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Obstructive Sleep Apnea, Erectile Dysfunction and Depression in Pakistani Husbands

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Abstract

This study attempted to examine potential association of obstructive sleep apnea, erectile dysfunction and depression in Pakistani husbands. Furthermore, this study investigates whether obstructive sleep apnea and erectile dysfunction predicts depression in the aforementioned sample. A survey booklet comprises of demographics and standardized assessment tools including Berlin Questionnaire, International index of erectile function and Beck depression inventory was used to collect data from 200 participants. The main statistical tools administered were descriptive statistics, Pearson product moment correlation and Multiple hierarchical regression analysis, using SPSS version 23. Obstructive sleep apnea was significantly positively correlated to erectile dysfunction. Similarly, it was revealed that obstructive sleep apnea and depression were significantly positively correlated. Multiple hierarchical regression analysis demonstrates that demographics like participant's sleep duration, socioeconomic status, and obstructive sleep apnea and erectile dysfunction were significantly predicting depression. Healthcare practitioners should consider screening patients for obstructive sleep apnea along with erectile dysfunction while treating depression.

Keywords: Depression, Erectile Dysfunction, Husbands, Obstructive Sleep Apnea

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Introduction

A condition characterized by frequent episodes of respiratory stoppage during sleep, either as a result of partial or complete obstruction of the airways is defined as Obstructive sleep apnea (OSA). OSA characterized by hypoxic episodes, snoring, disturbed sleep, and daytime drowsiness, is a serious health concern, negatively affecting one's quality of life (Stepnowsky et al., 2019). There are 100 million people in the world suffering from Obstructive sleep apnea, indicating its 9% to 38% prevalence in the total population (Zhang et al., 2019). The common risk factors considered for this condition are ageing, male gender and obesity (Jehan et al., 2017; Nigro et al., 2018). The most often co-occurring health conditions with obstructive sleep apnea are diabetes, cardiovascular disorders, sexual dysfunctions and hypertension (Bonsignore et al., 2019; Pinto et al., 2016; Zheng et al., 2020).

One of the most frequently reported psychological disorder with obstructive sleep apnea is depression (Latif et al., 2024), characterized by persistent disturbed and sad mood, poor functioning in cognitive and emotional realms and no interest in usually pleasurable activities (APA, 2013). Individuals suffering from severe obstructive sleep apnea are at an increased risk of developing depression (Lee & Lee, 2023). The OSA patient's clinical and personal characteristics and their high risk of developing depression, OSA is considered to be one of the risk factors of depression. Females suffering from obstructive sleep apnea have a high prevalence of depression

indicating a link between sex and depression (Wong et al., 2021).

Erectile dysfunction is characterized by an inability to obtain or maintain a stiff penile erection suitable for sexual activity (APA, 2013). Since erectile dysfunction (ED) affects 52% of males between the ages of 40 and 70, its prevalence and negative impact on quality of life represent it as a major health issue. Globally, it is expected to affect 320 million men by 2025 (Kessler et al., 2019; Yafi et al., 2016). Prostatic and lower urinary tract surgeries are other possible causes of erectile dysfunctions, besides neurological and hormonal/metabolic illnesses. Individuals with OSA have a higher prevalence of ED (Romero-Otero et al., 2021). There have been numerous investigations carried out to look into the potential psychological effects of experiencing erectile dysfunction. Initially, feeling emasculated is one of the most typical responses to erectile dysfunction (Sheng, 2021). One may experience feelings of embarrassment and shame, concern that their spouse may leave them and a sense of betrayal even after only one episode of erectile dysfunction (Sheng, 2021). A person experiencing these psychological reactions may also withdraw from intimacy at some point as a self-fulfilling prophecy when their relationship is most vulnerable out of fear of disappointing their partner or fearing that their partner may leave them (Sheng, 2021). Additionally, a more negative body image, rumination and catastrophizing, and feelings of loneliness and isolation, and a decline in self-worth and confidence are common reactions to erectile dysfunction (Dewitte et al., 2021). This makes their partner feel unloved and undesired. If a man's erection is perceived by a partner as an indication of his sexual attraction, erectile dysfunction may also lead to trust concerns (Dewitte et al., 2021).

Erectile dysfunction-related withdrawal from intimacy can be perplexing for the partner, sparking rumors of an affair, and convey a sense of disinterest on the part of the man. The uncomfortable ideas could have a big impact on one's perception of their own value and attractiveness (Li et al., 2016). Particularly after their partner had erectile problems, women report feeling less sexually motivated. This involves less arousal, orgasm, and desire for sex. This ultimately resulted in relationship dissatisfaction, a decrease in sex-life satisfaction, and a decrease in overall life happiness (Li et al., 2016). The quality of life is also viewed as being lower by spouses of erectile dysfunction patients (Elterman et al., 2021). There may also be other consequences of erectile dysfunction on a sexual relationship. For example, studies on heterosexual couples have shown a positive association between female sexual dysfunction and erectile dysfunction (Wang et al., 2022).

Erectile dysfunction is often accompanied with depression and poor quality of life representing serious clinical and psychosocial consequences (Kims et al., 2015). Studies report a high co-morbidity between erectile dysfunction and depressive illness but still inconclusive about their casual links. Many studies examined the connection between depression and erectile dysfunction (Teoh et al., 2017). According to Meurs et al. (2016), there appears to be a bidirectional association between depression and erectile dysfunction. While some research indicates that being exposed to depression raises the likelihood of developing ED, other studies found no link between the prevalence of ED and depressed symptoms. Furthermore, according to some research, having an ED raises your chance of developing depression (Chou et al. 2015). According to the meta-analysis review, individuals with depression have a 39% increased chance of developing ED, and their

incidence of ED is 1.39 times higher than that of patients without depression. Patients with ED had a 2.92 times greater frequency of depression than patients without ED, and exposure to ED raises the risk of depression by 192% (Liu et al., 2018).

Research suggests that depression symptoms and mood can be passed from romantic partners (Joiner & Katz, 1999). Research on romantic partners' depressed symptoms has shown a positive correlation in both cross-sectional (Dudek et al., 2001) and longitudinal (Wong et al., 2023) designs. According to a qualitative research including 135 couples, non-depressed spouses are frequently adversely impacted by mood swings of their depressed partner's. Additionally, both partners report feeling less intimate emotionally and sexually, as well as engaging in more negative patterns of interaction (Sharabi et al., 2016). Depression symptoms are therefore linked to how well an individual's personal and their partner's relationships work (Morgan et al., 2018). When a person experiences depression, it can either (1) spread to their partner's bad feelings or (2) cause their partner to mistakenly attribute the depressed state to the relationship (van Kleef, 2009). Depressive states have been shown to distort perceptions in addition to lowering dyadic actions, which are believed to foster intimacy between love partners. The quality of both spouses' relationships declined as a result of depressed symptoms (Horn et al., 2017), which was linked to less sharing of happy memories and emotions by both partners. The relationship between sleep disorders and sexual issues is, however, poorly understood and OSA syndrome is one of the less well-researched risk factors for ED (Kalejaiye et al., 2017). Men with sleep difficulties frequently experience sexual issues, even though the underlying causes of ED are still unknown (Hoyos et al., 2015). Since, Pakistan is a highly patriarchal society where discussing sexual issues are considered as taboos bringing out humiliation. Furthermore, husbands feeling shame and hesitate to disclose their sexual functioning when visiting fertility clinics because of sexuality associated shame. Therefore, this study attempts to investigate a relationship between obstructive sleep apnea, erectile dysfunction and depression in Pakistani husbands. Furthermore, this study investigates that whether certain demographics such as socioeconomic status, sleep duration and obstructive sleep apnea and erectile dysfunction predicts depression in Pakistani husbands. Based on the aforementioned literature, the following hypotheses are proposed:

H1: Obstructive sleep apnea is more likely to have a relationship with erectile dysfunction in Pakistani husbands.

H2: Obstructive sleep apnea is more likely to have a relationship with depression in Pakistani husbands.

H3: Erectile dysfunction is more likely to have a relationship with depression in Pakistani husbands.

H4: Socioeconomic Status and duration of sleep is more likely to predict depression in Pakistani husbands.

H5: Obstructive sleep apnea and erectile dysfunction in more likely to predict depression in Pakistani husband.

Method

Research Design

A quantitative cross sectional research design was implemented.

Participants

A total of 200 participants were recruited via purposive sampling technique. The sample size was calculated using Green (1991) formula (N>50+8m) where m is the number of independent variables. According to this formula, the required sample size was 82. A questionnaire booklet comprised of demographics (age, type of marriage, body

mass index, socioeconomic status, and duration of sleep) and standardized assessment tools such as Berlin Questionnaire, International Index of Erectile Function and Beck Depression Inventory.

Inclusion Criteria

The inclusion criteria to recruit participant for this study was husbands, having sexually active partner, and an age range of 18-55 years.

Exclusion Criteria

The exclusion criteria for this study were male participants who are divorced, suffering from physical diseases such as hepatitis, renal failure, enlarge prostate gland, renal surgery; mental illnesses such as psychosis, anxiety disorders, and smoking cigarettes respectively.

Measures

The Berlin Questionnaire

The Berlin questionnaire, first introduced in Berlin, Germany during the Conference on Sleep in Primary Care in 1996, was used to assess obstructive sleep apnea (OSA). The questionnaire includes ten questions that evaluate three domains - snoring, drowsiness, and risk factors - according to Netzer et al. (1999). The OSA high risk indicated by at least two respondents is required for the affirmation of a category. This tool requires two or three categories to be positive for the diagnosis of Obstructive sleep apnea. This study reported 0.78 reliability index of Berlin questionnaire.

International Index of Erectile Function

The husband's erectile functioning was measured through International Index of Erectile Function (IIEF-5). This standardized assessment tool consists of 5 questions having a 5-point Likert response format. The potential score range of this tool is 5-25. The scale is scored up by summing up all the responses. An individuals score of 22-25 represents no erectile dysfunction, and 5-7 indicates severe erectile dysfunction (Rhoden et al., 2002; Rosen et al., 1999). The IIEF-5 reliability index in this study was 0.72.

Beck Depression Inventory

The Beck Depression Inventory I (Beck et al., 1988) was used to measure the level of depression. This assessment measure consists of 21 questions, having a 4-point Likert scale (0 =no symptom and 3 =most severe). All the responses are summed up to generate a total score. The potential score range of BDI ranges from 0 to 63. The BDI Cronbach's alpha value in this study was 0.87.

Procedure

A questionnaire booklet was shared with Pakistani husbands through online social media platform such as WhatsApp. A total sample of 463 participants was recruited between August 2022 and September 2023, from Punjab, Khyber Pakhtunkhwa and Baluchistan. The participant's body mass index was calculated using BMI formula (kg/m^2) by taking into account the height (meters) and weight (kg) of the recruited participants. Out of 463 participants, a sample size of 200 participants was retained. The remaining 263 participants were excluded because of incomplete responses, not at risk for obstructive sleep apnea, having no erectile dysfunction, sexually inactive for the last 6 months, and suffering from physical diseases such as renal failure, hepatitis, diabetes and other chronic illnesses. All participants were recruited after signing an informed consent. Ethical considerations such as right to withdrawal, privacy of information, and keeping identity anonymous were ensured.

Statistical Analysis

The collected data were statistically analysed through SPSS ver.23, utilizing descriptive statistics, Pearson product-moment correlation, and multiple hierarchical regression analysis as the main statistical tools. All of the recruited participant's demographic information was compiled using descriptive statistics. In recruited

subjects, obstructive sleep apnea, erectile dysfunction, and depression were examined using Pearson product-moment correlation. To ascertain whether specific demographics, erectile dysfunction, and obstructive sleep apnea are predictive of depression, hierarchical regression analysis was employed.

Results

Table 1

Demographic characteristics of participants (N=200)

Variables	*M*	*SD*	*N*	%
Age	21.49	2.38		
Type of Marriage				
Love Marriage			78	39.0
Arrange Marriage			122	61.0
Body Mass Index				
<18.5			12	06
18.5-23			2	01
>23			186	93
Socioeconomic Class				
Upper Class			15	7.5
Middle Class			168	84.0
Lower Class			17	8.5
Duration of Sleep				
<7 hours			177	88.5
7-8 hours			19	9.5
>8 hours			4	2.0

Note: *M*=mean, *SD*= standard deviation, *n*= frequency

The participants' average age is 21.49 years, with a standard deviation of 2.38. Type of marriage distribution among the participant's shows that 39% have love marriage, and 61% have arranged marriage. Majority of participants (93%) have BMI greater than 23, while a small percentage have BMI range of 18.5-23 (6%) or >18.5(1%). The socioeconomic class distribution indicates that the majority of participants belong to the middle class (84%), with smaller proportions in the upper class (7.5%) and lower class (8.5%). Duration of Sleep vary among participants, with the majority (88.5%) being slept for <7 hours, followed by participants who sleep for 7-8 hours (9.5%) and >8 hours (2.0%) respectively.

Table 2

Correlation for Obstructive Sleep Apnea, Erectile Dysfunction and Depression in Pakistani Husbands (N=200)

Variables	*M*	*SD*	1	2	3
1.Obstructive Sleep Apnea	4.58	2.32	-		
2.Erectile Dysfunction	8.04	4.27	.19**	-	
3. Depression	26.58	15.52	.22**	.12*	-

*p<.05. **p<.01

Table 2 indicates a significant positive association between obstructive sleep apnea and both erectile dysfunction (r (200) =.19, p<0.05) and depression (r (200) =.22, p<0.05). Furthermore, it is revealed that erectile dysfunction is significantly positively related to depression (r (200) =.12, p<0.05).

Table 3

Hierarchical Regression Analysis of Duration of Sleep, Socioeconomic Status, Obstructive Sleep Apnea, Erectile Dysfunction and Depression in Pakistani Husbands (N=200)

Variable	*B*	*95%CI*		*SE*	*B*	R	ΔR^2
		LL	*UL*				
Step 1							
Duration of sleep	-2.87	-5.33	-.42	1.24	-.16*	.16	.03*
Step 2							
Socioeconomic status	-1.67	-2.64	-.69	.49	-.23**	.28	.05**
Step 3							
Obstructive sleep apnea	1.28	1.18	1.38	.05	.87***	.88	.71***
Erectile Dysfunction	.50	.93	.07	.21	.07*		

Outcome= Depression

Note. CI =confidence interval, LL = lower limit, UL= upper limit, *p< .05. **p< .01. <.001***

Step 1 results show that sleep duration is a significant predictor of depression (p<.05), and a negative beta value suggests that sleep deprivation is linked to an increased risk of depression. According to the shift in R-squared, sleep duration explains 3% of the variance in depression prediction.

Step 2's addition of socioeconomic status increased the beta coefficient's significance (p<.01), suggesting a negative relationship between depression and socioeconomic status. According to the shift in R-squared, socioeconomic position increases the explained variation in depression prediction by an extra 5%.

In Step 3, erectile dysfunction and obstructive sleep apnea are both significant predictors of depression (p<.001). Combining these factors explains 71% of the variation in depression. Overall, the results of the hierarchical regression analysis indicate that erectile dysfunction, obstructive sleep apnea, socioeconomic level, and duration of sleep are important predictive factors for depression among Pakistani husbands.

Discussion

This study aimed to investigate a potential link between obstructive sleep apnea, erectile dysfunction, and depression. This study found a substantial positive relationship between OSA and erectile dysfunction in husbands, reinforcing the study's finding conducted by (Romero-Otero et al., 2021). The link between obstructive sleep apnea and erectile dysfunction may be explained by sleep fragmentation, daytime sleepiness, prolonged bulbocavernosus reflex latency,

decreased REM sleep, elevated endothelin and catecholamine levels, Nitric oxide bioavailability, reduced vasodilation, increased oxidative stress and decreased testosterone. Furthermore, literature attributes androgen deficits and reduced libido to obstructive sleep apnea but this association is poorly investigated and much less well-understood (Pascual et al., 2018; Schulz et al., 2019).

Furthermore, Obstructive sleep apnea and depression among Pakistani husbands are strongly positively correlated, according to previous research (Latif et al., 2024; Lee & Lee, 2023; Wong et al., 2021). Although several theories have been put out, the pathological mechanism underlying the association between sleep apnea and depressed symptoms is still unknown. The symptoms of depression in obstructive sleep apnea patients may be caused by hypoxemia or lack of sleep (Pesonen et al., 2019). Furthermore, the pathogenic process of neuroinflammation is linked to pathophysiology of depression (Beurel et al., 2020) which is affected by intermittent hypoxia (Kerner & Roose, 2016). There was an elevated level of proinflammatory cytokines in patients suffering from major depressive disorder (Kohler et al., 2017). An individual's symptoms of depression could be alleviated by the usage of anti-inflammatory drugs (Kohler-Forsberg et al., 2019).

The findings of this study reported that erectile dysfunction and depression were positively correlated in Pakistani husbands, reinforcing the study's findings carried out by (Chou et al. 2015; Liu et al., 2018; Teoh et al., 2017). Male sufferings from erectile dysfunction avoid sexual activity (Giuri et al., 2017) and increased inhibition (Sarin et al., 2014) because of negative emotions like low self-worth, humiliation and emasculation (Takeuchi et al., 2021). Their unrealistic attitudes towards sexual performance of male, influence their feelings of incompetent and lack of self-efficacy (Rowland et al., 2015). Some misconceptions like the dependency of female's sexual satisfaction on male's erection ability or inability to get an erection cause one's partner to leave (Nobre, 2010).

This study reported that level of socioeconomic status, sleep duration, obstructive sleep apnea and erectile dysfunction predicts depression in Pakistani husbands. An individual's sleep duration is associated with elevated risks of health-related conditions like cardiovascular events (Daghlas et al., 2019), mental illness (Faulkner et al., 2019; Paksarian et al., 2020) and mortality (Butler et al., 2019; Wang et al., 2019). Individuals having short duration of sleep are more prone to develop depression (Berger et al., 2019; Koo et al., 2021; Ogawa et al., 2019). The alteration in a person's cytokine sensitivity is caused by sleep disturbances, changing the brain's sensitivity to inflammation and increase their risks of depression (Irwin and Opp, 2017).

An individual's socioeconomic status significantly negatively related to depression (Andrade et al., 2000). The significant negative impact of socioeconomic status on depression (Jo et al., 2011) indicates that depression is more prevalent in individuals having lower socioeconomic status (Lorant et al., 2007). The increase in obstructive sleep apnea prevalence (Edwards et al., 2020; Jackson et al., 2019) also increase the chances of developing depression in individuals without any prior mood disorder (Redhead et al, 2020). Furthermore, obstructive sleep apnea exacerbates the depressive symptoms of individuals suffering from depression (Redhead et al., 2020). With recorded rates ranging from 60.9% to 78.6%, ED has been shown to dramatically lower sexual pleasure and self-esteem, which may result in feelings of worry and despair in affected persons (Yang et al., 2019).

Limitations and Recommendations

Cause and effect relationships cannot be established because of this study's cross-sectional design. The bidirectional association between depression and obstructive sleep apnea was not considered in this study. Furthermore, this study only involves husbands limiting the generalizability of the findings in dyadic contexts. Future research studies using cross sectional research design must screened couples while investigating the obstructive sleep apnea and depression, to determine that whether obstructive sleep apnea cause a depression in the partner because of disruption in sleep patterns. Similarly, different assessment tools must be implemented to increase the validity of the findings of the present study.

Implications

This study highlighting the relationship between physical and mental health and suggests that addressing an individual's obstructive sleep apnea could help in improving the mental health (depression) and sexual health (erectile dysfunction) outcomes. Since, duration of sleep predicts depression in patients suffering from OSA, therefore this study also encourages the healthcare practitioners to educate obstructive sleep apnea patients about practices related to good sleep hygiene to manage both obstructive sleep apnea and depression.

Conclusion

According to this study, husbands suffering from obstructive sleep apnea are more likely to have erectile dysfunction and depression. Furthermore, obstructive sleep apnea and erectile dysfunction develop depression in spouse. The findings of this study suggest that individuals suffering from obstructive sleep apnea must be screened for erectile dysfunction and depression. Furthermore, fertility clinics should screen the male partners to screen out the presence of Obstructive sleep apnea as its presence may increase the likelihood of erectile dysfunction.

Contribution of Authors

Khair Muhammad: Conceptualization, Investigation, Methodology, Data Curation, Writing – Original Draft, Writing - Reviewing & Editing

Saba Riaz: Conceptualization, Methodology, Formal Analysis, Writing – Original Draft, Writing - Reviewing & Editing

Conflict of Interest

There is no conflict of interest declared by the authors.

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Data Availability Statement

The datasets of the current study are not available publicly due to ethical reasons but are available from the corresponding author [K.M.] upon the reasonable request.

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