

Detection of Minimal Hepatic Encephalopathy through PHES Battery in Patients with Cirrhosis from the UMAE 14

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ABSTRACT

Introduction: Minimal hepatic encephalopathy (MHE) is a neuropsychiatric complication in the patient with hepatic insufficiency, portal hypertension and/or portosystemic shunt, where there is cognitive damage, which includes alterations in attention, integrative function, delay in information processing, among others in the absence of manifest hepatic encephalopathy.

Objective: To determine the prevalence of MHE by measuring cognitive damage in patients with hepatic cirrhosis through the PHES battery.

Methodology: An observational, prospective, cross-sectional, and analytical study was carried out in patients with liver cirrhosis diagnosis, who came to the outpatient clinic of the gastroenterology department at the UMAE HE No. 14 Adolfo Ruiz Cortines National Medical Center. Patients with cirrhosis and no history of psychiatric illness or manifest encephalopathy were included, with previous authorization of informed consent and the research committee from the UV Medical School. The PHES battery was used as standardized test.

Results: The sample size was calculated to be 66 patients. The PHES battery was performed in 34 of them, of which 35% (12) were diagnosed with minimal hepatic encephalopathy, 50% (6) women. The average age was 59 ± 10 years, minimum range 39, maximum range 80 (95% CI).

Conclusion: The prevalence of minimal hepatic encephalopathy in 12 (35%), at UMAE HE No.14. The number and symbols test (DST) had a significant correlation regarding years of study, gender and age variables.

Keywords

Minimal hepatic encephalopathy, Cirrhosis, Psychometric tests, PHES.

Introduction

Minimal hepatic encephalopathy (MHE) is a neuropsychiatric complication in patients with liver failure and/or portosystemic shunt, which is not clinically evident. Therefore, it is not detected on conventional physical examination, but through neuropsychometric or neurophysiological tests. It is distinguished by the presence of

cognitive damage that includes attention disturbances, vigilance, integrative function, psychomotor speed, visual spatial perception, response inhibition, and information processing delay [1-4]. The prevalence of MHE varies between 22 and 74% in patients with liver cirrhosis, as well as subclinical neuropsychiatric alterations have been identified in up to 84% [1,2]. The problem is multifactorial, with an early identification of the reversible factors, preventive measures, a diagnosis and a therapeutic approach will lead to the hepatic encephalopathy conditioning cause, which impacts the patient's quality of life and affects the daily functioning and the

vehicular driving. Studies show that there is an association between the presence of MHE and the predictive risk for the development of hepatic encephalopathy which is evident in 3 years in up to 56% of patients with cirrhosis and MHE [2,3,5]. Its pathophysiology is explained by liver failure and/or the presence of portosystemic shunts that makes possible the brain exposure to neurotoxins accumulated by inefficient metabolism and liver excretion. From these neurotoxins, ammonium has been considered the main one involved in the development of HE [3,6-9]. The cognitive damage characteristic of MHE is clear through neuropsychometric tests such as the PHES battery, considered as the gold standard for its diagnosis. To evaluate this battery, accurate normality tables must be carried out to the population of each country, since the age and school level are variables, which have great influence in the result. It is composed of five tests: Numeric Connection Test-A (NCT-A), Number Connection Test-B (NCT-B), Serial Point Test (SDT), Traceability Test (LTT) [10-19].

The aim of the study was to ascertain the prevalence of MHE by measuring cognitive damage in patients with liver cirrhosis through the PHES battery.

Material and Methods

An observational, prospective, cross-sectional, and analytical study was carried out in patients diagnosed with liver cirrhosis who attend the outpatient clinic from the gastroenterology service at the High Specialty Medical Unit No. 14. Adolfo Ruiz Cortines National Medical Center, having prior approval and informed consent by the Research Committee of the UV Medical School. Patients were selected based on the following inclusion criteria: patients with liver cirrhosis despite their etiology; between 30 and 80 years old; reading and writing knowledge; with appropriate hearing, vision, and physical conditions to be able to perform the test. The PHES battery (Psychometric Scale for Hepatic Encephalopathy) was applied as a standardized test to identify the cognitive damage typical of minimal hepatic encephalopathy in a maximum period of 15 minutes per test. Mexican normality tables will be used to evaluate the patients through this battery, where the patient's age and school level will be entered; in this way the theoretical result that should be obtained in each test will be calculated. Subsequently, the difference between the resultant value in the tests is calculated through $DST = \text{Test of numbers and symbols} - \text{Test of numerical connection A} - \text{Test of numerical connection B} - \text{Test of serial marking} - \text{Dashed line test}$ the expected result and divide by the standard deviation (SD). The points final sum allows the diagnosis of minimal hepatic encephalopathy if it is less than -4.

Statistical analysis used: Descriptive Statistics: frequencies and percentages of qualitative variables distribution will be expressed in tables and graphs. The relationship of variables with the Pearson correlation test. Qualitative type variables: chi square. Difference of means: T test for student.

Results

The study population was made up by 34 patients. The average age was 59 ± 10 years. Patients older than 60 years were 12 (47%),

the predominant schooling was <6 years of study in 15 (44) (Table 1). A prevalence of minimal hepatic encephalopathy was observed in 12 (35%) whom 6 (50%) were women. In the 5 tests, the correlation analysis was significant with the age, the gender and the school level (years of study). The Child Pugh scale: A 17(50%), B 9(27%) and C 8(23%) (Table 2).

The Numbers and Symbols Test (DST) correlation with age was significantly negative ($r=-0.38$), (Figure 1). That means that the older patient gets scores below +1; the same test showed a negative correlation with gender ($r=-0.45$), thereby determining that females got lower scores (Figure 2). According to the years of study, the DST test showed a meaningful positive correlation ($r=0.4$), (Figure 3) which means the patient with most years of study got better scores in that test. The DST test was the one that showed the highest correlation in terms of age, gender and years of study (Table 3).

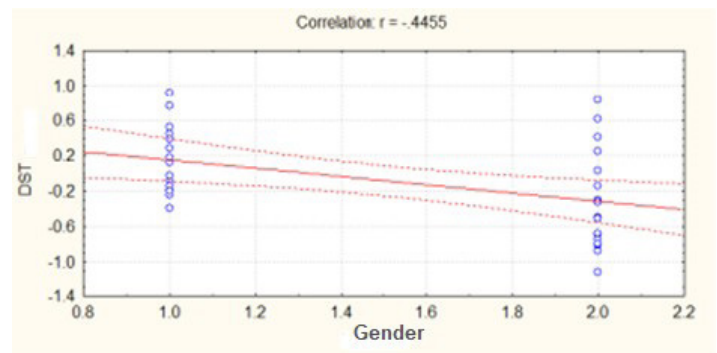


Figure 1: Digit Symbol Test (DST) correlation with age.

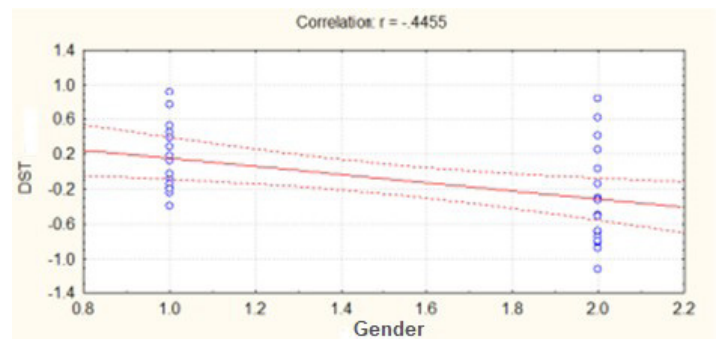


Figure 2: Digit Symbol Test (DST) correlation with gender.

Table 1: Patients' distribution in the Hepatic Psychometric Evaluation (HPES) regarding age and years of study.

School level (years of study)		< 6 years	9 years	12 years	>16 years	Total
Age (years)						
30-39		0	1	0	0	1
40-49		0	2	1	2	5
50-59		3	5	1	3	12
≥ 60		12	3	0	1	16
Total		15 (44%)	11 (32%)	2 (6%)	6 (18%)	34 (100)

Table 2: Patients' features in the Hepatic Psychometric Evaluation (HPES).

Age (years)	59 ± 10 years
Years of study	8 ± 4 years
Child Pugh	
A	17 (50%)
B	9 (27%)
C	8 (23%)
Encephalopathy	12 (35%)

Table 3: Pearson's correlation coefficient, age, gender and years of study with DST: symbol and number test; TCN-A: test of numerical connection A; TCN-B: test of digital connection B; SDT: serial marking test; LDT: broken line test. Pearson's correlation coefficient, $p < 0.05$.

	DST	TNC-A	TNC-B	SDT	LDT
Age	-0.38	-0.06	-0.22	-0.13	0.27
Gender	-0.44*	0.10	0.07	0.06	0.10
Years of study	0.40	0.17	0.27	0.30	0.01

Discussion

Minimal hepatic encephalopathy is a neuropsychiatric complication in patients with liver failure and/or portosystemic shunt, it is not clinically evident. However, it is characterized by the presence of cognitive damage, which mainly affects attention, visuospatial skills, information and psychomotor function processing. It becomes evident through neuropsychometric and neurophysiological tests. Neuropsychometric exams such as the PHES are standardized, and they must be adapted to the population of each country to be analyzed. It depends on the patients' age and years of study because these variables have great influence in this test diagnostic results [16-18]. In Mexico, Duarte et al. [19] carried out studies in healthy and sick population, they established a table of normality in the Mexican population, which was used in this study, with the obtained results. A prevalence of MHE detected through the PHES battery was observed in 35% of cirrhotic patients, which corresponds with the established prevalence in studies performed in Colombia, Mexico, and Cuba [3,12,19].

In this study, the prevalence regarding gender was not significant, and slightly differs from the established in other studies, 50% were women. Padilla RM describes a prevalence of 53.9% in women [12], while Duarte RA et al. [19] report a 58 %. The DST test showed a greater correlation with gender ($r=-0.45$), age ($r=-0.38$) and years of study ($r=0.4$) unlike the other tests, as described by Padilla RM, Duarte RA et al. [12,19,20]. This is because in a test the correct answers for a given amount of time (90 seconds) are registered, while the time in seconds until the end is generally evaluated in the remaining tests. For this reason, the DST test has a higher performance compared to the others [16,17].

Conclusions

- The prevalence of MHE at the UME HE No. 14 the highest frequency was in the female gender 6 (50%)
- The DST test had a significant correlation regarding years of study, gender and age variables.

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