Original article

Sleep-related worry, sleep hygiene and associated factors in patients with depressive disorders at Psychiatric Outpatient Department, King Chulalongkorn Memorial Hospital

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Abstract

Background: Previous studies have shown that patients with depressive disorders suffered greatly from symptoms of insomnia and struggled to comply with sleep hygiene practice, causing strong dissatisfaction over sleep quantity and its quality. However, studies on sleep-related worry, sleep hygiene and its associated factors in Thai depressed patient are still limited.

Objective: To study sleep-related worry and sleep hygiene behaviors among depressed patients at department of psychiatry, King Chulalongkorn Memorial Hospital (KCMH), and to determine any associated factors on depression and sleep behaviors with sleep-related worry.

Methods: This was a cross-sectional study conducted at the department of psychiatry, KCMH. We recruited 144 patients aged 18 years and above diagnosed with major depressive disorder, persistent depressive disorder or unspecified depressive disorder using diagnostic and statistical manual of mental disorders, fifth edition (DSM-5) criteria. All subjects completed demographic questionnaires, the anxiety and preoccupation about sleep questionnaire (APSQ), the sleep hygiene awareness and practice scale (SHAPS) and the quick inventory of depressive symptomatology (QIDS SR-16). Subsequently, medical records were accessed obtaining data on type of depressive disorder, duration of depression treatment at KCMH and current antidepressants.

Results: Most subjects were female. The median standard deviation of sleep-related worry was 56.95 (26.99) scores (interquartile range) of sleep-related worry on APSQ, sleep hygiene practice on SHAPS were 61.0 (35.5 - 77.8) and 32.0 (24.0 - 45.0) respectively. Factors related with sleep-related worry were sleep hygiene practice, sleep onset latency, sleep disturbances, excessive daytime sleepiness, sleep efficiency, depressive symptoms, and total sleep time ($P < 0.001$).

Conclusion: These findings can be applied in reducing sleep-related worry among the depressed patients by promoting good sleep quality through an individual or group sleep hygiene psychoeducation.

Keywords: Depression, insomnia, sleep-related worry, sleep hygiene.

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E-mail: siriluckspp@gmail.com
Received: May 20, 2022
Revised: June 5, 2022
Accepted: July 10, 2022

Insomnia is the most common form of sleeping disorders. It affects as much as 20.0% of the adult population worldwide[1] and approximately 10.0% in Thailand.[2] Individuals with insomnia generally report dissatisfaction with sleep quality or quantity with at least one of these symptoms, namely: difficulty initiating sleep, difficulty maintaining sleep, or early morning awakening.[3] Existing research on insomnia revealed that impaired sleep, without proper treatment, is associated with psychiatric conditions including depression and anxiety, road accidents, deteriorating academic/work performance and decreased quality of life.[4]

The relationship between insomnia and psychiatric conditions has been extensively studied to understand underlying mechanisms between sleep disruption and mental health disorders such as major depressive disorder (MDD) and to mitigate manifesting symptoms with higher efficiency. One study showed that two-thirds of patients with the MDD reported insomnia co-morbidity. The symptoms of insomnia contribute to less consolidated sleep and more sleep fragmentation due to shorter rapid eye movement (REM) latency and impaired slow-wave sleep.[5] Furthermore, insomnia in the depressed patients leads to lower treatment adherence and higher suicidal risk, when compared with their counterparts who reported no sleep problem.[6, 7]

Sleep-related worry, worrisome thoughts resulted from getting poor sleep and losing an ability to control sleep, is an everyday phenomenon encountered among the patients with MDD. One study demonstrated that individuals with chronic insomnia facing sleep-related worry would experience poor sleep quality. Having sleep-related worry reduced was found to have an association with insomnia severity and depressive symptoms.[8]

Sleep hygiene is knowledge on behavioral and environmental modification to increase sleep efficiency. Its goals are to deliver basic guidelines to tackle sleep-interfering factors and reduce mental stimulating pre-sleep arousal including stressful and anxious thoughts. Despite its lower effectiveness in comparison to antidepressant and cognitive-behavior therapy for insomnia (CBT-I), sleep hygiene is one possible technique in managing the symptoms of insomnia at low cost with no technical training required.[9]

Considering the relationship between sleep-related worry and sleep hygiene through the 3P model of insomnia (predisposing factor, precipitating factor, and perpetuating factor) proposed by Spielman AJ, *et al*.[10], both sleep-related worry and sleep hygiene are essentially related. Sleep-related worry causes the symptoms of insomnia to persist or get worse[8] while sleep hygiene aims to prevent the symptoms from perpetuating. Even if sleep worry and lack of proper sleep hygiene in depressed patients contribute to the perception of poor sleep quality and aggravating depressive symptoms, the available data regarding the association among these factors remains scarce, especially in the context of Thailand.

Hence, the purposes of this study were to describe sleep-related worry and sleep hygiene behaviors among depressed patients at the Department of Psychiatry, King Chulalongkorn Memorial Hospital, to explain an association between sleep-related worry and sleep hygiene, and to present any associated factors on depression and sleep behaviors with sleep-related worry.

Materials and methods

Study population

This study was a cross-sectional descriptive study, conducted at the Outpatient Clinic, Department of Psychiatry, King Chulalongkorn Memorial Hospital, (KCMH) Thailand from September to December 2021. The sample size was one hundred and forty-four, calculated by using a Cochran Formula. Subjects aged 18 years or above and diagnosed by psychiatrists with either major depressive disorder (MDD), persistent depressive disorder (PDD) or dysthymia or unspecified depressive disorder (UDD) based on the diagnostic and statistical manual of mental disorders, fifth edition (DSM-5) were recruited with informed consents if they had no evidence of schizophrenia and other psychotic disorders, bipolar disorder, major neurocognitive disorders, organic psychosis, or substance use disorders. The study has been approved by the Ethics Committee of the Faculty of Medicine, Chulalongkorn University (no. 422/64).

Data collection

As for this study, the data were obtained from two sources, namely: self - reporting questionnaires and medical records accessed through patient records system.

Self-reporting questionnaires covered demographic questionnaires, the anxiety and preoccupation about sleep questionnaire (APSQ),

the sleep hygiene awareness and practice scale (SHAPS) and the quick inventory of depressive symptomatology (QIDS SR-16). Subsequently, the researcher gathered the data regarding type of depressive disorder, duration of depression treatment at KCMH and current antidepressants by completing a medical records form.

Demographic questionnaire consisted of individual's demographic variables and sleep-related factors. Individual's demographic factors were items on gender, age, educational level, marital status, family background of depression and physical symptoms. Sleep-related factors included total sleep time, sleep onset latency, nighttime awakening behavior, sleep disturbances, night noise, sleep efficiency, and daytime napping behavior.

Sleep-related worry was assessed by APSQ – Thai version. The researcher received an approval to translate the Thai version of the measurement. [11] The APSQ contains 10 items evaluating sleep-related concerns. Subjects were asked to rate the truth of each statement over the past month (1 "not true"; 10 "very true"). Therefore, possible scores range from 10 - 100, and the higher scores implies more worry about sleep. The Thai version had a good validity (IOC = 0.83) and good internal consistency with Cronbach's alpha coefficient ($\alpha = 0.94$).

Sleep hygiene practice was measured by the SHAPS – Thai version. The scale was developed by Lacks P. and Rotert M. [12], translated into Thai by Chimluang J. [13] There were 19 items with 15 negatively and four positively worded statements. The total scores range from 0 to 87, with the higher scores suggest the worse quality of sleep hygiene practice. The SHAPS has good internal consistency with Cronbach's alpha coefficient ($\alpha = 0.63$) and good content validity index (CVI = 1).

The assessment of depression severity was performed using the QIDS SR-16 - Thai version, which was developed by Rush AJ, *et al*. [14] and translated into Thai by Suppapitiporn S, *et al.* [15] The QIDS SR-16 consists of 16 items and scores range from 0 to 27 and categorized into five degrees of depression severity; no depression (0 - 5), mild depression (6 - 10), moderate depression (11 - 15), severe depression (16 - 20), and very severe depression (21 - 27). The QIDS SR-16 has good internal consistency with Cronbach's alpha coefficient ($\alpha = 0.83$).

Statistical analysis

Data were analyzed using SPSS software for Windows 22.0 and reported by frequency and percentage for categorical variables, mean and standard deviation (SD) and median and interquartile range (IQR) for continuous variables. The associated factors of sleep-related worry were analyzed by Mann-Whitney U test, Kruskal-Wallis test, and Spearman's ranked correlation coefficient. P – value < 0.05 based on a two-tailed test was considered as statistically significant.

Results

Subject characteristics

Table 1 shows the demographic characteristics and sleep-related factors of the patients with depressive disorder (n = 144). More than half of the participants (72.9%) were female. The median (IQR) age was 29 (24 - 37) years, and the majority of the subjects were single (73.6%). MDD (65.3%), PDD (20.1%) and UDD were diagnosed in the research subjects (14.6%). The majority of them, 88 patients (66.1%), had been treated at KCMH for two years or less, and 131 patients (91.0%) were currently taking antidepressants. However, most patients did not use sleep-promoting antidepressant (73.6%)

Regarding sleep-related factors, the average amount of sleep among the patients were categorized into three groups, including less than 6 hours (35.4%), 6 - 8 hours (35.4%) and more than 8 hours (29.2%). Most subjects struggled with difficulty initiating sleep (85.4%) and reported nighttime awakening behavior (77.8%). Sleep disturbances were found in the patients with depressive disorder (73.6%), and excessive daytime sleepiness (EDS) was most frequently reported symptom (55.6%). The majority of the participants had low level of sleep efficiency (60.4%), and regularly napped on daily basis (62.5%).

As for this study, data on sleep-related worry and sleep hygiene were not normally distributed. Hence, the median scores (interquartile range) of sleep related worry on APSQ and sleep hygiene practice on SHAPS were 61.0 (35.5 - 77.8) and 32.0 (24.0 - 45.0), as presented in Table 2. The median (SD) of sleep-related worry was 56.95 (26.99) Additionally, the mean of the depression score based on QIDS SR-16 was 13.0 ± 5.8, while the median score (with IQR) was 14.0 (9.0 - 17.0.)

Table 1. Subjects' demographic characteristics and sleep-related factors.

Demographic characteristics	n	%	Sleep-related factors	n	%
Gender			**Total sleep time (mins)**		
Male	39	27.1	Less than 360 (6 hours)	51	35.4
Female	105	72.9	360 – 480 (6 - 8 hours)	51	35.4
Age (years)[16]			More than 481 (8 hours)	42	29.2
18 - 40	124	86.1	(Median (IQR) = 415 (330-508), Min, Max = 100, 960)		
Above 40	20	13.9	**Sleep onset latency (mins)**		
(Median (IQR) = 29 (24 - 37), Min, Max = 18, 62)			Normal (≤ 20)	21	14.6
Education level			Late (> 20)	123	85.4
Lower than bachelor	26	18.1	(Median (IQR) = 60 (30 - 120), Min, Max = 0, 390)		
Bachelor or above	118	81.9	**Nighttime awakening behavior**		
Marital status			No	32	22.2
Single	106	73.6	Yes	112	77.8
Couples	30	20.8	**Sleep disturbances**		
Separated	2	1.4	No	38	26.4
Divorced	2	1.4	Yes	106	73.6
Widowed	4	2.8	**Excessive daytime sleepiness**		
Physical symptoms			No	80	55.6
No	87	60.4	Yes	64	44.4
Yes	57	39.6	**Night noise**		
Family background of depression			No	83	57.6
No	87	60.4	Yes	61	42.4
Yes	57	39.6	**Sleep efficiency**		
Type of depressive disorder			Low (< 85)	87	60.4
Major depressive disorder	94	65.3	High (≥ 85)	57	39.4
Persistent depressive disorder	29	20.1	(Median (IQR) = 81 (70-90), Min, Max = 15, 100)		
Unspecified depressive disorder	21	14.6	**Daytime napping behavior**		
Duration of depression treatment			No	54	37.5
2 years or less	88	61.1	Yes	90	62.5
More than 2 years	56	38.9	(Median (IQR) = 30 (0.00 - 60), Min, Max = 0, 240)		
(Median (IQR) = 1.5 years (2.92 years – 0.75 year) Min, Max = 0.08 year, 9.33 years)			**Current use of sleep-promoting antidepressants (SARI, NaSSAs, TCAs, Melatonin receptor agonist, AMSs)**		
Current antidepressants			No	106	73.6
No	13	9.0	Yes	38	26.4
Yes	131	91.0			

Table 2. Median (IQR), minimum and maximum of sleep-related worry, sleep hygiene practice, depression, and frequency of depression levels of patients with depressive disorders (n = 150).

Questionnaire title	Median	IQR	Max - Min
Sleep-related worry	61.0	35.5 - 77.8	100.0 - 10.0
Sleep hygiene practice	32.0	24.0 - 45.0	87.0 - 10.0
Depression	14.0	9.0 - 17.0	27.0 - 0.0
Mean (±SD) = 13.04 (± 5.79)			
Depression levels	**N**	**Percentage**	
No depression (0 - 5)	16	11.1	
Mild depression (6 - 10)	31	21.5	
Moderate depression (11 - 15)	46	31.9	
Severe depression (16 - 20)	38	26.4	
Very severe depression (21 - 27)	13	9.0	

Severity of depression

Of all subjects (n = 144) in this study, only 13 patients (11.1%) declared no symptom of depression whereas the remaining 133 patients (89.9%) reported depressive symptoms at four different levels: mild (21.5%), moderate (31.9%), severe (26.4%) and very severe (9.0%).

Correlations between sleep-related worry and related factors are shown in Table 3.

Depression, sleep hygiene practice and sleep onset latency were positively correlated with sleep-related worry (r = 0.476, 0.565, 0.303 respectively, $P < 0.001$), while total sleep time and sleep efficiency were negatively correlated with sleep-related worry (r = - 0.296, - 0.392 respectively $P < 0.001$). Furthermore, the results showed that depression, sleep hygiene practice, total sleep time, sleep onset latency and sleep efficiency were associated with sleep-related worry ($P < 0.01$). The magnitude of correlation level among associated factors was highest for sleep hygiene practice ($r = 0.565$, $P < 0.001$), followed by depression ($r = 0.476$, $P < 0.001$), sleep efficiency ($r = - 0.392$, $P < 0.001$), sleep onset latency ($r = 0.303$, $P < 0.001$), and was lowest for sleep duration ($r = - 0.296$, $P < 0.001$).

Table 3. Spearman's rank coefficients of correlations for sleep-related worry and related factors.

	1	2	3	4	5	6	7	8	9
Depression	-								
Depression: self-esteem	0.619**	-							
Depression: suicidal thought	0.743**	0.456**	-						
Depression: physical energy	0.656**	0.338**	0.368**	-					
Sleep hygiene practice	0.528**	0.317**	0.371**	0.419**	-				
Total sleep time (mins)	- 0.114	- 0.118	0.073	- 0.087	- 0.293**	-			
Sleep onset latency (mins)	0.332**	0.251**	0.132	0.134	0.260**	- 0.277**	-		
Sleep efficiency	- 0.332**	- 0.288**	- 0.100	- 0.218**	- 0.315**	0.575**	- 0.782**	-	
Sleep-related worry	0.476**	0.296**	0.299**	0.342**	0.565**	- 0.296**	0.303**	- 0.392**	-

*$P < 0.05$ ** $P < 0.001$

Table 4. Median comparison of sleep-related worry and associated factors in depressed patients.

Associated factors		Sleep-related worry Median (IQR)	N	*P - value*	*R*
Sleep onset latency (min)	Normal (≤ 20)	23.00 (10.50 - 53.50)	21		
	Late (> 20)	65.00 (45.00 - 81.00)	123	0.000*	0.313
Sleep disturbances	No	42.00 (13.50 - 64.25)	38		
	Yes	68.50 (47.75 - 81.00)	106	0.000*	0.322
Excessive daytime sleepiness	No	48.00 (17.00 - 69.75)	64		
	Yes	69.00 (51.25 - 81.75)	80	0.000*	0.314
Sleep efficiency	Low (< 85)	69.00 (51.00 - 82.00)	87		
	High (≥ 85)	47.00 (13.50 - 69.00)	57	0.000*	0.340
Depressive symptoms	No	13.00 (10.00 -58.75)	16		
	Yes	62.00 (45.50 - 81.00)	128	0.000*	0.322
Total sleep time (per day)	Less than 360 (6 hours)	59.00 (41.00 - 74.00)	51		
	360 - 480 (6 - 8 hours)	75.00 (51.00 - 83.00)	51		
	More than 481 (8 hours)	47.00 (27.50 - 69.00)	42	0.003†	

Mann-Whitney U Test, * is significant at $P < 0.001$

Kruskal-Wallis test, † is significant at $P < 0.01$

There were statistically significant differences in the patients' sleep-related worry scores based on following factors, namely sleep onset latency, sleep disturbances, excessive daytime sleepiness, sleep efficiency, depressive symptoms and total sleep time. The depressed patients whose sleep onset latency was above 20 minutes reported statistically higher score on sleep-related worry than their counterparts who initiated sleep within 20 minutes ($P < 0.001$). Those encountering sleep disturbances at night or excessive daytime sleepiness during daytime showed statistically higher score on worry about sleep than others who faced no similar issue ($P < 0.001$). Patients who slept with high efficiency generally expressed significantly lower sleep-related worry than the patients with low sleep efficiency ($P < 0.001$). Likewise, the patients with the total sleep time exceeding 8 hours tended to experience statistically lower anxious thoughts about sleep than the rest who slept for 8 hours or less ($P < 0.001$). In addition, the depressed patients who no longer experienced the depressive symptom would report significantly lower score on the APSQ than the patients who still struggled with the symptoms of depression.

Discussion

In this cross-sectional study, the median (IQR) score of sleep-related worry among the depressed patients was 61.0 (35.5 - 77.8). The patients who still encountered symptoms of depression reported statistically higher score on sleep-related worry than others who did not have any depressive symptom. This was consistent with a study of Levenson JS, *et al*.[17] that insomnia patients with depression comorbidity reported statistically higher scores on dysfunctional and attitudes about sleep and insomnia symptoms-related rumination than those who solely struggled against insomnia alone. In addition, when compared with the previous study by Narongsak T, *et al*.[18], major depressive disorders (MDD) patients with more severe symptoms experienced lower quality of sleep. One possible reason explaining the relationship between depression and low sleep quality is that symptoms of depression impaired various functions of human sleep architecture, resulting in the reduction of non-rapid eye movement (NREM) stage 3 - 4 (or restorative sleep), increasing amount of time in rapid eye movement (REM) stage (or dream sleep) and early arrival of REM sleep (or shortened REM latency). These sleep-related structural changes may lead to several symptoms of insomnia e.g. frequent nighttime awakening, early morning awakening, shorter sleep duration, and consequently promotes sleep-related worry.[19, 20]

Considering the sleep hygiene practice in the depressed patients, their median (IQR) score was 32.0 (24.0 - 45.0). The patients with no depressive symptoms would generally practice better sleep hygiene than those with no symptom. Hence, we proposed that the symptom of depression is a possible reason why patients find it difficult to maintain their sleep hygiene practice. The relationship between depression and sleep hygiene practice was studied before, yet the results were both negatively and positively associated. One study by Rahimi A, *et al*.[21] proved that sleep hygiene practice was effective in improving the depression, as practicing appropriate hygiene at night potentially prevents insomnia symptoms from further aggravation. On the contrary, another study by Gupta P, *et al*.[22] found an opposite outcome.

This is one of the few studies interested in the relationship between sleep hygiene practice and sleep-related worry in the depressed patients. Based on the study outcomes, an association between both factors was confirmed. *Bootzin RR, et al*.[23] elaborated a link between repetitive pre-sleep worry and sleep hygiene. If spending too much time in bed overthinking and feeling anxious, human brain will establish a connection between anxious thoughts and/or bodily feelings and bedtime routines based on classical conditioning theory by Peters B.[24] Subsequently, this process will replace pre-sleep wind down period, and may result in a difficulty in initiating sleep, reduced total sleep time or impaired sleep quality. With extended period of sleep disruptions, one might be concerned if his/her sleep is sufficient or effective and may contribute to the manifestation of the anxious thoughts and preoccupation related to sleep. [25]

From this study, the factors associated with sleep-related worry among the depressive disorder patients were all sleep-related factors, namely late sleep onset latency, excessive daytime sleepiness, low sleep efficiency and less than 8 hours sleep.

Regarding late sleep onset latency, this study found that being unable to initiate sleep within 20 minutes was statistically associated with having sleep-related worry. The longer time the patients spend in bed intentionally obsess about their sleep, the higher score on sleep-related worry is reported. This may

be because sleep-related worry occurs when the patients fail to initiate sleep within 20 minutes and perceive remaining time in bed as a period of cognitive arousal, and this brings about more severe symptoms of insomnia, frequently complained among the patients with depressive disorder.[26] This was consistent with Lovato N, *et al*.'s study[27] that adolescents with depression had longer sleep onset latency and reported lower sleep efficiency than their peers with no symptom. Moreover, the study by Jansson M, *et a*l. also found an association between sleep onset latency and sleep-related worry.[28]

Concerning daytime consequences of poor sleep, the depressed patients who encounter excessive daytime sleepiness expressed more worrisome thoughts related to sleep than those who faced no similar issue. This is in line with to the study of Tsou MT, *et al.*[29] that excessive daytime sleepiness potentially predicts the onset of depression and is a risk factor of depression relapse in the university students. Besides, excessive daytime sleepiness is a symptom which affects daytime functioning in various life domains including lessen work productivity, drowsiness, or avoiding socialized behaviors.[30] Once aware about these negative consequences, the depressed patients may start to ruminate about the quality and quantity of their sleep.

Low level of sleep efficiency (below 85.0%) in the patients with depressive disorder was found to have a significant relationship with sleep-related worry. Essentially, low sleep efficiency level reflects poor quality of sleep. This was similar to the previous study by Vorvolakos T, *et al*.[31] that found similar direction between sleep efficiency and sleep quality in the depressed adults. Both factors were statistically related with depression in adult population and sleep efficiency in the depressed adult was 4.0% lower than the rate in the non-depressed individuals.

Likewise, the patients with the sleep duration above 8 hours are less likely to develop worry about sleep than others who slept for 8 hours or less. From the study of Jansson M, *et al*.[28], total sleep time was a statistically significant factor and a good predictor of sleep-related worry in the patients who reported sleep issues. This happened because these patients obtain short sleep duration, increasing greater risk of facing nigh time cognitive arousal. In addition, another study by Mendoza JF, *et al*.[32] found greater encephalographic cortical activity among the short sleepers while asleep, when compared with long sleepers.

In summary, the depressed patients may encounter sleep-related worry at different levels. The severely depressed patients are more likely to experience high level of sleep-related worry.

Several limitations should be considered in this study. First, the study was carried out on a sample group of patients with depressive disorder at the Out-patient Clinic, Department of Psychiatric, King Chulalongkorn Memorial Hospital. To generalize the research findings to other populations may be limited, since the nature of the dependent variable is not normally distributed. Second, the patients' comorbid anxiety was not evaluated. Certain traits of anxiety may influence the patients' perception of sleep. Third, due to its cross-sectional descriptive design, this study could not infer any causal relationship between variables. Future analytical research is still required to clarify the casual relationship (if any). Fourth, the prescription of antidepressants among the patients was considered as a confounding factor. The medications taken may alter the severity of insomnia symptoms, which consequently affect their worries on sleep.

Conclusion

Sleep-related worry and sleep hygiene practice in depressed patients were differently reported, yet both factors were statistically related. The associated factors of worry about sleep were late sleep onset latency, facing excessive daytime sleepiness, low efficiency, total sleep time for 8 hour or less, poor sleep hygiene and the existence of depressive symptomatology. Based on these findings, it is crucial for the multidisciplinary team to be attentive on sleep complaints among the depressed patients. By organizing an individual or a group session to promote proper sleep hygiene practices, the patients will have an opportunity to learn how to handle with sleep problems and enhance better sleep efficiency. Both clinical implications will result in lower level of the sleep-related worry.

Acknowledgements

The author would like to sincerely thank Asst. Prof Allison G. Harvey for permitting the translation into Thai for the Anxiety and Preoccupation about Sleep Questionnaire (APSQ), Assoc. Prof Chanokporn Jitpanya, doctor for the Sleep Hygiene Awareness and Practice Scale, as well as the SHAPS Thai version and MAPI Research Trust for permitting the use of the Quick Inventory of Depressive Symptomatology QIDS SR-16 Thai version.

Conflict of interest statement

Each of the authors has completed an ICMJE disclosure form. None of the authors declare any potential or actual relationship, activity, or interest related to the content of this article.

Data sharing statement

The present review is based on the reference cited. Further details, opinions, and interpretation are available from the corresponding authors on reasonable request.

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