The Effects of Chronic Liver Diseases on Quality of Sleep

Jonah Rosenblum, Pallavi Surana*, Alison Weiss*, Theo Heller*, Christopher Koh**
**Liver Diseases Branch, NIDDK*

National Institute of Diabetes and Digestive and Kidney Diseases

Introduction

- Approximately one in ten people living in the United States have some form of liver disease, with millions still undiagnosed.
- If left untreated, many chronic liver diseases result in scarring of the liver, which eventually can lead to cirrhosis and end-stage liver disease.
- Studies have described that cirrhotic patients with chronic hepatitis C (HCV), primary biliary cirrhosis (PBC), and non-alcoholic steatohepatitis (NASH) have poor sleep quality.
- Specific causes and the onset of poor sleep quality in chronic hepatitis B & C have not been evaluated.

Aims

- To compare the quality of sleep between subjects infected with HBV and HCV with healthy controls.
- To determine what component(s) of sleep quality is/are affected in HBV and HCV.
- To evaluate the associations between sleep quality and commonly used biomarkers of liver disease in subjects with HBV and HCV.

Methods

- From 2012 to 2014, 126 subjects not on therapy infected with HCV or HBV e-antigen negative disease participated in a one time survey.
- Quantitative sleep quality was assessed via the validated Pittsburg Sleep Quality Index (PSQI), a self rated questionnaire (Table 1).
- Laboratory measurements were obtained within three months of survey administration.
- Non-invasive biomarkers (FIB-4 and APRI) were calculated and used as indicators of fibrosis severity.
- Sleep quality in normal historical controls were compared with that of infected subjects.
- Laboratory measurements, biomarkers, and components of sleep were compared.

Results

Table 1: Established Models

PSQI Scoring Component*	Qualitative Definition
1. Sleep Quality	One's perception of how well they are sleeping.
2. Sleep Latency	Length of time it takes to complete the transition from full wakefulness to sleep.
3. Sleep Duration	Length of time that one is asleep.
4. Habitual Sleep Duration	The ratio of time spent sleeping to the time spent in bed.
5. Sleep Disturbances	How often sleep is interrupted.
6. Use of Sleep Medication	How frequently one uses sleep medication.
7. Daytime Dysfunction	How sleep impacts one during daily activities.

*Scores for each section of the 7 sections are out of 3 points, with a total of 21 possible. Receiving a total score (Global PSQI Score) of 5 or higher indicates poor sleep quality.

Figure 1: Mean Global PSQI Scores

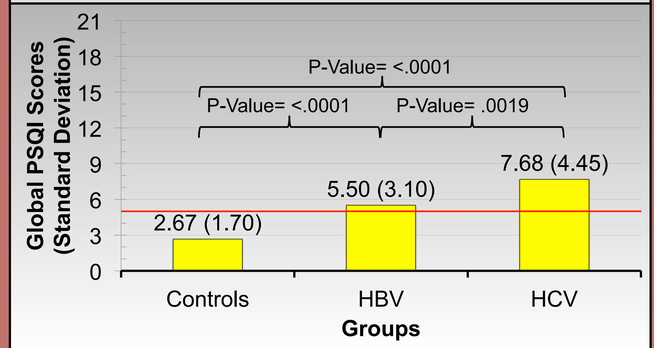


Table 2: Baseline Characteristics

	All (n=126)	HBV (n=50)	HCV (n=76)
Percentage M/F	57/43	64/36	55/45
Mean Age (SD)	55.8 (12.4)	49.5 (14.3)	60.0 (8.9)
Ethnicity* (W/B/A/O)	64/24/31/7	13/13/23/1	51/11/8/6
Mean ALT (SD)	47.8 (37.5)	35.2 (21.4)	56.4 (43.4)
Mean AST (SD)	36.6 (26.5)	26.3 (11.1)	43.5 (31.3)
Mean Platelet Count (SD)	190.6 (69.2)	206.8 (73.3)	180.2 (64.8)
Mean Albumin (SD)	4.1 (.4)	4.2 (.3)	4.1 (.5)

*Abbreviations: W=White, B=Black, A=Asian O= Other (Hispanic, American Indian/Alaska Native, Multiracial, Hawaiian/Pacific Islander, Unknown).

Table 3: Comparing Components Against Historical Controls

	Mean (SD) Score			P-Value		
	Controls (n=52)	HBV (n=50)	HCV (n=76)	Control-HBV	Control-HCV	HBV-HCV
C1	0.35 (0.48)	0.78 (0.77)	1.26 (0.88)	0.001	<0.0001	0.002
C2	0.56 (0.73)	1.02 (0.98)	1.18 (1.02)	0.008	<0.0001	0.37
C3	0.29 (0.50)	1.20 (0.99)	1.49 (1.34)	<0.0001	<0.0001	0.15
C4	0.10 (0.30)	0.50 (0.83)	0.97 (1.13)	0.002	<0.0001	0.008
C5	1.00 (0.40)	1.04 (0.53)	1.45 (0.72)	0.67	<0.0001	0.0009
C6	0.04 (0.28)	0.36 (.88)	0.62 (1.10)	0.02	<0.0001	0.16
C7	0.35 (0.48)	0.64 (0.75)	0.78 (0.84)	0.02	0.001	0.36

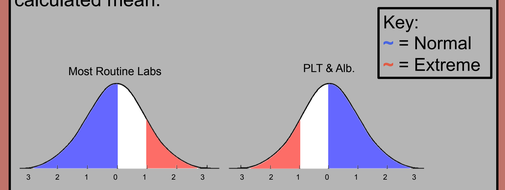
Table 4: Comparing PSQI and Labs for HBV and HCV

Average Global PSQI						
	HBV			HCV		
	Extreme*	Normal^	P-Value	Extreme*	Normal^	P-Value
AST	4.71 (2.43)	5.39 (3.38)	0.62	9.91 (5.58)	7.14 (4.30)	0.07
ALT	6.00 (3.39)	5.57 (3.44)	0.80	9.92 (5.09)	7.24 (4.27)	0.06
ALP	6.25 (3.45)	5.44 (3.47)	0.57	9.00 (4.72)	7.16 (4.25)	0.27
PLT	5.20 (2.17)	6.61 (3.73)	0.43	7.44 (4.75)	7.71 (4.56)	0.88
Alb.	5.14 (4.30)	5.67 (2.46)	0.69	8.67 (5.05)	7.40 (4.28)	0.44
Tbili	4.57 (2.99)	5.16 (2.95)	0.65	7.55 (5.39)	8.57 (4.63)	0.53
Viral Load	5.00 (3.61)	5.57 (3.14)	0.76	8.22 (4.47)	7.77 (4.58)	0.78
Fib-4	5.71 (2.43)	5.74 (3.50)	0.98	8.17 (5.49)	7.51 (4.44)	0.74
APRI	4.60 (2.07)	5.73 (3.47)	0.49	7.60 (5.94)	7.40 (4.32)	0.92

Table 4 Legend: Extreme and Normal Criteria

*Each extreme group consisted of subjects with biomarkers greater than 1 SD above the calculated mean. For platelet and albumin the extreme group includes those with biomarkers at least 1 SD below the mean.

^Each normal group consisted of subjects with biomarkers less than or equal to the calculated mean. For platelets and albumin the normal group included subjects with biomarkers greater than or equal to the calculated mean.



Discussion

- On average, subjects with HBV and HCV demonstrated significantly worse Global PSQI scores compared to normal historical controls.
- Subjects infected with HCV had significantly worse sleep quality compared to HBV, however, both groups were above the cutoff for healthy sleep quality.
- In HBV, all components except sleep disturbances were significantly worse than that of historical controls.
- In HCV, all components were significantly worse than historical controls, and had higher mean values than HBV.
- Disease severity, viral load, and fibrosis do not appear to affect sleep in HBV
- In HCV, hepatocellular inflammation may play a role in sleep quality.

Conclusions

- Patients chronically infected with HBV or HCV experience an unhealthy lower quality of sleep compared to uninfected individuals.
- In subjects infected with HBV, biomarkers of disease severity do not correlate with quality of sleep.
- In subjects infected with HCV, biomarkers of hepatic inflammation may play a role in sleep quality. Further exploration is warranted.

References

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