

Depression, anxiety, and bodily pain independently predict poor sleep quality among adult women attending a primary health center of Puducherry, India

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ABSTRACT

Background: Sleep disorders and mental health problems are common diagnoses in primary care settings. The objective of this study was to estimate the magnitude of poor sleep, depression, and anxiety through opportunistic screening and to find out the independent predictors of poor sleep quality among female participants. **Materials and Methods:** A hospital-based study was conducted in the outpatient department (OPD) of an urban primary health center of Puducherry. Patients and accompanying healthy attendants ≥ 18 years of age who visited the OPD for any reason were included. Those with serious acute illness, previously diagnosed mental illness, pregnant women, and women in postpartum period (upto 6 weeks) were excluded. Systematic random sampling was used to select the participants. A semi-structured questionnaire was used to collect sociodemographic and clinical details along with the Pittsburgh Sleep Quality Index (PSQI) and the Hospital Anxiety and Depression Scale. Height and weight were also measured. **Results:** A total of 301 participants were recruited. Mean age of the participants was 49.4 (standard deviation 15.2) years. Magnitude of poor sleep (PSQI score > 5), abnormal anxiety, and abnormal depression were 118 (39.2%), 60 (19.9%), and 28 (9.3%) respectively. Multivariate logistic regression analysis showed that history of pain [odds ratio (OR) 3.2 (1.6–6.5), $P = 0.001$], abnormal anxiety [OR 2.5 (1.2–5.6), $P = 0.021$], and abnormal depression [OR 4.3 (1.4–13.2), $P = 0.01$] independently predicted poor sleep quality among females. **Conclusion:** OPD-based opportunistic screening for sleep and mental health problems should be routinely conducted by primary care and family physicians.

Keywords: Anxiety, depression, primary care, screening, sleep

Introduction

Sleep disorders are a fairly common diagnosis in primary care clinics. The most common sleep disorders seen in primary care settings are insomnia, obstructive sleep apnea (OSA), and restless legs syndrome (RLS). In the general population, symptoms of insomnia are present in up to 15% of individuals,^[1] OSA in

about 5% (though 26%–32% are at high risk for OSA),^[2–4] and RLS in 5%–15%.^[5,6] Similarly, common mental disorders such as depression and anxiety are also very common diagnosis in primary care facilities.^[7–9]

Changes in lifestyle, death of a close relative, bodily pain, various physical or mental health conditions, and medications may all affect sleep quality.^[10] Insufficient sleep and poor sleep quality often result in road traffic injuries and occupational hazards. For instance, in the United States, the National Department of Transportation estimates that drowsy driving is responsible

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for 1,550 fatalities and 40,000 nonfatal injuries annually.^[11] Insufficient sleep also predisposes to chronic diseases such as hypertension, diabetes, and cancer, thereby reducing the quality of life and productivity.^[12-15]

Mental health screening in primary care is a neglected area. Common mental health problems such as anxiety and depression often go undetected. It has been previously reported that there is a high prevalence of anxiety,^[16] depression,^[17] and poor sleep quality among people accessing health center on any day. There is also a strong association of anxiety, depression, or poor sleep quality with suicidal ideation or suicidal attempts.^[18] Some previous studies have reported that it is feasible to screen for mental health problems in a cost-effective way in primary care settings, thus leading to early initiation of appropriate treatment. Similarly, sleep complaints, which are easily treatable, are often not addressed adequately by primary care physicians despite their high burden and adverse consequences.^[19,20] A recent national survey of 14 distinct database batteries used by family medicine clinics found that only 6 of the 14 contained any questions related to sleep symptoms.^[21] Lack of awareness regarding the importance of diagnosing and treating common sleep problems, limited time, lack of financial incentives, and pressure to treat the patient's immediate ailments are some of the barriers in provision of preventive care and screening services for sleep disorders by physicians in primary care settings.^[22]

Although opportunistic screening and continued surveillance for common mental health problems and sleep disorders is extremely important, understanding the association between these two is important as well. Screening for sleep problems might help in identifying the high-risk group for mental health problems and vice versa (bidirectional screening), which ultimately will help develop better cost-effective models of care, without having the need to screen for both the conditions.

Hence, we planned this study with the primary objective of measuring the magnitude of undiagnosed poor quality sleep and two common mental health problems, that is, depression and anxiety, through a primary health center (PHC)-based opportunistic screening program. The secondary objective was to find out the independent predictors of poor sleep quality in females among the screened participants.

Materials and Methods

This study was a hospital-based cross-sectional study carried out in the setting of outpatient department (OPD) of an urban PHC in Puducherry. This PHC is attached to a publicly funded tertiary care teaching hospital and caters to a population of around 9,000 in four urban wards in its designated field practice area. Apart from regular general outpatient clinics in the forenoons on all weekdays, the center also runs special once-weekly clinics for noncommunicable disease (NCD) patients, antenatal mothers, and under-five children, which are managed by general physicians and medical interns along with support staff such as nurses,

pharmacists, and laboratory personnel. During the months prior to conduct of the study, the average daily attendance at the general OPD was around 50 (including patients and attenders), whereas the attendance of the weekly-once NCD clinic, antenatal clinic, and under-five clinic was around 70, 20, and 20, respectively.

This study was conducted during a 2-week period in the month of July 2015. Adults age 18 years and above residing in the field practice area of the PHC for at least 1 year, who attended the OPD either as patients or accompanying attendants for any reason, were included in the study. Adults with serious acute illness, those with previously diagnosed mental illness, and women who were either pregnant or up to 6 weeks postpartum were excluded.

An earlier study conducted among apparently healthy subjects accompanying patients in a neurology OPD of a tertiary care hospital reported the prevalence of sleep-related disorders ranging from 20% to 34.2%.^[23] Taking the lowest prevalence of 20% from this study and taking an absolute precision of 5% and nonresponse rate of 20%, the minimum sample size required was calculated to be 282. This was planned to be achieved in a 2-week period, with data collection on all working days. Systematic random sampling was applied to recruit the participants. Taking 10 days of effective data collection (excluding government holidays and Sundays), and an average of 70 adults visiting the OPD per day (including special weekly clinics), it was decided to recruit every alternate patient, so that around 30 interviews per day (after accounting for refusals) leads to 300 interviews in 10 days, thus fulfilling the sample size requirements.

Exit interviews were conducted on adults satisfying the inclusion criteria and after obtaining written consent. Hospital OPD numbers were used to recruit participants. First number was chosen randomly, and adults at alternate numbers starting from the first number were recruited subsequently. If the chosen adult refused to participate, the number next to this number was chosen and so on. If a child was registered as patient at the chosen number, the adult accompanying the child (if present) was included. Three medical interns were trained by the research team in conducting interviews and they conducted the exit interviews simultaneously. Adequate privacy was maintained during the interviews. Those who were detected with poor sleep and were a case of anxiety/depression [diagnosed through Hospital Anxiety and Depression Scale (HADS)] were referred to the psychiatric clinic of the tertiary care hospital this PHC is attached to.

The study tools used in this study were the Pittsburgh Sleep Quality Index (PSQI) and the HADS, which have been validated through previous studies in India.^[23] The PSQI collects data on subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the last month. Those having a PSQI score >5 have been taken to have poor sleep quality. Psychological symptoms were considered as absent if the

HADS score was 0–7, borderline case if subjects scored 8–10, and case if score ranged from 11 to 21. An interview schedule was also developed to collect data on sociodemographic variables (i.e., age, gender, occupation, education, total family income, and socioeconomic status), lifestyle factors (caffeine, cigarette, and alcohol consumption), and any clinical history of pain or chronic disease. The tools were translated to Tamil and back-translated to English before using it.

Operational definitions

The time limit for tobacco use, alcohol use, and any pain was taken to be within the last month. The time limit for coffee and tea intake was taken to be any intake of these beverages within 4 h of going to bed during night-time. Any history of diabetes, hypertension, cardiovascular disease, stroke, chronic obstructive pulmonary disease, epilepsy, asthma, and cancer was taken as history of chronic disease. For height and weight measurement, standard methods were followed. Body mass index (BMI) was calculated using the formula weight (kg)/height (m)² and categorized as per standard criteria for Asian Indians.^[24] “Borderline case” and “case” categories according to HAD scale were taken as abnormal depression/anxiety in this study.

Data were entered in Epidata software 3.1 version (The EpiData Association, Odense, Denmark) and analyzed by SPSS version 17 (SPSS Inc., Chicago, IL, USA). For quantitative data, mean and standard deviation (SD) were calculated. Chi-square test was used to compare proportions among groups. *P* value < 0.05 was taken as significant. Because of small number of males recruited, we excluded males from analysis of risk factors for poor sleep quality. Univariate and multivariate logistic regression analyses were carried out to identify predictors of sleep quality in women. Unadjusted and adjusted odds ratios (ORs) were reported respectively with 95% confidence intervals (CIs).

Results

The OPD-based screening resulted in recruitment of 301 participants in all, that is, 58 (19.3%) males and 243 (80.7%) females. In all, 260 (86.4%) of the participants were patients and 41 (13.6%) were healthy persons accompanying patients. Table 1 describes the sociodemographic profile of the study participants. The majority of the study participants belonged to 41–60 years (46.8%). The mean age of the participants was 49.4 (SD 15.2) years. Around 40% of the participants were illiterate, nearly 70% were currently married, the majority belonged to upper lower socioeconomic status (56.1%), and more than two-third of the participants belonged to nuclear family.

Of 301 participants overall, the proportion of poor sleep, abnormal anxiety (including borderline cases), and abnormal depression (including borderline cases) was 118 (39.2%), 60 (19.9%), and 28 (9.3%), respectively. Of 58 males, 23 (39.7%) had a poor sleep quality, 8 (13.8%) had abnormal anxiety, and 1 (1.7%) had abnormal depression [Figure 1]. Of 243 females, 95 (39.1%) had poor sleep, 52 (21.4%) had abnormal anxiety,

Table 1: Sociodemographic profile of the study participants

| Variable | Male (n=58) | Female (n=243) | Total (n=301) |
|--|-------------|----------------|---------------|
| Age (years) | | | |
| 18-30 | 12 (20.7) | 32 (13.2) | 44 (14.6) |
| 31-40 | 13 (22.4) | 36 (14.8) | 49 (16.3) |
| 41-50 | 13 (22.4) | 49 (20.2) | 62 (20.6) |
| 51-60 | 8 (13.8) | 71 (29.2) | 79 (26.2) |
| 61-70 | 5 (8.6) | 37 (15.2) | 42 (14.0) |
| >70 | 7 (12.1) | 18 (7.4) | 25 (8.3) |
| Education | | | |
| Illiterate | 16 (27.6) | 105 (43.2) | 121 (40.2) |
| Primary school complete | 10 (17.2) | 66 (27.2) | 76 (25.2) |
| Middle school complete | 14 (24.1) | 34 (14.0) | 48 (15.9) |
| Secondary school complete | 13 (22.4) | 17 (7.0) | 30 (10.0) |
| Intermediate complete | 2 (3.4) | 10 (4.1) | 12 (4.0) |
| Graduate and above | 3 (5.2) | 11 (4.5) | 14 (4.7) |
| Marital status | | | |
| Married | 48 (82.8) | 162 (66.7) | 210 (69.8) |
| Unmarried | 6 (10.3) | 5 (2.1) | 11 (3.7) |
| Widow/separated/divorced | 4 (6.9) | 76 (31.3) | 80 (26.6) |
| Socioeconomic status (modified Kuppuswamy scale) | | | |
| Upper | 1 (1.7) | 4 (1.6) | 5 (1.7) |
| Upper middle | 15 (25.9) | 33 (13.6) | 48 (15.9) |
| Lower middle | 11 (19.0) | 59 (24.3) | 70 (23.3) |
| Upper lower | 29 (50.0) | 140 (57.6) | 169 (56.1) |
| Lower | 2 (3.4) | 7 (2.9) | 9 (3.0) |
| Family type | | | |
| Nuclear | 46 (79.3) | 162 (66.7) | 208 (69.1) |
| Extended | 12 (20.7) | 81 (33.3) | 93 (30.9) |

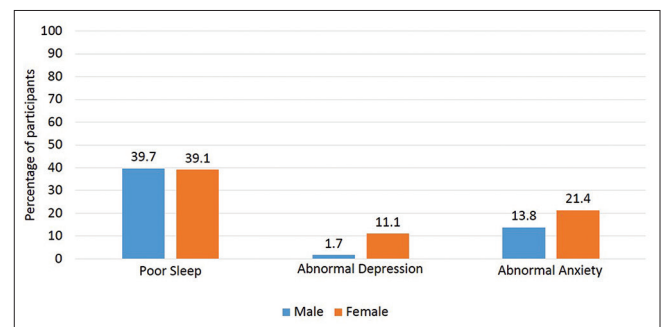


Figure 1: Magnitude of poor sleep, abnormal depression, and abnormal anxiety among the screened participants

and 27 (11.1%) had abnormal depression. There was a significant difference between males and females with respect to abnormal depression (*P* = 0.027, OR = 7.1) but no difference with respect to poor sleep and abnormal anxiety. Table 2 gives results of some of the selected items of PSQI.

Univariate analysis using logistic regression showed that variables that were significantly associated (*P* < 0.05) with quality of sleep in females were age, education, marital status, socioeconomic status, family type, anxiety, depression, history of pain, and tobacco use [Table 3]. Multivariate analysis [Table 4] showed that having abnormal depression/anxiety (according to HAD categories) and having a history of pain acted as independent

Table 2: Results of selected items from the PSQI, n=301

| Item as per the PSQI | Categories | No. (%) |
|---|----------------------------|---------------------|
| Average duration of actual sleep (in hours) | | 6.67±1.40 (mean±SD) |
| Average time to fall asleep (in minutes) | | 50.3±54.1 (mean±SD) |
| Problem keeping up enough enthusiasm to get things done | No problem at all | 267 (88.7) |
| | Only a very slight problem | 23 (7.6) |
| | Somewhat of a problem | 3 (1.0) |
| | A very big problem | 8 (2.7) |
| Self-rating of overall sleep quality | Very good | 69 (22.9) |
| | Fairly good | 165 (54.8) |
| | Fairly bad | 53 (17.6) |
| | Very bad | 14 (4.7) |
| Trouble staying awake while driving, eating meals, or engaging in social activity | Not during the past month | 263 (87.4) |
| | Less than once a week | 23 (7.6) |
| | Once or twice a week | 7 (2.3) |
| | Three or more times a week | 8 (2.7) |
| Taken medicine to help sleep (prescribed or “over the counter”)? | Not during the past month | 291 (96.7) |
| | Less than once a week | 6 (1.8) |
| | Once or twice a week | 2 (0.6) |
| | Three or more times a week | 2 (0.6) |
| Trouble sleeping because of not getting to sleep within 30 minutes | Not during the past month | 109 (36.2) |
| | Less than once a week | 52 (17.3) |
| | Once or twice a week | 33 (11.0) |
| | Three or more times a week | 107 (35.5) |

PSQI: Pittsburgh Sleep Quality Index; SD: standard deviation

predictors of poor sleep quality among female participants. Variables that were statistically not significant ($P > 0.05$) in univariate analysis, which were not included in the multivariate analysis, were history of chronic disease, consumption of coffee/tea prior to sleep, alcohol use, and BMI.

Discussion

The need for screening of sleep problems and common mental disorders cannot be overemphasized. Early detection of sleep problems and common mental health problems through simple screening tools used in primary care clinics enables early management at primary care level and timely referral to higher centers, subsequently cutting down the burden on health system and the cost of care, both for the provider and the consumer.^[24,25] Validated questionnaires can efficiently identify patients at risk for these mental health and sleep problems. The validity and reliability of tools such as HADS and PSQI have already been proven by strong Cronbach's alpha values.^[26-29] These are also easy to implement in any busy outpatient clinic, even in a low-cost setting.

In a study conducted among healthy attendees/relatives of patients visiting the OPD of a tertiary care institution of Bangalore, 6.2% of participants reported having poor quality sleep (global PSQI > 5).^[23] This was much higher in our study (39.2%). The major reason for this discrepancy is that our study was mainly conducted among patients (86.4% of participants), many of them suffering from chronic diseases, where sleep problems are often an accompanying complaint. SuriJC *et al.* conducted a study among parents of school children in New Delhi and found that almost 55% of adult participants

had some sleep-related problem.^[30] In a study similar to our study, which was conducted among participants ≥ 16 years in three primary care clinics of urban and suburban areas, it was found that 41% of the participants reported having a sleep problem.^[31] A study conducted among chain of family medicine clinics in North Carolina reported that $>50\%$ of the participants experienced excessive daytime sleepiness, 37% dozed off during daily activities, and more than one-third had insomnia.^[32]

In our study, the average duration of actual sleep was 6.7 (SD 1.4) hours and 46.5% of the participants had trouble initiating sleep at least once a week. Compared with this, in the New Delhi study, more than half of the study participants slept < 8 hours per day and 28.1% had complaints related to initiation or maintenance of sleep.^[30] In the Bangalore study, the average time-to-fall-asleep was 22 minutes, whereas in our study it was around 50 minutes.^[23] The actual hours of sleep was slightly more in that study than this study.

In a study among outpatients of a secondary-level hospital in a rural Delhi, the prevalence of unrecognized depression was found to be 23.8% and a female-to-male ratio in excess of 4:1.^[7] In this study, 9.3% had abnormal depression and the female-to-male ratio was 6.5:1. Salve *et al.* studied the psychiatric morbidities among outpatients attending a mobile health clinic in urban Delhi and reported that the prevalence of anxiety disorders was 11.1%. In this study, the magnitude of undiagnosed anxiety was 19.9%.^[8] The lower prevalence of 11.1% can be attributed to the fact that the Patient Health Questionnaire and Mini International Neuropsychiatric Interview were used, and because patients with much less severe health ailments visit mobile clinics when compared with a PHC, which has comparatively better facilities. Newer technologies such as mHealth, Telemedicine, and

Table 3: Results of univariate analysis showing predictors of sleep quality among female participants (n=243)

| Variable and categories | Good sleep (%), n=148 | Poor sleep (%), n=95 | OR (95% CI) | P |
|---|-----------------------|----------------------|----------------|---------|
| Age (years) | | | | |
| 18-30 | 28 (18.9) | 4 (4.2) | - | - |
| 31-40 | 21 (14.2) | 15 (15.8) | 5.0 (1.5-17.3) | 0.01* |
| 41-50 | 32 (21.6) | 17 (17.9) | 3.7 (1.1-12.4) | 0.03 |
| 51-60 | 38 (25.7) | 33 (34.7) | 6.1 (1.9-19.1) | 0.002* |
| 61-70 | 18 (12.2) | 19 (20.0) | 7.4 (2.2-25.3) | 0.001* |
| >70 | 11 (7.4) | 7 (7.4) | 4.5 (1.1-18.3) | 0.04 |
| Family type | | | | |
| Nuclear | 90 (60.8) | 72 (75.8) | 2.0 (1.1-3.6) | 0.02 |
| Extended | 58 (39.2) | 23 (24.2) | - | - |
| Socioeconomic status | | | | |
| Upper | 3 (2.0) | 1 (1.1) | - | - |
| Upper middle | 19 (12.8) | 14 (14.7) | 2.2 (0.2-23.6) | 0.51 |
| Lower middle | 46 (31.1) | 13 (13.7) | 0.8 (0.1-8.9) | 0.89 |
| Upper lower | 75 (50.7) | 65 (68.4) | 2.6 (0.3-25.6) | 0.41 |
| Lower | 5 (3.4) | 2 (2.1) | 1.2 (0.1-19.6) | 0.90 |
| Prior tea/coffee intake | | | | |
| Yes | 18 (12.2) | 18 (18.9) | 1.7 (0.8-3.4) | 0.15 |
| No | 130 (87.8) | 77 (81.1) | - | - |
| History of tobacco consumption | | | | |
| Yes | 6 (4.1) | 12 (12.6) | 3.4 (1.2-9.5) | 0.02 |
| No | 142 (95.9) | 83 (87.4) | - | - |
| History of alcohol consumption | | | | |
| Yes | 3 (2.1) | 1 (1.1) | 0.5 (0.1-5.0) | 0.57 |
| No | 145 (98.0) | 94 (98.9) | - | - |
| History of chronic disease | | | | |
| Present | 63 (42.6) | 52 (54.7) | 1.6 (1.0-2.7) | 0.06 |
| Absent | 85 (57.4) | 43 (45.3) | - | - |
| History of pain | | | | |
| Yes | 76 (51.2) | 78 (82.1) | 4.4 (2.4-8.1) | <0.001* |
| No | 72 (48.6) | 17 (17.9) | - | - |
| Education | | | | |
| Illiterate to below middle school completion | 94 (63.5) | 77 (81.1) | 3.5 (1.1-10.8) | 0.03 |
| Middle school complete to below intermediate completion | 37 (25) | 14 (14.7) | 1.6 (0.5-5.6) | 0.46 |
| Intermediate complete and above | 17 (11.5) | 4 (4.2) | - | - |
| HAD depression category | | | | |
| Normal | 142 (95.9) | 74 (77.9) | - | <0.001 |
| Borderline abnormal or abnormal | 6 (4.1) | 21 (22.1) | 6.7 (2.6-17.4) | |
| HAD anxiety category | | | | |
| Normal | 130 (87.8) | 61 (64.2) | - | <0.001* |
| Borderline abnormal or abnormal | 18 (12.2) | 34 (35.8) | 4.0 (2.1-7.7) | |
| BMI (kg/m ²) | | | | |
| <18.5 | 5 (3.4) | 2 (2.1) | - | - |
| 18.5-22.9 | 54 (36.5) | 23 (24.2) | 1.1 (0.2-5.9) | 0.94 |
| 23.0-24.9 (overweight) | 28 (18.9) | 24 (25.3) | 2.1 (0.4-12.1) | 0.39 |
| ≥25.0 (obese) | 61 (41.2) | 46 (48.4) | 1.8 (0.4-10.2) | 0.46 |
| Marital status | | | | |
| Married | 108 (73.0) | 54 (56.8) | - | - |
| Unmarried | 4 (2.7) | 1 (1.1) | 0.5 (0.1-4.6) | 0.54 |
| Widow/separated/divorced | 36 (24.3) | 40 (42.1) | 2.2 (1.3-3.9) | 0.005 |

OR: Odds ratio; CI: Confidence interval; HAD: Hospital Anxiety and Depression; BMI: Body mass index

decision support softwares can be used to screen and diagnose patients with common psychiatric morbidities, who could then be linked with proper care and follow-up.^[33-35]

Thus study found that history of pain, abnormal anxiety, and abnormal depression independently predicted poor sleep quality

in females. An earlier study found that participants having pain syndromes were at significantly higher risk for sleep problems.^[32] Also, women have been found to have a higher prevalence of insomnia-related depression.^[36] In another study, up to 50% of patients with sleep problems had depression and 48% had anxiety.^[31] In the same study, females had higher depression and

Table 4: Results of multivariate analysis showing independent predictors of sleep quality among female participants

| Variable and categories | Adjusted OR (95% CI) | P |
|---------------------------------|----------------------|-------|
| History of pain | | |
| Yes | 3.2 (1.6-6.5) | 0.001 |
| No | | |
| HAD depression category | | |
| Borderline abnormal or abnormal | 4.3 (1.4-13.2) | 0.01 |
| Normal | | |
| HAD anxiety category | | |
| Borderline abnormal or abnormal | 2.5 (1.2-5.6) | 0.021 |
| Normal | | |

OR: Odds ratio; CI: Confidence interval; HAD: Hospital Anxiety and Depression

anxiety (67% and 70%, respectively) than males (33% and 30%, respectively).^[31] In the Bangalore study, 11.7% of participants attributed insomnia to depression and 2.5% attributed to anxiety.^[23] When compared with males, insomnia was significantly higher in females, depression being the main reason. Other studies have also shown depression as a risk factor for poor sleep.^[32]

According to our knowledge, this study is the only one from India, which gives the magnitude of an opportunistic screening program for sleep problems in primary care hospital setting. Most of the earlier studies in India have been conducted either in population settings (estimating the prevalence) or in tertiary healthcare settings. We also did a real-life practical sampling, recruiting patients from both general OPD and specialty clinics without excluding many patients with comorbidities. One limitation of the study was that most of the participants were females. This mostly resulted due to recruiting patients from under-five clinics where mothers/grandmothers usually accompanied the child. Similarly, most of the patients with chronic disease who received regular services from the NCD clinic were females (as most males were out for work during the clinic timings). Nevertheless, this study brings useful insight especially into the magnitude of undiagnosed mental and sleep problems and to a small extent regarding the feasibility of such a screening program.

To conclude, this study found that around 39% of the participants had poor sleep quality, 19.9% participants had abnormal anxiety, and 9.3% participants had abnormal depression. Females with a history of bodily pain, abnormal anxiety, and abnormal depression (diagnosed through HAD scale) were at significantly higher risk of having poor quality of sleep. Opportunistic screening for sleep problems and common mental health problems should be routinely conducted by primary care physicians and family physicians in urban PHCs of Puducherry.

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Conflicts of interest

There are no conflicts of interest.

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