(1.25-58.12)
Nocturia	151(83.9)	0.003*	2.66(1.39-5.1)	1.54	0.111	1.225(0.032-1.43)
Restless leg syndrome	159(85.0)	<0.001*	3.73(1.93-7.23)	0.322	0.666	1.38(0.320-5.96)
Restlessness during sleep	115(89.8)	<0.001*	4.26(2.13-8.49)	1.02	0.02*	2.78(1.16-6.710)
Obesity	135(78.0)	0.492	0.783(0.389-1.58)	0.645	0.142	0.525(0.222-1.24)

r: reference group

AOR: Adjusted odds ratio, COR: Crude odds ratio

**Table 4: Relation between personal habits and sleep quality of the studied older adults.**

Personal habits	total number=245	Sleep quality		$\chi^2$	p value
		Poorn=194(%)	Goodn=51(%)		
Frequent toileting at night	174	149(85.6)	25(14.4)	15.15	<0.001*
Taking naps	168	139(82.7)	29(17.3)	4.09	0.04*
Eating much food before bedtime	157	131(83.4)	26(16.6)	4.80	0.028*
Drinking caffeinated fluids before bedtime	148	124(83.8)	24(16.2)	4.79	0.028*
Watching TV	98	72(73.5)	26(26.5)	3.23	0.072
Going to bed hungry	84	73(86.9)	11(13.1)	4.62	0.032*
Talking on the phone	44	32(72.7)	12(27.3)	1.36	0.244
Smoking before bedtime	41	26(63.4)	15(36.6)	7.43	0.006*
Reading in bed	12	7(58.3)	5(41.7)	3.33	0.068
Exercising close to bedtime	12	9(75.0)	3(25.0)	0.134	0.714

$\chi^2$ :Chi-Square test , \*statistically significant

**Table 5: Relation between external factors affecting sleep and sleep quality of the studied older adults.**

External factors	Total number =245	Sleep quality		$\chi^2$	P value
		Poor N=194(%)	Good N=51(%)		
Environmental factors that affect sleep	221	185(83.7)	36(16.3)	28.05	<0.001*
Noise	188	158(84.0)	30(16.0)	11.57	0.001*
Room temperature	163	148(90.8)	15(9.2)	39.85	<0.001*
Light	161	139(86.3)	22(13.7)	14.57	<0.001*
Relocation	89	81(91.0)	8(9.0)	11.86	0.001*
Insects	77	71(92.2)	6(7.8)	11.56	0.001*
Social factors that affect sleep	194	161(83.0)	33(17.0)	8.19	0.004*
Financial burden	153	130(85.0)	23(15.0)	8.27	0.004*
Family problems	151	126(83.4)	25(16.6)	4.33	0.037*
Social media	26	19(73.1)	7(26.9)	0.658	0.445
Psychological factors that affect sleep	206	171(83.0)	35(17.0)	11.49	0.001*
Anxiety	188	159(84.6)	29(15.4)	14.25	<0.001*
Thinking about death	132	114(86.4)	18(13.6)	8.95	0.003*
Fear	125	107(85.6)	18(14.4)	6.37	0.012*
Nightmares	119	103(86.6)	16(13.4)	7.63	0.006*

$\chi^2$ :Chi-Square test , \*statistically significant

**Table 6: Relation between depression, pain and loneliness and sleep quality of the studied older adults.**

Items	Total number=245	Sleep quality		$\chi^2$	P value
		PoorN=194(%)	GoodN=51(%)		
Geriatric depression Yes	169	140(82.8)	29(17.2)	4.42	0.036*
Depression level				6.46	0.091
Normal	78	56(71.8)	22(28.2)		
Mild	103	81(78.6)	22(21.4)		
Moderate	42	37(88.1)	5(11.9)		
Severe	22	20(90.9)	2(9.1)		
Numerical rating pain scale				18.71	<0.001*
No pain	32	24(75.0)	8(25.0)		
Mild	65	42(64.6)	23(35.4)		
Moderate	102	83(81.4)	19(18.6)		
Severe	46	45(97.8)	1(2.2)		
UCLA Loneliness Scale				8.06	0.018*
Low	75	53(70.7)	22(29.3)		
Mild	121	96(79.3)	25(20.7)		
High	49	45(91.8)	4(8.2)		



$\chi^2$ :Chi-Square test , \*statistically significant

**Table 7: Binary logistic regression significant independent predictors of poor sleep quality among studied subjects.**

Predictors	B	P value	AOR(95% CI)
Living condition			R
Spouse (R )	1		
Alone	0.352	0.582	1.42(0.406-4.98)
Siblings	1.586	<b>0.02*</b>	4.88(1.28-18.62)
Environmental factors that affect sleep	1.678	<b>0.003*</b>	5.36(1.78-16.09)
Psychological factors that affect sleep	1.20	<b>0.002*</b>	3.32(1.54-7.17)
Numerical rating pain scale			R
No pain(R )	1		
Mild	-1.198	<b>0.046*</b>	0.302(0.093-0.977)
Moderate	-0.250	0.662	0.779(0.254-2.39)
Severe	1.46	0.205	4.32(0.450-41.42)
Overall % predicted =78.8%			

AOR: Adjusted odds ratio , R:Reference

**5.Discussion:**

Sleep is an essential physiological process that has significant restorative benefits and contributes to biological processes that are crucial to the survival of most living things (Tucker, 2020). Since sleep is a major predictor of quality of life, changes in sleep that take place as we age have a detrimental impact on quality of life. Age-related changes in various circadian rhythms, increased medication use, the prevalence of medical and psychiatric comorbidities, changes in the environment and lifestyle changes, as well as age-related changes in circadian rhythms, all raise the risk of sleep disruptions (Heidari & Huege, 2020). Therefore, this study was conducted to estimate the prevalence of poor sleep quality and its associated factors among older adults.

The current study revealed that the majority of studied older adults had poor sleep quality while the least of them had good sleep quality. This suggests that poor sleep quality should be considered a serious public health concern for older adults. This finding is in line with a study done by Singh, et al (2021), who found that more than three quarter of the participants stated that they suffer from poor sleep, and study done by Kulpatcharapong, et al, (2020) showed high prevalence of poor sleep quality in approximately half of hospitalized patients.

When studying the relationship between the demographic characteristics of the older adults and their poor sleep quality, the current study revealed that sex, marital status, income, and living condition were predictors for poor sleep quality. In relation to sex, statistically significant relationship was found in current results between sex and poor

sleep quality as slightly more than three quarter of females had poor sleep quality. The reason for poor sleep quality in women may be due to the women had heavy household responsibilities and burden which can lead to higher risk of sleep problems and depression. In addition, females may be more sensitive to negative life events, such as the loss of family members or friends, which may result in poor sleep quality. In agreement a study done in Brazil by Barros, Lima, Ceolim, Zancanella, & Cardoso, (2019), found that poor self-rated sleep was significantly higher in women and another study done in China by Lee, Chang, Chang, & Shelley, (2022), revealed that poor sleep quality was significantly associated with female sex and a study held in China by Wang, et al, (2020) estimated that elderly females had a higher prevalence of sleep disturbance than elderly males. However, other studies done in Pakistan by Umar, et al., (2022), in Aswan by Ahmed, & Mohamed, (2021) and in Sweden by Dragioti, et al., (2018) revealed that there was a non-significance difference.

The present study revealed that poor sleep quality is statistically significantly higher among unmarried older adults than the married. This may be due to unmarried elderly people living alone and this increases anxiety and fear, especially at night for them, which could disrupt their sleep. This is in the same line with a study done in Egypt by El-Gilany, Saleh, Mohamed &Elsayed, (2017) who found that insomnia among the unmarried older adults than the married. Also, the present study found that poor sleep quality is statistically significantly higher among those who reported inadequate income. This may be due to elderly people with low income often having unhealthy lifestyles and suffering from more complains and

diseases that in turn will affect negatively on their sleep quality. This is in line with a study done in Canada by EtindeSosso et al., (2022), who reported that that low income was a predictor for poor sleep quality.

As for living condition, the current finding revealed that poor sleep quality is a statistically significantly higher among the elderly living with their children; this may be due to the elderly being occupied with child's problems. Dissimilarly with a study done in Korea by Chu, Oh, & Lee, (2022), found that the risk of poor sleep quality was significantly high among older adults living alone.

There was a statistically significant relationship between poor sleep quality and level of activity as poor sleep quality was prevailing among the study participants who were dependent on the other. This may be justified by low activity throughout the day make elderly take naps. Similarly, a study done in Turkey by AzizoğluŞen, et al., (2021), who found there was a negative correlation between baseline PSQI scores and Katz ADL scores. Also, a study done in Egypt by Kamel, et al., (2022), who found that there was a significant weak negative correlation between PSQI and ADL. And study done in Turkey by AzizoğluŞen, et al., (2021), who found that Katz ADL scores were lower in poor sleepers than good sleepers.

Older people are more likely to experience pain syndromes, arthritis, digestive disorders, heart conditions, lung conditions, renal and urologic diseases, and cancer. All these conditions might produce sleep disturbances due to specific symptoms, complications, or anxieties that are linked to these conditions (Miner & Kryger, 2020). The accumulation of comorbidities has more effect than single ailment on sleep disturbances; it is one of the main factors raising the likelihood of sleep issues in older persons. The likelihood of having sleep issues rises with the number of health issues (Miner & Kryger, 2020). However, current results showed that there was no statistically significant relationship between poor sleep quality and presence of chronic diseases at all. This may be justified by elderly people becoming more able to adapt to chronic diseases due to various means of awareness such as the media, the internet, and periodic follow-ups with specialists. Dissimilarly with a study done by Zhang, et al., (2022), who found that sleep quality and depression symptoms were strongly positively linked with the number of chronic conditions, other study done in China by Zhu, et al., (2020), showed that participants having one to two kinds of chronic diseases had an

increased risk of poor sleep quality and study done by Zhang, et al., (2022), who found that the number of chronic diseases was significantly positively correlated with sleep quality.

Current results showed that there was a statistically significant relationship between poor sleep quality and drug intake. This may be justified by the need for multiple medication uses come from the need to treat presenting multimorbidity concurrently with aging as most of the studied older adults were had more than one disease and some of these medications can disrupt normal sleep on its quantity or quality. This in the same line with a study done in Japan by Tai, et al., (2021), who showed that potential confounders for poor sleep quality including use of sleep medication, study done in Canada Özkök, et al., (2022), and study done in Turkey by AzizoğluŞen, et al., (2021), who showed that the number of medications being used was higher in insomnia patients according to the PSQI. But a study done in Canada by Bullock, Kovacevic, Kuhn & Heisz, (2020), found that there were no significant differences between poor and good sleepers for use of sleeping medication.

Current results showed that there was a statistically significant relationship between poor sleep quality and diuretics, anti-histaminic, bronchodilators, laxative, anticholesterolemia, hypnotics and cortisone. Study done in Taiwan by Liu, Liou, & Jou, (2022), found that benzodiazepines and total activity in the day were covariates of the main effect of group-by-time interaction on sleep efficiency.

Present study showed that there was a statistically significant relationship between poor sleep quality and hyperacidity, restless leg syndrome, dyspnea, nocturia, snoring, restlessness during sleep, cough, and apnea. Because most of these symptoms become more noticeable at night and cause sleep quality disturbance. A study done in Taiwan by Shao, et al, (2016), who found that the PSQI scores were significantly correlated with nocturia, and study done in Turkey by AzizoğluŞen, et al., (2021) showed diuretic drug, and restless legs syndrome were related to poor sleep quality according to PSQI scores.

Caffeine's stimulant effects can shorten sleep duration by raising the number of arousals and sleep latency. In various research, tobacco use, and sleeplessness have been linked. Nicotine may enhance wakefulness by influencing acetylcholine transmission in the central nervous system, making it a potential mediator of this effect (Barczi, & Teodorescu, 2017). Current results show that, there was a statistically significant relationship between

poor sleep quality and bad personal habits; such as drinking caffeinated fluids before bed time, smoking before bed time, frequent toileting at night, taking naps, eating much food before bed time and going to bed hungry. Similarly, Egyptian study done in by Ahmed, & Mohamed, (2021), found statistically significant relationship between poor sleep quality and smoking before bedtime, eating much food before bedtime, drinking caffeinated drink 4hrs before bedtime, drinking a lot before bedtime, napping, or resting during day, watching TV, reading at bed. But our findings differed from the study done in Nepal by Shrestha, Roka, Shrestha & Shakya, (2017), found that older people who had a habit of smoking have no association with insomnia symptoms and study done in China by Lee, Chang, Chang, & Shelley, (2022), found that smoking behavior and exercise status were neither positively nor negatively associated with status change of sleeping patterns.

Current results showed that there is a statistically significant relationship between poor sleep quality and all environmental factors that affect sleep such as noise, room temperature, light, relocation, and insects. This result may be explained by light in patients' room also plays a very important role because it suppresses melatonin production and interrupts patients' circadian rhythm which can cause sleep disturbance and lead to poor sleep quality (Hastings, Maywood & Brancaccio, 2018). Furthermore, the routine can aid in a patient's preparation for sleep. This should involve ceasing noisy activities and avoiding bright lights like computer screens, both of which can disrupt circadian cycles (Andrew, et al., 2019). This is in same line with a study done by Singh, et al (2021), showed that among environmental factors, change in the environment, nearby patients' sound/conversation and television sound had a significant association with poor quality of sleep based on the PSQI scores. Also, study done in Thailand by Kulpacharapong, et al., (2020), who showed that the Light exposure and sound exposure were the most frequent factors reported by patients who had poor sleep quality. Dissimilarly studies done in Australia by Delaney, Currie, Huang, Lopez & Van Haren, (2018), showed that light did not have any significant impact on patient's sleep, but noise had significant impact on patient's sleep.

Current results showed that there is a statistically significant relationship between poor sleep quality and financial distress. This is because the elderly have multiple financial obligations, which may include housing, clothing, food, and expenses for examination and treatment of chronic

diseases, in addition to the limited monthly income that exceeds covering such expenses, which may lead to them feeling financial pressure. In contradiction a study done by Singh, et al (2021), who found that there was no significant relationship between poor sleep quality and financial distress.

Stressed people will release extra corticosteroids and adrenalin, because of enhanced sympathetic activity; this leads to more catabolism, more sleeplessness, and more anxiety (Dow, 2019). The present study revealed that anxiety was the main psychological factor that affects sleep of the studied older adults. In the same line with the present study a study done by Zagalaz-Anula, et al., (2019), found that Anxiety and worse psychological symptoms severity of were associated with poorer sleep quality, and a study done by Umar et al., (2022) who found that the anxiety was related to greater sleep disturbances.

In depressive patients, sleep complaints (e.g. insomnia, narcolepsy, sleep disordered breathing and RLS) are universal in approximately 90% of patients (Fang, Tu, Sheng & Shao, 2019), Current results showed that, there was a statistically significant relationship between poor sleep quality and depression level. This is in same line with a study done in China by Zhu, et al., (2020), in Germany Weber, Schnorr, Morat, Morat, & Donath, (2020), showed that participants with depression symptoms, and anxiety symptoms had an increased risk of poor sleep quality. In contrast a study done in China by Ouyang, & Sun, (2019), who found that there was no significant associations were found between depression and subsequent long sleep duration among middle-aged and elderly people.

Pain lowers the overall quality of sleep by increasing cortical alertness, causing fragmented sleep, and causing irregular awakenings (Li, Robinson, Ruan, Surapaneni & Southerland, 2022). Current study revealed that there was a statistically significant relationship between poor sleep quality and pain level as poor sleep quality was higher among elderly who had severe pain level. Similarly, study done in Turkey by AzizoğluŞen, et al., (2021) showed that pain was independently related to poor sleep quality according to PSQI scores, also a study done by Singh, et al (2021) showed that a significant association between pain and poor quality of sleep, and study done by (Tran, (2021) showed that higher pain levels were linked to more sleep problems, poorer global health, and more interference with functional outcomes from sleep impairment.

Current results showed that, there was a statistically significant relationship between poor sleep quality and feeling of loneliness as poor sleep quality was higher among those who had high feeling of loneliness it may be justified by while activity and satisfaction with social life protected those aged 65 and older from the symptoms of insomnia, loneliness can affect sleep through its effect on sleep hygiene as the loss of a regular schedule, inactivity, and boredom, potentially encouraging behaviors like napping and irregular bedtimes. In the same line with current results study done in china by Jia, & Yuan, (2020), who found that the average loneliness score of older individuals with poor sleep quality, was significantly higher than that of older individuals with good sleep quality.

Current study showed that living condition, environmental factors, psychological factors, pain were the main predictors for the poor sleep quality among the studied older adults. This is in agreement with a study done in Brazil by Drager, Pachito, Morihisa, Carvalho, Lobao & Poyares, (2022) showed that poor sleep quality is predicted by the presence of a partner or roommate sleeping in another bed or another room. Also, study done by Kulpatcharapong, et al., (2020), reported that pain was the main independent factors for poor sleep quality as well as, study done in Italy by Salfi, et al, (2021) showed that psychological factors were main predictors of sleep disturbances and another study done in Korea by Kim & Yoon, (2020) reported that environmental factors, psychological factors, pain were the main predictors for the poor sleep quality among long-term care residents.

The gerontological nurse as a member of the health team plays crucial role in enhancing seniors' sleep efficiency (El-Gilany, Saleh, Mohamed & Elsayed, 2017). Therefore, this study is an important step toward throwing light on factors affecting sleep among older adults so that effective nursing interventions can be instituted.

#### **6. Conclusion:**

In conclusion most of the studied older adults had poor sleep quality. Overall poor sleep quality was more common among female, unmarried, housewife elderly, who had basic level of education, not enough family income and those who live with their children. As well as living condition, environmental factors, psychological factors, pain were the main predictors for the poor sleep quality among the studied older adults.

#### **7. Recommendations:**

- Design educational program for elders about the factors associated with poor sleep quality to

enhance sleep and manage associated symptoms through emphasizing on the importance of sleep hygiene practice, behavioral and non-pharmacological interventions, and healthy lifestyle.

- Adequately planned in-service training programs for nurses related to factors associated with poor sleep quality among older adults must be established to advance nurses' knowledge, attitude, and practices in order to fit newly developed concepts in care.

#### **8. References**

- Abd Allah, E. S., Abdel-Aziz, H. R., & El-Seoud, A. R. A. (2014). Insomnia: Prevalence, risk factors, and its effect on quality of life among elderly in Zagazig City, Egypt. *Journal of nursing education and practice*, 4(8), 52.
- Ahmed, A. M., & Mohamed, H. E. (2021). Effect of Sleeping Instruction on Reducing Insomnia among Elderly. *Minia Scientific Nursing Journal*, 9(1), 65-70. DOI: [10.21608/msnj.2021.188499](https://doi.org/10.21608/msnj.2021.188499)
- Andrew, D., Krystal, I., Aric, A., Prather, L., Liza, H., Ashbrook. (2019). The assessment and management of insomnia: an update. *World Psychiatry* 18:3 - October 2019.
- Azizoğlu Şen, İ., Özsürekci, C., Balcı, C., Çalışkan, H., Eşme, M., Ünsal, P., Gülhan Halil, M. G., Cankurtaran, M & Doğu, B. B. (2021). Sleep quality and sleep-disturbing factors of geriatric inpatients. *European geriatric medicine*, 12, 133-141. <https://doi.org/10.1007/s41999-020-00400-4>
- Barczy, S. R., & Teodorescu, M. C. (2017). Psychiatric and medical comorbidities and effects of medications in older adults. In *Principles and practice of sleep medicine* (pp. 1484-1495). 6th edition. Philadelphia: Elsevier.
- Barros, M. B. D. A., Lima, M. G., Ceolim, M. F., Zancanella, E., & Cardoso, T. A. M. D. O. (2019). Quality of sleep, health and well-being in a population-based study. *Revista de saude publica*, 53.
- Bullock, A., Kovacevic, A., Kuhn, T., & Heisz, J. J. (2020). Optimizing sleep in older adults: Where does high-intensity interval training fit? *Frontiers in Psychology*, 11, 576316.

- Buysse, D.J., Reynolds III, C.F., Monk, T.H., Berman, S.R., & Kupfer, D.J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. (2), 193-213.
- Chu, H. S., Oh, J., & Lee, K. (2022). The relationship between living arrangements and sleep quality in older adults: gender differences. *International Journal of Environmental Research and Public Health*, 19(7), 3893.
- Delaney, L. J., Currie, M. J., Huang, H. C. C., Lopez, V., & Van Haren, F. (2018). "They can rest at home": an observational study of patients' quality of sleep in an Australian hospital. *BMC health services research*, 18, 1-9. <https://doi.org/10.1186/s12913-018-3201-z>
- DelRosso, L. M., & Ferri, R. (Eds.). (2020). *Sleep Neurology: A Comprehensive Guide to Basic and Clinical Aspects*. Springer Nature.
- DiVall, M. V., & Woolley, A. B. (2019). CHAPTER Pharmacologic Agents. *Acute Care Handbook for Physical Therapists E-Book*, 431.
- Dow, M. (2019). *Heal your drained brain: Naturally relieve anxiety, combat insomnia, and balance your brain in just 14 days*. Hay House, Inc.
- Drager, L. F., Pachito, D. V., Morihisa, R., Carvalho, P., Lobao, A., & Poyares, D. (2022). Sleep quality in the Brazilian general population: A cross-sectional study. *Sleep Epidemiology*, 2, 100020. <https://doi.org/10.1016/j.sleepe.2022.100020>
- Dragioti, E., Bernfort, L., Larsson, B., Gerdle, B., & Levin, L. Å. (2018). Association of insomnia severity with well - being, quality of life and health care costs: A cross - sectional study in older adults with chronic pain (PainS65+). *European Journal of Pain*, 22(2), 414-425.
- Dzierzewski, J. M., Rodriguez Tapia, J. C., & Alessi, C. A. (2017). Synopsis of geriatric sleep disorders. *Review of sleep medicine*, 4, 373-385.
- Ebraheem N., Shehata H. and Thabet R.: Feeling of Depression and Loneliness among Elderly People Attending Geriatric Clubs, Assiut City. *Life Science Journal*, 9 (2): 258-321, 2012.
- El-Gilany, A. H., Saleh, N. M. H., Mohamed, H. N. A. E. A., & Elsayed, E. B. M. (2017). Prevalence of insomnia and its associated factors among rural elderly: a community based study. *International Journal of Advanced Nursing Studies*, 6(1), 56.
- Elhousseini, S. (2013) Effect of self-care intervention on quality of life of older adults with heart failure. Unpublished Doctorate Thesis. Alexandria University, Faculty of Nursing.
- EtindeleSosso, F. A., Kreidlmayer, M., Pearson, D., & Bendaoud, I. (2022). Towards a socioeconomic model of sleep health among the Canadian population: A systematic review of the relationship between age, income, employment, education, social class, socioeconomic status and sleep disparities. *European Journal of Investigation in Health, Psychology and Education*, 12(8), 1143-1167.
- Fang, H., Tu, S., Sheng, J., & Shao, A. (2019). Depression in sleep disturbance: a review on a bidirectional relationship, mechanisms and treatment. *Journal of cellular and molecular medicine*, 23(4), 2324-2332. <https://doi.org/10.1111/jcmm.14170>
- Gulam, S., Xyrichis, A., & Lee, G. A. (2020). Still too noisy—An audit of sleep quality in trauma and orthopaedic patients. *International emergency nursing*, 49, 100812. <https://doi.org/10.1016/j.ienj.2019.10.0812>
- Gulia, K. K., & Kumar, V. M. (2018). Sleep disorders in the elderly: a growing challenge. *Psychogeriatrics*, 18(3), 155-165.
- Hastings, M. H., Maywood, E. S., & Brancaccio, M. (2018). Generation of circadian rhythms in the suprachiasmatic nucleus. *Nature Reviews Neuroscience*, 19(8), 453-469. <https://doi.org/10.1038/s41583-018-0026-z>
- Heidari, S., & Huege, S. (2020). Sleep Disorders in the Geriatric Population. In *Sleep Medicine and Mental Health* (pp. 293-313). Springer, Cham.
- Ibrahim, H. M., Abouelil, M., Ahmmed, S., & Abd-Elrahim, S. (2022). Effect of a Training Program about Cognitive Behavioral Therapy on Sleep Quality among the Older Person.



- Jia, G., & Yuan, P. (2020). The association between sleep quality and loneliness in rural older individuals: a cross-sectional study in Shandong Province, China. *BMC geriatrics*, 20(1), 1-12.
- Kakazu, V. A., Pinto, R. Z., Dokkedal-Silva, V., Fernandes, G. L., Gobbi, C., Andersen, M. L., Tufik, S., Pires, G. N & Morelhão, P. K. (2022). Sleep quality, body mass index and waist-to-hip ratio in older adults. *Physical & Occupational Therapy In Geriatrics*, 40(2), 150-160.
- Kamel, D. M., Tantawy, S. A., Alsayed, N., Bekhet, A. H., Algabarty, N., Zahran, H., Rajab, E., Elsayed, S.H & Abdelbasset, W. K. (2022). Exploring the physical activity level and sleep quality among a cohort of healthy females in Egypt: a cross-sectional survey. *European Review for Medical and Pharmacological Sciences*, 26(14), 4951-4958.
- Katz MacLeod, S., Musich, S., Kraemer, S., & Wicker, E. (2018). Practical non-pharmacological intervention approaches for sleep problems among older adults. *Geriatric Nursing*, 39(5), 506-512 <https://doi.org/10.1016/j.gerinurse.2018.02.02>
- Katz, S., & Akpom, C. A. (1976). A measure of primary sociobiological functions. *International journal of health services*, 6(3), 493-508.
- Kim, D. E., & Yoon, J. Y. (2020). Factors that influence sleep among residents in long-term care facilities. *International Journal of Environmental Research and Public Health*, 17(6), 1889. <https://doi.org/10.3390/ijerph17061889>
- Korkmaz Aslan, G., İnci, F. H., & Kartal, A. (2020). The prevalence of insomnia and its risk factors among older adults in a city in Turkey's Aegean Region. *Psychogeriatrics*, 20(1), 111-117. <https://doi.org/10.1111/psyg.12464>
- Kulpatcharapong, S., Chewcharat, P., Ruxrungtham, K., Gonlathanvit, S., Patcharatrakul, T., Chaitusaney, B.,...& Chirakalwasan, N. (2020). Sleep quality of hospitalized patients, contributing factors, and prevalence of associated disorders. *Sleep disorders*, 2020. <https://doi.org/10.1155/2020/8518396>
- Lee, Y. H., Chang, Y. C., Chang, P. J., & Shelley, M. (2022). Socio-demographic and behavioural factors associated with status change of sleep quality and duration among Chinese older adults. *Ageing & Society*, 42(9), 2206-2223.
- Lemrasky M., Shamsalinia A., Nasiri M. and Hajiahmadi M., (2019). The Effect of Sleep Hygiene Education on the Quality of Sleep of Elderly Women, *Aging Medicine and Healthcare*; 10(1):32-38.
- Li, J., Vitiello, M. V., & Gooneratne, N. S. (2018). Sleep in normal aging. *Sleep medicine clinics*, 13(1), 1-11. DOI: <https://doi.org/10.1016/j.jsmc.2017.09.001>
- Li, M. T., Robinson, C. L., Ruan, Q. Z., Surapaneni, S., & Southerland, W. (2022). The Influence of Sleep Disturbance on Chronic Pain. *Current Pain and Headache Reports*, 26(10), 795-804.
- Liu, C. R., Liou, Y. M., & Jou, J. H. (2022). Ambient bright lighting in the morning improves sleep disturbances of older adults with dementia. *Sleep Medicine*, 89, 1-9.
- McCaffery, M., & Beebe, A., (1989). *Pain: Clinical manual for nursing practice*, Mosby St. Louis, MO.
- Medic, G., Wille, M., & Hemels, M. E. (2017). Short-and long-term health consequences of sleep disruption. *Nature and science of sleep*, 9, 151. doi: [10.2147/NSS.S134864](https://doi.org/10.2147/NSS.S134864)
- Miner, B., & Kryger, M. H. (2020). Sleep in the aging population. *Sleep medicine clinics*, 15(2), 311-318.
- Ouyang, P., & Sun, W. (2019). Depression and sleep duration: findings from middle-aged and elderly people in China. *Public health*, 166, 148-154.
- Özkök, S., Aydın, Ç. Ö., Saçar, D. E., Çatıkkaş, N. M., Erdoğan, T., Kılıç, C., Karan, M. A & Bahat, G. (2022). A prevalent sleep disorder in older adults: Restless legs syndrome (Is there any association with other geriatric syndromes?). *European Journal of Geriatrics and Gerontology*.
- Park, J. H., Yoo, M. S., & Bae, S. H. (2013). Prevalence and predictors of poor sleep quality in Korean older adults. *International Journal of Nursing Practice*, 19(2), 116-123.

- Polit, D. F., & Beck, C. T. (2020). *Nursing Research: Generating and Assessing Evidence for Nursing Practice*. (11th Edition). Philadelphia: Wolters Kluwer Health ISBN197511065X, 9781975110659.
- Putri, N. N. (2019). *Kondisi Insomnia Pada Lansia Setelah Diberikan Intervensi Senam Lansia Di Desa Barengkok, Kecamatan Leuwiliang, Kabupaten Bogor, Jawa Barat Tahun 2017 (Analisa Lanjut)* (Doctoral dissertation, Universitas Binawan).
- Rajoub, R. A. (2015). Effect of Applying a Sleep Hygiene Program on Glycemic Control Among Type Two Diabetic Patient. Unpublished master thesis. Alexandria : University of Alexandria, Faculty of Nursing.
- Roland, J., 2021. How to Measure Your Height Accurately at Home. [online] *Healthline*. Available at: <https://www.healthline.com/health/how-to-measure-height> [Accessed 7 August 2021].
- Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of personality assessment*, 66(1), 20-40.
- Salfi, F., Lauriola, M., D'Atri, A., Amicucci, G., Viselli, L., Tempesta, D., & Ferrara, M. (2021). Demographic, psychological, chronobiological, and work-related predictors of sleep disturbances during the COVID-19 lockdown in Italy. *Scientific Reports*, 11(1), 11416. <https://doi.org/10.1038/s41598-021-90993-y>
- Shao, I. H., Wu, C. C., Hsu, H. S., Chang, S. C., Wang, H. H., Chuang, H. C., & Tam, Y. Y. (2016). The effect of nocturia on sleep quality and daytime function in patients with lower urinary tract symptoms: a cross-sectional study. *Clinical interventions in aging*, 879-885.
- Sheikh, J. I., & Yesavage, J. A. (1986). Geriatric Depression Scale (GDS): recent evidence and development of a shorter version. *Clinical Gerontologist: The Journal of Aging and Mental Health*.
- Shivalingaiah, S. B., Tuladhar, S., Mahalakshmi, A. M., Muthukumar, P., Yannam, S. K., Rashan, L., Essa, M. A., Mohan, S. K., Veeraraghavan, V. P., Bolla, S. R., Chidambaram, S. B & Qoronfle, M. W. (2021). Sleep and gonadotrophin hormones. *International Journal of Nutrition, Pharmacology, Neurological Diseases*, 11(1), 17. DOI: 10.4103/ijnpnd.ijnpnd\_97\_20
- Shrestha, S., Roka, T., Shrestha, S., & Shakya, S. (2017). Prevalence and contributing factors of insomnia among elderly of Pashupati old aged home (Briddhashram). *Mathews Journal of Psychiatry & Mental Health*, 2(2), 014.
- Siddiqui, N., Farooq, R., Saadat, S., Siddiqui, M., Javed, Z. A., Shah, A. F., & Mansoor, S. (2020). Poor sleep quality: a wake up call for the elderly at a tertiary care centre in Islamabad, Pakistan. *Journal of the Pakistan Medical Association*, 1-14.
- Singh, S., Sharma, S., Bishnoi, S., Saini, S., Jose, S., Sharma, R., & Jelly, P. (2021). Sleep quality index and factors influencing sleep of patients in tertiary care hospital: A cross-sectional study. *Sleep and Vigilance*, 5(2), 259-266. <https://doi.org/10.1007/s41782-021-00157-1>
- Sorour, D. M., Khalil, M. I. M., Sharaan, M. A., & El Geneidy, M. M. (2019). Effect of Deep Breathing Exercises versus Incentive Spirometry on Pulmonary Complications among Geriatric Patients Undergoing Upper Abdominal Surgery. *International Journal of Novel Research in Healthcare and Nursing*, 6(3), 537-555.
- Tai, Y., Obayashi, K., Yamagami, Y., Yoshimoto, K., Kurumatani, N., Nishio, K., & Saeki, K. (2021). Hot-water bathing before bedtime and shorter sleep onset latency are accompanied by a higher distal-proximal skin temperature gradient in older adults. *Journal of Clinical Sleep Medicine*, 17(6), 1257-1266.
- Tran, L. (2021). *The associations between pain, sleep, global health, and functional outcomes in older adults* (Doctoral dissertation, University of Pittsburgh).
- Tucker, M. A. (2020). The Value of Sleep for Optimizing Health. In *Nutrition, Fitness, and Mindfulness* (pp. 203-215). Humana, Cham. [https://doi.org/10.1007/978-3-030-30892-6\\_14](https://doi.org/10.1007/978-3-030-30892-6_14)

- Umar, A., Khan, M. S., Sehgal, S. A., Jafar, K., Ahmad, S., Waheed, A., ... & Tahir, R. (2022). Epidemiological studies of sleep disorder in educational community of Pakistani population, its major risk factors and associated diseases. *PloS one*, *17*(4), e0266739.
- Wang, P., Song, L., Wang, K., Han, X., Cong, L., Wang, Y., Zhang, L., Yan, Z., Tang, s & Du, Y. (2020). Prevalence and associated factors of poor sleep quality among Chinese older adults living in a rural area: a population-based study. *Aging clinical and experimental research*, *32*(1), 125-131. <https://doi.org/10.1007/s40520-019-01171-0>
- Wang, Y., Li, Y., Liu, X., Liu, R., Mao, Z., Tu, R., Zhang, H., Zhang, X., Qian, X., Jiang, J., Qiao, D., Luo, Z., Dong, X., Liu, X & Wang, C. (2019). Gender-specific prevalence of poor sleep quality and related factors in a Chinese rural population: the Henan Rural Cohort Study. *Sleep medicine*, *54*, 134-141. <https://doi.org/10.1016/j.sleep.2018.10.031>
- Weber, M., Schnorr, T., Morat, M., Morat, T., & Donath, L. (2020). Effects of mind-body interventions involving meditative movements on quality of life, depressive symptoms, fear of falling and sleep quality in older adults: A systematic review with meta-analysis. *International journal of environmental research and public health*, *17*(18), 6556.
- Zagalaz-Anula, N., Hita-Contreras, F., Martínez-Amat, A., Cruz-Díaz, D., Aibar-Almazán, A., Barranco-Zafra, R. J., & Lomas-Vega, R. (2019). The associations between menopausal symptoms and sleep quality in Spanish postmenopausal women. *Climacteric*, *22*(5), 511-517.
- Zhang, C., Chang, Y., Yun, Q., Lu, J., Zheng, X., Xue, Y., Zhao, X., Yuan, W., Zou, J & Zheng, J. (2022). The impact of chronic diseases on depressive symptoms among the older adults: The role of sleep quality and empty nest status. *Journal of Affective Disorders*, *302*, 94-100.
- Zhu, X., Hu, Z., Nie, Y., Zhu, T., ChiwandaKaminga, A., Yu, Y., & Xu, H. (2020). The prevalence of poor sleep quality and associated risk factors among Chinese elderly adults in nursing homes: A cross-sectional study. *PloS one*, *15*(5), e0232834; <https://doi.org/10.1371/journal.pone.0232834>