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Cognitive Behavioral Intervention to Improve Sleep Quality in Older Adults

Eman Shokry Abd Allah[1], Hassanat Ramadan Abdel-Aziz[2], Salwa Abbas Ali[3], and Amany Rashad Abo El-Seoud[4]

[1]*(Professor and Head of Gerontological Nursing Department, Faculty of Nursing, Zagazig University, Egypt)*
[2]*(Assistant Lecturer of Gerontological Nursing, Faculty of Nursing, Zagazig University, Egypt)*
[3]*(Professor of Community Health Nursing, Faculty of Nursing, Zagazig University, Egypt)*
[4]*(Professor of Community Medicine, Faculty of Medicine, Zagazig University, Egypt)*

Abstract:
Background*: Poor sleep is reported in 50% of older adults, calling for an important need for identifying safe and effective alternatives to improve their sleep quality.*
Aim of the study: *The present study aimed to evaluate the effect of cognitive behavioral (CB) intervention on improving sleep quality in older adults.*
Design: *A quasi-experimental pretest-and-posttest design was utilized to conduct this study.*
Setting*: The study was conducted in the geriatric social club in Zagazig City.*
Sample: *A purposive sample of 75 elderly subjects who fulfilled the study inclusion criteria.*
Tools: *Three tools were used in the present study; the first tool was a structured interview questionnaire consisted of two parts, the second tool was The Sleep Hygiene Awareness and Practice Scale, and the third tool was The Pittsburgh Sleep Quality Index (PSQI).*
Results: *The results revealed post-intervention statistically significant improvements in PSQI components scores, PSQI global score, sleep hygiene knowledge, caffeine knowledge, sleep hygiene practice, and other sleep parameters as sleep latency and sleep efficiency.*
Conclusion: *CB intervention is effective in improving elderly's sleep quality, and can be considered a safe and effective non-pharmacological approach to improve elderly's sleep quality.*
Recommendations: *The developed CB intervention should be implemented in the study setting on a long term basis to test its sustainability, and in similar settings to confirm its effectiveness and for further improvements.*
Keywords: *Behavioral, Cognitive, Intervention, Older Adults, Sleep Quality.*

I. Introduction

The world's population of older adults is growing. Old age is a normal, biological and universal process. Population of the world has been aging because the expected life span at birth has become longer. It is estimated that the population of the elderly people in the world will have exceeded one billion by 2020 and most of the elder population will be living in the developing countries ***(Tel, 2013; Wennberg et al., 2013).*** In Egypt, The number of older persons reached 5.9 million (2.9 million male, 3 million female) in 2012, 7.1% of total population and is expected to increase to 11.5% in 2031 ***(Central Agency for Public Mobilization and Statistics [CAPMAS], 2013).*** Sleep complaints are prevalent among older adults, with over 50% reporting difficulty initiating or maintaining sleep. As the population of older adults continues to grow, so too will the prevalence of insomnia and associated sleep conditions, making assessment and management increasingly important ***(Wennberg et al., 2013).***

Sleep is a vital process linked to neural restoration and physiological maintenance across multiple systems. Conversely, sleep loss is linked to a diverse range of adverse effects ***(Cox & Olatunji, 2016).*** People experience many physical and psychological changes in old age. One of these changes occurs in the quality and quantity of their sleep. Sleep efficiency and total sleep time are reduced with age and there are an increased number of sleep stage shifts. Epidemiologic data indicate that sleep complaints and sleep problems increase with old age. It is emphasized that prevalence of the sleep disorder is higher than 50% among the community-living elderly people ***(Cooke & Ancoli-Israel, 2011; Tel, 2013).*** Sleep disturbances, such as difficulty falling asleep and nighttime awakenings, have been linked to depression, cognitive decline, functional impairment, and lower quality of life (QOL). Sleep dysfunction can also lead to serious impairment in daytime performance and exacerbate medical, neurologic, and psychiatric conditions ***(Mollayeva et al., 2016; Pa et al., 2014).***

Findings suggest that sleep complaints in older adults are due to multiple factors, including changes in circadian rhythms, an age-related increase in the prevalence of chronic medical conditions, and psychosocial changes that commonly accompany aging ***(Wennberg et al., 2013).*** Sleep patterns are affected by medications, pain, neurodegenerative diseases, excessive daytime sleep, and specific sleep pathologies (e.g., sleep-related

breathing problems, periodic limb movements) ***(Singer & Nanda, 2010)***. Hypnotics may be effective for short-term management of sleep disorders; however, the adverse effects of some hypnotics can outweigh their advantages. Elderly individuals may be more susceptible to the adverse effects of medication due to diminished metabolism, high comorbidity rate, and the interactions among different medications. Guidelines for evidence-based practice encourage the use of behavioral therapies rather than medications for treatment of insomnia and sleep complaints. Studies also confirm that behavioral therapies are effective in improving sleep in hypnotic-dependent older adults. The most common effective behavioral therapy is cognitive behavioral therapy (CBT) ***(Yang et al., 2011; Miller, 2012).***

CBT is a common nonpharmacological approach for improving sleep quality. CBT is a multicomponent intervention that is usually conducted in groups or administered individually. CBT consists of educational, cognitive and behavioral components. The educational component aims to enhance understanding of the basic mechanisms of sleep regulation, etiological factors of sleep disturbance, and good sleep hygiene. The behavioral component includes relaxation techniques that can reduce tension and anxiety and other techniques that enhance sleep quality by adjusting the sleep schedule. Finally, the cognitive component aims to correct dysfunctional beliefs and attitudes about sleep that may provoke anxiety about sleep or lead to maladaptive sleep practices ***(Neikrug & Ancoli-Israel, 2010; Yang et al., 2011).***

Nurses must be able to identify, assess, and refer elderly patients with symptoms of sleep disorders. No other group of health care providers watch more people sleep than nurses, and sleep disorders can affect all aspects of health and illness. Nurses also must incorporate sleep hygiene measures and actively address existing sleep disorders in care plans of older adults to ensure adequate sleep in all settings: acute care, primary care, and at home. Failing to identify, diagnose, or treat excessive sleepiness and its underlying causes can adversely affect the health and longevity of older adults ***(Boltz et al., 2012).***

Significance of the study:

Sleep problems increase with aging and it is estimated that nearly 67% of the elderly people have at least one sleep-related complaint. Researchers have observed direct correlation between poor sleep quality and increased physical and psychiatric morbidity, decline in cognitive function, and impaired quality of life ***(Bankar et al., 2013).*** The most common treatment for sleep problems is pharmacological treatment; which is associated with hazardous side effects especially in older persons ***(Yang et al., 2011).*** Therefore, there is an important need for identifying safe and effective alternatives for treating disruptive sleep problems in this population. There are few prior studies focused on improving sleep quality of elderly people in Egypt. Hence, the present study was conducted to evaluate the effect of cognitive behavioral intervention on improving sleep quality in older adults attending the geriatric social club in Zagazig City.

Aim of the study:

The aim of the current study was to evaluate the effect of cognitive behavioral intervention on improving sleep quality in older adults attending the geriatric social club in Zagazig City.

This aim has been achieved through the following objectives:-

1. Assess sleep hygiene knowledge and sleep hygiene practices of older adults pre and post cognitive behavioral intervention.
2. Assess the sleep quality of older adults pre and post cognitive behavioral intervention.
3. Develop and implement cognitive behavioral intervention to improve sleep quality in older adults.
4. Evaluate the effect of cognitive behavioral intervention on improving sleep quality in older adults.

Research Hypothesis:

After implementation of cognitive behavioral intervention, sleep quality of older adults will be improved.

II. Subjects And Methods

2.1. Research Design:-

A quasi-experimental pretest-and-posttest design was used to evaluate the effect of cognitive behavioral intervention on improving sleep quality in older adults attending the geriatric social club in Zagazig City**.**

2.2. Study Setting:-

The study was conducted at the geriatric social club in El-Qawmia in Zagazig City. This club provides recreational and social services in addition to some medical care at low cost for the elderly.

2.3. Subjects:-

The study sample comprised 75 elderly from the above mentioned setting who fulfilled ***the following inclusion criteria*** (1) Age: 60 years and older**,** (2) Difficulties in initiating sleep and/or maintaining sleep and/or early morning awakenings with difficulties returning to sleep for at least 3 episodes per week for at least 6 months prior to study enrolment, (3) Daytime consequences of poor sleep, such as fatigue, irritability, excessive daytime sleepiness, or difficulty concentrating, (4) Not receiving hypnotic medications, (5) Free from communication

problems (speech and hearing problems), (6) Attending the geriatric social club regularly, and (7) Not enrolled in any other interventional study and accept to participate in the study.

Sampling technique: A Purposive sampling technique was used in the recruitment of this study subjects from the above mentioned setting and who fulfilled the study inclusion criteria.

Sample size calculation: The sample size was calculated using EPI Info software program version 6.04. It was based on the prevalence of insomnia among elderly in a study conducted by the researcher in the same study setting, which was 33.6% ***(Abd Allah et al., 2014)***. The sample size was 75 assuming that the elderly population attending the geriatric social club is 600 elderly (Based on the records of the geriatric social club), desired precision 90%, and at confidence level 95%.

2.4. Tools for data collection:-

Tool I: A structured interview questionnaire: It was developed by the researcher to collect the necessary data for the study. It consisted of two parts:

Part 1: Demographic characteristics of the studied elderly:

Entails data about demographic characteristic of the study sample such as; age, sex, educational level, current occupation, residence, marital status, income, income source, and data for calculating the crowding index.

Part 2: History of chronic diseases, medications, and daytime problems caused by inadequate sleep:

This part was concerning with medical history of the studied elderly. It involved questions about number and type of chronic diseases such as; hypertension, diabetes, orthopedic diseases, renal diseases, cardio-vascular diseases, and gastro intestinal diseases…etc. In Addition to, the number of medications used to take daily and daytime problems caused by inadequate sleep as fatigue, daytime sleepiness, stress, and dysfunction.

Tool II: The Sleep Hygiene Awareness and Practice Scale (Lacks & Rotert, 1986)*:*

The Sleep Hygiene Awareness and Practice Scale (SHAPS) is an instrument that measures awareness of sleep hygiene and current practices. It is a self-report questionnaire divided into 2 sections. The first section, the Awareness section, is divided into two subsections labeled Sleep Hygiene knowledge (SHK) and Caffeine knowledge. The second section, the Practice section, contains 18 items related to sleep hygiene practices (SHP) ***(Lacks & Rotert, 1986).*** Minimal modifications to this scale were done by the researcher to make it suitable to the culture of the study subjects; as the original scale contains questions about alcohol consumption and beer. ***The Sleep Hygiene knowledge subsection*** inquires about respondent knowledge of daytime behavior effects on sleep. There are 14 questions that list a variety of behaviors (e.g. daytime napping, smoking, sleep medication, caffeine use) that are rated from 1, beneficial to sleep, to 3, disruptive to sleep. Responses are given 1 point if correct and 3 points if incorrect or not answered. The total scores can range from 14-42, with higher scores indicating less sleep hygiene knowledge. The second subsection of the Awareness section, ***Caffeine knowledge,*** evaluates caffeine knowledge by asking respondents to identify common foods, beverages, and nonprescription drugs as caffeinated or non-caffeinated. Respondents answer "Yes" if the substance contains caffeine, "No" if it does not contain caffeine and "I don't know" if they are unfamiliar with the substance. Scores range from 0-100, which corresponds to the percentage of correct answers. Higher scores indicate more knowledge about substances that contain caffeine. ***The Practice section*** lists 18 questions about sleep hygiene practices. Respondents are asked to identify the number of days per week (0-7) that they have had the experience or engaged in the activity listed (e.g. take a nap, exercise 2 hours before bedtime, relax before bed). Responses are scored one point for each day of the activity from 0, indicating never, to 7, indicating every day or night. Scores range from 0 to 126 with higher scores less indicative of good sleep hygiene practices.

Tool III: The Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989)*:*

The Pittsburgh Sleep Quality Index (PSQI) is a 19-item self-report questionnaire designed to measure sleep quality and disturbances over a one month period. The first PSQI items ask respondents for their usual bedtime, length of time to fall asleep, usual wake-up time, and duration of actual sleep. The rest of the 15 Likert-type items inquire about the frequency of sleep disturbances and subjective sleep quality within the past month. Each item is rated on a 0-3 scale with 0 indicating no difficulty and 3 indicating severe difficulty ***(Buysse et al., 1989).*** The 19 items are combined to form seven component scores or subscales: subjective sleep quality (item 6), sleep latency (item 2 and 5a), sleep duration (item 4), habitual sleep efficiency (items 1, 3 and 4), sleep disturbances (items 5b to 5j), use of sleep medications (item 7), and daytime dysfunction (items 8 and 9). Component scores range from 0, indicating no problem, to 3 indicating severe difficulties. In addition, the seven component scores are summed to yield one global score that ranges from 0 to 21 with higher scores denoting poorer sleep quality. The global score has a cut-off of > 5 that has been used to distinguish poor sleepers from good sleepers. Scores < 5 refer to good sleepers; scores > 5 refer to poor sleepers ***(Buysse et al., 1989).*** An Arabic version of The PSQI was designed; validity and reliability were done by ***Suleiman et al. (2010)***.

2.5. Preparatory phase:-

Based on review of the past and current local and international literature about sleep and Cognitive behavioral therapy using textbooks, web sites, and articles in the scientific periodicals and journals; the researcher prepared the two data collection tools including A structured interview questionnaire, Sleep Hygiene Awareness and Practice Scale, and The Pittsburgh Sleep Quality Index (PSQI).The review has also helped in a basic framework of the Cognitive behavioral (CB) intervention.

2.6. Content validity:-

The tools were translated into Arabic, and then reviewed by five experts from the departments of Gerontological Nursing, Community Health Nursing, and Medical Surgical Nursing at the Faculty of Nursing, Zagazig University, and the department of Community medicine at the Faculty of Medicine, Zagazig University. These experts assessed the tools for clarity, relevance, application, and comprehensiveness. This constituted the face and content validation of tools. All recommended modifications were done.

2.7. Content reliability:-

Reliability of tools was assessed through estimating test-retest reliability and measuring their internal consistency. Test-retest reliability was done by the researcher through administrating the same tools to the same subjects under similar conditions on two or more occasions. Internal consistency of the tools was assessed by calculating Cronbach alpha coefficients. Their reliability proved to be high as shown by the values of Cronbach alpha coefficient (0.78 for Sleep Hygiene Awareness and Practice Scale, and 0.86 PSQI).

2.8. Pilot study:-

Before performing the main study, a pilot study was carried out on 8 elderly from the study setting, constituting about 10 percent of the sample calculated for main study. The purpose of pilot was to test the questions for any ambiguity, and to assess the practicability and feasibility of using the structured interview questionnaire sheet for the elderly. It also helped the researcher to determine the time needed for filling out the forms (30 to 45 minutes). The tools were finalized after doing necessary modifications according to the pilot study results. The pilot subjects were not included later in the main study sample.

2.9. Fieldwork:-

The fieldwork was carried out within the period of 6 months, starting from the first of July 2015 to the end of December 2015. This included the phases of assessment, planning, implementation, and evaluation of CB intervention.

- ***Assessment phase*:** This phase involved the pre-intervention data collection for baseline assessment. The researcher introduced herself and explained the purpose of the study briefly to the studied elderly and oral consent for participation was obtained. The researcher read and explained each item of the study scales to the elderly and then recorded his/her response to each item. The time consumed for answering the study tools ranged from 30 to 45 minutes. The data were preliminary analyzed to provide the basis for building-up the CB intervention according to identified needs.
- ***Planning phase*:** Based on the results obtained from the data analysis of the assessment phase, and in view of the pertinent literature about Cognitive behavioral therapy, the researcher developed the CB intervention and sessions contents according to the elderly needs and the study objectives. Identified needs, requirements and deficiencies were translated into aim and objectives of the CB intervention and set in the form of a booklet. ***The CB intervention*** consisted of eight sessions included all the basic components of CBT. The first and second session focused on improving elderly's knowledge about normal sleep, sleep stages, benefits of sleep, consequences of insufficient sleep, common sleep disorders among elderly, sleep medications, and cognitive behavioral therapy. The third and fourth sessions focused on sleep hygiene education. The fifth session focused on knowledge about caffeine and its sources and foods which help in promoting sleep. The sixth session focused on relaxation techniques. The seventh session focused on sleep restriction and stimulus control. The eighth session focused on cognitive therapy.
- ***Implementation phase*:** The CB intervention was implemented for the studied elderly. They acquired pertinent basic knowledge about sleep, sleep hygiene, and other cognitive behavioral therapies. The intervention was offered to the studied elderly in the form of eight sessions for small groups to give more chance for discussions, interactions, and practical training. The total sample was divided into small groups (5 to 8 elderly in each group). All groups received the same content using the same teaching methods, media, discussions, and the same booklet. The researcher allocated two days per week for implementation of the CB intervention. The length of each session was variable according to elderly's responses and active participation, as well as the time available, and the content of each session. To ensure that the studied elderly understand the content, each session was started by a summary about what was given through the

previous session and the objectives of the new one, taking into consideration the use of simple language to suit the level of understanding of the elderly. Motivation and reinforcement techniques as praise and recognition during the session were used to enhance active participation and foster learning. The sessions were aided by using pictures, posters, as well as the booklet.

Methods of teaching: The researcher utilized various approaches of learning in carrying out the intervention. These included interactive lectures with group discussions and brain storming to exchange ideas between the elderly participants and the researcher.

Teaching media: Various media were used including power-point presentations, posters, and pictures. The researcher also prepared an illustrated pamphlet, booklet and distributed them to all of the participants to enhance the process of learning.

- ***Evaluation phase*:** The evaluation of the effectiveness of the CB intervention was done after its implementation. A post-test was carried out after three months of completion of the intervention. This was done using the same data collection tools of the pre-test.

2.10. Ethical Considerations:-

The study protocol was approved by The Research Ethics Committee at the Faculty of Nursing, Zagazig University. An informed consent for participation was taken verbally from each of the elderly subjects after full explanation of the purpose of the study. They were notified that they could withdraw at any time and were assured that any information taken from them would be confidential and used for the research purpose only. The researcher phone number and all possible communicating methods were identified to the participants to return at any time for any explanation.

2.11. Administrative Design:-

An official permission for data collection and implementation of the CB intervention was obtained by submission of official letters issued from the Dean of the Faculty of Nursing at Zagazig University to the president of administration council of Assembly of Health Improvement in Sharkia Governorate and to the director of the Geriatric Social Club in Zagazig City. The researcher visited the study setting, met with the director of the club, explained to him the aim and importance of the study, and asked for his cooperation.

2.12. Statistical Design:-

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables. Cronbach alpha coefficient was calculated to assess the reliability of the developed tools through their internal consistency. Paired Quantitative continuous data were compared using the paired t test. Pearson correlation was used for assessment of the inter-relationships among scales and quantitative variables. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. Statistical significance was considered at p-value < 0.05.

III. Results

Table 1 shows that the age of the studied elderly ranged between 60 and 84 years, with mean 68.8±6.8 years, and higher percentage of females (80%). Slightly less than three-fourths of the studied elderly (72%) were currently unmarried, and 40% of them were highly educated. Almost all of the studied elderly were residing in urban areas and were not working currently, and 57.3% of them were living alone. For almost all of the studied elderly, the main source of income was the retirement pension (97.3%), and this income was sufficient (82.6%).

Concerning the medical history of the studied elderly, **Table 2** illustrates that the majority of the studied elderly (92%) were having chronic diseases and 89.3% of them were receiving medications regularly for these diseases. The most common diseases were hypertension (66.7%), diabetes (54.7%), and arthritis (49.3%). The median number of medications per elderly person was 3. **Table 3** indicates post-intervention statistically significant improvements in all daytime problems caused by inadequate sleep ($P<0.01$).

Concerning sleep hygiene knowledge and practices, **Table 4** demonstrates post-intervention statistically significant improvements in elderly's Sleep hygiene knowledge (SHK) ($P=0.00$), caffeine knowledge ($P=0.00$), and self-reported sleep hygiene practice (SHP) ($P=0.00$).

Table 5 demonstrates statistically significant improvements in PSQI components scores and PSQI global score ($P=0.00$) at the post-intervention phase, which indicates significant improvement in elderly's sleep quality. Also **Table 5** indicates that the percentage of bad sleepers decreased from 100% pre intervention to 58.7% post intervention ($P=0.00$).

Table 6 illustrates post-intervention statistically significant improvements in sleep parameters as revealed by significant statistical differences in mean scores of sleep latency, sleep efficiency, and daytime naps as reported by the studied elderly ($P=0.00$).

Table 7 demonstrates statistically significant positive correlations between total score of SHP and Global PSQI Score at the pre (R= 0.473) and post (R= 0.681) intervention phases. Statistically significant positive correlations were revealed between total score of elderly's SHK and their SHP at pre (R= 0.436) and post (R= 0.320) intervention phases.

Table 8 indicates that both SHK and SHP total scores were negatively correlated to the elderly's level of education at post intervention phase. However, caffeine knowledge total score is positively correlated to elderly's level of education at post intervention phase. Concerning Global PSQI Score, it is positively correlated to the number of chronic diseases and the number of medications at the post intervention phase.

Table 1: Demographic characteristics of the studied elderly (N=75)

Items	Frequency	Percent
Age (years):		
60 <70	47	
70 +	28	62.7
Range	**60-84**	37.3
Mean±SD	**68.8±6.8**	
Gender:		
Male	15	20.0
Female	60	80.0
Education:		
Illiterate/read and write	9	12.0
Basic	11	14.7
Secondary	25	33.3
University	30	40.0
Residence:		
Rural	6	8.0
Urban	69	92.0
Marital status:		
Single	1	1.3
Married	21	28.0
Divorced	3	4
Widowed	50	66.7
Current Job status:		
Not working	74	98.7
Working	1	1.3
Have children:		
Yes	68	90.7
No	7	9.3
Living:		
Alone	32	42.7
With others	43	57.3
Crowding index:		
<1	62	82.7
+1	13	17.3
Income:		
Insufficient		
Just sufficient	13	17.3
Sufficient and saving	52	69.3
	10	13.3
Income source:		
Pension	73	97.3
Aids	2	2.7

Table 2: Medical history of the studied elderly (N=75)

Items	Frequency	Percent
Have chronic diseases:	**69**	**92.0**
Range	0-7	
Mean ± SD	2.57±1.44	
Median	3	
Types of diseases:		
▪ Hypertension	50	66.7
▪ Diabetes Mellitus	41	54.7
▪ Arthritis	37	49.3
▪ Cardiac diseases	15	20.0
▪ Osteoporosis	15	20.0
▪ GIT diseases	9	12.0
▪ Chest diseases	8	10.7
▪ Renal diseases	5	6.7
▪ Liver diseases	4	5.3
▪ **Others**	8	10.7
On medications:	**67**	**89.3**
Range	0-8	
Mean ± SD	3.05±1.77	
Median	3	

Table 3: Daytime problems caused by inadequate sleep as reported by elderly pre and post intervention (N=75)

Daytime problems	Phase				P
	Pre (n=75)		**Post** (n=75)		
	N	**%**	**N**	**%**	
Fatigue	37	49.3	16	21.3	0.00**
Daytime Sleepiness	55	73.3	22	29.3	0.00**
Stress	13	17.3	4	5.3	0.012*
Low Concentration	40	53.3	20	26.7	0.00**
Low Functioning	24	32.0	6	8.0	0.00**
Nothing	1	1.3	22	29.3	0.00**

** P < 0.05 (significant) ** P < 0.01 (High significant)*

Table 4: Sleep hygiene knowledge, caffeine knowledge, and sleep hygiene practices as reported by the studied elderly pre and post intervention (n=75)

Item	Phase		P
	Pre (n=75) Mean± SD	**Post (n=75) Mean± SD**	
Total mean score of elderly's Sleep Hygiene Knowledge (SHK)	26.05±3.7	17.4±1.7	0.00**
Total mean score of elderly's Caffeine Knowledge	41.33±14.9	83.92±7.5	0.00**
Total mean score of Sleep Hygiene Practice as reported by the studied elderly (SHP)	52.80±9.16	21.20±7.92	0.00**

** P < 0.05 (significant) ** P < 0.01 (High significant)*

Table 5: Comparison of the mean values of PSQI Component and Global scores of the studied elderly and number of good and bad sleepers pre and post intervention (N=75)

PSQI Components scores	Phase				P
	Pre (n=75) **M±SD**		**Post** (n=75) **M±SD**		
Subjective sleep quality	1.58±0.63		0.82±0.41		0.00**
Sleep latency	2.4±0.56		1.48±0.64		0.00**
Sleep duration	1.85±0.61		1.09±0.6		0.00**
Sleep efficiency	1.89±0.72		0.82±0.7		0.00**
Sleep disturbances	1.97±0.36		1.25±0.43		0.00**
Daytime dysfunction	1.82±0.52		0.86±0.4		0.00**
Sleep medications	.00±0.00		.00±0.00		---
Global PSQI Score	**11.53±2.2**		**6.33±2.4**		**0.00****
Sleep Quality	**N**	**%**	**N**	**%**	P
Good Sleeper	0	0.0	31	41.3	0.00**
Bad Sleeper	75	100.0	44	58.7	

(---) Test result not valid ** P < 0.05 (significant)* *** P < 0.01 (High significant)*

Table 6: Mean values of Sleep latency, Sleep Efficiency, and Daytime Naps as reported by the studied elderly pre and post intervention (N=75)

Sleep parameters	Phase		P
	Pre (n=75) **M±SD**	**Post** (n=75) **M±SD**	
Sleep Latency (min)	50 ±25	21±13	0.00**
Daytime Naps (no. /wk.)	4.50±1.71	2.12±1.26	0.000*
Total time in bed (hours)	7.88±1.7	8.0±1.04	0.33
Total sleep time (hours)	5.44±1.0	6.44±0.96	0.00**
Sleep Efficiency (%)	69.88±7.9	80.57±6.88	0.00**

Sleep Efficiency= (Number of hours slept) / (Number of hours in bed) x 100%

** P < 0.05 (significant)* *** P < 0.01 (High significant)*

Table 7: Correlation between elderly's total mean score of sleep hygiene knowledge and sleep hygiene practice and their Global PSQI Score (N=75)

Items	Total mean score of sleep hygiene knowledge (SHK)		Total mean score of sleep hygiene practice (SHP)	
	R	**P**	**R**	**P**
Global PSQI Score				
Pre-intervention	0.178	0.127	0.473**	0.000
Post-intervention	0.100	0.395	0.681**	0.00
Sleep hygiene practice total score				
Pre-intervention	0.436**	0.000		
Post-intervention	0.320**	0.005		

R: Pearson's correlation coefficient

Table 8: Correlation between post intervention scores of Sleep hygiene knowledge, Caffeine knowledge, Sleep hygiene practice, and Global PSQI Score and elderly's general characteristics (N=75)

Elderly Characteristics	Spearman's rank correlation coefficient			
	Sleep hygiene knowledge total score	**Caffeine knowledge total score**	**Sleep hygiene practice total score**	**Global PSQI Score**
Post-intervention Age	- 0.001	- 0.023	- 0.128	- 0.188
Sex	0.020	- 0.051	- 0.030	0.148
Education	- 0.526**	0.347**	- 0.270*	- 0.124
No. of chronic diseases	0.082	0.088	0.114	0.350**
No. of medications	0.146	0.106	0.184	0.338**

(*) Statistically significant at p<0.05 *(**) statistically significant at p<0.01*

IV. Discussion

Population of the world has been aging. It is emphasized that prevalence of the sleep problems is higher than 50% among the community-living elderly people ***(Tel, 2013)***. Several studies have demonstrated that sleep problems may lead to substantially impaired health, cognitive decline, and reduced QOL ***(Gómez-Esteban et al., 2011).*** Therefore, healthy sleep is an essential necessity for maintaining the physical and mental performance and health of elderly people. Long-term pharmacological therapy with hypnotics is not advisable because of the

habituation effect and the risk of addiction. Cognitive-behavioral therapy appears to be the most effective non-pharmacological therapy for insomnia and improving sleep quality ***(Richter et al., 2014)***. The aim of this study was to evaluate the effect of CB intervention on improving sleep quality in older adults attending the geriatric social club in Zagazig City. It was hypothesized that after implementation of CB intervention, sleep quality of older adults will be improved.

The present study findings revealed that after the implementation of the CB intervention, there were significant improvements in all daytime problems caused by inadequate sleep as reported by the studied elderly. In line with this, a study in Germany demonstrated that pre-post comparisons revealed a significant reduction of day-time sleepiness and depressive symptoms of the studied older adults ***(Richter et al., 2014)***. Similarly in another German study by ***Gebhart et al. (2011)*** revealed post intervention improvements in daytime mood of the intervention group as well as their overall psychological condition. They also demonstrated decreased depressive symptoms after the intervention. In a more recent study, similar results have been found by ***Lovato et al. (2014)*** who conducted their study in South Australia to evaluate the efficacy of a brief treatment program of CBT for older adults. The findings of this study indicated that CBT produced improvements in daytime functioning, daytime sleepiness, fatigue and anxiety.

As far as the Sleep Hygiene Knowledge (SHK) and caffeine knowledge of the studied elderly, after the implementation of the CB intervention there were statistically significant improvements in total score of elderly's SHK and Caffeine knowledge. This finding was expected since the questions from the Sleep Hygiene Knowledge and Caffeine knowledge Pretest and Post-Test Scales came directly from the sleep hygiene education component of CB Intervention included in the booklet that the researcher distributed it to all of the studied elderly, as well as the fifth session of CB Intervention was about caffeine and its sources. Also the educational level of the majority of the studied elderly was high or moderate and this might play an important role in improving their knowledge. In agreement with this, a study in Egypt conducted by ***Byomi and Sharkaway (2013)*** to develop, implement and evaluate an educational training program about sleep disturbance. Their study results revealed that there is statistical significance difference in elderly's knowledge about sleep hygiene tips before and after program. Concerning self-reported sleep hygiene practice (SHP) of the studied elderly, there was post-intervention statistically significant improvement in total score of elderly's SHP. Similarly, A Japanese study reported that sleep management that included sleep education and cognitive-behavioral interventions improved sleep-related habits ***(Tanaka & Tamura, 2016).***

It was hypothesized that after implementation of cognitive behavioral intervention, sleep quality of older adults will be improved. This hypothesis was supported by the current study findings which revealed that cognitive behavioral intervention had an effect on PSQI components scores and PSQI global score when comparing pre-intervention mean scores with post-intervention mean scores, which indicated significant improvement in the elderly's sleep quality as measured by the PSQI. In accordance with the current study findings, a study in Egypt conducted *by* ***Byomi and Sharkaway (2013)*** revealed that the elderly's sleep quality significantly improved after implementation of their educational training program about sleep disturbance in elderly. On the same line, in another Egyptian study conducted by ***El Kady et al. (2011)*** to determine the prevalence and risk factors of insomnia, and the impact of a cognitive behavioral therapy for institutionalized elders complaining of sleep disturbance in Alexandria. The findings of this study demonstrated that after carrying out the behavioral therapy for the elders, there was a highly significant improvement in elderly's sleep quality as measured by the PSQI.

Also in agreement with the foregoing present study findings, ***Richter et al. (2014)*** study in Germany demonstrated that pre-post comparisons revealed a significant improvement in sleep quality of the studied older adults as measured by the PSQI. Similar results have been found by ***Lovato et al. (2014)*** who conducted their study in South Australia to evaluate the efficacy of a brief treatment program of CBT for older adults. The findings of this study indicated that CBT produced improvements in sleep quality and sleep efficiency of older adults. Importantly, a review study by ***Wennberg et al. (2013)*** concluded that cognitive-behavioral therapies produced long-term improvements on both subjective and objective measures of sleep in older people.

The current study findings revealed post intervention significant statistical improvements in sleep parameters as sleep latency, sleep efficiency, total sleep time, and daytime naps as reported by the studied elderly. In accordance with the current study findings, a German study by ***Richter et al. (2014)*** demonstrated that pre-post comparisons revealed significant improvements in sleep latency, sleep efficiency, and daytime sleep of the studied elderly. On the same line, ***Gałuszko-Węgielnik et al. (2012)*** in their study in Poland found significant improvements in the measures of sleep onset latency, numbers of awakenings during night, sleep efficiency, and quality of sleep after CBT for primary insomnia. Furthermore, a systematic review of 37 studies using CBT reported significant improvements in sleep-onset latency, sleep efficiency, time awake after sleep onset, and total sleep time after CBT ***(Morin et al., 2006).*** Also, another recent meta-analysis by ***Okajima et al. (2011)*** to examine CBT efficacy on both subjective and objective sleep parameters for individuals with primary insomnia. They reported significant improvements in subjective sleep measures, which included sleep onset

latency, total sleep time, wake after sleep onset, total wake time, time in bed, early morning awakening, and sleep efficiency; which was concurred with the present study findings.

As for as the number of good and bad sleepers, the present study findings demonstrated that after carrying out the cognitive behavioral intervention, the percentage of bad sleepers decreased from 100% pre intervention to 58.7% post intervention according to PSQI; which indicates statistically significant improvement in sleep quality of the studied elderly. The finding is in agreement with a study conducted by ***El Kady et al. (2011)*** in Egypt. The findings of this study showed that after carrying out the behavioral therapy for the elders, the percentage of poor sleepers decreased from 63.3% to 46.2% as measured by the PSQI.

The efficacy of CBT for insomnia and improving sleep quality and sleep parameters in older adults has been shown in many studies including systematic reviews and meta-analyses from many different countries (***Jungquist et al., 2010; Alessi & Vitiello, 2011; Cheng & Dizon, 2012; Hofmann et al., 2012; Fornal-Pawłowska & Szelenberger, 2013; Trauer et al., 2015).*** One randomized controlled trial showed improvements in global Pittsburgh Sleep Quality Index (PSQI) scores and PSQI sleep-efficiency sub-score in older adults randomized to a self-help and CBT for insomnia treatment group compared to controls ***(Morgan et al., 2012).*** In ***Alessi & Vitiello (2011)*** systematic review, that presented information relating to the effectiveness and safety of different interventions for primary insomnia in older people which included cognitive behavioral therapy. They reported that CBT improved sleep in older people with primary insomnia. They found 5 systematic reviews which identified 11 randomized control trials in total. All the reviews reported that the included studies demonstrated that CBT might be more effective at improving sleep outcomes in older people with primary insomnia compared with no treatment.

Regarding the correlations between elderly's sleep hygiene knowledge and sleep hygiene practice and their Global PSQI Score pre and post intervention, the findings of the current study indicated statistically significant positive correlations between the score of sleep hygiene practice and Global PSQI Score at the pre and post intervention phases. However, there were no statistically significant correlations between elderly's sleep hygiene knowledge and their Global PSQI Score at the pre and post intervention phases. These findings suggest that knowing about proper sleep habits does not necessarily influence sleep quality, whereas practicing proper sleep habits is strongly related to good sleep quality. These findings are consistent with a study conducted in Australia by ***Gallasch & Gradisar (2007)*** to examine the relationships between sleep knowledge, sleep practice and sleep quality in a sample of 946 participants with ages ranging from 16 years old to 50 years and older. The results of this study showed that there was a significant association between sleep practice and sleep quality. As well as, there was no significant relationship between sleep knowledge and sleep quality. Similarly, a study by ***Cho et al. (2013***) revealed that both subscales and total scores of the Sleep Hygiene Index (SHI), a self-report measure to assess the practice of sleep hygiene behaviors, were positively correlated with sleep quality. Moreover, several sleep hygiene practice studies, have shown that good sleep hygiene practices are related to good sleep quality ***(Petit et al., 2003; Lebourgeois et al., 2005; Brown et al., 2006).***

Concerning the correlations between elderly's sleep hygiene knowledge and their sleep hygiene practice pre and post intervention, the findings of the current study showed statistically significant positive correlations between total mean score of sleep hygiene knowledge of the studied elderly and their sleep hygiene practice at pre and post intervention phases. This highlights the importance of improving elderly's sleep hygiene knowledge in order to improve their sleep hygiene practice. In agreement with this, the study conducted in Australia by ***Gallasch & Gradisar (2007)*** revealed that sleep knowledge was significantly related to sleep practice, which in turn, is related to better sleep quality. Regarding the correlations between the score of sleep hygiene knowledge and sleep hygiene practice and elderly's personal characteristics, the findings of the current study revealed that both sleep hygiene knowledge and sleep hygiene practice had statistically significant negative correlation with elderly's educational level at the post intervention phase. This implies that having a high educational level was related to having low scores of sleep hygiene knowledge and sleep hygiene practice. This finding was expected since having higher scores of sleep hygiene knowledge indicating less sleep hygiene knowledge; as well having higher scores of sleep hygiene practice indicating less healthy sleep hygiene practices, and vice versa.

The findings of the current study demonstrated that Global PSQI Score was positively correlated to the number of chronic diseases and the number of medications at the post intervention phase. This implies that increasing number of chronic diseases and medications was related to having higher PSQI score, which in turn, meaning having bad sleep quality. This finding was expected as chronic diseases and side effects of medication used to treat them can deteriorate sleep quality of elderly people. This result is incongruent with ***Bakr et al. (2012)*** in a study conducted in Cairo in Egypt, they found that elderly suffering from three or more chronic diseases significantly suffered insomnia more than those having less number of chronic diseases. Furthermore, a review study by ***Bloom et al. (2009)*** reported that older adults with medical conditions are more likely to complain of difficulty sleeping, and that medications used to treat various underlying chronic conditions also contribute to sleep disruptions.

Evaluation of the effect of CB intervention on improving sleep quality in older adults attending the geriatric social club in Zagazig City was the aim of the present study. The CB intervention used in the current study was effective in improving sleep quality and other sleep parameters in older adults. There are relatively few prior studies on improving sleep quality, sleep hygiene knowledge, and sleep hygiene practice of community elderly in Egypt. The findings of the current study provide further evidence and add to the literature on the effectiveness of CBT on improving sleep quality, sleep hygiene knowledge, and sleep hygiene practice in older adults. The results also offer suggestions to health professionals, including nurses interested in addressing sleep complaints for the elderly people.

The improvement in sleep quality of the studied elderly would have a positive impact on their physical and mental health and on their quality of life as reported by ***Tanaka & Tamura (2016)*** in their study in Japan. The number of elderly people is expected to dramatically increase in the future. Comfortable sleep in old age will not only result in a clear increase in the QOL of elderly people themselves but will also be important for an increased well-being of the family and caregivers of the elderly, as well as society as a whole.

V. Conclusion

CB intervention is effective in improving sleep quality and other sleep parameters as sleep latency and sleep efficiency in older adults. The implementation of CB intervention is also effective in improving the elderly's sleep hygiene knowledge, caffeine knowledge, and sleep hygiene practice.

VI. Recommendations

In the light of the current study findings, it is recommended to apply the developed CB intervention in the study setting on a long term basis and in similar settings to confirm its effectiveness and for further improvements. It is recommended to replicate this study using a randomized clinical trial design in order to confirm the findings and to provide a higher level of evidence of its findings. Further research is needed to determine to what extent interventions to improve sleep quality of the elderly can produce beneficial effects on their quality of life.

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