

CONTRAST SENSITIVITY REGARDING THE TOXIC OPTIC NEUROPATHY

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Abstract: We studied the parameters of the visual function of the patients with alcoholic dependence syndrome. Material and method: n=32 patients with alcoholic dependence syndrome visual acuity >4/10 uc/bcva and normal Goldmann visual field, n=20 subjects control group. Subjects were tested taking into account: visual acuity-Snellen tables, colours tests-Ishihara tables, stereopsis –Lang test, contrast sensitivity test performed with MAV-I. Results: 25% of subjects do not have Stereoscopic sight. (-) and 50% of them presented only the first degree. Contrast sensitivity showed a significant reduction of all spatial frequencies in all patients. Conclusion: This test demonstrates its utility in checking the visual function from the point of view of alcohol dependence.

Keywords: alcohol dependence, stereopsis, contrast sensitivity.

Rezumat: S-au luat în studiu parametri ai funcției vizuale la pacienții cu Sindrom de dependență etanolică Material și metodă: n=32 pacienți diagnosticați cu Sindrom de dependență etanolică cu AV>4/10fc/cc și perimetrie Goldmann limite normale, lot martor n=20. S-au testat: acuitate vizuală – tabele Snellen, simț cromatic – tabele Ishihara, vedere stereoscopică – stereoteste Lang, sensibilitate la contrast – MAV. Rezultate: S-au înregistrat diferențe pentru vederea stereoscopică și sensibilitatea la contrast: 25% nu au vedere stereoscopică și 50% dintre pacienți au prezentat doar gr I. Sensibilitatea la contrast a fost afectată la toți pacienții cu dg. Sindrom de dependență etanolică. (p<0,05), toate nivelurile funcției SC au fost afectate, cu scăderi marcate pentru frecvențele înalte.

Cuvinte cheie: dependență etanolică, stereoscopie, sensibilitate la contrast.

INTRODUCTION

Toxic neuropathy due to alcohol and smoking. It represents the largest frequency of voluntary toxic aggression;

It has multifactorial etiology: ethanol + tobacco + malnutrition + family history in 40-50% of cases (1,2,4,7).

- Pathogeny is controversial regarding:
 - the toxic role of cyanides and thiocyanates;

- the reduced plasmatic level of vitamins B1 and B6 alcohol-induced;

The accumulation of formic acids and cyanates inhibits the mitochondrial function as well as the disruption of the ATP production, affecting the axonal transportation system – ATP-dependent (3,7,8,10).

From the point of view of symptomatology, the visual acuity is normal at the beginning; discrete alteration of the chromatic sensation may occur, as well as modifications of the Contrast Sensitivity (CS) and adaptation disorders.

PURPOSE OF THE PAPER

- The evaluation of the visual function of the patients diagnosed with alcoholic dependence syndrome, hospitalized in the Psychiatric Clinic of Sibiu.
- The examination of the Contrast Sensitivity, as a method for detecting the subtle affection of the visual function, consists in testing the perception of certain sinusoidal networks which are the only stimuli perceived at brain level. It is considered as the first affected visual function and the last one which comes back to normal (1).

MATERIAL AND METHOD

The study included 32 patients (64 eyes) hospitalized in the Psychiatric Clinic of Sibiu, diagnosed with alcoholic dependence syndrome. Inclusion criteria: absence of other ocular affections, AV>4/10fc/cc; CV Goldmann normal.

Tested visual indicators: visual acuity-Snellen tables, colours tests-Ishihara tables, stereopsis – Lang test, contrast sensitivity – sinusoidal networks at five levels of frequency and eight levels of contrast sensitivity.

RESULTS

All patients were men, aged between 45-63 years old, average age = 52,6 years old.

Alcohol consumption:

- >300ml/day
- >5years

Smokers:

- 93,75 % - 30 patients
- >20 cigarettes /day
- 10 - 40 years

CLINICAL ASPECTS

Table no.1 Functional characteristics

Parameters		Target batch N=32	Witness batch N=20
Stereoscopy	(-)	9	0
	(+)	15	5
	(++)	6	11
	(+++)	2	4
Chromatic sense	N	29	20
	A-ax R-V	3	0
Contrast sensitivity	1,5	47	82
	3	76	150
	6	48	165
	12	20	59
	18	5	18

Visual function indicators:

Visual acuity: 9,52% < 5/10; 44,44% - 5/10-7/10; 46,03% - 8/10-10/10fc/cc.

Stereoscopy : (-) 28,12%; (+) 46,87%; (++) 18,75% (+++)- 6,25%

Chromatic sense: N - 90,62%; A ax R-V - 9,37% -T. Ishihara

Contrast sensitivity: 1,5 - 47,31u

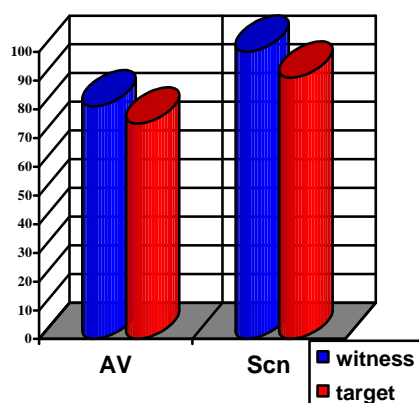
3 - 76,47u

6 - 48,21u

12 - 19,89u

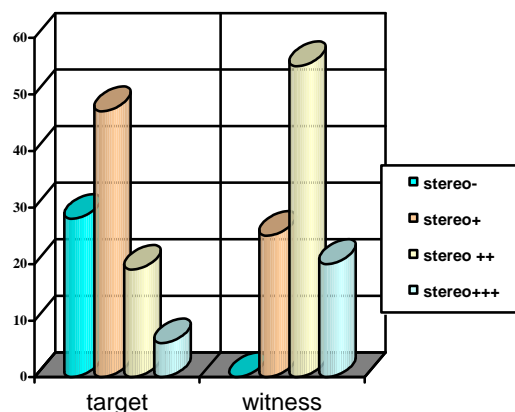
18 - 4,82u

Fig.no.1. AV representation and chromatic sense



Regarding the two common indicators of the visual function (AV and the chromatic sense), there were no differences between the two batches. The absence of the modifications of the chromatic sight may be related to the fact that the testing method used - the Ishihara tables - , does not reveal the incipient modifications.

Fig.no.2 Stereoscopy levels representation.



Regarding the other two indicators:

Stereoscopic sight and

Contrast sensitivity - there were significant differences between the two batches.

Regarding the target batch, Stereo(-) and Stereo(+) represented 75% (28;47%) and for the witness batch, Stereo(-) and Stereo(+) represented 25% (0;25%).

The decrease of the stereoscopy level is correlated to the decrease of the contrast sensitivity values for all frequencies. The most important affection was signalled at the level of frequencies highly responsible for the perception of fine details intercepted by the “dwarfism” ganglion cells (1).

Fig.no.3. Contrast sensitivity within the target batch

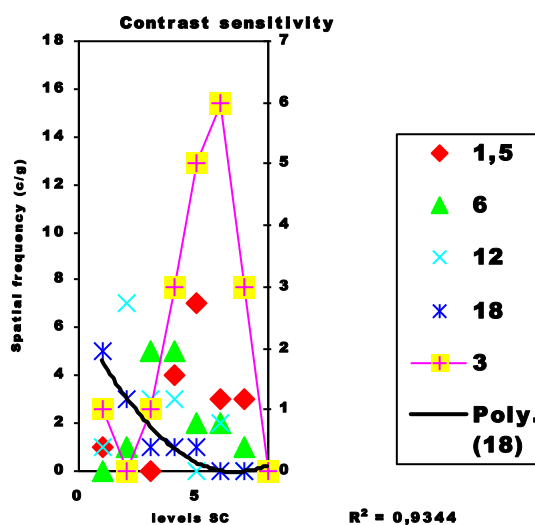
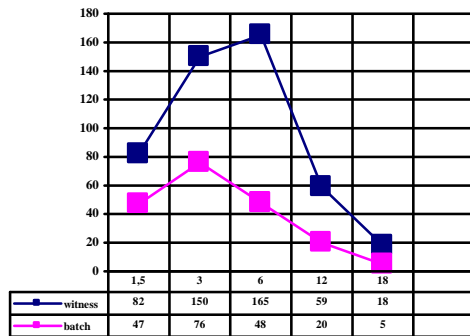


Fig no. 4. Representation of the contrast sensitivity levels within the two batches



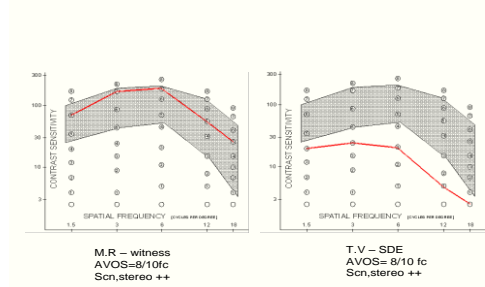
Regarding the contrast sensitivity curve, three distinct areas may be globally distinguished:

- 1.- low spatial frequencies area – gross analysis field
- 2.- average spatial frequencies area – forms global analysis field
- 3.- high spatial frequencies area – fine details analysis field (1,2.).

The significant decrease of the contrast sensitivity values, especially for the average and high frequencies expresses the affection of the transfer function at retinal-thalamic level and at thalamocortical level in patients with alcoholic dependence and in heavy smokers. These changes may be correlated to the cognitive deterioration in these patients (3,4,5,9).

The toxic aggression may occur at the level of retina – maculopathy: chiasma-chiasmopathy of the lateral geniculate nuclei (6,8).

Fig. no. 5. Comparative representation of the Contrast Sensitivity function witness-patient



CONCLUSIONS

- Regarding the visual acuity and the chromatic sense, no differences were registered between the two batches ($p>0,01$).
- Differences were recorded for the stereoscopic sight, 25% of the subjects did not present stereoscopic sight and 50% of them presented only the first degree.
- Contrast sensitivity was affected to all patients with alcoholic dependence syndrome ($p<0,05$).
- All levels of the Contrast Sensitivity function were affected, with significant decreases for the high frequencies.

- In the absence of the classic elements for the affection of the optic nerve, the target batch presented changes at the level of two components of the visual function: stereoscopy and contrast sensitivity as an expression of the dysfunction of the retinal-thalamo-cortical path.

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