

# Continuous Positive Airway Pressure therapy improves the Quality of Life among Obstructive Sleep Apnea individuals in the Pakistani Population

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## ABSTRACT

**Background:** Continuous Positive Airway Pressure therapy is the most recommended treatment for OSA patients.

**Aim:** To investigate a possible correlation between the Quality of life in obstructive sleep apnea patient's pre and post-adhering to continuous positive airway pressure therapy for six months and compare them with the non-exposed group.

**Methods:** This cohort study enrolled a sample of 180 participants, of which 90 were exposed to CPAP and 90 were not exposed by non-random purposive sampling from the Sleep Lab where obstructive Sleep apnea was diagnosed through Polysomnography. In the clinic, demographic data including gender, age, height, weight, body mass index, ESS, and Calgary Sleep Apnea Quality of Life Index were recorded in pre-CPAP therapy questionnaires and repeated after 6 months.

**Results:** After six months of effective continuous positive airway pressure therapy, there was a remarkable increase in all individuals' all-around quality of life as measured by the total Sleep Apnea Quality of Life Index score. Total SAQLI score before treatment was  $3.04 \pm 0.2$  and after treatment was  $5.3 \pm 0.5$   $p < 0.01$ ; Daily Functioning,  $3.3 \pm 0.4$  and  $5.3 \pm 0.6$ ; Social Interaction,  $2.9 \pm 0.4$  and  $5.5 \pm 0.5$ ; Emotional Functional,  $2.9 \pm 0.5$  and  $5.1 \pm 0.5$ ; Symptoms,  $2.9 \pm 0.5$  and  $5.2 \pm 0.6$  ( $p < 0.001$ ). In contrast, the SAQLI scores in non-exposed individuals became worsened after six months. For domains A, B, C, and D, the mean difference was  $1.96 \pm 0.74$ ,  $2.50 \pm 0.64$ ,  $2.21 \pm 0.70$ , and  $2.34 \pm 0.80$  respectively, has a statistically significant correlation ( $p = 0.00$ ).

**Conclusion:** In conclusion, the current investigation yields some significant findings. Six months of continuous CPAP usage can help patients feel less sleepy, increase their SAQLI scores, and significantly lessen OSA-associated symptoms.

**Keywords:** Quality of Life (QOL), Calgary Sleep Apnea Quality of Life Index (SAQLI), Obstructive Sleep Apnea (OSA), Continuous Positive Airway Pressures (CPAP), Daytime Sleepiness, Karachi.

## INTRODUCTION

Obstructive sleep apnea syndrome (OSAS) is a considerable public health concern that has several detrimental repercussions on patients and imposes a substantial strain on healthcare systems<sup>12</sup>. OSAS is a condition marked by the recurrent occurrence of complete or partial upper respiratory tract obstruction while sleeping, which causes fragmented sleep<sup>16</sup>. In Obstructive sleep apnea (OSA), nocturnal hypoxemia, severe daytime sleepiness, reduced cognitive function, and mood changes are the most common causes of OSA<sup>8</sup>. Patients are inclined to accidents while using a vehicle or at work, and mostly report impaired quality of life and inadequate social functioning<sup>4</sup>. Wataru Hida et al took up the study and assess the quality of life in OSA obese, OSA non-obese, and OHS patients before and after CPAP therapy and they found that daytime sleepiness is responsible for impaired general health and it is reversible after taking the nasal CPAP therapy on the quality of life by improving the daytime sleepiness results alertness, active in the daytime, physically mobilize and active and improved thinking abilities<sup>22</sup>. CPAP therapy is the most recommended treatment for OSA patients. CPAP is a device used to open the airways by increasing the airway pressures and keeping the airway patent, resolving breathing problems while asleep and improving sleep quality<sup>18</sup>. Patients who adhere to their treatment plan and utilize CPAP for at least 4.5 hours each night are more likely to see positive outcomes<sup>23</sup>.

In clinical medicine, Schipper et al. defined quality of life as "the effective influence of an ailment and its subsequent therapy on an individual, as anticipated by the individual"<sup>20</sup>. With CPAP therapy, the quality of life of a patient in OSA may be improved. The numeral of QOL instruments available that are centered on OSA has surged because of the rapid advancement in QOL interest<sup>14</sup>. The most elaborate tool to evaluate Quality of Life tends to be the Calgary Sleep Apnea Quality of Life Index (SAQLI), created by Flemons and Reimer<sup>10</sup>.

There is some indication that individuals with mild, moderate, and severe forms of the ailment may benefit from long-term compliance to CPAP therapy, but the evidence is inadequate

However, research in individuals with mild OSAS has revealed that persistent use of CPAP therapy for six months can alleviate the symptoms associated with the syndrome, although it was not found to have an impact on these patients' cognitive function or quality of life<sup>19,15</sup>.

Considering the aforementioned, the current research aimed to investigate a possible association between the Quality of life in obstructive sleep apnea patient's pre and post-adhering to continuous positive airway pressure therapy for six months.

## MATERIALS AND METHODS

This cohort research, which was organized in the Department of Pulmonary Vascular and Sleep Disorder, Dow University Hospital, Karachi, enrolled a sample of 180 participants, of which 90 were exposed to CPAP and 90 were not exposed. The research was performed after receiving written informed approval and research approval was getting by the ethical review board, participants were included by non-random purposive sampling. We obtained secondary information about participants who had been diagnosed with OSA from a sleep lab in Karachi and noted the patient's weight, height, body mass index, circumference of the neck, and Epworth Sleepiness Scale from the sleep lab's medical file. In the clinic, enumeration data including gender, age, height, weight, and body mass index were recorded in pre-CPAP therapy questionnaires and repeated after 6 months. Through Polysomnography, the apnea-hypopnea index was determined.

The study was limited to adult patients initially determined to have OSAS by completing Polysomnography and receiving CPAP for at least six months. The study only included individuals who acceptably adhered to the CPAP therapy. The use of CPAP for a minimum of 4 hours every night for at least 70% of the nights every week has been deemed to be an appropriate level of adherence to the therapy<sup>11</sup>.

The Calgary Sleep Apnea Quality of Life Index was used in this research to compare the QOL of OSA patients before and after a minimum of six months of CPAP therapy. The Calgary Sleep Apnea Quality of Life Instrument (SAQLI) is among the few Health-related quality of life (HRQOL) tools designed exclusively for OSAS patients<sup>9</sup>. It is a reliable and authentic questionnaire used not only to assess the quality of life of a patient but also to illustrate how it has gotten better after taking CPAP therapy<sup>10</sup>. It is a special

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tool for evaluating OSAS since it considers potential adverse effects of treatment and consequently identifies the overall impact more accurately. It consists of 35 questions categorized into the following domains: day-to-day functioning, social communications, sentimental functioning, and symptoms. To assess any potential adverse effects of treatment, the fifth domain of symptoms linked to it is also present<sup>9</sup>. The responses with the highest scores are "always" and "never at all" on a 7-point scale. A composite total score between 1 and 7 is produced by averaging the item and domain scores. A higher score indicates a good quality of life. The SAQLI's short form was used in this study as it allowed for participant self-completion<sup>17</sup>.

The Epworth Sleepiness Scale was used to evaluate subjective sleepiness (ESS). An assessment method for subjective sleepiness is the ESS [12]. Patients are questioned about their probability of nodding off or falling asleep in eight distinct conditions. The overall ESS would be between 0 and 24, and each event score can vary from 0 = would never doze to 3= a high probability of dozing. An excessively high score of >12 implies daytime sleepiness<sup>4</sup>.

With SPSS Statistics 25, frequency, means, standard deviation, and percentages were estimated. The level of statistical significance was 0.05. The SAQLI indices before and after the therapy were determined by paired t-tests to evaluate the response to treatment validity. Independent t-tests were used to compare all of the SAQLI indexes between the two groups of patients—those who received treatment and those who did not—to evaluate distinguish validity. The chi-square analysis was used to correlate the percentages of patients who said they complained about a particular symptom before and after therapy.

**RESULTS**

The entire study was completed by 180 participants. It was successful and resulted in extremely good compliance when the study coordinator took proactive action by scheduling bi-monthly phone calls to every participant regarding the use of CPAP at night. Out of 180 patients, 106 (58.9%) were men and 74(41.1%) were women. The mean age was 51.76±12.318, and the mean circumference of the neck was 17.10±1.41. The mean BMI and ESS were 38.1 ±9.03 and 13.8±4.9 respectively.

Table 1 Attributes of Individuals from Polysomnography

Characteristics	Exposed	Non-Exposed
Apnea-Hypopnea Index (events/hr.)	45.9 ± 24.2	34.6 ± 22.8
Epworth Sleepiness Score	16.0 ± 4.2	11.6 ± 4.5
Weight (kg)	104.1 ± 18.5	98.4 ± 17.0
Severe OSA (no. /Percent)	64 (71.7%)	37 (41.1%)
Moderate OSA (no. /Percent)	16 (17.8%)	32 (35.6%)
Mild OSA (no. /Percent)	10 (11.1%)	21 (23.3%)
CPAP pressures (cm of H <sub>2</sub> O)	12.5 ± 3.2	-
Nightly use of CPAP (hours)	6.34 ± 1.1	-

The values are given as Mean ± SD.

Table 3 Mean Scores of SAQLI domains among exposed and non-Exposed groups after 6 months

Group of Persons	Domains of SAQLI							
	Daily Functioning		Social Interaction		Emotional Functioning		Symptoms	
	Baseline	After 6 months	Baseline	After 6 months	Baseline	After 6 months	Baseline	After 6 months
Exposed	3.3±0.4	5.3±0.6	2.9±0.4	5.5±0.5	2.9±0.5	5.1±0.5	2.9±0.5	5.2±0.6
Non-Exposed	2.9± 0.5	3.3±0.4	2.9±0.5	2.9±0.4	3.3±0.4	2.9±0.4	2.9±0.4	2.9±0.5

Table 4 Paired Difference between pre and post in all domains of SAQLI scores among Exposed individuals

		Paired Differences				t	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval		
Pair 1	Daily Functional Pre – Daily Functional Post	-1.96	0.74	.08	-2.12	-1.81	.000
Pair 2	Social Interaction Pre – Social Interaction Post	-2.50	0.64	0.07	-2.64	-2.38	.000
Pair 3	Emotional Functioning Pre – Emotional Functioning Post	-2.21	0.70	0.07	-2.36	-2.07	.000
Pair 4	Symptoms Pre – Symptoms Post	-2.34	0.80	0.08	-2.51	-2.18	.000

The baseline statistics from the Polysomnography recording and the continuous positive airway pressure adherence from the PAP device in exposed and non-exposed groups (Table 1).

After six months of effective continuous positive airway pressure therapy, there was a marked increase in the overall quality of life of all individuals as measured by the total SAQLI score, representing refinement across every single SAQLI category. Total SAQLI score before treatment was 3.04 ± 0.2 and after treatment was 5.3 ± 0.5 p < 0.01; Daily Functioning, 3.3±0.4 and 5.3±0.6; Social Interaction, 2.9±0.4 and 5.5±0.5; Emotional Functional, 2.9±0.5 and 5.1±0.5; Symptoms, 2.9±0.5 and 5.2±0.6.

There was no noticeable difference in the overall SAQLI values between the three patient groups divided into categories based on the diagnostic severity of OSA, either pre or post-therapy, demonstrating that all groupings experienced the identical deterioration of their quality of life before receiving CPAP therapy and that all groups displayed a comparably substantial enhancement of the SAQLI after observing CPAP therapy for six months, as shown in Table 2.

Whereas, in the non-exposed group, the quality of life worsened or remain the same after 6 months.

Table 2: Means of SAQLI Scores in Exposed with CPAP and Non-Exposed by Severity of OSA

Severity of OSA	SAQLI Scores		P value
Exposed (n = 90)	Baseline	After 6 months	
Mild (n = 10)	3.15 ± 0.5	5.3 ± 0.4	<0.001
Moderate (n = 16)	3.06 ± 0.3	5.2 ± 0.4	
Severe (n = 64)	3.02 ± 0.2	5.3 ± 0.4	
Total (n = 90)	3.04 ± 0.2	5.3 ± 0.5	
Non-Exposed (n = 90)			
Mild (n = 21)	3.01 ± 0.17	2.9 ± 0.37	0.75
Moderate (n = 32)	3.07 ± 0.17	3.2 ± 0.56	
Severe (n = 37)	3.02 ± 0.17	2.9 ± 0.42	
Total (n = 90)	3.04 ± 0.17	3.0 ± 0.50	

Used paired t-test for p-value

Evaluating each of the SAQLI's four domains separately, similar results were observed (Table 3). Before receiving CPAP therapy, all individuals' categories had a low tally for their everyday tasks, social communications, sentimental functioning and symptom severity. Regardless of the severity of OSAS, there was a marked improvement (p < 0.001) in all SAQLI domains after CPAP therapy. On the contrary, the SAQLI scores in the non-exposed group became worsened after six months.

Table 4 depicted that the difference in the overall SAQLI score from before to after the interference was 2.26, which is substantially higher than the least significant change. For domains A, B, C and D, the mean difference was 1.96±0.74, 2.50±0.64, 2.21±0.70 and 2.34±0.80 respectively, have a statistically noteworthy correlation (p=0.00).

## DISCUSSION

The research aimed to ascertain whether CPAP treatment improved the QOL for OSA individuals as measured by the SAQLI, a particular tool for sleep disorders. According to our apprehension, this study is the foremost to assess the quality of life in OSA patients who have been exposed to CPAP therapy for six months and those who have not. This study's outcomes reveal that compliance with CPAP therapy impacts patients' quality of life (QOL) and symptoms. This study also revealed an important finding: even in patients with mild OSAS, the tally in the state of everyday activities, interpersonal relations, emotional health, and signs were reduced, suggesting that these patients may also benefit from therapy for the OSAS. In comparison to baseline values, the CPAP therapy groups' mean scores increased throughout all domains. This aspect is consistent with other research showing that patients with mild OSAS who adherent CPAP treatment had reductions in their symptoms and an improvement in daytime functioning<sup>15,19</sup>.

Prior studies on QOL indicators showed that CPAP therapy for a short period of 4 to 5 weeks, can improve daytime function, OSAS symptoms<sup>6,5</sup>, intellectual performance<sup>6</sup> and Quality of life<sup>1</sup>.

An excessive amount of daytime sleepiness is the main and most prevalent symptom of sleep apnea. Patients in the current study had high ESS values before therapy, which was associated with their AHI tally. However, it should be highlighted that individuals with mild obstructive sleep apnea syndrome also experienced sleepiness, which may have contributed to their poor quality of life scores who fulfilled the requirements for this study were only those who adhered to the usage of the CPAP equipment reasonably well. Since it has been noticed that the OSA individuals who are adaptable to CPAP treatment reveal notable furtherance in their quality of sleep and everyday functioning, in contrast to the individuals who do not adhere and are denied CPAP therapy after six months, an element also preferable through our study results, good compliance is of the utmost significance for improving the QOL and the characteristics of OSA individuals<sup>23,3</sup>.

All patients' QOL had significantly better after six months of CPAP treatment, according to our observations. This result is consistent with earlier research that has demonstrated that compliant CPAP therapy leads to sleep restoration, marked alertness and decreased morning drowsiness, decreased concern and unhappiness, improved frame of mind, increased efficiency at the job, and enhanced level of concentration, and memory<sup>19,15,21</sup>.

The remarkable increase in QOL and its components were shown to be self-sufficient in the extent of obstructive sleep apnea, which is a predominant finding of our research. Multiple studies have revealed that continuous positive airway pressure therapy may enhance the quality of life regardless of the seriousness of sleep apnea<sup>2,7,5</sup>.

In our study, there were several strengths. At first, the generalizability of the results may be constrained due to a few factors, including the small number of participants we analyzed. However, we decided to investigate the patients who were objectively complying with CPAP therapy and those who were not used CPAP therapy due to any reason. Furthermore, we were able to rule out the probability of "robust adherence" by comparing the initial quality of life of the exposed individuals with the initial quality of life of the non-exposed individuals. Our study is among the few to demonstrate that individuals with OSAS who adhere to CPAP therapy may experience reductions in daytime sleepiness and improvements in all areas of quality of life<sup>13,17</sup>. Furthermore, although extended CPAP use may be advantageous for all OSAS individuals, some unresolved symptoms may prevent optimal recovery, even in compliant individuals.

## CONCLUSION

In conclusion, the current investigation yields some significant findings. Our observations showed that patients with mild or severe OSAS may have deterioration in their quality of life. Patients should be conscientiously educated on how to use CPAP machines and, if feasible, monitored. As a result, patients will experience significant development in both their corporeal fitness and QOL. Nonetheless, there is still a numeral of issues that need to be communicated to improve CPAP compliance and efficacy.

**Conflict of interest:** Nothing to declare

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