

Quality of Life in Obstructive Sleep Apnea

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ABSTRACT

Obstructive sleep apnea (OSA) is associated with significant cardiovascular and cerebrovascular morbidity and mortality. Usual parameters studied in sleep laboratory are unable to measure overall impact of OSA on human life. Consequently, it is important to measure Quality of Life (QoL) in OSA. QoL can be measured with generic instruments like SF-36 or OSA specific questionnaires like Calgary Sleep Apnea Quality of Life (SAQLI) questionnaire. Most of the studies suggest that there is significant impairment of QoL in patients of OSA. But the present evidence suggests that impairment in QoL is not proportional to severity of OSA. There is no consensus on the question of improvement in QoL with Continuous Positive Airway Pressure (CPAP) therapy. A recent Cochrane review concluded that CPAP improves QoL in people with moderate and severe OSA.

Key words : Obstructive sleep apnea, Quality of Life, Continuous Positive Airway Pressure

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Sleep apnea is defined as repetitive episodes of decreased or total cessation of respiratory airflow during sleep, leading on to desaturation and sleep fragmentation. There are two types of sleep apnea - OSA and Central Sleep Apnea. In OSA the cessation of respiration during sleep is caused by upper respiratory obstruction and the apnea is followed by strenuous breathing effort.

The site of occlusion varies, and it can occur at several levels or at various sites during different stages of sleep. Any disorder that produces or contributes to upper airway narrowing is a risk factor for OSA, including obesity, enlarged tonsils, anatomical malformations of the jaw/pharynx and pharyngeal muscle weakness caused by neuromuscular disorders. When the OSA is accompanied by daytime sleepiness, it is referred to as the OSA syndrome(OSAS)(1).

In a population based study of employed adults between 30 and 60 years of age in the western world, the prevalence of OSA (which was defined as at least five apneas and hypopneas per hour of sleep accompanied by excessive daytime sleepiness) was 4% for males and 2% for females (2). Indian prevalence studies estimated disease prevalence rates of 3.5-13.7% (4.4-19.5% in males and 2.5-7.4% in females) (3,4,5,6). Prevalence of OSAS in India is 1.7-3.6% (2.4-7.5% in males and 1-2.1% in females). Although the number of OSA prevalence studies in India is not sufficient and there is major difference in the prevalence among different studies but all the studies

indicate that it is an important public health concern in India also.

Research on sleep-disordered breathing, including sleep apnea syndromes, has grown tremendously in recent years. Many studies have indicated an association between sleep apnea and cardiovascular / cerebrovascular related morbidity and mortality (7,8). Sleep apnea has also been linked to an increased risk of road accidents and changes in personality. These symptoms have been attributed to nocturnal oxyhaemoglobin desaturation and to the chronic sleep deprivation caused by sleep fragmentation. Even patients with comparatively mild OSA with Apnea-Hypopnea Index (AHI) < 20 report impairment in social functioning, and limitations in function because of physical and emotional factors, as well as a lowered sense of well being for mental health and energy than in normal subjects(9).

With successful treatment, quality of life may improve with nasal continuous positive airway pressure (nasal CPAP). However, so far, disease severity prior to nasal CPAP treatment does not clearly relate to post-treatment improvements in health related QoL (10). Conventionally, the impact of the disease in OSA cases is often measured in term of physiological response on control sleep recordings and severity of symptoms. But these symptomatic measures and the physiological scales e.g. AHI have failed to measure adequately the rather broader impact of the disorder on human life. As symptoms are usually a subset of overall

QoL of patient, it is important to measure overall impact of the disease on life per se. Several researchers have highlighted the importance of measuring QoL in OSA patients(11).

Measuring Quality of life in OSA :

Health Related Quality of Life (HRQoL) is a concept developed on the lines of the WHO definition of health (including physical, emotional, social and spiritual well being) by including both personal health status and social well being when assessing health. HRQoL is evaluated subjectively; that means it is assessed by the person himself and it is evaluated with the help of Questionnaires. These Questionnaires have multiple domains representing different aspects of life. There are two types of Questionnaires which can be used to measure QoL in patients of OSA. (Table 1)

1) Generic Questionnaires – These Questionnaires can be used to measure QoL in all kind of clinical conditions.

2) OSA Specific Questionnaires – These Questionnaire can be used to determine QoL in OSA patients only.

Which type of Questionnaire should be used for measuring QoL :

Generic and the OSA specific Questionnaires have different advantages and disadvantages. The structure of Generic questionnaires is more comprehensive. They can allow comparison between studies, populations, or diseases but they may have some domains which are not related to OSA. Thus they may be less sensitive as compared to the disease specific Questionnaires (12). In case a person is suffering from more than one disease, Generic Questionnaires are more appropriate.

Table 1- List of Generic and OSA specific QoL Questionnaires

Generic Questionnaires	OSA Specific Questionnaires
MOS(Medical Outcome Survey)	Calgary SAQLI (Sleep Apnea Quality of Life Questionnaire)
SF-36(Short Form-36)	FOSQ (Functional Outcome of Sleepiness Questionnaire)
NHP (Nottingham Health Profile)	QSQ (Quebec Sleep Questionnaire)
EuroQoL	OSAPOS (OSA Patient Oriented Severity Index)
SIP (Sickness Impact Profile)	
MLDL(Munich Life Quality Dimension List)	

Disease specific questionnaires are more sensitive to detect subtle changes in QoL in patients having that disease. These questionnaires have Questions related to the disease so these tend to have higher acceptability and completion rates. But disease specific Questionnaires don't allow inter disease comparisons.

Thus, the choice of Questionnaire should be based on research question. If the researcher wants to compare QoL among two conditions then obviously only generic questionnaires can be used. Otherwise the recent trend is towards use of OSA specific questionnaires because of their better acceptability and completion rates.

Discussion :

The symptoms of OSA have been recognized for many years. Interestingly, the first observation of disease was not made by a physician but a famous writer. Charles Dickens described an obese, hypersomnolent boy in his novel "The Posthumous Papers of the Pickwick Club" where he wrote "... and on the box sat a fat and red faced boy, in a state of somnolency" or "Joe damn that boy, he's gone to sleep again" is a classic portrayal of an OSA patient (13). William Osler, who was a famous physician of early 20th Century also observed the association of obesity and hypersomnolence when he described the obesity-hypoventilation syndrome or Pickwickian syndrome in 1918(14). Despite the description of these observations and associations, it was only in 1973 that Guilleminault described the disease as obstructive sleep apnea

syndrome (15). Subsequently several reports appeared regarding pathophysiology, diagnosis and treatment of OSA. Although OSA is relatively recent disease as far as the discovery is concerned, it is a disease with high prevalence and carries significant morbidity associated with it.

Like any other chronic medical conditions OSA also impair normal human life extent of which can be measured quantitatively in form of HRQoL index. Various scales such as the Nottingham Health Profile and SF 36 have been used in patients with OSA to evaluate the QoL. Measurement of QoL has become an important part of management of patients with OSA.

Although WHO recognised as early as in 1947 that health encompassed physical, mental and social well being, the use of QoL measurement started mostly in 1980s (16). QoL measurement was even more appropriate in case of OSA as AHI, the index of OSA severity, was inadequate in measuring the overall impact of OSA on human life. The First study of QoL in OSA was published by Gall et al which used SF-36 questionnaire to measure QoL (9). The study recruited 42 males and the researchers observed that QoL was significantly impaired in OSA patients. Interestingly in some severe OSA patients there was little impairment of QoL. After that there have been many studies exploring QoL in patients of OSA which has been summarised in table-2. The initial studies used only generic instruments to measure HRQoL in these patients. In 1998 Flemons et al in their instrument validation study used Calgary SAQLI, an OSA specific

Questionnaire to measure QoL in OSA patients (17). After this other OSA specific Questionnaires like Functional Outcome of Sleepiness Questionnaire (FOSQ), OSA Patient Oriented Severity Index (OSAPOSI) and Quebec Sleep Questionnaire (QSQ) have also been used. Among the Generic Questionnaires SF-36 has been used most. Jenkinson *et al.* used SF-36 to assess QoL and observed that there is significant deterioration of QoL in

patients of OSA and it improved with CPAP treatment. The generic instruments studies have shown significant variability in QoL assessment even among same patients (18). Jenkinson *et al.* used SF-36, **respiratory disturbance index** (RDI) and EuroQoL among same group of OSA patients and observed that while SF-36 and PGI showed significant life impairment in OSA, in contrast to the EuroQoL, which showed little QoL impairment (19).

Table 2 – Summary of studies exploring QoL in OSA

Study	Sample size	AHI	Instrument used	Setting	Observation
Gall <i>et al.</i> (1993)(9)	OSA patients = 42 (All Males)	AHI	SF-36	Untreated	Mild OSA patients had impairment in Social Functioning, Role Limitations-Physical and Emotional, lowered mental health and well-being.
Fornas <i>et al.</i> (1995) (20)	OSA Patients = 103 Healthy controls= 40	38± 27	NHP	Untreated	SAHS patients showed a deterioration of general health status parameters in comparison with healthy subjects, these parameters do not correlate with the physiological disturbances of SAHS, expressed as the number of respiratory events per hour
Bolitschek <i>et al.</i> (1998)	OSA patients treated with CPAP=21 Untreated OSA patients = 21 Healthy controls =113	47.08/49.94 (Treated/ Untreated)	MLDL	Untreated	OSA patients treated with CPAP had 'life satisfaction' ratings comparable to that of the healthy controls. Untreated OSA patients had impairment in all 4 domains of MLDL.
Jenkinson <i>et al.</i> (1998)(18)	n = 89 for PGI and EuroQoL, n= 86 for SF-36		PGI, EuroQoL SF-36	Before and after 3 months CPAP	Before CPAP SF-36 scores were low which increased to levels similar to general population after 3 months of CPAP therapy. Change in EuroQoL scores were not significant. The PGI scores in accordance with SF-36 scores showed substantial improvement after CPAP.

Study	Sample size	AHI	Instrument used	Setting	Observation
Piccirillo et al. (1998)	119 OSA patients- 71 given CPAP, 48 underwent surgery	Mean= 40.0	SF-36, OSAPOSI	Before and after CPAP/Surgery	Scores on the role-physical, vitality, and emotional wellbeing subscales of the SF-36 increased significantly. OSAPOSI awake and sleep subscales and total instrument score increased
Flemons et al. (1998)	SAQLI was tested in 24 OSA patients.	N.A.	SAQLI SF-36	Before starting and 4 week after CPAP	SAQLI had a high correlation with SF-36 among patients successfully completing CPAP
Bennett et al. (1999)	51 OSA patients (46 M and 5 F)	Median apnea/hypopnea index [AHI] 25, 90% central range: 1 to 98	SF-36	Before and after 4 week CPAP	In OSA patients SF-36 subscale scores for role-physical and vitality were impaired prior to CPAP as compared to normal population, which improved to normal levels after CPAP therapy.
D'Ambrosio et al. (1999)	OSA patients = 29 (23 M, 6 F)	77 + 9	SF-36	8 week CPAP	All domains of SF-36 were impaired in OSA patients when compared with an age and sex matched population. Eight weeks of treatment improved Quality of life to the level of normal population. Improvement was maximum in domains of vitality, social functioning and mental health.
Engleman et al. (1999)	OSA patients = 34 (21 M, 13 F) Cross over trial- patients on 4 weeks of CPAP and 4 weeks of oral placebo therapy alternatively Mild sleep apnea patients (5-15)	NHP	SF-36	Before and after 4 week CPAP or oral placebo	In OSA patients SF-36 scores were impaired on all subscales except general health perceptions. After CPAP treatment, significant improvements were seen in general health, role-physical, bodily pain, social functioning, and vitality. Social functioning and vitality were significantly greater on CPAP than on placebo. There was no change in QoL after CPAP therapy on NHP for health and functional status.

Study	Sample size	AHI	Instrument used	Setting	Observation
Yang et al. (2000) (25)	OSA patients -37 Controls- 46		SF-36	Untreated	After controlling for age, gender, body mass index, and number of comorbid conditions, the association between sleep apnea and QOL was significant in the domains of physical functioning and role limitation due to physical health problems and was borderline in vitality.
Stepnowsky et al. (2000) (26)	n = 69 (29 M, 40 F)	22 ± 19	MOS QWB	Untreated	OSA patients with RDI< 15 had significant impairment in general physical functioning and mental health functioning (not those with RDI>15).
Walker-Engstrom et al. (2000) (27)	84 OSA patients- 41 in oral appliance group 43 in UPPP group		MSE-P	Before and 1 year after UPPP or dental Device	The mean values for the three dimensions vitality, contentment and sleep improved significantly 1 year after intervention in the dental appliance and UPPP groups. One year after intervention the UPPP group showed significantly more contentment than the dental appliance group. In contrast, vitality and sleep dimensions did not differ between the two treatment groups. No significant correlations were observed between the QOL scores and somnographic values.
Baldwin et al. (2001)(28)	2398 OSA patients 5-14 AHI=1473 15+= 916		SF-36	Untreated	Sleep disturbances are associated with worse physical and better mental HR-QOL than the U.S. norm.
Akashiba et al. (2002) (29)	60 OSA patients, 34 healthy controls(entry criteria AHI > 20/h and severe arterial oxygen desaturation (arterial oxygen saturation [Sao ₂] < 80%) accompanied by EDS	51.6 ± 26.6	SF-36	Untreated	Six of eight domains and the total score on the SF-36 were significantly lower than those in the control subjects.

Study	Sample size	AHI	Instrument used	Setting	Observation
Glebocka et al. (2006)(30)	29 OSA patient, 34 healthy controls	33.3 ±15.8	Satisfaction With Life Scale (SWLS)	Untreated	No difference in satisfaction with life score between OSA patients and Controls.
Dutt et al. (2013)(30)	69 OSA patients (57 M+12 F) 41 healthy controls	26.39 ±16.62	SAQLI	Untreated	QoL was impaired in OSA patients in all the four domains of Calgary SAQLI. QoL impairment not directly proportional to severity of OSA.

Most of the studies suggest that there is significant impairment of QoL in OSA patients but interestingly the QoL impairment has not been found to be directly proportional with the severity of OSA as determined by AHI (10, 20, 25). Only Indian study conducted on this issue also observed significant impairment of QoL in OSA and no association of severity of impairment with severity of OSA (31). No other polysomnographic variable has also been consistently found to be associated with QoL impairment. It has been suggested that HRQoL deteriorates only to a certain level with increasing RDI, but then plateaus (32).

The question of effect of CPAP treatment on QoL in OSA patients has not been answered convincingly. Different

studies have shown divergent results. Some studies have shown that CPAP treatment improves QoL so much so that it reaches the level of healthy controls but some studies did not observe significant improvement in QoL. In many CPAP trials the issue of compliance has not been addressed properly and proper adjustment to take compliance has not been done. A 2006 Cochrane review on Continuous positive airways pressure for OSA in adults concluded that CPAP improves QoL in people with moderate and severe OSA (33).

Thus, it is important to measure QoL in patients of OSA as it gives the clear picture of sufferings of the patients and helps in formulating holistic treatment strategy.

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