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Research Article
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Does Type D personality Increase Perchance for CPAP Non-Adherence in Patients with OSA?

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Abstract

Introduction: Adherence to Continuous Positive Airway Pressure (CPAP) therapy in patients with Obstructive Sleep Apnea (OSA) has been inconclusively linked to gender, age, disease severity, sleepiness and socioeconomic status. This study aimed to examine the association between distressed personality and CPAP adherence in Indian patients with OSA.

Method: This was a single center, prospective study conducted at a tertiary-care hospital in Delhi, India. Patients diagnosed as OSA by polysomnography (PSG) (and underwent CPAP titration), who completed the questionnaires and returned for follow-up were recruited. Demographic data, clinical and PSG variables were collected. DS14 for Type D personality was administered. Subjects were followed for minimum 30 days of CPAP treatment for adherence verification. Good CPAP compliance was defined as CPAP use >4 hours/night at least 5 days/week.

Result: Sixty-nine patients with OSA (age: 52.23 ± 12.28 years, 76% male) were enrolled. 73% (n=50) had severe OSA while 73.9% had Type D personality (n=51). Although 79.7% (n=55) agreed to CPAP use and 75.4% (n=52) actually initiated therapy, only 43% (n=30) had good CPAP compliance. Therefore, majority (57%, n=39) of patients had poor compliance with CPAP. There was no association between age, gender, marital status and degree of OSA with distressed personality. Interestingly, overall 90% (n=36) of patients having poor acceptance and/or compliance possessed Type D personality as compared to 10% (n=3) non-type D CPAP users (p<0.000).

Conclusion: Distressed personality possibly contributes towards poor CPAP adherence in Indian OSA patients. A multi-dimensional approach including intensive screening for personality profiles, use of patient education and behavior modifications at time of prescription of CPAP may help improve CPAP adherence.

Keywords: Obstructive sleep apnea; Continuous positive airway pressure; Non-compliance; Adherence; Type D personality

Introduction

Sleep apnea is known to be significantly associated with medical, metabolic and cardiovascular diseases, as well as psychological and mood disturbances. Obstructive sleep apnea (OSA), that is associated with repeated episodes of complete or partial blockage of upper airway during sleep, can lead to serious health consequences, including metabolic, cardiovascular comorbidities, marked psychological distress and poor quality of life [1-5].

Approximately one in five adults suffers from mild OSA, 1 in 15 moderate OSA and 1 of 20 have severe OSA [6]. The prevalence of OSA in Indian population varies from 13 to 18% [7,8]. Prevalence of OSA in middle-aged urban Indian population is 9.3% [7] and it is three-fold higher in men as compared to women. The prevalence of OSA increases with age, though age is not an independent risk factor for the OSA.

Among the various treatment options available, continuous positive airway pressure (CPAP) is the first line of therapy especially for moderate to severe OSA. CPAP treatment improves neuro-cognitive deficits including impairment in higher mental processes such as concentration, memory, and executive function, affect in patients with severe depression, behavioral morbidity like excessive daytime sleepiness (EDS), and possibly reduces an increased chance of accidents [9].

Adherence is defined as 'the extent to which a person's behavior-taking medications, following a diet and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider'. This definition given by Haynes and Rand has been adopted by World Health Organization [10]. Compliance with CPAP remains a major drawback. Although this treatment is more successful than other modalities, adherence to CPAP for OSA has been problematic.

The problem is further magnified due to concern regarding its side effects. The rate of adherence failure ranges from 5% to 89% in the first week to 6 months [11,12]. Previous studies made attempts to examine the predictors of non-compliance with CPAP therapy and found significant relationships with gender, age, severity of disease, symptoms of sleepiness and socioeconomic status, though the findings are inconsistent [13,14].

Other studies made an attempt to answer this question by examining personality changes and its association with CPAP adherence [15] Depression may also reduce adherence to CPAP [16].

No individual factor has been found to be consistently predictive of adherence.

Type D personality is defined as a combination of negative affectivity (NA) or a tendency to experience negative emotions and social inhibition (SI) or a tendency to inhibit the expression of emotions to others because of insecurity and tension [17].

Studies from the general population of Denmark and Belgium have shown that type D was present in 28% and 21% of patients with CAD [17,18]. Type D is an independent predictor of negative outcomes such as poor health status, (recurrent) myocardial infarction and increased risk of mortality in cardiovascular patients [18-20].

Several studies have demonstrated that the effect of Type D personality on adverse outcomes is independent of biomedical risk factors [21]. Results of earlier studies showed that the prevalence of type D among cardiovascular patients is 27%-31% compared to 13%-24% in normative population [22].

Other studies examined non-cardiovascular population like sleep apnea [15], melanoma [23], mild brain injury [24] and vertigo [25]. In these studies, type D was found to be associated with increased report of anxiety and depression, health complaints, adverse health related behaviors and poor compliance to treatment [15,23-25].

The present study aimed to examine 1) the prevalence of distressed personality in Indian patients with OSA therapy, and 2) the association of distressed personality in Indian patients with OSA and CPAP non-adherence.

Method

This was a single center, prospective study conducted at a tertiary care hospital in New Delhi, India. The study was approved by the institutional ethics committee. All individuals attending the Sleep clinic at the hospital and suspected to have OSA were scheduled for level 1 Polysomnography (PSG) at the hospital.

Patients, who were diagnosed as having OSA after PSG, were recommended to undergo CPAP titration. Those patients fulfilling the criteria below and returning for follow-up were recruited for the study.

Inclusion criteria

Those who complained of snoring, sleep apnea, or EDS and were found by the sleep physician to have OSA and gave informed consent were recruited.

Exclusion criteria

Subjects suffering from 1) anemia 2) liver and kidney disease 3) neuro-psychiatric disorders 4) cardiac failure 5) spine disorder 6) on multiple drugs 7) any other significant medical disorder contributing to poor sleep were excluded.

Demographic data

Demographic data was collected from the patients regarding age, gender, clinical, sleep variables and personality profile. Data was achieved by two questionnaires: DS14 for Type D personality and Epworth Sleepiness Scale (ESS).

Subjects were followed up for minimum 30 days of CPAP treatment for adherence verification. All information was obtained through face to face interview and psychometric testing conducted by sleep medicine expert and sleep psychologist respectively.

Parameters measured

Severity of OSA: PSG was performed in the hospital-based sleep laboratory. The channels included electroencephalography, electro-oculography, and electromyography of chin and tibialis anterior, electrocardiography, measurement of respiratory flow, thoracic or abdominal movements and arterial oxygen saturation.

Apnea was defined as cessation of airflow for at least 10 seconds and hypopnea was defined as blood oxygen desaturation of 4% or greater and 30% reduction in airflow for more than 10 seconds. The apnea-hypopnea index (AHI) was the number of apneas and hypopneas per hour of sleep. OSA syndrome was diagnosed when a patient had an AHI greater than 5 with symptoms of excessive daytime sleepiness, or an AHI greater than 15 regardless of daytime symptoms, in line with the recommendations of the American Academy of Sleep Medicine [6].

Severity of OSA was judged from AHI, and graded as mild OSA (5≤AHI<15/hour), moderate OSA (15≤AHI<30/hour), and severe OSA (AHI≥30/hour). Patients with OSA who decided to use CPAP therapy were subjected to CPAP titration the following night. Optimal pressures for CPAP were determined by manual titration.

Distressed personality: DS-14 was used to measure negative affect (NA), social inhibition (SI) and Type D personality [17]. The questionnaire containing 14 items and a 5-point Likert-type scale ranging from 0=false to 4=true, was used to evaluate for distressed personality. The 14 items of the whole scale, as well as the seven items on each of the NA and SI scales, can be summarized. A score of 10 and more on both of the subscales indicates that the person has a Type D personality.

Excessive daytime sleepiness: The ESS is widely used in the field of sleep medicine as a subjective measure of a patient's sleepiness [26]. The test is a list of eight situations in which one rates the tendency to become sleepy on a scale of 0-no chance of dozing, to 3-high chance of dozing. The maximum total score is 24.

Adherence: Adherence to CPAP therapy was defined on the basis of the extent of CPAP use. Good compliance with CPAP therapy was defined as use of CPAP for more than 4 hours per night for at least 5 days per week. The data collected was split into two groups and subjected to statistical analysis. Group A comprised of patients with OSA possessing distressed personality whereas Group B had non-type D personality.

Statistical analysis

Statistical analyses were performed using a statistical software package (SPSS version 17.0). Continuous variables were summarized as mean ± SD or median and categorical variables as proportions.

Differences between groups were assessed for categorical variables with Chi-square or Fisher's exact test. ANOVA were used for comparison of continuous variables between groups. All tests were two sided and a p value less than 0.05 was considered statistically significant.

Results

Study population

One hundred and eight individuals at risk for OSA were scheduled for level 1 PSG at the hospital. Out of these, 76 underwent PSG (Figure 1). A total of 69 patients with confirmed OSA completing the questionnaires and returning for follow up were recruited for the study.

The final sample included 53 men (76%) and 16 women (24%). The mean age of the study population was 52.23 ± 12.28 years (range=20-69 years). Majority of the subjects were married (n=66) and suffered from severe degree of OSA (n=50).

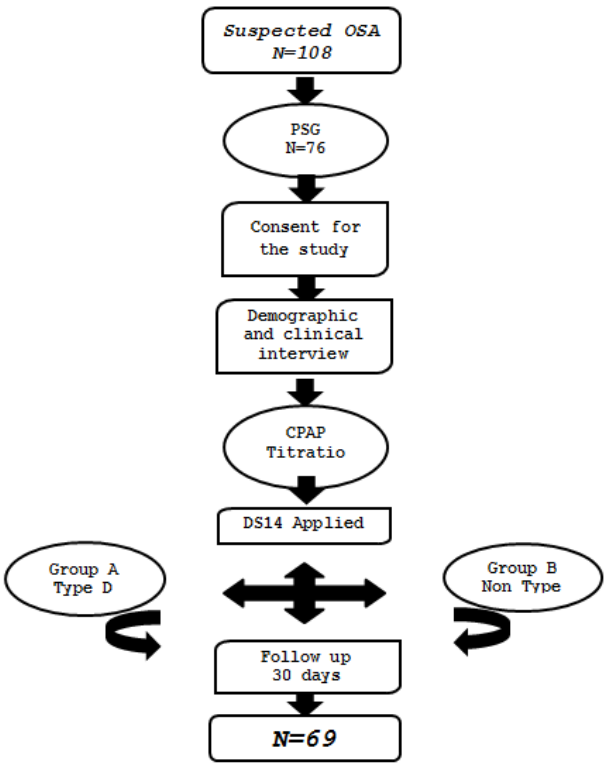

Figure 1: Flow chart showing recruitment of patients into the study.

Psychological variables

Distressed personality was measured with the help of DS14 and showed that 73% (n=51) of patients with OSA had Type D personality. Approximately 73% men and 27% women possessed Type D personality.

Comparison between Group A (patients with Type D) and Group B (patients with non-Type D personality) showed no difference in gender and marital status (p=0.2 and 0.6 respectively) whereas average age did marginally differ statistically between the groups (p=0.08).

The two facets of DS14, NA and SI were looked at independently. The mean score of NA and SI was higher in Type D OSA subjects than non-type D OSA subjects with statistically significant difference (p=0.0) (Table 1).

	Group A	Group B	Total	P value
	n=51 [73 %]	n=18 (27%)	n=69 (%)	
Age				
Mean (±S.D)	53.78 (12.736)	47.83 (9.901)	52.23 (12.82)	0.08
Male gender	37 (72.5%)	16 (88.9%)	53	0.2
Married	48 (94.1%)	18 (100%)	66	0.6
SI				
Mean (±S.D)	15.24 (4.942)	6.28 (2.845)	12.89	0
NA				
Mean (±S.D)	16.06 (4.149)	9.72 (3.801)	14.4	0
ESS [Mean(±S.D)]	12.49 (5.815)	13.72 (5.367)	12.85 (8.48)	0.4
Degree of OSA in participants				
Mild	4 [7.8]	2 [11.1]	6 [8.7]	0.8
Moderate	9 [17.6]	4 [22.2]	13 [18.8]	
Severe	38 [74.5]	12 [66.7]	50 [72.5]	
Patients with OSA who agreed for CPAP therapy				
Agreed	40 [78.4]	15 [83.3]	55 [79.7]	0.7
Disagreed	11 [21.6]	3 [16.7]	14 [20.3]	
Patients who started CPAP therapy				
Yes	37 [72.5]	15 [83.3]	52 [75.4]	0.5
No	14[27.5]	3 [16.7]	17 [24.6]	
Overall acceptance and/or CPAP compliance.				
Good	15 [29.4]	15 [83.3]	30 [43.5%]	0
Poor	36 [70.6]	3 [16.7]	39 [56.5%]	

Table 1: Comparison of demographic and sleep variables between patients having OSA with and without Type D personality. NA: Negative Affect; SI: Social Inhibition; ESS: Epworth Sleepiness Scale; OSA: Obstructive Sleep Apnea; CPAP: Continuous Positive Airway Pressure.

Sleep-related variables

The average score of ESS in the study population was 12.85. Though the ESS score was more in non-type D patients, the difference was statistically insignificant (Table 1). Further analysis of polysomnography revealed that 7.2% had mild OSA, 18.8% had moderate OSA and 72.5% subjects had severe OSA (Table 1).

CPAP is the gold standard treatment for OSA and was offered to all patients after diagnosis. Although 79.7% (n=55) subjects agreed to CPAP usage, 75.4% (n=52) actually initiated therapy. Only 43.5% (n=30) of the entire sample (n=69) were identified as having a good compliance indicating poor adherence to therapy in the majority.

Though a comparable number of patients in both groups initially agreed to use CPAP, 83.3% non-Type D patients started using CPAP after recommendation compared with 72.5% of Type D OSA patients

(Table 1). All non-Type D OSA patients (15/15) agreed for CPAP therapy actually started therapy compared to 92.5% (37/40) Type D OSA patients. Among the total CPAP users (n=52), 42.3% (n=22) had poor CPAP compliance while 30 patients had good CPAP compliance. Interestingly, all 22 non-compliant patients had Type D personality while all 15 non-Type D patients who accepted CPAP were compliant. This exhibits lack of self-care behavior in type D patients. Finally, 56.5% (n=39) of all OSA patients (n=69) had poor CPAP acceptability and/or compliance of which 92.3% (n=36) had Type D personality. Type D OSA patients had a higher tendency to reject CPAP use and be non-complaint if initially accepting CPAP (70.6%) compared to 16.7% non-type D CPAP users (p=0.0). Therefore, overall, Type D personality was significantly associated with poor acceptance and/or compliance of CPAP (p<0.0).

Discussion

The present study found that there is a high prevalence of distressed personality in Indian patients with OSA. Additionally, distressed personality is associated with poor acceptability of CPAP therapy and subsequent CPAP adherence. Factors influencing CPAP adherence are varied and no individual factor has been found to have a consistent causal relationship with CPAP adherence [11-15]. At the present time, there are no studies conducted in Indian subcontinent throwing light on prevalence of type D in general population and/or patients with specific diseases. This study highlights the high frequency of distressed personality in OSA and associated poor CPAP compliance.

Type D across age, gender and marital status

Significant age difference was found across the two groups. It was seen that majority of the distressed personality patients were older than non-distressed patients (p=0.08). No statistically significant difference was found in gender and marital status indicating that type D personality affects both genders in a similar manner irrespective of marital status. Although our results are in accordance with Brostrom et al. [15] it is difficult to draw conclusions because of lack of literature on Indian population.

Distressed personality in Indian patients with OSA

The present study indicates a positive association between distressed personality and OSA. We found that approximately three-fourth of OSA patients examined possessed distressed personality. These results are consistent with prevalence data for other medical conditions such as cardiovascular disease [27]. Brostrom et al. from Sweden found 30% incidence of type D personality in OSA patients [15]. This highlights a much higher rate of prevalence of distressed personality in Indian patients with OSA as compared to other populations. Possible mechanisms of this higher prevalence rate can be attributed to the higher prevalence of psychiatric disorders with prominent somatic and emotional features, and sleeplessness arising from stressful, mechanical and sedentary lifestyle of people in the metropolis. Most importantly, this problem is magnified with the present status of sleep medicine in India. It is still an emerging branch of medicine where sleep disorders largely remaining un-diagnosed and undertreated and the general population has poor health seeking behaviors [8].

Type D and clinical outcomes

A positive correlation between distressed personality and severe negative clinical outcomes has been reported in a number of studies [21-25]. Various studies on possible mechanisms behind type D personality have given birth to the understanding that Type D not only increases vulnerability for negative clinical outcomes in cardiovascular patients but also negatively affect the prognosis of other medical conditions like melanoma, mild brain injury and vertigo [23-25]. Studies on Type D among cardiovascular patients have shown that Type D is an independent predictor of negative outcomes such as poor health status, (recurrent) myocardial infarction and increased risk of mortality [19]. Our study supports these findings as majority of OSA patients had distressed personality, more so in the subgroup found to have non-compliance.

Type D and self-care behavior

We found that 79.7% (n=55) OSA patients examined, agreed for CPAP therapy whereas 14 (20.3%) decided against it (p=0.747). Further analysis revealed that 75.4% (n=52) actually initiated the treatment and the number for those who did not start the treatment, increased to 17 (24.6%). Majority (n=14) of these patients belonged to type D group though the difference was statistically insignificant (Table 1). However, this finding is considered important as it throws light on the pattern of self-management of these patients. Lack of motivation and display of avoidance behavior leads to self-neglected medical care, adverse clinical outcomes and poor prognosis. Behavioral mechanisms attached with distressed personality such as an unhealthy lifestyle and reluctance to consult medical staff may be directly linked to this behavior pattern and consequently negative clinical outcomes. Findings from this study are in sync with previous studies on cardiovascular and non-cardiovascular population [28-30].

Refusal rate for CPAP therapy

In our study, we found that 79.7% patients diagnosed with OSA, agreed for CPAP therapy. We did not find any significant role of type D personality in making this decision. However, 24.6% patients subsequently did not start CPAP treatment. All those rejecting therapy possessed distressed personality while those with non-type D accepted CPAP therapy. Many OSA patients terminate CPAP treatment at an earlier stage. Rolfe et al. reported that 90% of CPAP treatment interruptions happened within the first 4 months [31]. Weaver et al. showed that the pattern of CPAP use is determined in the first week of treatment and remains stable after that time [32]. Patients skipping nights of treatment also use CPAP for shorter nightly duration [12]. The rate of rejection of CPAP therapy amongst OSA patients in our study is in accordance with an earlier study which observed that 5-50% rejected CPAP before or during titration [33].

Association of type D and CPAP adherence

Our study revealed that at the end of follow up, 30 participants were CPAP compliant (15 in both groups) whereas 22 failed to use CPAP for minimum of 4 hrs/d for atleast 5 days/week. All 22 CPAP non-compliant patients possessed type D personality. These findings are in accordance with that in previous studies [23]. Brostrom et al. showed that patients with Type D personality had significantly higher complaints of adverse events with CPAP therapy and reported a higher rate of continued sleepiness than non-type D personalities, despite comparable level of disease severity. Results showed 50% of patients with type D personality used their CPAP less than 4 hours per night compared to 16% of non-type D patients tested [14]. This amounted to a significantly lower objective adherence (p<0.001) for OSA patients

with Type D than those without Type D, both with respect to mean use of 4 hours per night and 85% self-rated sleep time per night [14].

Limitation

This prospective exploratory study does not allow us to confer a causal relationship but provides us a preliminary understanding of distressed personality and CPAP compliance. The enrolment of consecutive cases visiting a tertiary care hospital in the National Capital Region of India and predominantly including middle to high socioeconomic status patients could have led to a selection bias. Other potential factors for CPAP noncompliance such as mask discomfort were not studied as the study only focused on distressed personality. It is difficult to establish a clear relationship between distressed personality and CPAP adherence because of the influence of pre-existing medical or other psychological conditions because of the scope of the study. Also, the bed partner's preference and perceived benefits were not taken into consideration.

Conclusion

Despite CPAP being the treatment of choice in most cases of OSA, treatment adherence rates are low. The present study suggests the benefits of evaluating for psychological variables like patients' personality, understanding of illness, attitudes and beliefs towards their medical condition. As depression is also known to be associated with poor compliance, assessment for psychological disorders, especially depression and anxiety at the initiation of treatment can be beneficial. Apart from this, behavioral modification, counselling and early patient and partner education regarding knowledge about OSA and CPAP, its benefits and expectations can be useful. Also, regular follow ups with the psychologist and sleep specialists with telemonitoring if possible can be effective for identifying treatment problems and adherence early in the course. This would facilitate screening of non-complaint patients as also enable to formulate an individualized approach aimed at helping the patient adapt to this demanding treatment before and after the initiation of CPAP therapy and consequently, increase the likelihood of treatment adherence.

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