

Sleep Health and COVID-19-related Anxiety during the Lockdown Phase of the Pandemic in Nigeria: A Preliminary Report

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ABSTRACT

Background: During the pandemic's peak, changes in sleep and dreaming were reported around the world.

Objective: The objective was to assess changes in sleep and dreaming during the lockdown phase of the coronavirus disease-2019 (COVID-19) pandemic in Nigeria. It also aimed to determine how these changes might be related to COVID-19-related fear.

Methods: This was a cross-sectional study conducted during the lockdown period of the COVID-19 pandemic in Nigeria. Data were collected from 288 respondents using an online survey. Apart from sociodemographic characteristics, questions were asked about sleep and dream changes. The Pittsburgh Sleep Quality Index (PSQI) and the Fear of COVID-19 Scale (FCS) were also administered.

Results: The mean age of respondents was 33 years, and 52% were females. Poor sleep quality was present in 65.1%. An increase in dream recall frequency (DRF) was reported in 20.5%, while 15.5% mainly had negatively themed dreams. Sleep latency, sleep disturbances, and daytime dysfunction were significantly associated with changes in DRF ($p < 0.05$). Subjective sleep quality, habitual sleep efficiency, sleep disturbances, daytime dysfunction, overall sleep quality, and fear of COVID-19 were all significantly associated with the theme of dreams ($p < 0.05$). In binary logistic regression, fear of COVID-19 [odds ratio (OR): 1.07, 95% confidence interval (CI): 1.02–1.13], negatively themed dreams (OR: 8.03, 95% CI: 1.81–35.57), and positively themed dreams (OR: 0.38 95% CI: 0.17–0.87) emerged as predictors of sleep quality.

Conclusion: The COVID-19 pandemic impacted sleep quality at its peak.

Clinical significance: Clinicians should pay more attention to dream changes as they could serve as indicators of sleep quality.

Keywords: Anxiety, COVID-19, Dreams, Pandemics, Sleep.

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INTRODUCTION

At its peak, the COVID-19 pandemic resulted in the deaths of over 3 million people worldwide.¹ Governments enacted measures to minimize contact with the infected and limit viral transmission. As a result, billions found themselves in isolation following unprecedented lockdown measures worldwide. Many aspects of living were affected, including food systems, public health, and work.² Fear of infection or death, in addition to reduced social contact, had a substantial impact on psychological well-being.³ There were reports of increases in anxiety, depression, phobias, cognitive changes, avoidance, compulsive behavior, and somatization in the general population.^{4,5} Substance use and suicidal thoughts were also rising among young adults.⁶

In addition, changes in sleep and dreaming among healthy individuals worldwide were anecdotally reported and subsequently substantiated by research.^{7–9} Dream recall frequency has been confirmed to have increased during the pandemic. It is associated with nightmares, sleep maintenance problems, repeated disturbing thoughts, and emotional intensity. It is worth noting that an increase in dreaming is considered an increase in DRF. Dreaming has been proven to occur even among those who report that they have never dreamed.¹⁰ The difference is thus in the recall of dreams and not the actual occurrence of dreaming. Change in the rate of dreaming is more accurately an increase in recall frequency.

Significant correlations between qualitative/emotional dream features and COVID-19-related factors that cause anxiety,

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such as fear of contagion, have also been found.^{7,11} Also, anxiety has been shown to have a relationship with negatively themed dreams. However, most studies either used measures of anxiety not explicitly related to COVID-19 or single-item measures of COVID-19-related anxiety, which might have limitations in terms of validity.

To the best of our knowledge, very few African studies have examined sleep and dreaming during the lockdown phase of the pandemic. The study's objective was to determine the relationship between COVID-19-related fear and sleep quality. Furthermore, it

assessed the frequency and theme of dreams and their correlates during the lockdown phase of the pandemic in Nigeria.

METHODS

Study Setting and Design

A cross-sectional study using an anonymous online survey was conducted among Nigerians. Data were collected in May 2020, which was the peak of the COVID-19 pandemic. There was a national lockdown in Nigeria during this time, and an online survey was the safest approach to data collection.

Only adult Nigerians over 18 years who provided informed consent were eligible for participation. A convenience sample based on response to the online questionnaire was used for this study.

Sample Size Calculation

The formula for known proportions $Z\alpha^2 pq/d^2$ was used to estimate sample size.¹² Using a 95% CI at a precision level of 5% and a proportion of sleep disorders from a previous Nigerian study (29.7%), we calculated a sample size of 288.¹³

Study Instruments

The study instrument was a compiled online survey using Google Forms. The first page provided information concerning the study objectives and included a question on consent for participation. Subsequent pages had questions concerning essential sociodemographic variables such as age and gender.

A single question was used to elicit information concerning the frequency of dreams (*In the last 2 months, how frequently do you have dreams during your night sleep? "I am dreaming more" "I am dreaming less" "No change"*). This variable was analyzed as "DRF". A single question also assessed dream themes (*What is the commonest theme of your dreams over the last 2 months? "Mostly good" "Mostly bad" "Mostly neutral"*).

The Pittsburgh Sleep Quality Index (PSQI): This instrument measured respondents' sleep quality over the previous month.¹⁴ It has 19 self-related questions that are scored to generate seven components of sleep as follows: subjective sleep quality (C1), sleep latency (C2), sleep duration (C3), sleep efficiency (C4), sleep disturbances (C5), use of sleeping medication (C6), and daytime dysfunction (C7). The components are summed to yield a global score. Generally, higher scores indicate poorer sleep and a global score of 5 or more marks the poor sleeper. The scale has been reported to have good reliability and validity and has been translated to over 50 languages.¹⁵

The Fear of COVID-19 Scale (FCS): This is a 7-item self-report that measured the fear of COVID-19 among adult populations.¹⁶ Its items inquire about fear or anxiety responses that arise in response to the pandemic. The sixth item of the scale (*I cannot sleep because I am worried about getting coronavirus-19*) was excluded when summing the scale to avoid spurious statistical associations with PSQI. The scale does not use cutoffs and was treated as a continuous variable in statistical analysis.

Data Collection

Invitations for study participation were shared via social media platforms. These invites contained a link that granted access to the online forms. Data collection ended when the calculated sample size was reached and exported for analysis.

Ethical Consideration

This study received ethical clearance from the Research Ethics Board of the Federal Neuropsychiatric Hospital, Calabar, Cross River State (Ref no: FNPH/HREC/01/03). Only respondents who provided informed consent were participated. The data were collected anonymously, and confidentially was assured. This study was conducted following the principles of the Declaration of Helsinki.

Data Analysis

Data were analyzed using IBM SPSS Statistics for Windows, version 21.0. Categorical variables such as sociodemographic characteristics were expressed as frequencies and proportions, while continuous variables were expressed as means. In analyzing the relationship between DRF and dream theme, these variables were simplified to "change in frequency" and "no change" for dream frequency and "neutral" vs "emotionally charged" dreams (i.e., dreams with negative or positive themes) for dream theme. Analysis of variance (ANOVA) and *t* test were used to analyze continuous variables with Tukey's Honest Significant Difference (HSD) *post hoc* tests done to further elucidate significant relationships. A binary logistic regression, controlling for possible confounders such as age and gender, was done to assess fear of COVID-19 as a predictor of sleep quality. *p*-values were considered significant when less than 0.05.

RESULTS

Data collection was ended after 288 questionnaires were filled. Among these, ten questionnaires were discarded due to missing data, leaving 278 used for data analysis.

Table 1 shows the sociodemographic characteristics of the respondents. The majority were less than 35 years of age. Gender distribution was roughly equal, and most respondents were married. Almost a third reported an increase in DRF, and over a fourth reported emotionally charged dreams (i.e., dreams with either negative or positive themes). Poor sleep quality as assessed using the PSQI was present in over two-thirds of the sample.

Table 2 shows a bivariate comparison between changes in DRF and the emotional charge of dreams. Respondents who reported changes in DRF had significantly more emotionally charged dreams ($p < 0.01$).

Table 3 shows the association between FCS, PSQI, and DRF. Component 2 (sleep latency), component 5 (sleep disturbances), and component 7 (daytime dysfunction) of the PSQI were significantly associated with changes in DRF ($p < 0.05$). To further illuminate these associations, *post hoc* tests showed that a reduction in DRF was associated with significantly longer sleep latency (component 2) compared to those who had no change. Also, an increase in DRF was associated with significantly more sleep disturbances (component 5) than those with no change and significantly more daytime dysfunction (component 7) than those who dreamed less.

As seen in Table 4, FCS score, PSQI total score, C1 (subjective sleep quality), C4 (habitual sleep efficiency), C5 (sleep disturbances), and C7 (daytime dysfunction) were all significantly associated with the dream theme ($p < 0.05$). *Post hoc* tests revealed that respondents with mostly negatively themed dreams had significantly higher fear of COVID-19 compared to those with neutral dreams, significantly poorer sleep quality compared to those with positive or neutral dreams, significantly poorer subjective sleep quality compared to those with positive or neutral dreams, significantly higher sleep disturbances compared to those with positive or neutral dreams,

Table 1: Sociodemographic and dream-related characteristics of sample

Variable	Frequency (n = 278)	Percentage (100%)
Age		
18–25	60	21.6
26–30	51	18.3
31–35	80	28.8
36–40	39	14.0
41–45	24	8.6
Above 45	24	8.6
Mean = 32.96 (SD: 8.72)		
Gender		
Male	149	53.6
Female	125	45.0
Marital status		
Married	146	52.5
Unmarried	132	47.5
Employment		
Student	44	15.8
Employed	192	69.1
Unemployed	42	15.1
Medical condition		
No	244	87.8
Yes	34	12.2
Changes in frequency of dreaming		
Dreaming more	57	20.5
Dreaming less	33	11.9
No change	172	61.9
Not applicable	16	5.8
Themes of dreams		
Bad	43	15.5
Good	36	12.6
Neither	183	65.8
Not applicable	16	5.8
Sleep quality (PSQI)		
Bad	181	65.1
Good	97	34.9

Table 2: Relationship between changes in the frequency of dream recall and emotional charge of dreams

Dependent variable	Neutral	Charged	Statistical test
Changes in DRF			
No change	129 (75.0%)	43 (25.0%)	$\chi^2 = 6.31$
Change	54 (60.0%)	36 (40.0%)	$p = 0.01$

and significantly higher daytime disturbances compared to those with neutral dreams. Respondents with mostly positive dreams had significantly better sleep efficiency than those with bad or neutral dreams.

Binary logistic regression was done to assess FCS as a predictor of sleep quality, controlling for sociodemographic variables (Table 5). Fear of COVID-19, negatively and positively themed dreams emerged significant predictors of sleep quality. While FCS and negatively themed dreams predicted poor sleep, having positively themed dreams predicted good sleep.

DISCUSSION

This study aimed to examine sleep during the peak of the COVID-19 pandemic and its association with the fear of COVID-19. We found that roughly one-third had changes in DRF and over a quarter had emotionally charged dreams. Poor sleep was present in most respondents. Changes in DRF had significant associations with sleep latency, sleep disturbances, and daytime dysfunction. Having mostly negatively themed dreams was associated with fear of COVID-19, poorer subjective sleep quality, more sleep disturbances, daytime dysfunction, and poorer overall sleep quality. On the contrary, having positively themed dreams was associated with better sleep efficiency. Also, FCS scores, having positively themed dreams and negatively themed dreams, emerged as predictors of sleep quality as measured by the PSQI. Finally, changes in DRF were associated with having emotionally charged dreams.

The prevalence of poor sleep as measured by the PSQI was higher than some reports but lower compared to others.¹⁷ Our findings confirm that changes in DRF occurred during the lockdown phase of the first wave. The proportion with dream frequency changes was less than the report by Conte et al., where almost 50% reported changes in DRF during total lockdown while about 40% reported DRF changes in partial lockdown.¹⁸ Our DRF was also less than that reported by other studies.^{7,8} These studies were conducted in Europe where mortality was higher and lockdowns were stricter compared to Nigeria. Thus, COVID-related psychological stress could have been less among Nigerians with lesser effects on sleep. Several reasons have been proposed to explain changes in DRF. During lockdowns, sleep duration increased. The latter is associated with more intermittent awakening and higher DRF. Also, delayed sleep could be responsible. Sleeping later than usual increases rapid eye movement (REM) sleep which comes much later in the sleep cycle, with a concomitant increase in DRF.⁹ Increased intermittent awakening and sleep latency have been demonstrated during the pandemic.¹⁹

Other studies have similarly shown an association between changes in DRF and emotionally charged dreams. Dream recall frequency is over four times more likely among people who had nightmares during the pandemic.⁷ Emotionally charged dreams may be more likely to cause intermittent awakening due to heightened arousal, increasing the frequency of dream recall. The “salience effect” might also play a role. It proposes that it is commoner to remember dreams with important details.¹⁸

We found that sleep latency was increased in persons who had reduced DRF compared to those with no change in DRF. This finding is similar to a study that found lower dream recall among subjects with an increased sleep latency of over 30 minutes. They suggested that delayed sleep onset might impair the cognitive processes required to remember the content of dreams.²⁰

Sleep disturbances were significantly higher among persons with more DRF than those with no change. It is expected that sleep disturbances might lead to more awakenings at night, which has been shown to increase DRF.²¹ More awakening due to disturbed sleep would increase opportunities for registering and rehearsing content of dreams with concomitant increases in recall.

Respondents who had more DRF had higher scores in the daytime dysfunction component of PSQI. High recallers have a higher number of awakenings than low recallers, which allows memory encoding.²¹ Also, multiple arousals at night are associated with daytime sleepiness and might explain this finding.²²

Table 3: Correlates of change in dream recall frequency due to the COVID-19 pandemic

Variable	Fear of COVID-19 scale (mean, SD)	ANOVA	Tukey's post hoc	p-value
Change in DRF				
Increased	19.08 (5.68)	$F = 1.49$		
Decreased	19.18 (5.37)	$p = 0.22$		
No change	17.77 (6.21)			
PSQI total (mean, SD)				
ANOVA				
Change in DRF				
Increased	7.05 (3.27)	$F = 1.56$		
Decreased	6.27 (3.66)	$p = 0.21$		
No change	6.15 (3.28)			
C1 Subjective sleep quality (mean, SD)				
ANOVA				
Change in DRF				
Increased	1.16 (0.86)	$F = 1.85$		
Decreased	0.94 (0.82)	$p = 0.15$		
No change	0.91 (0.86)			
C2 Sleep latency (mean, SD)				
ANOVA				
Tukey's post hoc				
p-value				
Change in DRF				
Increased	1.26 (0.97)	$F = 3.13$	Increased: no change	ns
Decreased	1.48 (1.03)	$p = 0.03^*$	Decreased: no change	0.04*
No change	1.04 (0.91)		Increased: decreased	ns
C3 Sleep duration (mean, SD)				
ANOVA				
Change in DRF				
Increased	0.96 (0.92)	$F = 1.32$		
Decreased	0.96 (0.72)	$p = 0.26$		
No change	1.14 (0.83)			
C4 Sleep efficiency (mean, SD)				
ANOVA				
Change in DRF				
Increased	0.52 (0.80)	$F = 0.72$		
Decreased	0.69 (1.13)	$p = 0.48$		
No change	0.48 (0.89)			
C5 Sleep disturbances (mean, SD)				
ANOVA				
Tukey's post hoc				
p-value				
Change in DRF				
Increased	1.45 (0.75)	$F = 3.94$	Increased: no change	0.01*
Decreased	1.18 (0.68)	$p = 0.02^*$	Decreased: no change	ns
No change	1.19 (0.57)		Increased: decreased	ns
C6 Use of sleep medication (mean, SD)				
ANOVA				
Change in DRF				
Increased	0.39 (0.86)	$F = 0.33$		
Decreased	0.24 (0.66)	$p = 0.71$		
No change	0.34 (0.81)			
C7 Daytime dysfunction (mean, SD)				
ANOVA				
Tukey's post hoc				
p-value				
Change in DRF				
Increased	1.29 (0.92)	$F = 4.29$	Increased: no change	ns
Decreased	0.75 (0.79)	$p = 0.01^*$	Decreased: no change	ns
No change	1.03 (0.85)		Increased: decreased	0.01*

ns, not statistically significant; * $p < 0.05$

Negatively themed dreams were associated with increased fear of COVID-19, consistent with a previous study that found an association between negatively themed dreams and anxiety during the lockdown.⁸ However, they used a measure of generalized anxiety, unlike our study. Another study that used a single question to assess fear of COVID-19 also found a relationship with negatively themed dreams.²³ Some evidence supports the association

between anxiety and disturbing dreams.²⁴ Such individuals might have “thin boundaries” between sleep and awake states, allowing the interpenetration of contents. Also, the suppression of distressing mentation in the daytime has been associated with their emergence in dreams.²⁵

Poor sleepers have higher rates of negatively themed dreams, consistent with previous studies.^{26,27} We also found that bad dreams

Table 4: Correlates of dream themes during the COVID-19 pandemic

<i>Variable</i>	<i>Fear of COVID-19 scale (mean, SD)</i>	<i>ANOVA</i>	<i>Tukey's post hoc</i>	<i>p-value</i>
Dream theme				
Negative	21.2 (5.97)	$F = 8.46$	Negative: neutral	0.000*
Positive	19.25 (6.01)	$p = 0.000$	Positive: neutral	ns
Neutral	17.332 (5.79)		Negative: positive	ns
	<i>PSQI total (mean, SD)</i>	<i>ANOVA</i>	<i>Tukey's post hoc</i>	<i>p-value</i>
Dream theme				
Negative	8.25 (2.90)	$F = 9.86$	Negative: neutral	0.000
Positive	5.27 (3.23)	$p = 0.000$	Positive: neutral	ns
Neutral	6.13 (3.29)		Negative: positive	0.000
	<i>C1 Subjective sleep quality (mean, SD)</i>	<i>ANOVA</i>	<i>Tukey's post hoc</i>	<i>p-value</i>
Dream theme				
Negative	1.60 (0.82)	$F = 17.78$	Negative: neutral	0.000
Positive	0.61 (0.59)		Positive: neutral	ns
Neutral	0.89 (0.84)	$p = 0.000$	Negative: positive	0.000
	<i>C2 Sleep latency (mean, SD)</i>	<i>ANOVA</i>		
Dream theme		$F = 2.30$		
Negative	1.41 (0.93)	$p = 0.10$		
Positive	1.00 (0.89)			
Neutral	1.11 (0.96)			
	<i>C3 Sleep duration (mean, SD)</i>	<i>ANOVA</i>		
Dream theme				
Negative	1.02 (0.88)	$F = 1.10$		
Positive	0.91 (0.84)	$p = 0.33$		
Neutral	1.13 (0.83)			
	<i>C4 Sleep efficiency (mean, SD)</i>	<i>ANOVA</i>	<i>Tukey's post hoc</i>	<i>p-value</i>
Dream theme		$F = 3.56$		
Negative	0.67 (0.94)	$p = 0.03^*$	Negative: neutral	ns
Positive	0.16 (0.37)		Positive: neutral	0.04
Neutral	0.55 (0.95)		Negative: positive	0.03
	<i>C5 Sleep disturbances (mean, SD)</i>	<i>ANOVA</i>	<i>Tukey's post hoc</i>	
Dream theme				
Negative	1.58 (0.73)	$F = 7.40$	Negative: neutral	0.000
Positive	1.22 (0.76)	$p = 0.001$	Positive: neutral	ns
Neutral	1.17 (0.56)		Negative: positive	0.03
	<i>C6 Use of sleep medication (mean, SD)</i>	<i>ANOVA</i>		
Dream theme		$F = 1.62$		
Negative	0.53 (1.05)	$p = 0.19$		
Positive	0.36 (0.89)			
Neutral	0.29 (0.71)			
	<i>C7 Daytime dysfunction (mean, SD)</i>	<i>ANOVA</i>	<i>Tukey's post hoc</i>	<i>p-value</i>
Dream theme				
Negative	1.41 (0.76)	$F = 4.55$	Negative: neutral	0.009
Positive	1.00 (1.04)	$p = 0.01$	Positive: neutral	ns
Neutral	0.98 (0.84)		Negative: positive	ns

ns, not statistically significant; * $p < 0.05$

predicted poor sleep in regression analysis. An Italian study showed that poorer sleep predicted the emotional load of dreams during the lockdown.²⁸ Another study showed an association between

negatively themed dreams and global PSQI scores, consistent with our study.²³ Multiple awakenings have been associated with negative dreams, explaining poorer overall sleep quality.²⁹

Table 5: Predictors of poor sleep

Predictor	B	WALD	p-value	OR	95% CI	
					Lower	Upper
Age	0.02	0.92	0.33	1.02	0.97	1.06
Gender						
Male	-0.24	0.69	0.40	0.78	0.43	1.40
Female	ref					
Employment						
Student	0.80	1.93	0.16	2.27	0.72	6.88
Employed	0.31	0.50	0.47	1.37	0.57	3.25
Unemployed	ref					
Medical condition	-0.18	0.14	0.70	0.83	0.32	2.11
Change in freq						
More (1)	0.189	0.20	0.65	1.20	0.52	2.75
Less (2)	-0.70	2.80	0.94	0.49	0.21	1.12
No change (0)						
Dream theme						
Negative	2.08	7.54	0.006	8.03	1.81	35.57
Positive	-0.95	5.24	0.02	0.38	0.17	0.87
Neutral	ref					
FCS	0.07	7.95	0.005	1.07	1.02	1.13

Positively themed dreams were associated with better sleep efficiency. Also, positive dreams seemed to reduce the odds of poor sleep in regression analysis. Studies that assess the relationship between having positive dreams and sleep efficiency or sleep quality are scarce. Most focus on negative dreams, perhaps due to their psychopathological relevance. One might assume that if negatively themed dreams are bad for sleep, positively themed dreams might be beneficial. However, the effect of positive dreams needs to be substantiated further in research.

Unsurprisingly, negatively themed dreams were associated with more sleep disturbances (probably due to increased arousal and awakenings) and daytime dysfunction (multiple awakenings could lead to poorer night sleep and hence daytime sleepiness). These findings further underscore the impact of negatively themed dreams on sleep health.

CONCLUSION

We found that the lockdown phase of the COVID-19 pandemic was associated with sleep changes. Specifically, there was an alteration in DRF which was significantly associated with emotionally charged dreaming. Variation in DRF and the emotional tone of dreams was associated with changes in the different aspects of sleep such as sleep latency and subjective sleep quality. Furthermore, fear of COVID-19 infection and the emotional tone of dreams predicted overall sleep quality.

Clinical Significance

These findings highlight the impact of the COVID-19 pandemic on the psyche of the population. The pandemic has been described as a collectively traumatic event and the associated psychological response varies from person to person. Existential crises can affect sleep and this is apparently supported by the observed relationship between the fear of COVID-19 during the lockdown

phase of the pandemic and sleep quality. The nature of dreams tends to be neglected in assessment of sleep quality. Our research shows that dream changes have a significant relationship to the quality of sleep. Heightened levels of anxiety or other negative emotions when present generally worsen the impact of stressful experiences on sleep. Since stressful experiences cannot be avoided, managing stress responses using healthy coping strategies will minimize the effect of trauma on sleep health.

Strengths and Limitations

Data on the sleep changes during the lockdown phase of the pandemic from sub-Saharan Africa are quite scarce. Our study bridges the knowledge gap in this regard. Furthermore, this is one of the few studies that show an association between sleep quality and anxiety specific to COVID-19 that was measured with a validated instrument.

Our results should, however, be interpreted considering some limitations. Data were collected using an online survey which is prone to self-selection bias. At the time, however, using online surveys was sensible considering social distancing rules. Measuring sleep and other core variables using self-report might be associated with social desirability bias and recall bias.

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