

Obstructive Sleep Apnea Syndrome (OSAS): Impact of Continuous Positive Air Way Pressure (CPAP) in improving Quality of life

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Abstract: are in need for different types of support the aim of this study to evaluate the impact of continuous positive air way pressure (CPAP) in improving Quality of life for patients with obstructive sleep apnea. **Patient and Methods:** Quiz experimental (before and after) research design was conducted at the Sleep center in Chest Department at Assiut University Hospital. **Sample:** A convenience sample of 100 adult patients from both sexes with OSA. **Tools:** a Patients' interviewing questionnaire sheet, Pulmonary function tests, the St. George's Respiratory Questionnaire (SGRQ), Respiratory disturbed index (RDI) after full polysomnographic study, and designed nursing intervention protocol. **Results:** The study findings revealed that 52% were female, 44% of the studied patients were illiterate, read and write. Moreover, 88% of them were overweight and obese the BMI > 25, added to them about 28% of them were smoker. Majority of the studied patients had tired and fatigued & day time sleepiness. All of studied patients had moderate and severe OSA and not present any mild case. **Conclusion:** OSA patients before used CPAP machine had moderate level of air way limitation, severe OSA, fear from a wearing of CPAP mask, tired, fatigue & reduce of HRQL. After nursing intervention about important of continuous using of CPAP machine appear reduced feeling of fear from machine and from CPAP mask, reduced of tired, fatigue, sleepiness and increased number of normal sleeping hours, and improving of patients knowledge about CPAP machine and improved work of respiratory systems and health related quality of life.

Keywords: OSA, CPAP, Polysomnography, Respiratory Disturbed Index and The St. George's Respiratory Questionnaire (SGRQ).

1. INTRODUCTION

Obstructive sleep Apnea (OSA), is sleep disorder that involves cessation or significant decrease in the presence of breathing effort. OSA, is much more common type of sleep apnea in which patients have one or more pauses in breathing or shallow breaths while they sleep. Breathing pauses can last from a few seconds to minutes. They often occur 5 to 30 times or more an hour and 3 or more nights each week. Typically, normal breathing then starts again, sometimes with a loud snort or choking sound ⁽¹⁾.

OSA, can affect people of any age and of either sex, but it is most common in middle-aged and affects nearly 55% in men: 23% in women in the new literature. In Americans aged 30-65 years, approximately 6-7% of the population of the United States, or 18 million Americans, are thought to have sleep apnea, but only 10 million have symptoms, yet only 0.5% have been diagnosed and treated ⁽²⁾.

Symptoms of OSA consists of arousal, excessive sweating during sleep, bedwetting, nightmares, no supine position, snore, nocturia and dry mouth when awakening caused by sleeping with the mouth open. Day time symptoms of OSA

consists of dyspnea, headache, fatigue, muscles weakness and excessive day time sleepiness (EDS). Patients with OSA apnea may complain of impaired mental function, slowed reaction times, problems concentrating, memory loss, poor judgment, personality changes such as irritability or depression, morning headaches, and decreased interest in sex ⁽³⁾.

OSA, can also cause serious changes in the cardiovascular system, daytime hypertension, polycythemia, cor pulmonale, left ventricular failure. Life-threatening changes in the rhythm of the heart, including bradycardia, tachycardia, and other types of arrhythmias. OSA, have also been associated with a number of complications and other conditions, these include motor vehicle accidents, metabolic syndrome, stroke, glaucoma, chronic fatigue, decreased quality of life and increased mortality ⁽⁴⁾.

Continuous positive airway pressure (CPAP) is non-invasive machine and conceder the gold standard for people with sleep apnea and currently is the accepted standard for OSA ⁽⁵⁾. CPAP machines are programmed to run for a set number of hours at a pressure comfortable. CPAP, also portable and fairly quiet. Benefits of CPAP therapy include decreases daytime sleepiness, headache, blood pressure, incidence of MI, stroke and increase quality of life and at night time correct snoring, good sleep quality, prevent night mares, and decrease of nocturia, improved the concentration and memory ^(6,7&8).

Once the pulmonologist prescribes CPAP treatment, the patient is referred to the Sleep Unit to initiate therapy. This begins the nurse-patient relationship. In the introduction of treatment, the nurse teaches the correct use of the device (CPAP), and the causes of their illness and possible solutions, thus reducing the anxiety response to their fears and unknowns. This emphasizes the nurse role for decreased anxiety and management of therapeutic treatment ⁽⁹⁾.

Close follow-up of CPAP usage and the presence of an appropriately trained health care provider is indicated to establish effective CPAP utilization. There is evidence that the use of heated humidification and systematic educational program may improve CPAP compliance. Several different CPAP educational programs have been proposed, including information sessions, telephone calls, delivery of audio-visual material, CPAP-user group meetings, and training for patients' family members ⁽¹⁰⁾. Nursing intervention begins with assessment, continues with referral, educational and psychological support and can help OSA patients prevent life-threatening, physiologic changes and improve the quality of their lives ⁽⁵⁾.

Significance of the study:

CPAP is currently the first line treatment for patients with moderate to severe sleep apnea; yet despite its effectiveness, adherence with the treatment plan is poor. Non adherence with CPAP greatly reduces the overall effectiveness of treatment of OSA, leaving these patients at an increased risk for co morbid conditions, impaired daily functioning and decreased quality of life ⁽¹¹⁾. Improvements in CPAP adherence well be positively impact patients physiologically, psychologically and socially. Proper education and follow up is extremely important for all patients; however, it is paramount for patients with OSA, as CPAP can be challenging to adapt. So, this study well be improve CPAP adherence by of an educational program and increased patient support.

Aim of the study

Aim of this study to evaluate the impact of continuous positive air way pressure (CPAP) in improving Quality of life of patients with obstructive sleep apnea.

Research hypotheses:

- (1) What is the importance of nursing intervention in the adaptation of patients with OSA treated with (CPAP)?
- (2) What are the common problems that arise with use of CPAP care, and how to adapted?

2. SUBJECTS AND METHODS

Research design:

Quiz experimental (pre and post) research design was utilized to meet the aim of this study.

Study setting:

The present study was conducted at sleep lap in chest department at Assiut University Hospital.

Study subjects:

A convenience sample of (100) adult male and female patients, aged from (18-65 years), with obstructive sleep apnea (OSA), and under treatment with continuous positive air way pressure (CPAP), and who are willing to participate in the study.

Tools of data collection:

Tool 1: A structured interview questionnaire sheet: which was developed in a simple clear Arabic language by the researchers based on literature review and experts opinions in the light of relevant reference to identify the physical assessment and to assess patient's adaption before and after 1 ms and 3 ms from nursing intervention about using of the CPAP machine. It was filled in by the researcher after reviewing by the supervisions utilizing the most recent and relevant literature. It covers the following parts: (Socio-demographic data, patient's assessment sheet and patient's medical history).

Tool 2: Pulmonary function tests (PFTs) sheet:

It used to assess the ability of the lungs to receive, hold and use air ⁽¹²⁾. Forced vial capacity [FVC], exhaled lung volume. Attention were focused on three key parameters: FVC, FEV₁, and the FEV₁ -to-FVC ratio. Results of PFTs were categorized as: Normal > 85 % of the predicted values, Mild > 65 % but < 85 % of the predicted values, Moderate > 50 % but < 65 % of the predicted values, Severe < 50 % of the predicted values.

Tool 3: The St. George's Respiratory Questionnaire (SGRQ):

It is a standardized disease-specific questionnaire developed by **Jones et al. (1991)** to measure the impact of chest disease on health related quality of life (**HRQL**) and well being. It involves 50 questions covering three domains; the first part (Symptoms" evaluates symptomatology, effect of respiratory symptoms, their frequency and severity. It including frequency of cough, sputum production, wheeze, breathlessness and the duration and frequency of attacks of breathlessness or wheeze (8/ items). The second part has two components: "Activity "and "Impacts". The "Activity " (section addresses activities that cause breathlessness or are limited because of breathlessness (16 /items).

The "Impacts "section covers a range of aspects concerned with social functioning and psychological disturbances resulting from airways disease (as a covers a range of factors including influence on employment, being in control of health, panic, stigmatization, the need for medication, side effects of prescribed therapies, expectations for health and disturbances of daily life (26 /items) ⁽¹³⁾.

The number of response options per question varies from two to five. Responses are weighted and scores then calculated by dividing the summed weights by the maximum possible weight for all items of the questionnaire and expressing the result as a percentage of 0-100, with 0% being the best possible score and 100% the worst. The SGRQ has been translated into several languages. It is translated into Arabic by **Dr. Mohamed M. Abd El haady**. Then back translation was done into English to ensure translation accuracy.

Tool 4: Polysomnography (PSG):

It is used to assess the severity of OSA based on the total number of complete cessations (apnea) and partial obstructions (hypopnea) of breathing occurring per hour of sleep by used of sleep study. These pauses in breathing must last for 10 seconds and are associated with a decrease in oxygenation of the blood. In general, the Respiratory Disturbed Index (RDI) can be used to classify the severity of disease ⁽¹⁴⁾. **RDI scoring as:** RDI < 5 events/hrs is considered normal, RDI 5 < 15 events/hrs is considered mild OSA, RDI 15 < 30 events/hrs is considered moderate OSA, RDI ≥ 30 events/hrs is consistent severe OSA ⁽¹⁴⁾.

Tool 5: Designed nursing intervention protocol: It covers the following parts: **Part 1: Before and after 1 ms & 3 ms from using of CPAP machine assessment sheet:** Used to assess patient's knowledge about continues positive air way pressure: (definition, types, component, starting, stopping, indication, mechanism of action, care of CPAP, side effect of CPAP mask, nursing purgation (before, during, and after uses of CPAP) and Potential problems which can be happened during using of CPAP mask and way of prevention. Best way of connect patient with care giver and health care provider). It includes of (26) items.

Scoring system: Each right answer was given two degree. The total scores were 50 those who obtained less than 50% were considered having poor level. While those who obtained 50% were considered having fair level and more than 50% were considered having good level of knowledge.

Part 2: Designed nursing intervention protocol: This tool was prepared by the researcher from literature review, researcher experience and opinion of the medical and nursing expertise based on assessment needs to maintain health promotion for patients. The teaching booklet was revised and modified based on the expertise comment, it was written in Arabic using simple language with illustrations and it was concerning knowledge about: Brief illustration of the anatomy and physiology of lung, information about obstructive sleep apnea (definition, risk factor, symptoms, diagnosis, complication and nursing intervention). Information about continuous positive air way presser (CPAP): (indication, effect, how use it, types, accessory/component, complication, care of CPAP and importance of follow up for patients adaption with CPAP). And possible nursing interventions for physical, psychological and social side effects or problem with the CPAP equipment as mask problems and best way of connect patients with care giver and health care provider).

Pilot study and Ethical considerations:

A pilot study was applied on 10% of the studied patients with OSA, based on statistical percentage to test applicability and clarity of the tools, as well as to estimate the time needed to fill in the tools. Necessary modifications were done, and patients included in the pilot study were excluded from the study group. Prior to the pilot study, ethical approval was obtained from the Scientific Research Ethical Committee of Assiut University and written informed consent was obtained from each participant. In addition, they were assured that anonymity and confidentiality would be guaranteed and their right to withdraw from the study at any time without any reason.

Statistical design:

The collected data were organized, tabulated and analyzed using the statistical package from social sciences (SPSS) version 17 from windows. Data were presented in tables and charts using numbers, percentages, means and standard deviations, added to Chi-square to determine significance for non-parametric variable. Level of significant was threshold at 0.05 ($P > 0.05$ = insignificant, $P < 0.05$ = significant and $P < 0.001$ = highly significant).

3. RESULTS AND DATA ANALYSIS

This result shows that, characteristics of the studied sample, mean age of patients included in the study are (43.54 ± 14.14) (18-65 yr). Concerning gender, about (52.0 %) were female and nearly half of them (44%) were illiterate, read & write, and (56%) were educated. Moreover, present significant relation between level of education, occupation, family income & smoking with gender.

Table (1) show that; majority of the studied patients (58.0%) were having normal lung function and about (41%) were having mild and moderate air way limitation according to pulmonary function test.

Table (2) show that; mean of FEV_1 after one & three month from using of CPAP machine (77.90 ± 18.66 & 94.20 ± 15.19 respectively), were higher than mean of FEV_1 before using the CPAP (66.86 ± 20.75). The mean of FVC after one & three month from using of CPAP machine (83.18 ± 20.45 & 94.60 ± 15.93 respectively), were higher than mean of FVC before using of machine (71.72 ± 22.04). A significant relation was found between before one & three month after using CPAP machine regarding FEV_1 & FVC.

Table (3) show that; there was a significant relation between the mean scores of domains of HRQL for patients with OSA before using of CPAP machine and after one month. These significant relation were denoting the positive effect of the CPAP machine on HRQL for OSAS patients.

Figure (1) show that; all of the studied patients had delayed work of respiratory system before using of CPAP machine (100%). But, after one month from using of CPAP machine (88%) were in normal grades of SGRQ. Vast majority of the studied patients (99%) were improved from delayed work of respiratory system to normal after 3 month of using CPAP. A significant relation between health related quality of life and using of CPAP machine before and after one & three month.

Figure (2) show that; majority of the studied patients (83.0%) had severe OSAS; and (17.0%) had moderate OSAS according to respiratory disturbed index (RDI).

Table (4) show that; mean of sleeping hours before using of CPAP machine was (2.79 ± 0.66). After one and three month from using the CPAP machine the mean of sleeping hours were (4.88 ± 0.33 & 4.95 ± 0.26 respectively). A significant relation between compliance of CPAP machine and sleeping hours.

Table (5) show that; mean of patients knowledge about CPAP machine after three month (35.11 ± 1.51) was higher than mean of knowledge before using of CPAP machine (5.21 ± 3.33). A significant relation was found between patient’s knowledge and using CPAP machine after one & three month.

Table (6) show that; all studied patient afraid from use of CPAP device and wearing of CPAP mask (100.0). The most common cause of fear was poor knowledge about the CPAP machine and bad effect of CPAP machine (97.0 & 84.0 respectively). A after three month from using of CPAP the feeling of fear was decreased to (11.0%) and reassuring to treatment with CPAP machine increased to (89.0%). Moreover, A highly significant relation between feeling of fear and using of CPAP machine after one and three month.

Table (7) shows that; majority of the studied patients had poor knowledge about important of continuous using of CPAP machine (95.0). But, after three month from nursing intervention, the majority of studied patients (98.0), know the important of continuous using & traveling with CPAP machine. Moreover, a highly significant relation between patients knowledge important of compliance & travelling with CPAP machine and using of CPAP machine after one and three month.

Table (8) reveals that; more than half of the studied patients (63.0%) sleep more than 8 hours per day, while (22.0%) of them had normal sleeping hours (from 6:8 hr/per day) before using of CPAP machine. But after three month from using CPAP machine the percentage of patients who had normal sleeping hours was increased to 87%. A significant relation between number of sleeping hours & using of CPAP machine.

Table (1): Percentage distribution of the studied patients according to degree of air way limitation before using of CPAP machine (n=100)

FEV1/ FVC	No. (n= 100)	%
Normal	58	58.0
Mild	28	28.0
Moderate	13	13.0
Severe	1	1.0
FEV1/FVC (>= 80% Normal; 50-< 80 Mild; 30-< 50 Moderate; < 30 Severe)		
Data expressed as number (%)		

Table (2): Mean value of the studied patients according to their Pulmonary Functions Test (PFTs) before and 1 & 3 month after using CPAP machine (n-100).

Items	Before CPAP (n= 100)	After 1 ms (n= 100)	After 3 ms (n= 100)	P-value ¹	P-value ²
	Mean ± SD	Mean ± SD	Mean ± SD		
▪ FEV ₁	66.86 ± 20.75	77.90 ± 18.66	94.20 ± 15.19	0.014*	0.000*
▪ FVC	71.72 ± 22.04	83.18 ± 20.45	94.60 ± 15.93	0.007*	0.001*
▪ FEV ₁ /FVC	84.22 ± 27.60	85.44 ± 24.66	105.20 ± 26.67	0.995	0.077
Data expressed as mean ±SD (standard deviation).					
P-value ¹ = relation between before and after one month from using CPAP.					
P-value ² = relation between before and after three month from using CPAP.					

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Table (3): Health related quality of life for OSAS patients before and after using of CPAP machine according to grades of (SGRQ) (n=100)

Domains of health related to quality of life (0-100)	Before CPAP (n= 100)	After 1 ms (n= 100)	After 3 ms (n= 100)	P-value ¹	P-value ²
Symptoms: (8/ items)				0.001*	0.001*
Mean ± SD	78.15 ± 12.46	59.77 ± 9.09	40.43 ± 11.24		
Range	52.5 - 100.0	44.5 - 83.2	15.3 - 59.1		
Activity: (16/items)				0.001*	0.001*
Mean ± SD	79.03 ± 12.91	33.61 ± 12.71	25.48 ± 10.07		
Range	41.0 - 100.0	0.0 - 73.6	0.0 - 53.5		
Impact: (26/items)				0.001*	0.001*
Mean ± SD	80.57 ± 11.74	22.58 ± 17.33	14.03 ± 11.42		
Range	48.2 - 97.9	1.6 - 93.1	1.6 - 75.0		
Data are presented as mean ± SD					
P ¹ = between before & after using of CPAP, P ² = between before & after 3 ms of using CPAP machine.					

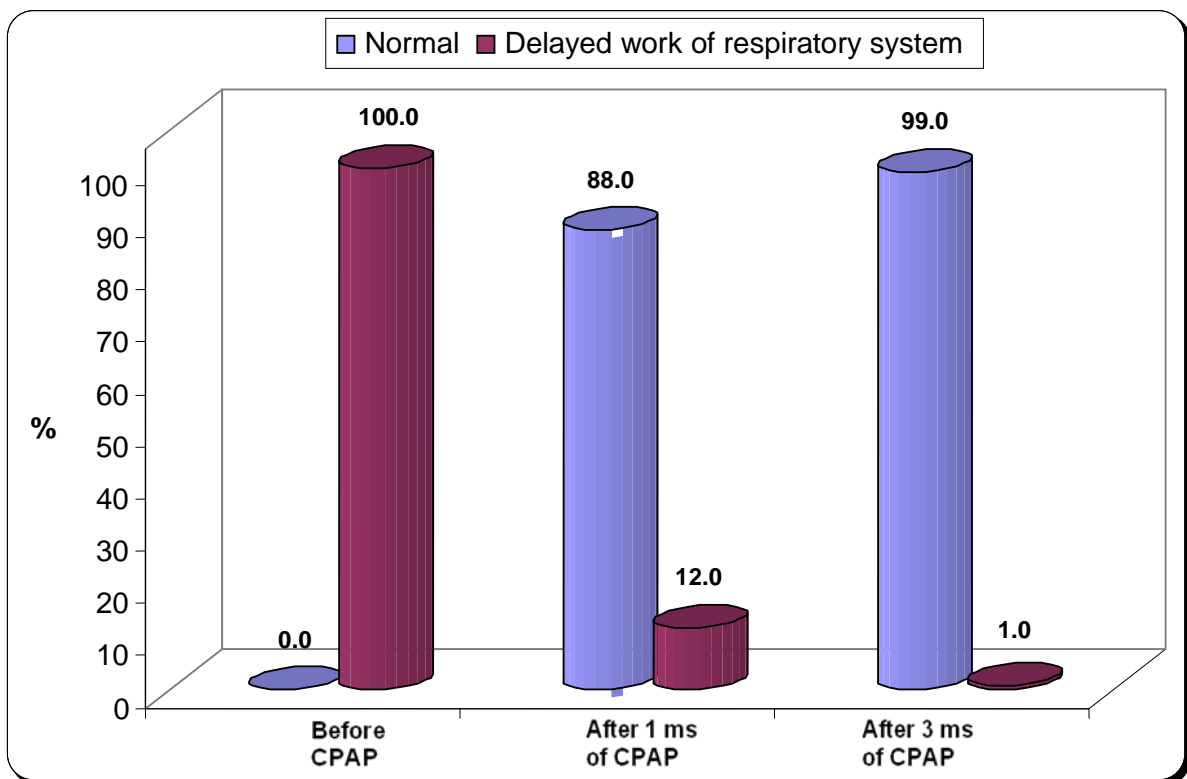


Figure (1): Health related quality of life according to grades of (SGRQ)

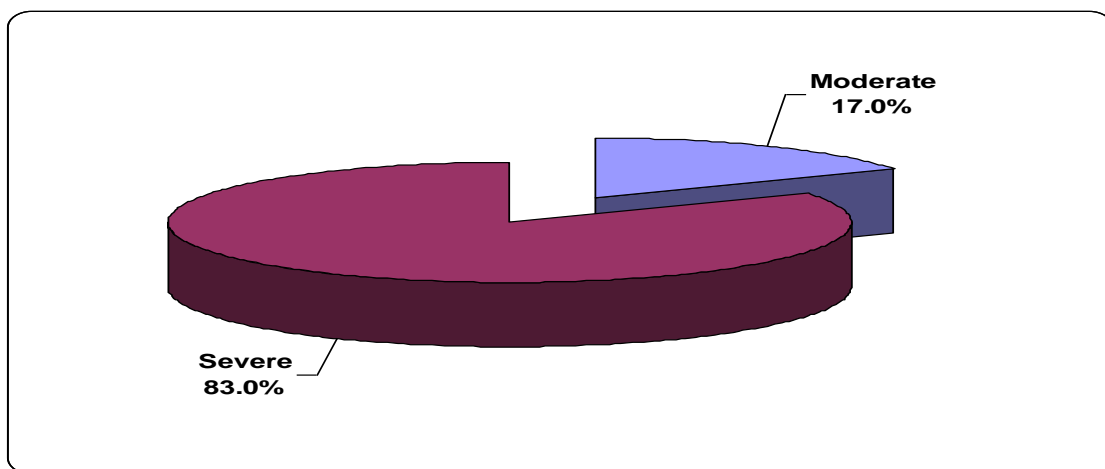


Figure (2): Level of Obstructive sleep apnea according to RDI

Table (4): Percentage distribution of the studied patients compliance (number of sleeping hours) to CPAP machine (n=100)

CPAP sleep hours	Before CPAP (n= 100)	After 1 ms (n= 100)	After 3 ms (n= 100)	P-value ¹	P-value ²
Mean ± SD	2.79 ± 0.66	4.88 ± 0.33	4.95 ± 0.26	0.001*	0.001*
Range	1.0 - 4.0	3.0 - 4.0	2.0 - 4.0		

Table (5): Percentage distributions of the studied patients' according to patient's knowledge about using of CPAP machine before and after 1 ms & 3 ms from using of CPAP machine (n=100)

Patients knowledge about CPAP	Before CPAP (n= 100)	After 1 ms (n= 100)	After 3 ms (n= 100)	P-value ¹	P-value ²
Mean ± SD	5.21 ± 3.33	34.02 ± 4.08	35.11 ± 1.51	0.001*	0.001*
Range	1.0 - 20.0	7.0 - 36.0	29.0 - 36.0		
Data expressed as mean ±SD					

Table (6): Percentage distribution of patients according to their feeling of fear before and after one & three month from using of CPAP machine (n=100)

Items	Before CPAP (n= 100)		After 1 ms (n= 100)		After 3 ms (n= 100)		P-value ¹	P-value ²
	No.	%	No.	%	No.	%		
Feeling of fear:								
▪ Reassuring for treatment using the CPAP device	0	0.0	12	12.0	89	89.0	0.000*	0.000*
▪ Afraid of the use of the device	100	100.0	88	88.0	11	11.0		
Cause of fear:								
▪ Poor knowledge about CPAP	97	97.0	16	18.2	0	0.0	0.000*	0.000*
▪ Fear from wearing of the CPAP mask	100	100.0	88	100.0	11	100.0		
▪ Fear from bad effect of CPAP	84	84.0	23	26.1	1	9.1	0.000*	0.000*
Data expressed as number (%)								

Table (7): Percentage distribution of studied patients according to their knowledge about compliance & travelling with CPAP machine (n=100).

Compliance with CPAP	Before CPAP (n= 100)		After 1ms (n= 100)		After 3ms (n= 100)		P-value ¹	P-value ²
	No.	%	No.	%	No.	%		
▪ Yes	5	5.0	95	95.0	98	98.0	0.000*	0.000*
▪ No	19	19.0	2	2.0	2	2.0		
▪ Don't know	76	76.0	3	3.0	0	0.0		
Data expressed as number (%)								

Table (8): Percentage distribution of number of excessive day time sleepiness (sleep hours) before and after using CPAP machine (n=100)

Sleep hours	Before CPAP (n= 100)		After 1ms (n= 100)		After 3ms (n= 100)		P-value ¹	P-value ²
	No.	%	No.	%	No.	%		
▪ Less than 4 hours	2	2.0	0	0.0	0	0.0	0.000*	0.000*
▪ From 4 - 6 hours	13	13.0	3	3.0	6	6.0		
▪ From 6 -8 hours	22	22.0	83	83.0	87	87.0		
▪ More than 8 hours	63	63.0	14	14.0	7	7.0		
Data expressed as number (%)								

4. DISCUSSION

This study is the first to assess impact of continuous positive air way pressure (CPAP) in improving Quality of life for patients with obstructive sleep apnea (OSA) in Egypt. OSA; it is fairly serious and much more common type of sleep apnea ⁽¹⁵⁾. Continuous Positive Airway Pressure (CPAP) is a first line and gold standard treatment for OSA, and it almost 100% effective when used regularly. But adherence with treatment poses problems for many patients' rates ranging from 30-60%, it involves education, support and ongoing care including the monitoring of treatment adherence ^(16&17). The current study aimed to evaluate the impact of continuous positive air way pressure (CPAP) in improving Quality of life for patients with Obstructive sleep apnea (OSA).

We evaluated these data from a multivariate perspective: Characteristics of the studied patients, level of OSAS, Health related quality of life before using of CPAP machine and after one month & after three month from using of CPAP machine.

In the present study, findings regarding patients' characteristics revealed that, mean age of the studied patients was (43.54±14.14) (18-65 yr). This finding was supported by ⁽¹⁾ who told that, OSA occurs with the greatest frequency in people between the ages of 40-60 years.

As regards gender, in the current study females slightly exceeded than males to develop OSA. This result was disagreement with ⁽²⁾ who recognized that OSA affects 3.5% of men and 1.5% of women. And the incidence of OSA, among men is higher than in women with a ratio of 55:23 in the new literature and this may be related to the anatomical issue in male as there is increased body mass in the torso and neck, especially through middle age and older. On the other hand, the registration of Assiut Sleep center in Assiut University Hospital (2016 & 2017), reported that the numbers of Egyptians suffer from OSA in Assiut and in Egypt is unknown. The total number of patients with OSA and doing sleep study in sleep lab unit in Assiut University Hospital reported 183 cases, majority of them were male.

In relation to educational level, less than half of studied patients were illiterate, read & write, and more than half of studied patients were educated. This result were in disagreement with ⁽¹⁸⁾ who mentioned that, patients with higher education had high global health status.

As regard ratio of FEV₁/FVC more than half of the studied patients had normal pulmonary function and not saver from any air way limitations. And about two fifth of them had mild and moderate air way limitations with ratio of FEV₁/FVC. A significant relation was found before, one and three month after using of CPAP machine regarding.

On the light of the present study finding, as regards health status, more than half of studied patients were had bad and very bad health statue before using of CPAP machine as St. Georges respiratory Questionnaire. And, after one & three month from nursing intervention about CPAP machine more than half of studied patients their health status were improved. Findings denoting the positive effect of the nursing intervention on health status for OSAS patients. These findings were supported by ⁽¹⁹⁾ who said that, knowledge is a pre-condition for change in health behavior.

In the same context, all of the studied patients had delayed work of respiratory system before using of CPAP machine, but after one month nearly four fifth of studied patients were in normal grades of SGRQ. Vast majority of the studied patients their grades of SGRQ were improved from delayed work of respiratory system to normal after three month of using CPAP. A significant relation between the mean scores of domains of HRQL for patients with OSAS before used of CPAP machine and after one & three month from using of CPAP machine.

As regard to HRQL, a significant relation between the mean scores of domains of HRQL for patients with OSA before using of CPAP machine and after one & three month. These differences between before and after using of CPAP machine the nursing intervention were denoting the positive effect of the nursing intervention about CPAP machine on QoL for OSAS patients. These findings were supported by ⁽²⁰⁾ who reported that quality of life occurs with the use of CPAP in persons with OSAS.

According to ⁽²¹⁾, improvements in CPAP adherence well be positively impact patients physiologically, psychologically and socially. Reduce snoring, sleep fragmentation, and provide psychological support to relieve fear, anxiety and depression.

The current study show that majority of studied patients had sever OSAS and nearly fifth of them had moderate OSAS. A according to RDI the severity of OSAS in male is higher than female, and present a significant relation between OSA and gender. This result were in agree with ⁽²⁾ who recognized that the incidence of OSA, among men is higher than in women with a ratio of 24:9 and this may be related to the anatomical issue in male as there is increased body mass in the torso and neck, especially through middle age and older.

As regard to patients knowledge about using of CPAP machine, majority of the studied patients needs to know the benefit & effect of the CPAP machine, components, way of cleaning machine components, way of turn on/off the machine, filling and empty of humidifier. These findings were supported by ⁽²²⁾ who said that, education and reassurance are critical components of the initiation of therapy. This process must be interactive with the patient having opportunity to have their questions answered and concerns addressed. This means that the patients were in need to more knowledge and correct practices to improve their self care.

All patients' knowledge improved after nursing intervention about the benefit of the CPAP machine, working hours, way of cleaning, and the supply used in cleaning. This study supported by ⁽²³⁾, who highlighted that adherence with treatment poses problems for many patients' rates ranging from 30-60%. It involves education, support and ongoing care including the monitoring of treatment adherence. Moreover, the education process must involve an opportunity to experience CPAP and appropriate interfaces.

This result agrees with ⁽²⁰⁾ who reported that, extensive education and empowering the patient's knowledge about CPAP therapy has been improvements in treatment with CPAP. And for some patients an extended trial in the home may be necessary before committing to CPAP therapy or to a type of interface. The CPAP provider shall have capacity to provide the patient with a trial of CPAP for sufficient time to allow an informed choice.

The current study show that, half of studied patient don't know the potential problems that may occur during use of CPAP as; dry mouth and nasal ulcer. And, after nursing intervention about potential problems which may occur through using of CPAP machine majority of the studied patient become aware of these problems and know the best way to solve it. This result supported by **(21)** who said that the nurses and health personnel familiarity with the side effects that can occur as result of CPAP treatment and the solutions can assist in early recognition and facilitation of the possible interventions thus, prevention of further complications.

According to ⁽²⁴⁾ who said that, poor adherence to CPAP is widely recognized as a significant limiting factor in treating OSA, reducing the overall effectiveness of the treatment and leaving many OSA patients at high risk for co-morbid conditions, impaired function and quality of life. These findings were supported by ⁽²³⁾ who told that, nursing intervention and reassurance are critical components of the initiation of therapy. Moreover, educational, supportive and behavioral interventions may help people with OSA recognize the need for regular and continued use of CPAP machine.

In the same context, all of studied patients had afraid from using of CPAP machine related to fear from wearing of the CPAP mask claustrophobia, poor knowledge about benefit of CPAP and induction of machine followed by bad effect of machine. These findings were supported by ⁽²⁰⁾ who said that, CPAP does not meet with universal acceptance by users. Claustrophobia which is a fear of a closed surrounding or feeling trapped in a closed space was also reported as a negative effect to a successful CPAP therapy. Claustrophobia can be treated by use of nasal pillows, and cognitive behavioral therapy has also been studied to improve the claustrophobic feeling.

After one month from using of CPAP machine and through nursing intervention feeling of fear from bad effect of CPAP and a wearing of CPAP mask is decreased and increased the reassuring to treatment with the CPAP machine and improved the adherence of CPAP machine. These result were supported by ⁽²⁵⁾ which mentioned that, claustrophobia is a fear from a wearing of CPAP mask and can be treated by use of nasal pillows, and cognitive behavioral therapy has also been studied to improve the claustrophobic feeling. Also, the involvement of the patient's partner in this process is important to encourage acceptance and subsequent adherence.

In the same context, majority of the studied patient's male & female had poor knowledge about the important of traveling with the CPAP machine. But, after one month from nursing intervention about the importance and benefit of traveling with CPAP machine the majority of studied patients know the important of traveling with CPAP and best way of protect the machine during traveling. Moreover, a significant relation between continuous nursing intervention and improving of traveling with CPAP machine. These findings were supported by ^(25&26) who said that, the travel with CPAP machine is not only possible but recommended that CPAP is necessary when patients travel. They will have more energy during trip and ensure the other benefits of treatment persist.

In the light of the present study finding as the mean of patients knowledge about using of CPAP machine after three month (35.11 ± 1.51) were higher than the mean of knowledge before nursing intervention (5.21 ± 3.33). This finding were supported by ⁽²⁶⁾ who said that, close follow-up for CPAP usage and problems in patients with OSAS by appropriately trained health care providers is indicated to establish effective utilization patterns and remediate problems, if needed. This is especially important during the first few weeks of CPAP use.

On the light of the present study finding, about two third of studied patients had sleep more than 8 hours per day before using of CPAP machine. And one fourth of studied patient had sleep hours from (6:8 hour/day). But after three month from using of CPAP machine, majority of the studied patients had normal sleeping hours. Moreover, present highly significant relation between before and after one and three month from using of CPAP machine and number of sleeping hours.

These results were supported by ⁽²³⁾ who said that, complete tolerance and compliance to the CPAP machine can be achieved when the patients use it for more than four hours in a night and there are no more symptoms of sleepiness during the day. And, adherence of CPAP treatment, usually measured as the average number of hours of usage per night. And agree with ⁽¹⁹⁾ who said that CPAP use of ≥ 4 hours per night among patients with severe OSA improves adherence of CPAP and QoL.

Finally ⁽¹⁹⁾, reported that the CPAP machine is almost always effective in controlling the apnoeic events and through randomized controlled trials has been shown to improve the symptoms of OSA, reduces daytime sleepiness, improves some measures of cognitive performance, reduces symptoms, reduces depression, decrease anxiety, help better mood, improves cognitive functioning on tests and work productivity, keep better concentration and memory, and improves perceptions of quality of life, energy and vitality.

5. CONCLUSION

Based on the findings of the present study, it can be concluded that:

Patients with OSA syndrome with continuous positive air way pressure support had moderate level of air way limitation, majority of them had severe OSA, fear from a wearing of CPAP mask, tired, fatigue & reduce of HRQL. After nursing intervention about important of continuous using of CPAP machine appear reduced feeling of fear from machine and from CPAP mask, tired, fatigue, sleepiness, increased number of normal sleeping hours, and improving of patients knowledge about CPAP machine and improved work of respiratory systems and health related quality of life.

6. RECOMMENDATIONS

The following recommendations were inferred from the study:

- An orientation program should be prepared for patients with OSAS treated with CPAP machine about definition, diagnosis, complication and way of treatment for OSAS.
- Prepare Arabic handbook for patients in a simplified manner powered Pictures guidance, the CPAP device, to demonstrate the use and benefits and its mode of operation and how to take care.
- The patient's family and bed partner should be involved in the CPAP treatment process as their acceptance and support of treatment is important in encouraging uptake and continued adherence with treatment.
- The nursing care should be given by the professional nurses or technical nurses and should be aware of potential problems with CPAP pressure, mask problems and how to prevent it and how to deal with it when develop.
- Ministry of health and Health Insurance Portability and Accountability (HIPAA) and health care organization must be covering the cost of investigation and treatment for OSAS patients treated with CPAP machine.

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