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The Validity of a Simple Sleep Timing and Sleep Quality Screening Questionnaire (STSQS) in Patients with Liver Cirrhosis in Assessing their Sleep - Wake Pattern

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Abstract

Introduction: A disturbance of sleep is recognized as one of early signs of hepatic encephalopathy, Nevertheless, specific enquiry about sleep behaviour is rarely included in the clinical assessment of patients with cirrhosis, most likely reflecting the fact that the currently available sleep-wake evaluation tools are time consuming and laborious to use. Subjective sleep disturbance is usually assessed with retrospective questionnaires and sleep diaries. For this reason, Pittsburgh sleep quality index (PSQI) was developed which is easy for subjects to use and for clinicians and researchers to interpret. The Sleep Timing and Sleep Quality Screening questionnaire (STSQS) is a simplified tool and, if validated in patients with cirrhosis, would allow their sleep problems to be formally documented and then, perhaps, better addressed. **Aim of the study:** to assess the validity of a simple sleep timing and sleep quality screening questionnaire (STSQS) in patients with liver cirrhosis against the Pittsburgh Sleep Quality Index (PSQI) questionnaire which is an established sleep quality questionnaire. **Patients and methods:** The study is done on 60 patients diagnosed as cirrhotic by compatible clinical history and imaging studies, divided as 20 patients Child's class A, 20 patients Child's class B, 20 patients Child's class C and 20 healthy volunteers. All subjected to full history taking, clinical examination, routine laboratory examination, liver function tests and abdominal ultrasonography, The Pittsburgh Sleep Quality Index (PSQI) questionnaire, The Sleep Timing and Sleep Quality Screening questionnaire (STSQS). **Results:** This study included 60 patients diagnosed to have liver cirrhosis without clinical evidence of hepatic encephalopathy (group 1) (43 men: 17 women) of mean age 57 (39-78) with an etiology of cirrhosis which was chronic hepatitis C in all patients. This group is further subdivided into A, B, C groups with 20 patients in each group according to Child-paugh classification A, B and C respectively. The reference population comprised 20 healthy volunteers (group 2) (12 men: 8 women) of mean age 46 (28-46) years. The prevalence of sleep disturbance in the patients with cirrhosis was high with almost 77% classified as 'poor sleepers' using the PSQI, also, Sleep timing was generally delayed in the patients compared to healthy volunteers. the STSQS proved to be successful in estimating sleep quality and is correlated significantly with results obtained using the more complex PSQI questionnaire and it can separate individuals classified as 'poor' or 'good sleepers' on the basis of the PSQI score. **Conclusion:** The STSQS provided useful estimates of sleep quality and sleep timing in both healthy volunteers and in patients with cirrhosis.

Keywords: hepatic encephalopathy, sleep-wake evaluation, STSQS, PSQI.

Introduction

Sleep-wake abnormalities are common in patients with cirrhosis. Approximately two-thirds of patients with cirrhosis report sleep-wake abnormalities, manifest as disturbed night sleep, delayed sleep habits and

excessive day-time sleepiness.⁵ These abnormalities are known to significantly affect their quality of life.³ Objective assessment techniques such as polysomnography or actigraphy are utilized as second

line investigations and in only 10–25% of patients with sleep–wake disturbance, even in specialist centres.¹⁰

Subjective sleep disturbance is usually assessed with retrospective questionnaires and sleep diaries. However, difficulties can arise in their use in elderly and the infirm, who often require assistance in interpreting and answering long strings of questions and in collecting diary data in an organized and accurate fashion. In addition, both questionnaires and diaries take time to review and score.¹⁰

The Pittsburgh sleep quality index was developed with several goals: (1) To provide a reliable, valid, and standardized measure of sleep quality; (2) to discriminate between “good” and “poor” sleepers; (3) to provide an index that is easy for subjects to use and for clinicians and researchers to interpret; and (4) to provide a brief, clinically useful assessment of a variety of sleep disturbances that might affect sleep quality. It is a validated tool used to assess sleep quality and sleep disturbances over the preceding month and differentiate “good” from “poor sleepers”.⁴

The questionnaire responses to 19 questions used to generate seven components, each of which is scored from zero to three, when three represents the negative extreme. These component scores are then summated to provide the total PSQI score (range: 0 – 21); scores of > 5 identify “poor sleepers”. The PSQI takes approximately 10 min to complete and 5 min to score.⁴

The Sleep Timing and Sleep Quality Screening questionnaire (STSQS) is one such tool and, if validated in patients with cirrhosis, would allow their sleep problems to be formally documented and then, perhaps, better addressed. It provides a simple overall assessment of sleep quality rated on a 1-9 analogue scale (1= best, 9 = worst sleep ever) and allows collection of information on habitual sleep timing (bed time, sleep latency, night awakenings, wake- up and get-up time). No attempt is made to differentiate week from week- end days or to account for atypical nights. The STSQS takes 1-2 min to complete with no additional time needed for scoring.²

Some patients are also asked to keep individual sleep diaries for 15 consecutive days, recording bed- time, the time they started trying to sleep, sleep onset time, night awakenings, wake- up and get- up times and the number of naps taken during the following day. Each sleep diary takes the patient 3-5 min per day to

complete and a set of 15 diaries takes the clinician 10 - 15 min to process.²

Aim of the work

The aim of the study is to assess the validity of a simple sleep timing and sleep quality screening questionnaire (STSQS) in patients with liver cirrhosis against the Pittsburgh Sleep Quality Index (PSQI) questionnaire which is an established sleep quality questionnaire

Patients and Methods

The study is done on 60 patients. All patients were recruited from the outpatient hepatology clinic of Aswan Fever Hospital between January and October 2013 diagnosed as cirrhotic by compatible clinical history and imaging studies with no history of other comorbidities or hypnotics, divided as 20 patients Child’s class A, 20 patients Child’s class B, 20 patients Child’s class C and 20 healthy volunteers. All subjected to full history taking, clinical examination, routine laboratory examination, liver function tests and abdominal ultrasonography in addition to;

(1) The Pittsburgh Sleep Quality Index (PSQI) questionnaire:

This validated tool is used to assess sleep quality and sleep disturbances over the preceding month, and to differentiate ‘good’ from ‘poor sleepers’. Questionnaire responses to 19 questions are used to generate seven components, each of which is scored from zero to three, where three represents the negative extreme:

Component (1): denotes the subjective sleep quality by examining question no.6

Component (2): denotes sleep latency by examining questions no.2 and 5a, then summation of scores of both questions.

Component (3): denotes sleep duration by examining question no.4

Component (4): denotes habitual sleep efficiency as follows:

1. answering question no.4

2. calculating number of hours spent in bed: it equals answer of question no. 3- answer of question no.1

3. Calculate habitual sleep efficiency as follows:

(Number of hours slept/Number of hours spent in bed) X 100

Component (5): denotes sleep disturbances by examining questions 5b-5j and then summation of scores of them.

Component (6): denotes the use of sleeping medications by examining question no.7.

Component (7): denotes the daytime dysfunction by examining questions no.8 and no.9, then summation of scores of both questions.

These component scores are then summated to provide the total PSQI score (range: 0–21); scores of >5 identify ‘poor sleepers’. The PSQI takes approximately 10 min to complete and 5 min to score.

Table 1: The Pittsburgh Sleep Quality Index (PSQI) questionnaire ⁴

Pittsburgh Sleep Quality Index (PSQI):	
1. During the past month, when have you usually gone to bed at night?	
2. During the past month, how long (in minutes) has it usually take you to fall asleep each night?	
3. During the past month, when have you usually gotten up in the morning?	
4. During the past month, how many hours of actual sleep did you get at night? (This may be less than the number of hours you spent in bed.)	
For each of the remaining questions, check the one best response. Please answer all questions:	
5. During the past month, how often have you had trouble sleeping because you:	
(a) Cannot get to sleep within 30 minutes:	
Not during the past month	Less than once a week
Once or twice a week	Three or more times a week
(b) Wake up in the middle of the night or early morning:	
Not during the past month	Less than - once a week
Once or- twice a week	Three or more times a week
(c) Have to get up to use the bathroom	
Not during the past month	Less than - once a week
Once or- twice a week	Three or more times a week
(d) Cannot breathe comfortably:	
Not during the past month	Less than - once a week
Once or- twice a week	Three or more times a week
(e) Cough or snore loudly:	
Not during the past month	Less than - once a week
Once or- twice a week	Three or more times a week
(f) Feel too cold:	
Not during the past month	Less than - once a week
Once or- twice a week	Three or more times a week
(g) Feel too hot:	
Not during the past month	Less than - once a week
Once or- twice a week	Three or more times a week
(h) Had bad dreams	
Not during the past month	Less than - once a week
Once or- twice a week	Three or more times a week
(i) Have pain:	
Not during the past month	Less than - once a week
Once or- twice a week	Three or more times a week
(j) Other reason(s), please describe	
Not during the past month	Less than - once a week
Once or- twice a week	Three or more times a week

6. During the past month, how would you rate your sleep quality overall?	Very good	Fairly good
	Fairly bad	Very bad
7. During the past month, how often have you taken medicine (prescribed or “over the counter”) to help you sleep?	Not during the past month	Less than - once a week
	Once or- twice a week	Three or more times a week
8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	Not during the past month	Less than once a week
	Once or twice a week	Three or more times a week
9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	No problem at all	Only a very slight problem
	Somewhat of a problem	A very big problem

Scoring instructions for the Pittsburgh Sleep Quality Index	
Component 1: Subjective sleep quality: Examine question #6, and assign scores as follows:	
Very good” 0	“Fairly good” 1
Fairly bad” 2	‘Very bad” 3
Component 1 score:	
Component 2: Sleep latency:	
1. Examine question #2, and assign scores as follows:	
15 minutes 0	16-30 minutes 1
31-60 minutes 2	> 60 minutes 3
Question #2 score:	
2. Examine question #5a, and assign scores as follows:	
Not during the past month 0	Less than once a week 1
Once or twice a week 2	Three or more times a week 3
Question #5a score:	
2. Add #2 score and #5a score	
3. Assign component 2 score as follows: Sum of #2 and #5a	
0 0	1-2 1
3-4 2	5-6 3
Component 2 score:	
Component 3: Sleep duration: Examine question #4, and assign scores as follows:	
> 7 hours 0	6-7 hours 1
5-6 hours 2	< 5 hours 3
Component 3 score	
Component 4: Habitual sleep efficiency:	
(1) Write the number of hours slept (question # 4)	
(2) Calculate the number of hours spent in bed	
Getting up time (question # 3) - Bedtime (question # 1)=Number of hours spent in bed	
(3) Calculate habitual sleep efficiency as follows:	
(Number of hours slept/Number of hours spent in bed) X 100 = Habitual sleep efficiency (%)	
(4) Assign component 4 score as follows: Habitual sleep efficiency %	
> 65% 0	75-64% 1
65-74% 2	< 65% 3
Component 4 score:	

Component 5: Sleep disturbances:			
(1) Examine questions # 5b-5j, and assign scores for <i>each</i> question as follows:			
Not during the past month	0	Less than once a week	1
Once or twice a week	2	Three or more times a week	3
(2) Add the scores for questions # 5b-5j:			
(3) Assign component 5 score as follows: Sum of # 5b-5j:			
0	0	1-9	1
10-16	2	19-27	3
Component 5 score			
Component 6: Use of sleeping medication:			
Examine question 7 and assign scores as follows:			
Not during the past month	0	Less than once a week	1
Once or twice a week	2	Three or more times a week	3
Component 6 score:			
Component 7: Daytime dysfunction:			
(1) Examine question 8, and assign scores as follows:			
Never	0	Once or twice	1
Once or twice each week	2	Three or more times each week	3
(2) Examine question 9, and assign scores as follows:			
No problem at all	0	Only a very slight problem	1
Somewhat of a problem	2	A very big problem	3
(3) Add the scores for question 8 and question 9			
(4) Assign component 7 score as follows: Sum of # 8 and # 9:			
0	0	1-2	1
3-4	2	5-6	3
Global PSGI Score: Add the seven component scores together:			

(2) Simple Sleep Timing and Sleep Quality Screening questionnaire (STSQS): ⁴

It provides a simple, overall assessment of sleep quality rated on a 1–9 analogue scale (1 = best, 9 = worst sleep ever) and allows collection of information

on habitual sleep timing (bed-time, sleep latency, night awakenings, wake-up and get-up time). No attempt is made to differentiate week from week-end days or to account for atypical nights. The STSQS takes 1–2 min to complete with no additional time needed for scoring:

Table 2: Sleep Timing and Sleep Quality Screening questionnaire: ³

What time do you usually go to bed?	
What time you usually start trying sleep?	
How long does it take you to fall asleep on average?	
How many times do you usually wake up?	
What time do you usually wake up in the morning?	
What time do you usually getup?	

How would you rate your usual quality of sleep?

1-2-3-4-5-6-7-8-9

Best sleep ever

Worst sleep ever

A subgroup of 15 patients (5 patients are Child-Paugh class A, 5 patients are Child-Paugh class B, and 5 patients are Child-Paugh class C) and 10 healthy controls were also asked to keep individual sleep diaries for 15 consecutive days, recording (bed-time, the time they started trying to sleep, sleep onset time, night awakenings, wake-up and get-up times and the number of naps taken during the following day). Each sleep diary takes the patient 3–5 min/day to complete and a set of 15 diaries takes the clinician 10–15 min to process.

The sleep quality information obtained from the STSQS analogue scale was compared to the PSQI total score, while the sleep timing parameters obtained from the STSQS were compared with corresponding data from the sleep diaries, averaged over the 2-week collection period.

Statistical analysis; Data was collected, tabled and statistically analyzed using SPSS v. 15 and MedCal version 12.3.0.

Results

This study included 60 patients diagnosed to have liver cirrhosis without clinical evidence of hepatic encephalopathy (group 1) (43 men:17 women) of mean age 57 (39-78) with an etiology of cirrhosis which was chronic hepatitis C in all patients. This group is further subdivided into A, B, C groups with 20 patients in each group according to Child-paugh classification A, B and C respectively.

The reference population comprised 20 healthy volunteers (group 2) (12 men: 8 women) of mean age 46 (28-46) years.

All patients show evidence of portal hypertension. Forty patients were being treated with diuretics because of ascites: furosemide and spironolactone, usually at low dose (furosemide 40 mg/dl, spironolactone 100mg/dl) were the most commonly used drugs. Diuretics were prescribed at a single morning dose to avoid nocturia.

Table 3: Correlation between (group 1) and (group 2) as regards different laboratory parameters

	Group 1 (n=60)	Group 2 (n=20)	t	Sig
Hb (g/dl)				
Mean± SD	10.5±1.2	13.5±1.3	9.4	<0.01
WBC (x10⁹/mm³)				
Mean± SD	6.3±2	8.9±1.2	5.4	<0.01
Platelets (x 10³/mm³)				
Mean± SD	184.4±69.5	280.1±45.9	5.7	<0.01
Serum Bilirubin (mg/dl)				
Mean± SD	2.5±1.9	0.7±0.2	4.2	<0.01
AST (IU/l)				
Mean± SD	60.4±35	19±7.1	5.2	<0.01
ALT (IU/l)				
Mean± SD	88.5±40.3	27.4±6.3	6.7	<0.01
INR				
Mean± SD	1.6±0.7	1.04±0.08	3.5	<0.01
Serum Albumin (g/dl)				
Mean± SD	2.9±0.9	5.1±0.5	10.3	< 0.01

Table 3 shows that each of serum Bilirubin, AST, ALT and INR levels were highly significantly higher among patients than among control (p 0.01).

Meanwhile the hemoglobin level, TLC, platelet count and serum albumin were highly significantly higher among control group than among patients (p 0.01).

Table 4: Pittsburgh index score and STSQS score correlation between (group 1) and (group 2):

	Group 1 (n=60)	Group 2 (n=20)	t	Sig
<u>Pittsburgh index score</u>				
Mean± SD	9.3±4.2	3.8±1.4	5.7	<0.01
<u>STSQS score</u>				
Mean± SD	4.8±1.6	2.35±1.2	6.2	<0.01

Table 4 shows that PSQI of patients was highly significantly higher than that of control group ($t=5.7$, $p < 0.01$). Also STSQS of patients was highly significantly higher than that of control ($t=6.2$, $p < 0.01$).

Table 5: Sleep quality of (group 1) and (group 2):

	Group 1 (n=60)	Group 2 (n=20)	χ^2	Sig
Good sleeper N (%)	14 (23.3%)	17 (85%)	21.5	<0.01
Bad sleeper (>5) N (%)	46 (76.7%)	3 (15%)		

Table 5 shows that 76.7% of (group 1) were bad sleepers while 15% of (group 2) subjects were bad sleepers and the difference between both groups was highly statistically significant ($\chi^2=21.5$, $p < 0.01$).

Table 6: Sleep quality of (group 1) and (group 2):

Group 1 (n=60)	0.8	<0.01
Group 2 (n=20)	0.5	<0.01

Table 6 shows highly significant direct correlations between PSQI and STSQS among both patients and control ($R=0.8$ and 0.5 respectively, $p < 0.01$).

sensitivity of 76.09% and a specificity of 100% among (group 1). A threshold of >5 discriminated 'poor' from 'good sleepers' with a sensitivity of 100% and a specificity of 100% among (group 2)

Figures 1 & 2 show that a threshold of >4 discriminated 'poor' from 'good sleepers' with a

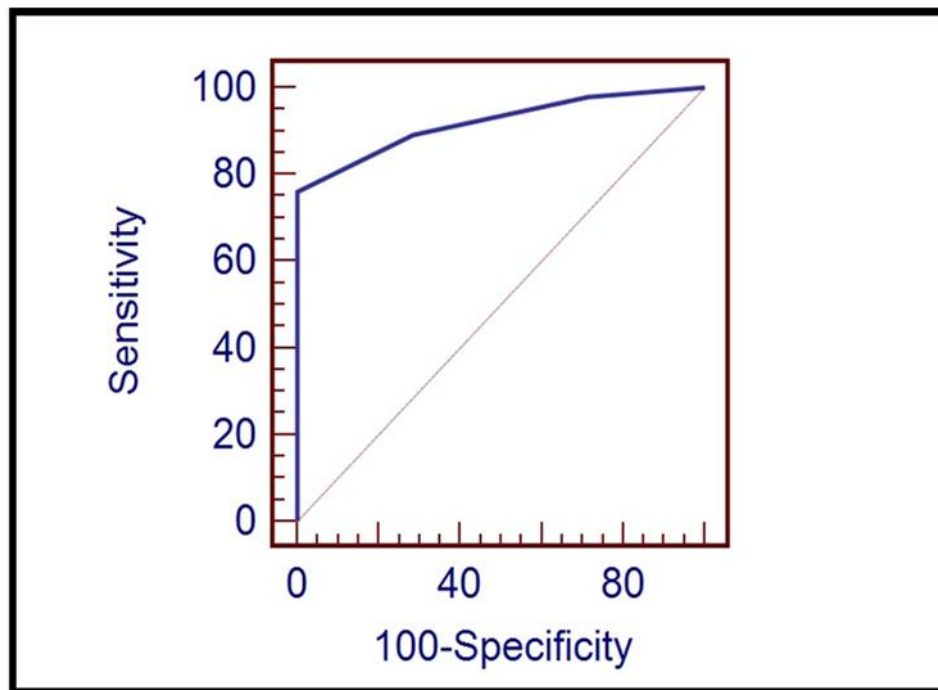


Figure 1: Receiving Operator Characteristic (ROC) curves indicating (h) the maximum specificity/sensitivity Sleep Quality and Sleep Timing Screening questionnaire (STSQS) sleep quality threshold separating 'good' (Pittsburgh Sleep Quality Index [PSQI] ≤ 5) from 'poor sleepers' (PSQI > 5) in (group 1).

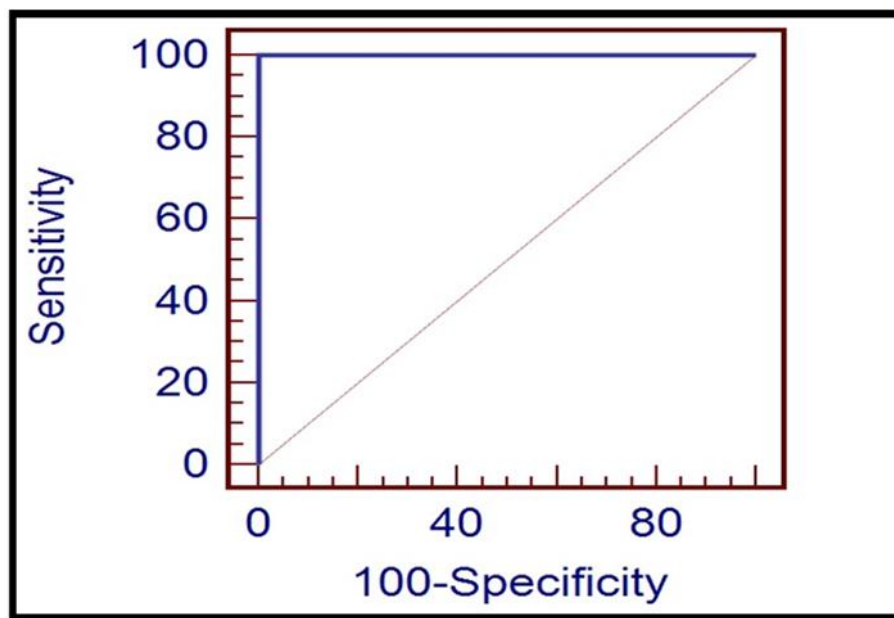


Figure 2: Receiving Operator Characteristic (ROC) curves indicating (h) the maximum specificity/sensitivity Sleep Quality and Sleep Timing Screening questionnaire (STSQS) sleep quality threshold separating ‘good’ (Pittsburgh Sleep Quality Index [PSQI] ≤ 5) from ‘poor sleepers’ (PSQI > 5) in (group 2)

Table 7: Correlation among the groups A, B and C according to laboratory investigations:

	Group A (n=20)	Group B (n=20)	Group C (n=20)	F	Sig
Hb (g/dl) Mean \pm SD	11.4 \pm 1.06	10.4 \pm 0.9	79.8 \pm 1	13.3	<0.01**
WBC ($\times 10^9/\text{mm}^3$) Mean \pm SD	8.3 \pm 1.7	5.4 \pm 1.04	5.5 \pm 1.7	23.6	<0.01**
Platelets ($\times 10^3/\text{mm}^3$) Mean \pm SD	247.3 \pm 49.06	144.8 \pm 58.7	161 \pm 52.5	21.1	<0.01**
Bilirubin (mg/dl) Mean \pm SD	0.8 \pm 0.2	1.9 \pm 0.6	4.7 \pm 1.8	66.6	<0.01**
AST(IU/l) Mean \pm SD	86.1 \pm 42.2	37.9 \pm 17.4	57.4 \pm 21.9	13.7	<0.01**
ALT(IU/l) Mean \pm SD	107.1 \pm 44.1	68.8 \pm 31.6	89.6 \pm 36.6	5.1	<0.01**
INR Mean \pm SD	1.06 \pm 0.09	1.6 \pm 0.3	2.1 \pm 1.03	14	<0.01**
Albumin (g/dl) Mean \pm SD	4.09 \pm 0.5	2.8 \pm 0.3	2.1 \pm 0.4	122.2	<0.01**

Table 7 shows highly statistically significant correlation between the three groups as regards the laboratory investigations ($p < 0.01$).

Table 8: Correlation among the groups A, B & C as regards PSQI and STSQS scores:

	Group A (n=20)	Group B (n=20)	Group C (n=20)	F	Sig
Pittsburgh index score Mean± SD	5.4±1.4	8±1.3	14.5±2.4	140	<0.01**
STSQS score Mean± SD	3.4±1	4.7±1.2	6.3±1.1	34.6	<0.01**

Table 8 shows there were highly statistically significant correlation between the three groups as regards PSQI and STSQS ($p<0.01$). Group C showed the highest PSQI and STSQS.

Table 9: Correlation among groups A, B & C according to PSQI

	Group A (n=20)	Group B (n=20)	Group C (n=20)	χ^2	Sig
Good sleepers (5) N (%)	13 (65%)	1 (5%)	0	29.3	<0.01**
Bad sleepers (>5) N (%)	7 (35%)	19 (95%)	20 (100%)		

Table 9 shows highly statistically significant correlation between the three groups as regards to prevalence of poor sleeping. Group C showed the highest prevalence of poor sleeping (100%), while group A showed the highest prevalence of good sleeping (65%).

Table 10: sleep timing parameters

Sleep variable	Subjects (n)	Assessment Method	Mean ± 1SD	Mean of the Differences (±95% CI) (STSQS – sleep diaries)	SD	Limits of agreement	
						Lower	Upper
Bed time (h)	Control	STSQS	12.4 ±0.9	-0.4	0.6	- 1	1.7
		Sleep diaries	12.75±0.76	(-0.8;0.08)		(-1.8;-0.1)	(0.81 ;2.5)
	Patients	STSQS	11.73±1.7	-0.21	0.5	-0.7	1.1
		Sleep diaries	11.94±1.6	(-0.5 ; 0.04)		(-1.1;-0.2)	(0.7 ; 1.5)
Wake up time (h)	Control	STSQS	8.6 ±1.1	-0.3	0.63	-0.91	1.7
		Sleep diaries	8.9±0.8	(- 0.73 ; -0.2)		(-1.7;-0.08)	(0.83;2.5)
	Patients	STSQS	6.6±1.7	-0.4	0.6	-1.1	1.74
		Sleep diaries	7±1.5	(-0.7; 0.03)		(-1.8;-0.41)	(1.04;2.5)
Get up time (h)	Control	STSQS	8.8±1.25	-0.4	0.7	-1.52	1
		Sleep diaries	9.2±0.74	(-0.8 ; 0.09)		(2.3;0.72)	(0.15;1.7)
	Patients	STSQS	7.1±1.7	-0.31	0.73	-0.81	1.52
		Sleep diaries	7.42±1.43	(-0.72; 0.09)		(1.4;-0.3)	(0.9 ;2.1)
Awakenings (n)	Control	STSQS	1±0	0.37	0.29	-0.2	0.94
		Sleep diaries	1.4±0.63	(0.16 ; 0.58)		(-0.6;0.2)	(0.6;1.3)
	Patients	STSQS	3±1.7	0.16	0.32	-0.5	0.8
		Sleep diaries	2.3±1.6	(-0.02; 0.34)		(-0.8;-0.16)	(0.5;1.1)
Latency (min)	Control	STSQS	15±9.83	3.7	14.9	-32.8	25.44
		Sleep diaries	60±32	(-7; 14.3)		(-14.3;7)	(6.6;44.2)
	Patients	STSQS	53±32	0.03	13	-0.8	0.48
		Sleep diaries	13.5±13.13	(-7.15 ; 7.21)		(-1.1;-0.5)	(0.16;0.8)

Table 10 shows that the sleep timing parameters were generally delayed in the patients compared to the healthy volunteers; wake-up and get-up times occurred significantly later. The estimates of the mean bed-time, wake-up time ,get-up time ,night awakenings ,naps per day and sleep latency obtained from the STSQS did not differ significantly from the average data recorded in the sleep diaries in healthy volunteers and patients with cirrhosis, for example, the mean of the differences in bed-time estimates was -0.4 ± 0.6 h (limits of agreement, -1 to 1.7 h ,While in patients with cirrhosis the mean of the differences in bed-time was -0.21 ± 0.5 h (limits of agreement,-1 to 1.7 h.

Discussion

In the current study, the prevalence of sleep disturbance in the patients with cirrhosis was high with almost 77% classified as ‘poor sleepers’ using the PSQI, also, Sleep timing was generally delayed in the patients compared to healthy volunteers. This was in agreement with those in other studies, as that done by **Cordoba J et al, 1998**¹ which assessed sleep quality in 44 patients with cirrhosis, 47% of whom reported significant sleep disturbances and also with **Mostacci et al., 2008**⁵ a semi-structured interview was done and administered a set of validated questionnaires to 178 patients with cirrhosis, 26% of whom complained of night-time sleep disturbance; in addition, 18% complained of excessive day-time sleepiness and over 50% napped regularly.

In current study using PSQI the Sleep quality was generally impaired in the patients(higher PSQI scores in 70% of patients) compared to the healthy subjects and Sleep timing-evaluated by sleep diaries- was generally delayed in the patients. the results are in agreement with a study done by (**Middleton et al., 2008**⁴) on using PSQI and sleep diaries to evaluate the sleep habits in cirrhotic patients which was done on 20 cirrhotic patients(classified as 14 patients as Child class A, 4 patients class B and 2 patients class C) and 9 healthy volunteers. The current study also is in agreement another study carried out by (**Montagnese et al.,2009**³) also compared STSQS with PSQI to evaluate sleep quality and with sleep diaries to evaluate sleep timing and was done on 87 cirrhotic patients divided as(59 patients Child’s class A,16 patients Child’s class B ,12 patients Child’s class C) and 19 healthy volunteers and proved that 70%of cirrhotic patients have disturbed sleep.

In the current study and that done by (**Montagnese et al.,2009**⁵) the STSQS proved to be successful in

estimating sleep quality and is correlated significantly with results obtained using the more complex PSQI questionnaire and it can separate individuals classified as ‘poor’ or ‘good sleepers’ on the basis of the PSQI score.

The sleep timing estimates obtained using the STSQS did not differ substantially from those obtained from the sleep diaries, so it provides a simple accurate tool instead of the complicated in accurate diaries. In addition, it is self-explanatory and no scoring is required, these characteristics may facilitate its use amongst physicians managing patients with cirrhosis, who are unlikely to engage with more complex methods for evaluating sleep disturbance.

Conclusion

The STSQS provided useful estimates of sleep quality and sleep timing in both healthy volunteers and in patients with cirrhosis. This simple questionnaire could be used as a screening tool to identify individuals whose sleep–wake behaviour requires formal assessment. In addition, it could be used to undertake repeat evaluations in treatment trials.

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