

Dreaming, sleep quality, and psychological distress among patients with chronic kidney disease at a national nephrology hospital in Sri Lanka: a descriptive cross-sectional study

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Abstract

Background

Chronic kidney disease (CKD) imposes substantial psychological and sleep-related burdens that are frequently underdiagnosed in low- and middle-income countries (LMICs). Dream characteristics, an understudied marker of psychological state, have not previously been examined in CKD populations in Sri Lanka. This study assessed sleep quality, dream characteristics, and psychological distress among patients with CKD and identified independent factors associated with distress.

Methods

A descriptive cross-sectional study was conducted among 422 adult patients with CKD receiving dialysis at the National Nephrology Specialised Hospital, Polonnaruwa, Sri Lanka, recruited by convenience sampling. Data were collected using an interviewer-administered questionnaire incorporating the Pittsburgh Sleep Quality Index (PSQI), the Depression Anxiety Stress Scales-21 (DASS-21), and items adapted from the Mannheim Dream Questionnaire (MADRE). Associations were examined using chi-square tests, Spearman correlations, and multiple linear regression, with Benjamini-Hochberg correction for multiple comparisons and significance set at $p < 0.05$.

Results

Of 422 participants (67.4% male; mean age 54.6 ± 11.5 years), 304 (72.0%) were poor sleepers (mean global PSQI = 9.58 ± 3.85). The mean total DASS-21 score was 20.71 (SD 10.34), with approximately one-third of participants classified into each of the low, moderate, and high distress categories. In bivariate analysis, distress was associated with gender (Cramér's $V = 0.22$), age group ($V = 0.16$), employment ($V = 0.13$), religion ($V = 0.16$), and dialysis duration ($V = 0.18$). Six of the ten dream characteristics were significantly correlated with distress, the strongest being nightmare distress ($p = 0.50$), dream-related sleep disturbance ($p = 0.47$), and nightmare frequency ($p = 0.46$). In multiple linear regression, dream-related sleep disturbance ($\beta = 0.34$, $p < .001$), nightmare frequency ($\beta = 0.27$, $p < .001$), and male sex ($\beta = 0.10$, $p = .006$) remained independently associated with distress (adjusted $R^2 = 0.43$).

Conclusions

Poor sleep, moderate psychological distress, and emotionally charged dreaming were common among patients with CKD. Nightmare frequency was independently associated with distress after adjustment for socio-demographic and sleep variables. Routine psychological and sleep screening, including enquiry about distressing dreams, should be incorporated into nephrology care in Sri Lanka and comparable LMIC settings.

Background

Chronic kidney disease (CKD) is among the fastest-growing causes of mortality worldwide. The Global Burden of Disease study estimated that 788 million adults (14.2% of the global adult population) were living with CKD in 2023, more than double the 1990 figure, making CKD the ninth leading cause of death globally (GBD 2023 Chronic Kidney Disease Collaborators, 2025). The burden falls disproportionately on low- and middle-income countries (LMICs), where kidney replacement therapy reaches fewer than 15% of patients with kidney failure (Liyanage et al., 2015). In Sri Lanka, this burden is compounded by an endemic CKD of undetermined aetiology (CKDu) that affects agricultural communities in the North Central, Uva, and Sabaragamuwa provinces, with prevalence exceeding 15% of the adult population in affected districts and predominantly affecting male farmers aged 30 to 60 years (Nanayakkara et al., 2012; Wanigasuriya et al., 2011).

Sleep disturbance is among the most prevalent non-renal complications of CKD, reported in 60% to 80% of patients compared with 10% to 15% of the general population (Nigam et al., 2018). Studies using the Pittsburgh Sleep Quality Index have reported a high prevalence of poor sleep in haemodialysis populations worldwide, with a recent systematic review and meta-analysis of 69 studies from 19 countries estimating a pooled global prevalence of approximately 64% (Shi et al., 2026). Poor sleep in CKD reflects accumulation of uraemic toxins that disrupt circadian regulation, alongside restless legs syndrome, nocturnal pruritus, and nocturia (Murtagh et al., 2007). Psychological distress is similarly common: a meta-analysis of 55 studies found clinical depression in 21.4% of patients with CKD, rising to 26.5% in haemodialysis, three to four times the general-population rate (Palmer et al., 2013). In Sri Lanka, 55.2% of patients with CKD attending a national nephrology unit have been reported to experience significant psychological distress (Hettiarachchi & Abeysena, 2018). Sleep and mood are bidirectionally linked, and in CKD this cycle is amplified by uraemic neurotoxicity and shared inflammatory pathways (Roumelioti et al., 2010; Walker, 2009).

A third, less studied dimension is dreaming. Dream phenomenology is coupled to sleep architecture and waking emotional state; the Continuity Hypothesis proposes that distressed waking states manifest as vivid, emotionally negative dreams and nightmares (Schredl & Hofmann, 2003). Nightmares and distressing dreams are elevated in anxiety, post-traumatic stress disorder, and chronic pain (Levin & Nielsen, 2007), and can disrupt sleep continuity and worsen next-day functioning independently of objective sleep quality (Yu, 2007). In South Asian cultural contexts, where dreams may carry spiritual or predictive significance, distressing dream content may be especially salient (Wax, 2004). Despite this, no previous study in Sri Lanka, and few globally, has concurrently characterised dreaming, sleep quality, and psychological distress in a CKD population. The present study aimed to determine the levels of dreaming, sleep quality, and psychological distress among patients with CKD at a national nephrology hospital in Sri Lanka, and to identify the socio-demographic, sleep, and dream factors independently associated with psychological distress.

Methods

Study design and setting

A descriptive cross-sectional study was conducted at the National Nephrology Specialised Hospital (NNSH), Polonnaruwa, Sri Lanka, one of the country's principal tertiary referral centres for nephrology care. The NNSH operates a haemodialysis unit with 50 dialysis stations across three daily sessions, serving patients from multiple districts of the North Central and Eastern provinces. Reporting follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline for cross-sectional studies (von Elm et al., 2007).

Study population and sampling

The target population comprised all adult patients receiving maintenance dialysis at the NNSH during the study period. Patients aged 18 years and above who were undergoing regular dialysis and provided written informed consent were eligible. Patients were excluded if they had severe cognitive impairment, were in acute psychiatric crisis, or had been initiated on dialysis within the preceding four weeks. Participants were recruited by convenience sampling, enrolling consecutive eligible patients who attended dialysis sessions during the data-collection period until the required sample size was reached.

Sample size

The sample size was estimated using the single-population-proportion formula, $n = Z^2 p(1 - p) / d^2$, with $Z = 1.96$, an assumed prevalence of $p = 0.50$ (in the absence of published Sri Lankan estimates for the combined outcomes), and a margin of error $d = 0.05$ (Daniel, 1999; Lwanga & Lemeshow, 1991). This yielded a minimum of 384, increased by 10% for non-response to give a target of 422..

Data collection instruments

Data were collected using an interviewer-administered structured questionnaire of four parts. Part A captured socio-demographic information (age, gender, marital status, educational level, employment status, and religion) together with clinical and disease-related characteristics abstracted from the patient's dialysis record, namely dialysis modality (haemodialysis or peritoneal dialysis), dialysis frequency, dialysis duration (time since dialysis initiation), and primary CKD aetiology. Parts B to D comprised three standardised instruments. Interviewer administration accommodated variation in literacy and minimised item non-response.

Part B - Sleep quality. The Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989) is a widely used self-report instrument that assesses sleep quality and disturbances over the preceding month. It comprises 19 self-rated items that are combined into seven component scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component is scored from 0 to 3, where 0 indicates no difficulty and 3

indicates severe difficulty, and the seven component scores are summed to yield a global score ranging from 0 to 21, with higher scores reflecting poorer sleep quality. A global score greater than 5 has been shown to distinguish poor from good sleepers with a diagnostic sensitivity of 89.6% and specificity of 86.5%, and this cut-off was applied in the present study. A Sinhala version validated among Sri Lankan adults was used (Anandakumar et al., 2016; reported $\alpha = 0.78$). In the present sample, internal consistency was $\alpha = 0.79$ (95% CI [0.76, 0.82]).

Part C - Dream characteristics. Dream experience was assessed using items from the Mannheim Dream Questionnaire (MADRE; Schredl et al., 2014), a comprehensive dream-history instrument whose single-item frequency, intensity, and nightmare scales have demonstrated good retest reliability (for example, dream-recall frequency $r = 0.76$, emotional intensity $r = 0.70$, and nightmare frequency $r = 0.75$). Ten dream characteristics judged most relevant to psychological distress and sleep in a clinical population were assessed, each retaining its native MADRE response format: dream-recall frequency (7-point scale, 0 = never to 6 = almost every morning); dream vividness and emotional intensity (5-point scales, 0 = not at all to 4 = very); emotional tone (5-point bipolar scale, - 2 = very negative to + 2 = very positive); nightmare frequency and the frequency of pleasant dreams, unpleasant dreams, sleep disturbance attributed to dreams, and dream influence on daily mood (8-point scales, 0 = never to 7 = several times a week); and nightmare distress (5-point scale, 0 = not at all to 4 = very distressing). The nightmare item was presented with the standard ICSD-3 definition of nightmares (American Academy of Sleep Medicine, 2014). As no Sinhala version exists, the items were forward-translated by two bilingual experts and back-translated by an independent third expert, with discrepancies resolved by consensus. Content validity was confirmed by a five-member expert panel (content validity index ≥ 0.80), and the items were pre-tested with 20 patients not included in the main study. For the regression analysis, a dream-distress composite was computed from the eight intensity and negatively valenced items (each standardised to a common metric before averaging, given their differing native ranges); this composite showed excellent internal consistency ($\alpha = 0.91$, 95% CI [0.89, 0.93]).

Part D - Psychological distress. The 21-item Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995) measures depressive, anxiety, and stress symptoms over the preceding week (each item 0–3). Depression, anxiety, and stress subscale scores were derived, and a total distress score was computed by summing all items. The publicly available Sinhala translation of the scale was used (Dheerasinghe, n.d.). In the present sample, internal consistency was $\alpha = 0.91$ (95% CI [0.89, 0.93]) for the full scale, and 0.87, 0.82, and 0.85 for the depression, anxiety, and stress subscales, respectively.

Data quality and pre-testing

The composite questionnaire was pre-tested with 20 patients at the NNSH who were not included in the main study, assessing comprehension, cultural appropriateness, and administration time (approximately 35 minutes). Two MADRE items were reworded for clarity. Three trained nurses proficient in Sinhala administered the questionnaire, and completed forms were checked for completeness on the day of collection.

Statistical analysis

Data were double-entered and analysed in IBM SPSS Statistics version 25.0. Continuous variables were summarised as means and standard deviations and categorical variables as frequencies and percentages. Because the dream items were single ordinal (Likert-type) variables and several continuous variables departed from normality on the Shapiro-Wilk test and on inspection of histograms and Q-Q plots, non-parametric Spearman rank correlations (ρ) were used to examine associations between dream characteristics and the total DASS-21 score; 95% confidence intervals for correlations were obtained by bias-corrected bootstrapping with 1,000 resamples. Chi-square tests of association examined relationships between categorical socio-demographic variables, sleep-quality category, and distress category, with Cramér's V reported as an effect size. To identify factors independently associated with distress while adjusting for confounding, a multiple linear regression model was fitted with the continuous total DASS-21 score as the dependent variable and age, sex, employment, education, marital status, dialysis duration, global PSQI score, nightmare frequency, dream emotional intensity, and dream-related sleep disturbance as predictors. Model assumptions (linearity, homoscedasticity, normality of residuals, and absence of multicollinearity, with all variance inflation factors < 2.5) were verified. Standardised coefficients (β) with 95% confidence intervals are reported. To control the false-discovery rate across the multiple bivariate tests, the Benjamini-Hochberg procedure was applied, and adjusted p-values are reported. Statistical significance was set at two-sided $p < 0.05$.

Handling of missing data

Missing data were minimal. Of 422 participants, complete data were available for all study instruments; isolated missing values occurred for two socio-demographic variables (gender, $n = 2$; employment, $n = 1$), accounting for less than 0.1% of all data points. Because missingness was negligible and confined to descriptive socio-demographic fields, complete-case analysis was used without imputation, and denominators are reported in each table. No questionnaire items were missing, as the interviewer-administered format prompted completion of every item at the point of data collection.

Ethical considerations

Ethical approval was obtained from the Ethics Review Committee of KAATSU International University (KIU), Sri Lanka (Approval No. KIU_ERC_25_027), with institutional approval from the NNSH. The study followed the Declaration of Helsinki (World Medical Association, 2013). All participants received a Sinhala-language information sheet and gave written informed consent. Anonymity was ensured by using unique numeric codes only.

Results

Participant flow

During the study period, 487 patients attended the haemodialysis unit and were screened for eligibility, of whom 46 were excluded on predefined clinical grounds. These comprised 21 patients who had been newly initiated on dialysis within the preceding four weeks (and had therefore not yet physiologically or psychologically stabilised), 14 with documented cognitive impairment that precluded reliable completion of the interview, eight who were experiencing an acute psychiatric crisis at the time of approach, and three who were transferred to another dialysis facility before data collection could be completed. A further 19 eligible patients declined to participate. After the inclusion and exclusion criteria had been applied, 422 patients were enrolled and completed the interviewer-administered questionnaire, yielding a final analytic sample of 422 and a participation rate of 95.7% among eligible patients approached.

Participant characteristics

Participant characteristics are summarised in Table 1. Most participants were male ($n = 283$, 67.1%), and the mean age was 54.6 years ($SD = 11.5$; median 55.0; range 22–80). Most were married ($n = 318$, 75.4%), had completed secondary education ($n = 195$, 46.2%), and were unemployed at the time of the study ($n = 162$, 38.5%), and the sample was predominantly Buddhist ($n = 353$, 83.6%). Clinically, the great majority were receiving haemodialysis ($n = 373$, 88.4%), with the remainder on peritoneal dialysis ($n = 49$, 11.6%), and most attended three sessions per week ($n = 276$, 65.4%). Dialysis duration ranged from less than six months to more than five years, with a mean of approximately 2.3 years ($SD = 1.8$). The most common primary aetiology was CKD of undetermined aetiology (CKDu; $n = 180$, 42.7%), followed by diabetic nephropathy ($n = 130$, 30.8%).

Table 1
Socio-demographic and Clinical Characteristics of Participants (N = 422)

Variable	Category	n	%
<i>Gender</i>			
	Male	283	67.1
	Female	137	32.5
	Missing	2	0.5
<i>Age (years)</i>			
	Mean (SD)	54.6 (11.5)	-
	Median (range)	55.0 (22–80)	-
<i>Marital status</i>			
	Married	318	75.4
	Widowed	56	13.3
	Unmarried	33	7.8
	Divorced	15	3.6
<i>Education level</i>			
	Secondary	195	46.2
	Primary	144	34.1
	Diploma / higher	68	16.1
	No formal education	15	3.6
<i>Employment status</i>			
	Unemployed	162	38.4
	Self-employed	124	29.4
	Private sector	82	19.4
	Government sector	53	12.6
	Missing	1	0.2
<i>Religion</i>			
	Buddhist	353	83.6
Note. N = 422. Percentages are calculated over the full sample and may not sum to exactly 100 because of rounding and missing values.			

Variable	Category	n	%
	Muslim	32	7.6
	Christian	25	5.9
	Hindu	12	2.8
<i>Dialysis modality</i>			
	Haemodialysis	373	88.4
	Peritoneal dialysis	49	11.6
<i>Dialysis frequency</i>			
	Twice weekly	146	34.6
	Thrice weekly	276	65.4
<i>Dialysis duration</i>			
	< 6 months	58	13.7
	6–12 months	74	17.5
	1–2 years	121	28.7
	2–5 years	118	28.0
	> 5 years	51	12.1
<i>Primary CKD aetiology</i>			
	CKD of undetermined aetiology (CKDu)	180	42.7
	Diabetic nephropathy	130	30.8
	Hypertensive nephrosclerosis	76	18.0
	Glomerulonephritis	36	8.5
Note. N = 422. Percentages are calculated over the full sample and may not sum to exactly 100 because of rounding and missing values.			

Sleep quality

The mean global PSQI score was 9.58 (SD = 3.85; 95% CI [9.21, 9.95]), above the cut-off of > 5 for poor sleep. Component-level statistics are presented in Table 2. The highest component means were sleep disturbances (M = 1.64, SD = 0.77) and sleep duration (M = 1.54, SD = 0.95); the lowest was use of sleep medication (M = 0.79, SD = 0.89). In total, 304 participants (72.0%) were classified as poor sleepers (PSQI > 5) and 118 (28.0%) as good sleepers.

Table 2
Descriptive Statistics for Pittsburgh Sleep Quality Index Components (N = 422)

PSQI Component	M	SD	Min	Max
Subjective sleep quality	1.26	0.72	0	3
Sleep latency	1.45	0.84	0	3
Sleep duration	1.54	0.95	0	3
Habitual sleep efficiency	1.40	0.81	0	3
Sleep disturbances	1.64	0.77	0	3
Use of sleep medication	0.79	0.89	0	3
Daytime dysfunction	1.50	0.83	0	3
Global PSQI score	9.58	3.85	0	21
Note. PSQI = Pittsburgh Sleep Quality Index. Components scored 0–3 (higher = worse); the global score is the sum of the seven components (range 0–21) and equals 9.58. Global PSQI 95% CI [9.21, 9.95]. Poor sleepers (PSQI > 5): n = 304 (72.0%); good sleepers: n = 118 (28.0%). M = mean; SD = standard deviation.				

Dream characteristics

Descriptive statistics for the dream items, reported on their native MADRE scales, are presented in Table 3. On the 8-point frequency scales, nightmares (M = 3.09), unpleasant dreams (M = 3.18), dream-related sleep disturbance (M = 3.10), and dream influence on daytime mood (M = 3.39) were all reported at frequencies of roughly once a month to two-to-three times a month. Dream-recall frequency on the 7-point scale was moderate (M = 3.10). On the bipolar emotional-tone scale, the mean was slightly negative (M = - 0.29). Dreams were rated as moderately vivid (M = 2.19) and emotionally intense (M = 2.39) on the 5-point scales, and nightmare distress was moderate (M = 2.17).

Table 3
Descriptive Statistics for Dream Characteristics on Native MADRE Scales (N = 422)

Dream Item	M	SD	Range
Dream-recall frequency	3.10	1.09	0–6
Dream vividness	2.19	0.77	0–4
Emotional intensity of dreams	2.39	0.80	0–4
Emotional tone of dreams	–0.29	0.82	–2 to + 2
Nightmare frequency	3.09	1.44	0–7
Nightmare distress	2.17	0.80	0–4
Frequency of pleasant dreams	2.88	1.34	0–7
Frequency of unpleasant dreams	3.18	1.34	0–7
Sleep disturbance due to dreams	3.10	1.44	0–7
Influence of dreams on daily mood	3.39	1.34	0–7
Note. Items administered using their native Mannheim Dream Questionnaire (MADRE) response formats. Frequency items: 7-point (0 = never to 6 = almost every morning) or 8-point (0 = never to 7 = several times a week). Intensity items: 5-point (0 = not at all to 4 = very). Emotional tone: 5-point bipolar (– 2 = very negative to + 2 = very positive). M = mean; SD = standard deviation.			

Psychological distress

The mean total DASS-21 score was 20.71 (SD = 10.34; median = 20.00; range 2–54). Subscale means were broadly comparable across the three domains (depression M = 6.42, SD = 3.71; anxiety M = 6.36, SD = 3.58; stress M = 6.51, SD = 3.62), and internal consistency was high for the full scale ($\alpha = 0.91$) and for each subscale (depression $\alpha = 0.87$; anxiety $\alpha = 0.82$; stress $\alpha = 0.85$). When the total score was divided into within-sample tertiles, approximately one-third of participants were classified into each category: 141 (33.4%) into the low category, 140 (33.2%) into the moderate category, and 141 (33.4%) into the high category. Descriptive statistics for the 21 individual DASS-21 items are provided in Additional file 2.

Factors associated with psychological distress

In bivariate analysis (Table 4), distress category was significantly associated with gender ($\chi^2 = 20.22$, $p < .001$; Cramér's $V = 0.22$, a small-to-medium effect), age group ($\chi^2 = 22.89$, $p = .011$; $V = 0.16$, small), employment status ($\chi^2 = 13.66$, $p = .034$; $V = 0.13$, small), religion ($\chi^2 = 20.42$, $p = .002$; $V = 0.16$, small), and dialysis duration ($\chi^2 = 25.87$, $p = .004$; $V = 0.18$, small-to-medium) after Benjamini-Hochberg correction. Marital status, education level, dialysis modality, primary CKD aetiology, and sleep-quality category were not significantly associated with distress.

Table 4

Chi-Square Tests of Association Between Categorical Variables and Psychological Distress (N = 422)

Variable	χ^2	df	p (adj.)	V
Gender	20.22	2	< .001	.22
Age group	22.89	10	.011	.16
Marital status	6.69	6	.408	.09
Education level	7.83	6	.351	.10
Employment status	13.66	6	.047	.13
Religion	20.42	6	.007	.16
Dialysis modality	2.75	2	.295	.08
Dialysis duration	25.87	8	.004	.18
Primary CKD aetiology	6.93	8	.545	.09
Sleep-quality category	1.81	2	.408	.07
Note. <i>p (adj.) = p-value after Benjamini-Hochberg false-discovery-rate correction across the seven tests. V = Cramér's V. Effect-size bands (Cohen, 1988): ≈ 0.10 small, 0.30 medium, 0.50 large; values are interpreted relative to the degrees of freedom.</i>				

Spearman rank correlations between dream characteristics and the total DASS-21 score, with bootstrap 95% confidence intervals, are presented in Table 5. After Benjamini-Hochberg correction, six of the ten dream characteristics were significantly associated with distress. The strongest positive associations were with nightmare distress ($\rho = 0.50$), dream-related sleep disturbance ($\rho = 0.47$), nightmare frequency ($\rho = 0.46$), and the influence of dreams on daytime mood ($\rho = 0.41$), followed by emotional intensity ($\rho = 0.38$) and unpleasant-dream frequency ($\rho = 0.34$). Dream vividness, dream-recall frequency, emotional tone, and the frequency of pleasant dreams were not significantly associated with distress.

Table 5

Spearman Correlations Between Dream Characteristics and Total Psychological Distress (N = 422)

Dream Characteristic	ρ	95% CI	p (adj.)
Nightmare distress	.50	[.43, .57]	< .001
Sleep disturbance due to dreams	.47	[.39, .54]	< .001
Nightmare frequency	.46	[.38, .53]	< .001
Influence of dreams on mood	.41	[.33, .49]	.002
Emotional intensity of dreams	.38	[.29, .46]	.004
Frequency of unpleasant dreams	.34	[.25, .42]	.011
Dream vividness	.17	[.07, .26]	.083
Emotional tone of dreams	-.14	[-.23, -.04]	.147
Dream-recall frequency	.12	[.02, .21]	.214
Frequency of pleasant dreams	-.09	[-.18, .01]	.436

Note. ρ = Spearman rank correlation with the total DASS-21 score. 95% CIs obtained by bias-corrected bootstrapping (1,000 resamples). p (adj.) = Benjamini-Hochberg-adjusted p -value. A negative emotional tone is coded toward -2; thus a negative coefficient indicates that more negatively toned dreams are associated with greater distress.

To identify factors independently associated with distress while adjusting for confounding, a multiple linear regression was fitted with the total DASS-21 score as the dependent variable (Table 6). The model explained a substantial proportion of variance ($R^2 = 0.45$, adjusted $R^2 = 0.43$; $F(10, 411) = 33.1$, $p < .001$), and all variance inflation factors were below 2.5. After adjustment, dream-related sleep disturbance ($\beta = 0.34$, $p < .001$) and nightmare frequency ($\beta = 0.27$, $p < .001$) were the strongest independent correlates of distress, followed by male sex ($\beta = 0.10$, $p = .006$), being married (associated with lower distress; $\beta = -0.09$, $p = .023$), dialysis duration ($\beta = 0.10$, $p = .008$), global PSQI score, and unemployment. Age, education, and dream emotional intensity were not significant after adjustment.

Table 6
Multiple Linear Regression Predicting Total Psychological Distress (N = 422)

Predictor	B	SE B	β	p
Age (years)	0.06	0.04	.06	.130
Male sex (ref: female)	2.42	0.88	.10	.006
Unemployed (ref: employed)	1.88	0.84	.08	.026
Education (years)	-0.25	0.13	-.07	.060
Married (ref: unmarried)	-2.09	0.91	-.09	.023
Global PSQI score	0.23	0.09	.09	.011
Dialysis duration (years)	0.67	0.25	.10	.008
Nightmare frequency	1.99	0.41	.27	< .001
Dream emotional intensity	1.29	0.73	.10	.080
Dream-related sleep disturbance	2.53	0.42	.34	< .001
Note. Dependent variable: total DASS-21 score. $R^2 = 0.45$; adjusted $R^2 = 0.43$; $F(10, 411) = 33.1$, $p < .001$. <i>B</i> = unstandardised coefficient; <i>SE B</i> = standard error; β = standardised coefficient. Dream predictors are on their native MADRE scales. All variance inflation factors < 2.5.				

Discussion

This study characterised sleep quality, dream characteristics, and psychological distress, and identified factors independently associated with distress, among patients with CKD at a national nephrology centre in Sri Lanka. The cohort was predominantly maintained on haemodialysis, with a substantial proportion having a dialysis duration exceeding two years and with CKD of undetermined aetiology as the leading cause, reflecting the endemic disease burden of the North Central Province and distinguishing this population from dialysis cohorts in high-income settings, where diabetic and hypertensive nephropathy predominate. Three principal findings emerged from the analysis. First, poor sleep quality and moderate psychological distress were both highly prevalent. Second, a subset of dream characteristics, most notably those reflecting distressing or emotionally negative dream content, were significantly associated with distress, whereas neutral dream dimensions such as recall frequency and vividness were not. Third, dream-related sleep disturbance and nightmare frequency remained independently associated with distress after adjustment for socio-demographic and clinical covariates.

Sleep quality

Poor sleep quality affected 72.0% of participants, a rate towards the upper end of the pooled global prevalence of poor sleep quality in haemodialysis cohorts internationally (Nigam et al., 2018; Shi et al., 2026). The mean global PSQI of 9.58 is comparable to values reported in other dialysis populations

internationally (Sabbatini et al., 2002; Shi et al., 2026), confirming a substantial sleep burden in this cohort. This burden is plausibly driven by uraemic toxin accumulation, restless legs syndrome, and pruritus, and may be amplified in this setting by limited access to sleep-focused interventions in rural nephrology services compared with high-income settings where sleep specialists are embedded in renal teams (Unruh et al., 2006). Routine sleep screening and adaptation of low-cost interventions such as cognitive-behavioural therapy for insomnia merit evaluation in this context.

Psychological distress

Distress was distributed approximately evenly across the within-sample tertiles, indicating that psychological burden was widespread rather than confined to a severely affected minority. The mean total DASS-21 score placed the sample in the moderate range. This pattern is broadly consistent with South Asian and African studies reporting psychological distress or depression in 45% to 55% of dialysis patients, and exceeds the pooled interview-based prevalence of approximately 22.8% reported for dialysis patients in a large meta-analysis, in which higher estimates typically arise from self-report screening tools (Ganu et al., 2018; Hedayati et al., 2009; Hettiarachchi & Abeysena, 2018; Palmer et al., 2013). Even moderate distress is associated with reduced treatment adherence and poorer outcomes in CKD (Palmer et al., 2013), supporting the case for universal rather than targeted psychological screening in this population.

In bivariate analysis, distress was associated with gender, age, employment, and religion, but the effect sizes were small (Cramér's $V \leq 0.22$), and several associations attenuated after multivariable adjustment. In the regression model, only male sex, nightmare frequency, and dream-related sleep disturbance remained independently associated with distress. The persistence of a sex effect may reflect broader gender-role expectations and financial responsibilities documented among South Asian dialysis populations (Hettiarachchi & Abeysena, 2018), although this interpretation is offered as a possible explanation rather than a demonstrated mechanism. The attenuation of the employment and religion associations after adjustment illustrates the value of multivariable modelling and cautions against over-interpreting unadjusted bivariate findings. The bivariate association with religion, in particular, may reflect confounding with other socio-demographic factors and should not be interpreted as an independent effect.

Dream characteristics

Dream-related sleep disturbance and nightmare frequency were the strongest independent correlates of distress after adjustment, and nightmare distress showed the highest bivariate association of any dream characteristic. Notably, the dream dimensions significantly associated with distress were those reflecting distressing or emotionally negative content, whereas neutral dimensions such as dream-recall frequency, vividness, and overall emotional tone were not significantly associated. This selective pattern is consistent with the Continuity Hypothesis and with literature linking nightmares specifically, rather than dreaming in general, to anxiety, post-traumatic stress disorder, and depression (Levin & Nielsen, 2007; Schredl & Hofmann, 2003). Because the design was cross-sectional, these results indicate that

distressing dream characteristics are associated with, rather than demonstrated to cause or result from, psychological distress. Nonetheless, the independence of the nightmare and dream-disturbance associations from sleep quality and socio-demographic factors suggests that dream-related symptoms may be a clinically informative marker worth assessing in this population.

Strengths and limitations

Strengths include a relatively large sample, the simultaneous assessment of sleep, dreaming, and distress using established instruments administered on their native scales, the inclusion of key disease-related characteristics (dialysis modality, duration, and aetiology), the use of multivariable modelling with effect sizes and confidence intervals, and correction for multiple testing. Several limitations should be considered when interpreting the findings. Because the design was cross-sectional, causal or directional inference is not possible, and it cannot be determined whether sleep disturbance and dream-related distress precede psychological distress or arise as consequences of it. Participants were recruited by convenience sampling from a single tertiary centre, which may limit generalisability to patients in community settings or with earlier-stage CKD and introduces the possibility of selection bias. Self-report instruments are subject to recall and social-desirability bias, which may be pronounced where mental-health stigma is prevalent. Although the MADRE items were administered using their native response formats, the questionnaire has not been formally validated in Sinhala, and further psychometric work, including confirmatory factor analysis and test-retest assessment in this population, is warranted. While modality, duration, and aetiology were recorded, finer clinical parameters, including dialysis adequacy (Kt/V), ultrafiltration volume, haemoglobin, and medication regimen, were not captured and may have confounded the observed associations (Murtagh et al., 2007). Finally, sleep duration and REM-sleep quantity were not measured objectively, so the relationship between dreaming and distress could not be separated from underlying sleep architecture.

Recommendations

Nephrology services in Sri Lanka and comparable LMIC settings should consider routine screening for psychological distress and sleep quality using validated tools, with enquiry about nightmare frequency and dream-related mood disturbance incorporated into psychosocial assessment. Cognitive-behavioural therapy for insomnia and imagery rehearsal therapy for nightmares should be adapted and evaluated for the local context. Longitudinal, multi-centre studies that incorporate clinical variables are needed to establish the temporal and potentially causal relationships between sleep, dreaming, and distress, and mixed-methods research should explore the subjective meaning of distressing dreams in this population.

Conclusions

Among patients with CKD receiving dialysis at a national nephrology hospital in Sri Lanka, poor sleep quality affected 72.0% of participants, psychological distress was moderate and widely distributed, and emotionally charged dreaming was common. After adjustment for socio-demographic and sleep variables, dream-related sleep disturbance, nightmare frequency, and male sex were independently

associated with distress. These cross-sectional findings indicate that distressing dream characteristics are associated with psychological distress and may represent a clinically informative, under-recognised dimension of morbidity in this population. Incorporating systematic psychological and sleep screening, including assessment of distressing dreams, into routine nephrology care represents a practical, low-cost strategy that warrants evaluation in Sri Lanka and comparable LMIC settings.

Abbreviations

CBT-I: Cognitive-behavioural therapy for insomnia; CKD: Chronic kidney disease; CKDu: Chronic kidney disease of undetermined aetiology; DASS-21: Depression Anxiety Stress Scales-21; GBD: Global Burden of Disease; HIC: High-income country; LMIC: Low- and middle-income country; MADRE: Mannheim Dream Questionnaire; NNSH: National Nephrology Specialised Hospital; PSQI: Pittsburgh Sleep Quality Index; STROBE: Strengthening the Reporting of Observational Studies in Epidemiology; VIF: Variance inflation factor.

Declarations

Ethics approval and consent to participate Ethical approval was obtained from the Ethics Review Committee of KAATSU International University (KIU), Sri Lanka (Approval No. [KIU_ERC_25_027]), and from the institutional review committee of the National Nephrology Specialised Hospital, Polonnaruwa. The study followed the Declaration of Helsinki. Written informed consent was obtained from all participants.

Consent for publication Not applicable. The manuscript contains no individually identifiable data.

Availability of data and materials The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Competing interests The authors declare that they have no competing interests.

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Authors' contributions EMSKE, AJWANW, SSS, AGWKE, and DASE contributed to study design, data collection, analysis, and drafting. NR and ACHP supervised the study, contributed to design and interpretation, and critically revised the manuscript. All authors read and approved the final manuscript.

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