

## **Obstructive Sleep Apnea Syndrome (OSAS): Effect of Nursing Intervention, on Patient's Adaptation with Continuous Positive Air Way Pressure (CPAP)**

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### **Abstract**

Continuous positive air way pressure is a first line and gold standard for obstructive sleep apnea syndromes, the aim of this study was to evaluate the effect of nursing intervention on adaptation of patients with obstructive sleep apnea syndrome with continues positive air way presser. **Patient and Methods:** (Quiz experimental (pre and post test) 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 obstructive sleep apnea syndromes and under treatment with continuous positive air way pressure. Data collection **Tools: 3** tools were used including **I:** Patients' interviewing questionnaire sheet. **II:** STOP-BANG questionnaires. **III:** Respiratory disturbed index. **Results:** The study findings revealed that all of studied patients had obstructive sleep apnea syndromes, moderate or severe. All, of patients not know the benefit and effect of continuous positive air way pressure. But, after application of the nursing intervention the patient's level of knowledge about its important, using and caring of the machine by the patients improved. **Conclusion:** After the application of nursing intervention about the important of machine, the feeling of discomfort with the machine and mask are improved, number of normal sleeping hours increased with improvement of respiratory systems work.

**Key words:** *Obstructive Sleep Apnea Syndrome, Continuous Positive air way Pressure, STOP-Bang, Nursing Intervention & Patients Adaptation.*

### **Introduction**

Obstructive sleep Apnea (OSA), is asleep 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 (**Gails et al., 2015**). OSA, can affect people of any age and of either sex, but it is most common in middle-aged. Also it affects nearly 55% in men and 23% in women in the new literature. Among Americans aged (between 30-65 years old, approximately 6-7% of them around 18 million Americans), are thought to have sleep apnea, but only 10 million have symptoms, yet only 0.5% have been diagnosed and treated. Symptoms of OSA may include excessive sweating during sleep, nocturia, nightmares, dry mouth when awakening day to sleeping with the open mouth (**Greenstane & Hack., 2014 & Riggs et al., 2016**).

Obstructive sleep apnea, can also cause serious changes in the cardiovascular system as: Arrthmia, ischemic pain, myocardic infarction, development of high blood pressure, polycythemia, cor pulmonale and left ventricular failure. Life-threatening changes in the rhythm of the heart, including bradycardia, tachycardia, and other types of arrhythmias. Obstructive sleep apnea, have also been associated

with a number of complications as motor vehicle accidents, metabolic syndrome, stroke, glaucoma, chronic fatigue, decreased quality of life and increased mortality rate (death) (**Riggs et al., 2016**). Also complain of neurological and psychological problems like (impaired mental function, concentration problems, memory loss and some personality changes as irritability, depression, decreased interest in sex and nocturia (**Qaseem et al., 2013**).

Obstructive sleep apnea, if left untreated, it can profoundly reduce daytime functioning, work performance, social relationship and quality of life. As well it may be fatal and represent major risk factor for motor vehicle accidents. Those individuals are also at risk for sudden death from respiratory arrest during sleep. Moreover, occurrence of stroke is associated with OSA (**Qaseem et al., 2013 & Su., et al., 2015**).

Continuous positive airway pressure (CPAP) is the gold standard of treatment for patients diagnosed with OSA. Continuous positive airway pressure, is non-invasive machine programmed to run for a set number of hours at a comfortable pressure. CPAP machine, is a portable and fairly quiet. Benefits of CPAP therapy during night include absent of snoring, good sleep quality, prevent night mares

and decrease of nocturnia. Also it help in decreasing the incidence of MI, stroke, blood pressure, headache, decreases EDS and improve the concentration, memory and quality of life (Tageldin et al., 2012, Owens, 2013 & Nural et al., 2013 & Lyons & Bradley, 2015).

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 patient importance of the anxiety response to their fears and unknowns. This emphasizes the nurse role for decreasing the anxiety and management of the therapeutic treatment (Jordan., et al., 2014).

Close follow-up to patient under CPAP usage and the presence of an appropriately trained health care provider are indicated to establish effective CPAP utilization. There is evidence that the use of heated humidification and systematic educational program may improve patients compliance with the CPAP therapy. Several different CPAP educational programs have been proposed, including information sessions, telephone calls, delivery of audio-visual material, CPAP-user group meetings, and training sessions for patients' family members (Salepci., 2013 & Ramon & Katz 2015). Nursing intervention begins with assessment, continues with referral, educational and psychological support and can help patients with OSAS to prevent life-threatening, physiologic changes and improve the quality of their lives (Ramon & Katz 2015 & Bratton et al., 2015).

### Significance of the study

Continuous positive airway pressure is currently the first line of treatment for patients with moderate to severe sleep apnea; yet despite its effectiveness, adherence with the treatment plan is poor. Non adherence with CPAP therapy 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 (Stallberg, et al., 2013).

Improvements in CPAP adherence will be positively affect patients physiologically, psychologically and socially conditions. Proper education and follow up is extremely important for all patients; however, it is paramount for patients with OSA, on CPAP can be challenging to adapt. So, this study was improve CPAP adherence by implementing a nursing interventions that consisted of an educational program, patient support options as well as increased educational provider.

### Aim of the study

The aim of this study was to evaluate the effect of nursing intervention on patients with obstructive sleep apnea syndrome (OSAS) adaption with Continuous positive air way pressure (CPAP).

### Research Hypotheses

To fulfill the aim of the study, the following hypotheses are formulated

- 1- The mean of patient's knowledge scores of post nursing intervention was higher than that of their pre nursing intervention.
- 2- Health promotion of participants was achieved.
- 3- The frequency of continuous positive air way pressure complication was lesser among study patients compared to pre nursing intervention.
- 4- Improved of the adapted and adherence with continuous positive air way pressure.

### 2- Subjects and Methods

#### Research design

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

#### Study setting

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

**Study subjects:** The sample was 100 patients was selected by using the following equation according to Steven, (2012).

$$n = \frac{N \times p(1-p)}{[(N-1) \times (d^2 \div z^2)] + p(1-p)}$$

N= total patient population size of 130 who admitted in sleep lap in chest department at Assiut University Hospital. During Nov 2015 to Oct 2016 by n=100. Who meet inclusion criteria of adult male and female patients, aged from (18-65 years), with obstructive sleep apnea (OSAS), and under treatment with continuous positive air way pressure (CPAP), and who are willing to participate in the study.

Z= confidence levels is 0.95 and is equal to 1.96 .

D= the error ratio is = 0.05

P= the property availability ratio and neutral = 0.50

#### Tools of data collection

##### Tool 1: A structured interview questionnaire

**Part (1):** to assess patient's socio – demographic data & medical history. **Part (2):** to assess patients physical condition and adaptation level before & after 1 month & 3 month from nursing interventions about using of the CPAP machine. **Part (3):** to assess patient's level of knowledge about CPAP machine. It was assessed twice pre the 1 ms & after the 3 ms.

It 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 assess patient's physical condition adaption level

before and after 1 month and 3 month from nursing interventions about using of the CPAP machine as: (sitting or lying still, getting washed or dressed, walking around the home, walking outside on the level, walking up a flight of stairs, walking up hills and playing sports or games). It was filled in by the researcher after reviewing the most recent and relevant literature.

**Tool 2: STOP- BANG Questionnaires:** It was developed by (Chung et al., 2008), to detect the OSA. It is formed of the following variables, **STOP:** (S) snoring, (T) tired, (O) obstruction, (P) pressure and (B) BMI, (a) age, (n) neck circumference, and (g) gender. In addition **BANG** include: **B**MI (more than 28), **A**ge (more than 50 yrs), **N**eck circumference (♂) more than 45 cm for male and (♀) more than 42 cm for female. **G**ender (male patient). Patients are considered to be at high risk of OSA if they answer yes to three or more items. Meanwhile, low risk of OSA, if answering yes to less than three items. The Questionnaires consists of 8 items.

**Tool 3: Polysomnography (PSG):** it was developed by (Henry & Rosenthal, 2013), 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 using of sleep study. These pauses in breathing must last for 10 seconds and are associated with a decrease in oxygenation of blood. In general, the Respiratory Disturbed Index (RDI) can be used to classify the severity of OSA.  $RDI \leq 5$  events/hrs is considered normal, while  $RDI 5 < 15$  mild, while  $15 < - 30$  moderate and  $\geq 30$  events/hrs is cons OSA. Second session for treatment and used to titration for CPAP (Bratton et al., 2015).

**Validity and Reliability:** The tools were tested for content validity by 5 experts of academic medical and nursing staff from the faculty of nursing at Assiut University. Modifications were done accordingly, and then the tools were designed in its final format and tested for reliability by using internal consistency for the tools measured using Cronbach test, the tools proved to be reliable (0.87) .

### Pilot study

A pilot study was carried out on (10%) of the sample (100 patients), with obstructive sleep apnea syndrome (OSAS) with the non- invasive ventilation positive pressure support device to examine the feasibility of the study. Analyses of the pilot study revealed that minimal modifications are required. These modifications were done and the subjects were excluded from the actual study. The purpose of the pilot study was: To ascertain the relevance of the tools, to detect any problem peculiar to the statements clarity that might interfere with the process of data

collection. To estimate the time needed to complete the interview schedule. And add (10 patients) to the sample and it become (100 patients).

### Ethical considerations

- 1- Research proposal was approved from Ethical Committee in the faculty of nursing.
- 2- There is no risk for study subject during application of research.
- 3- The study was follow common ethical principles in clinical research.
- 4- Written consent was obtained from patients or guidance that are willing to participate in study, after explaining the nature and purpose the study.
- 5- Confidentiality and anonymity was assured.
- 6- Study subject have the right to refuse to participate and or withdraw from the study without any rational any time.
- 7- Study subject privacy was considered during collection of data.

### Filed work

- An official permission was obtained from the Faculty of Nursing, Assiut University to the director of the study setting before starting any data collection, with explanation for the study aim to obtain permission and cooperation for data collection.
- Data were collected in Sleep Lap in Chest Department at Assiut University Hospital.
- Sampling was started and completed within one year, from November 2015 to October 2016.
- Purpose of the study was simply explained to patients who agree to participate in the study prior to any data collection.
- The researcher was available 3 days/ week, on morning and afternoon shifts to collect data from the studied patients.
- The following study tools were filled in and completed by the researcher once: Interview questionnaire, Stop Bang assessment to screen patients for severity of OSA, Respiratory Disterbed Index to classify the severity of OSA.
- **Designed nursing intervention protocol based on patents need assessment after assessing patents level of knowledge:** It covers the following parts: **Part 1: Before and after 1 month & 3 month 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 satisfactory level of knowledge.
- **Part 2: Designed nursing intervention protocol:** This protocol was prepared by the researcher based on patients need assessment prior to the 1 month and also based on 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: the anatomy and physiology of lung with illustration. Information about obstructive sleep apnea (definition, risk factor, symptoms, diagnosis, complications and nursing interventions). Information about continuous positive air way presser (CPAP): (indication, effect, how to use it, types, accessory/component, complications, care of CPAP and importance of follow up for patients adaption with CPAP). Also the 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).
- Filling in the tools was done according to the patients' understanding and health condition.

#### **Statistical design**

The collected data were organized, categorized, tabulated and analyzed using the statistical package for social sciences (SPSS). 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 significance was threshold at 0.05 ( $P > 0.05$  = insignificant,  $P < 0.05$  = significant and  $P < 0.001$  = highly significant).

## Results

Table (1): Characteristics data of the OSA patients included in this study (n=100).

Items	Gender				P-value
	Male (n= 48)		Female (n= 52)		
	No.	%	No.	%	
<b>Age: (years)</b>	<b>(18-65)</b>				0.821
< 40	16	33.3	20	38.5	
40 – 60	26	54.2	27	51.9	
≥ 60	6	12.5	5	9.6	
Mean ± SD (Range)	43.54±14.14 (18-65)				
<b>Marital status:</b>					0.480
Single	10	20.8	8	15.4	
Married	27	56.3	25	48.1	
Divorced	5	10.4	7	13.5	
Widow	6	12.5	12	23.1	
<b>Occupation:</b>					0.000*
Employee	27	56.2	6	11.5	
Skilled worker	8	16.7	0	0.0	
Unemployed	13	27.1	0	0.0	
Housewife	0	0.0	46	88.5	
<b>Educational level:</b>					0.002*
Illiterate	3	6.3	19	36.5	
Read & write	12	25.0	10	19.2	
Secondary	21	43.8	18	34.6	
High education	12	25.0	5	9.6	
<b>Smoking:</b>					0.000*
Non-smoker	15	31.3	48	92.3	
Ex-smoker	8	16.7	1	1.9	
Current smoker	25	52.1	3	5.8	

Table (2): Distribution of patients with OSAS before using of CPAP machine as regard their body measurements (n=100).

Items	Male (n= 48)		Female (n= 52)		P-value
	No.	%	No.	%	
<b>Waist size:</b>					0.000*
Normal:	29	60.4	11	21.2	
Abnormal:	19	39.6	41	78.8	
<b>Neck circumference:</b>					0.213
Normal:	36	75.0	33	63.5	
Abnormal:	12	25.0	19	36.5	
<b>BMI:</b>					0.054
Normal (18.5 - < 25)	5	10.4	7	13.5	
Overweight (25 - < 30)	15	31.3	6	11.5	
Obese (≥ 30)	28	58.3	39	75.0	
Chi-square test	BMI = body mass index.				
* Statistical significant difference (P < 0.05).					
Neck size: abnormal male (≥ 45 cm)			Abnormal female (≥ 42 cm)		
Waist size: abnormal male (≥ 102 cm)			Abnormal female (≥ 86 cm)		

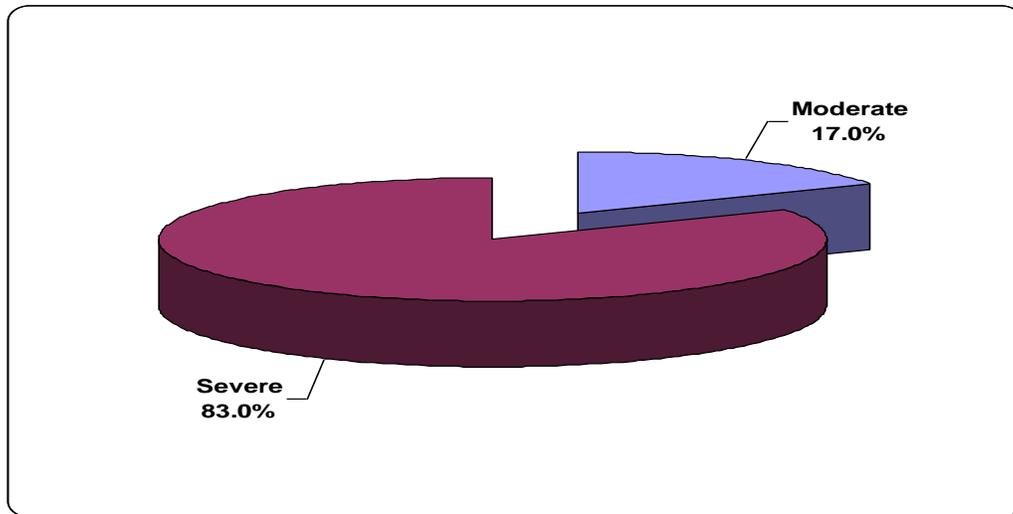


Figure (1): Level of Obstructive sleep apnea according to Respiratory Disturbed Index.

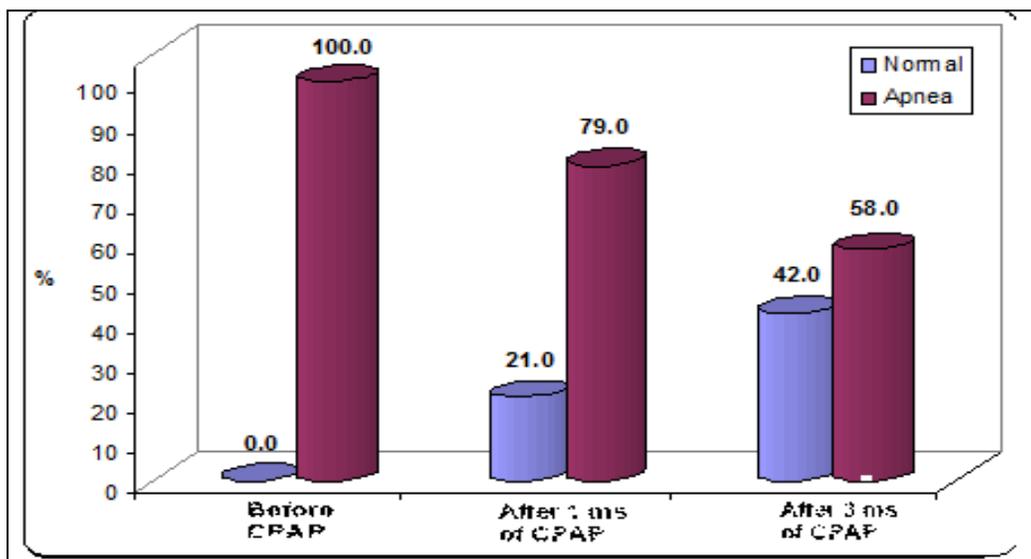


Figure (2): Percentage distribution of studied patients according to improvement the level of OSAS during used of CPAP machine according to (STOP- Bang score)

Table (3): Percentage distribution of the studied patients according to their (Stop-BANG score) before using of CPAP machine as regard their gender (n=100)

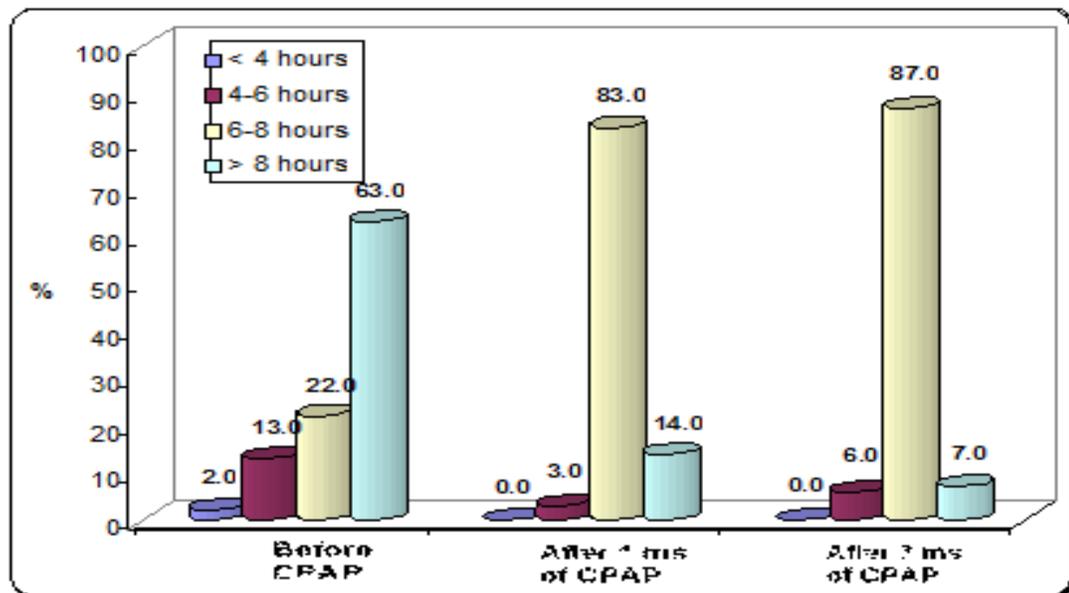
Stop-bang	Gender				P-value
	Male (n= 48)		Female (n= 52)		
	No.	%	No.	%	
Normal	0	0.0	0	0.0	0.001*
Mild	16	33.3	30	57.7	
Moderate	21	43.8	22	42.3	
Severe	11	22.9	0	0.0	
Normal > 3, mild = 3 < 5, moderate = 5 < 8, sever ≥ 8					

**Table (4): Percentage distribution of the studied patients according to their Co-morbidity before using of CPAP machine as regard their gender (n=100)**

Items	Gender				P-value
	Male (n= 48)		Female (n= 52)		
	No.	%	No.	%	
ENT: Nasal obstruction and snoring	46	95.8	48	92.3	0.679
<b>Digestive system:</b> Gastro esophageal reflex disease (GERD)	45	93.8	48	92.3	1.000
<b>Urinary system as:</b> Dysuria and frequency maturation	31	64.6	34	65.4	0.933
<b>liver problems:</b> Hepatitis C virus (HCV)	2	4.2	4	7.7	0.679
<b>Hypertension</b>	28	58.3	27	51.9	0.520
<b>Nuctoria</b>	38	79.2	19	36.5	0.000*
<b>Cardiovascular problems</b>	21	43.8	17	32.7	0.255
<b>Diabetes millets: (yes)</b>	15	31.3	18	34.6	0.721
Controlled diabetes:	9	60.0	10	55.6	0.797
<b>Insulin dependent:</b>	7	46.7	12	66.7	0.247

**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 month of CPAP (n= 100)		After 3 month of CPAP (n= 100)		P-value <sup>1</sup>	P-value <sup>2</sup>
	No.	%	No.	%	No.	%		
Poor level	98	98.0	2	2.0	0	0.0	0.000*	0.000*
Fair level	2	2.0	1	1.0	0	0.0		
Good level	0	0.0	97	97.0	100	100.0		

**Figure (3): Percentage distribution of number of sleep hours before and after using CPAP machine.**

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

Items	Before CPAP (n= 100)		After 1 ms of CPAP (n= 100)		After 3 ms of CPAP (n= 100)		P-value <sup>1</sup>	P-value <sup>2</sup>	
	No.	%	No.	%	No.	%			
<b>Feeling of discomfort:</b>									
▪ 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			
<b>Cause of discomfort:</b>								0.000*	0.000*
▪ Poor knowledge about CPAP	97	97.0	16	18.2	0	0.0	--	--	
▪ 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*	

**This result shows that**

**Table (1):** Shows that, characteristics data of the OSA patients included in this study, mean age of patients included in the study are (43.54±14.14) (18-65 yr). Concerning gender, about (52%) were female and majority of them were housewife (88.5%). And (56.2%) of male studied patients were employees while (56.3%) of them were married (52.1%) are smoker. As regards to the level of education; nearly half of study (44%) were illiterate, read & write. Moreover, there are significant relation between level of education, occupation, family income & smoking in relation to the gender.

**Table (2):** Show that, the relation between measurements among the studied patients regarding to their gender. More than (78.8%) of female patients had abnormal waist size, while (39.6%) only among male. As regard to BMI, one third of male patients (31.3%) had overweight rather than female (11.5%) but about (75%) of female were obese. Moreover, there are highly statistically significant relation between waist size as regards their gender and no statistical significant difference between neck size and BMI among the gender.

**Figure (1):** Showed that, percentage distribution of the studied patients according to their level of OSA according to RDI. The results revealed that, the majority of the studied patients (83.0%) had severe OSA according to respiratory disturbed index (RDI).

**Figure (2):** Showed that, percentage distribution of studied patients according to improvement of the level of OSAS during used of CPAP machine according to (STOP- Bang score). The results revealed that, all of the studied patients (100%) were at high risk of OSA before using of CPAP machine. After one month from using the machine the patients were at low risk of OSA (21%), and after three month the percentage of patients who at low risk of OSA

increased to (42%). Moreover, there are a significant relation before and after using of CPAP machine were found regarding to the level of OSA.

**Table (3):** Showed that, the percentage distribution of the studied patients according to their (STOP-BANG score) before using of CPAP machine in relation to their gender. The results revealed that, majority of the studied patients had mild and moderate OSAS (46% & 43% respectively). And majority of female patients (57.7%) were mild OSAS with no severe case. While there are a significant relation between OSAS and gender according to STOP- Bang scoring.

**Table (4):** Clarified the relation between co-morbidity before using of CPAP machine as regard to patients gender. The results showed that, the majority of the studied patient had snoring & nasal obstruction and GERD (94 & 93 respectively), followed by dysuria and frequency maturation, nocturia & hypertension (65, 57 & 55 respectively). More over present significant relation between gender and nocturia after three month from using of the CPAP machine.

**Table (5):** Show that, All patients had poor pre-knowledge about continuous positive air way pressure, and after three month post-nursing intervention all studied patients had good level of knowledge. A significant relation was found between patient's knowledge and using CPAP machine after one & three month.

**Figure (3):** Show that, about (22%) of the studied patients had normal sleeping hours from (6-8hr/day) before using of CPAP machine, but after three month from using of CPAP machine improved to (87%). Moreover, the normal sleeping hours improved after one and three months from using of CPAP machine.

**Table (6):** Show that, all studied patient afraid from used of CPAP device and wearing of CPAP mask (100%). The most common cause of discomfort was poor knowledge about the CPAP machine. After three month from using of CPAP the feeling of discomfort was decreased to (11%) and reassuring to treatment with CPAP machine increased to (89%), with a highly significant relation between feeling and causes of discomfort and using of CPAP machine after one and three months from the application of the nursing interventions.

## Discussion

This study is the first in Assiut to assess the adaption of patients with obstructive sleep apnea syndrome (OSAS) with the non- invasive ventilation positive pressure support device in Egypt. OSAS; it is fairly serious and often remains undiagnosed in primary care practice. The disorder is associated with significant morbidity and even some mortality, so family needs to be familiar with its clinical presentation and treatment (Chung., 2012). Continues positive air way pressure (CPAP), consider first line and gold standard treatment of OSA (Gaisl et al., 2015).

The current study aimed to evaluate the effect of nursing intervention in the adaption of patients with obstructive sleep apnea syndrome (OSAS) with continues positive air way pressure support (CPAP). We evaluated these data from a multivariate perspective: characteristics of the studied patients, levels of OSA & assessment of patients' information about using of CPAP machine. In addition, evaluate the adaption of patients with obstructive sleep apnea syndrome (OSAS) with Continues positive air way pressure (CPAP), throw evaluate patient's information after 1 month & 3 months from nursing intervention about using of CPAP machine.

In the present study, the findings regarding patients' characteristics revealed that, mean age of the studied patients was (42.55 ± 11.75) and about (53%) of them age range from 40-60 years. This finding was supported by (Gasil et al., 2015), who said that, OSA occurs with the greatest frequency in people between the ages of 40-60 years.

As regards to gender, in the current study females slightly exceeded males to develop OSA. This result were in disagreement with recognized that, OSA affects 3.5% of men and 1.5% of women. The incidence of OSA, among men is higher than in women with a ratio of 55:23 in 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 Lab Unit in Assiut University Hospital, 2015 & 2016), 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. Nearly, half of them were female.

In relation to the work status, the present study result revealed that the majority of the female patients were housewife and (33%) from all of the study patients still employed. This finding may be attributed to the signs and symptoms of OSA which lead to persistent fatigue and feeling of inability to perform any work. This finding was supported by (Soriano et al., 2013 & Wozniak et al., 2014), who found that, the patients who have OSA complains from excessive day time sleepiness, morning headaches, personality changes, irritability, anxiety or depression, poor job performance, clouded memory and intellectual deterioration.

As regards to body mass index, (67%) of the studied patients were obese, and (21%) of them had overweight and (12%) of them only had normal body weight. Moreover, (75%) of female patient were obese. This result was supported by (Sampaio., et al 2013 & Sujanska et al., 2013 & Goel et al., 2015), who said that, primary risk factor for OSA is excessive weight gain and the individual with OSA suffers from obesity, with particular heaviness at the face and neck.

Considering waist circumference, (60%) of the studied patients had abnormal waist and (39.6%) of male patient had abnormal waist size. This finding were supported by the (Puthalapattu & Ioachimescu.,2014 & Woehrl et al., 2017), who revealed that, waist-hip ratio is a risk factor especially in severe OSA. As a normal waist line for a woman is 86 cm or less, and for a man is 102 cm or less.

As regards the neck size the present study showed that, (31%) of the studied patients had large neck and the percent of female more than male (36.5 % & 25% respectively). These findings were supported by (Roman & Katz., 2015), who mentioned that, the accumulation of fat on the sides of the upper airway causes it to become narrow and predisposed to closure when the muscles relax. These findings were disagree with (Riggs et al., 2016), who said that, male hormones can cause structural changes in the upper airway.

The current study show the majority of patients (83%), had sever OSAS and (17%) had moderate OSAS with no present any mild case. Moreover, according to RDI the severity of OSAS in male (46.25±18.03) is higher than female (39.12±12.79), with significant relation between OSA and gender. This result were in agree with (Riggs et al., 2016), who recognized that, the incidence of OSA, among

men is higher than in women with a ratio of 24:9 and 55:23 in new literate 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.

Although, the present studied show that, majority of the studied patient's before using of CPAP machine had stop breathing during sleep, feel snore loudly, tired, fatigued, day time sleepiness, BMI more than 35  $\text{kg/m}^2$  and with high blood pressure (99%, 99%, 100% & % respectively). But after three month from using of CPAP machine the stop breathing during sleep, snoring, tired, fatigued, sleepy during daytime and high blood pressure improved to (38%, 22%, 23%, 38.0 & 47.0 respectively). This result were agreed with (Montemurro et al., 2012), who said that, continuous use of CPAP, many of the chronic conditions associated with sleep apnea can be resolved. Also daytime sleepiness, concentration, memory, heart disease, heart failure, heartburn and reflux, diabetes control, erectile dysfunction, and depression, are improved while the risk of car accidents are reduced.

The previous result was agree with (Montemurro et al., 2012 & (Puthalapattu & Ioachimescu.,2014), who said that people with OSA often experience severe daytime sleepiness, fatigue, irritability & tired. Moreover, the present studied showed the significant relation between using of CPAP machine and reduced of day time sleepiness, fatigue, tired, snoring, and stop breathing during sleep. The result was supported by (Bouloukaki, 2014 & Moon et al., 2014), who said that improved of adherence to using the CPAP machine reduces daytime sleepiness, symptoms of OSA, depression, reduce blood pressure, cardiovascular mortality and morbidity. Also adherence of CPAP machine is almost 100% effective when used regularly.

In relation to co-morbid, the present study revealed that, majority of the studied patients had problems related to the following systems: ENT, GIT and urinary systems, while hypertension problems due to nasal obstruction and snoring, GERD, dysuria and nocturia. More over present highly significant relation between before using of CPAP machine and after the application of the nursing interventions through follow up with GERD, nasal obstruction & snoring, urinary tract problems & nocturia. These results were supported by (Moon et al., 2014, Lyons & Ryon., 2015 & Sun et al., 2015), who found that, lack of breathing causes fall of the oxygen level in the blood stream which leading to multiple medical problems daytime sleepiness, nocturia, hypertension, heart failure, diabetes, stroke possible increased risk of sudden cardiac death. All of this problems improved after three month from using of CPAP

machine and during the application of the nursing intervention.

As regard to patients information about using of CPAP machine, the 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 impiety of the humidifier. These findings were supported by (Gasa et al., 2013 & Lyons & Ryon., 2015), 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 have more knowledge and correct practices to improve their self care.

All patients' information improved after the application of the nursing education about the benefit of the CPAP machine, component, working hours, way of cleaning, and the supply used in cleaning. This study supported by, (Wozniak et al., 2014), who highlighted that, adherence with treatment poses problems for many patients' rates ranging from 30-60%. It involves education, support and ongoing care including monitoring of the treatment adherence. Moreover, the education process must involve an opportunity to experience CPAP and appropriate interfaces.

In the light of the present study finding regarding the nursing education, of patients knowledge about How to use CPAP machine after three month ware (100%) good level, higher than the patients knowledge before the nursing education (2%). This finding were supported by (Gasa et al., 2013), 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. Thiess findings are agrees with (Lyons & Bradley 2015 & Salma et al., 2017), who said that extensive education and empowering the patient's knowledge about CPAP therapy improve the 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 have capacity to provide the patient with a trial of CPAP for sufficient time to allow an informed choice for the patients.

On the light of the present study finding, about (22%) of studied patients had sleep from (6:8 hour/day). But after one month from using CPAP machine the number of studied patients had normal sleeping hours (6:8 hour/day) increased to (83%) among them, and after three month the normal sleeping hour for such group of patients become (87%). Moreover, there are

highly significant relation between continuous using of CPAP machine and increased number of normal sleeping hours. These results were supported by (Woerhle et al., 2017), 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. Adherence of CPAP treatment, usually measured as the average number of hours of usage per night. This result agree with (Chai-coetzer et al., 2013), who said that CPAP use of  $\geq 4$  hours per night among patients with severe OSA improves adherence of CPAP and QOL.

In the same context, all of studied patients (100%) had afraid from using of CPAP machine related to discomfort from wearing of the CPAP mask claustrophobia, poor of knowledge about benefit of CPAP (97%) and induction of machine followed by effect of machine (84%). These findings were supported by (Chai-coetzer et al., 2013), 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 of CPAP therapy. Claustrophobia can be treated by use of nasal pillows, and cognitive behavioral therapy has to improve the claustrophobic feeling. But, 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 are improve to (100%) and increased the reassuring and adherence to treatment with the CPAP machine to (89%) and improved the adherence of CPAP machine. These result were supported by (European Archives of Oto-Rhino-Laryngology, 2013), who said that, claustrophobia which is a fear from wearing of CPAP mask can be treated by use of nasal pillows, and cognitive behavioral therapy. Also, the involvement of the patient's partner in this process is important to encourage acceptance and subsequent adherence.

Finally, (Gasa et al., 2013), who 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, absent of snoring, 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.

## Conclusion

**The findings of the present study indicated that Patients with OSA syndrome with continuous**

positive air way pressure support had moderate level of air way limitations while the majority of them had severe OSA and fear from a wearing of CPAP mask. After nursing intervention about the 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.

## 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 prior to start the therapy.
- 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 the 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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