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**NEUROPSYCHIATRIC AND  
CARDIOVASCULAR STUDY IN  
A GROUP OF WORKERS IN  
TRAFFIC SAFETY**

*SUMMARY*

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# NEUROPSYCHIATRIC AND CARDIOVASCULAR STUDY IN A GROUP OF WORKERS IN TRAFFIC SAFETY

**Keywords:** traffic safety workers, beginning of the shift, late shift, blood pressure, professional fatigue, neuropsychological changes

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## **1. INTRODUCTION**

In Europe and in our country, we observe an increased frequency of road or rail accidents, sometimes with catastrophic consequences. The health of workers in transport safety has a very important role in preventing such accidents.

In this paper, we conducted a comprehensive study on a group of workers in this field. Using traditional, but also modern methods, I studied, from a clinical and paraclinical point of view, cardiovascular and neuropsychiatric changes that occurred both during activity and at rest period.

## **2. GENERAL DATA**

The engine driver and professional driver operate from the vehicle cabin and outdoors, thus possibilities for personal hygiene are limited. To prevent accidents at work and to eliminate the dangers of producing infections, it is absolutely necessary to comply with health and safety norms, without neglecting personal hygiene. (Todea A.,2006).

The General part comprises 4 chapters:

1. Aspects of the working process in traffic safety workers (repetitive work, in alternating shifts, unhealthy diet, working positions and physical effort, exposure to vibration, professional noise, visual and neuropsychological overload).
2. Noninvasive functional cardiovascular exploration: ECG, echocardiography, Holter and classic blood pressure determination, plethysmography, rheography, thermometry, thermography, Doppler ultrasound vascular exploration.
3. Noninvasive neurophysiological and neuropsychological functional exploration: EEG, brain mapping, magneto encephalography, evoked potentials, echo encephalography, computed axial tomography, positron emission tomography, MRI, psychological tests - Pieron, Prague, Labyrinth, spatial view.
4. Cognitive brain functions (vigilance, orientation, attention, sleep, memory, learning, thinking, affectivity, language).

### 3. SPECIAL PART

**THE AIM OF THIS STUDY** is to observe certain changes on a neuropsychological or cardiovascular level arising for workers with functions in transport safety. Based on these changes, the ultimate goal is to develop a program of prevention and treatment to improve the working conditions and health of transport safety workers.

**STUDY OBJECTIVES** were as follows:

- To investigate and assess the main cognitive functions (perception, attention, concentration, memory, learning) using psychological group tests at the beginning and end of the work shift (Pieron, Prague, "Labyrinth" sample, Space view "Cubes").
- Linking the work done under neuropsychiatric stress conditions and leading to certain neurological changes.
- Emphasis of certain cardiovascular changes occurring during the work shift or at the end of the shift by clinical examination, ECG, Holter monitoring, determining BP, MAP, evaluating brain irrigation by the Doppler ultrasound method, EEG.
- What are the age groups with greater involvement in the study group.
- Assessing the potential reversibility of changes that appeared if the cause is removed (neuropsychiatric stress).

#### 3.1. MATERIAL AND METHODS

**The study group** included a total of 120 workers with responsibilities in traffic safety: 67 (55.83%) engine drivers and 53 (44.17%) professional drivers, aged between 35 and 55 years old. Workers were selected from among engine drivers from both public and private companies, as well as from companies of road transport which carried medical and psychological examinations within the Clinical Hospital CF Craiova and in one of the particular authorized polyclinics, approved by the Ministry of Transport to carry out such investigation.

**Study methods used:** clinical examination, determining BP and Holter and classic ECG, Crampton Index, noninvasive vascular Doppler ultrasound exploration, EEG, psychological testing group - Pieron, Prague, Labyrinth, space view.

### ***Results obtained***

94.16% of the study group experienced symptoms during a long race. The most common symptoms were headache (15.83% of the group), neck pain (17.5%), palpitations (16.66%), and chest pain (14.6%), predominantly to engine drivers belonging to the age group 46-55 years.

By the BP measurement with the classical method, there were identified between 141-189 mmHg SBP increases in the study group (54.16%), increase in DBP (between 81-119 mmHg) were recorded in 50% of workers. Most workers were mechanics in the age group 46-55 years. Statistical analysis revealed a positive average correlation between the age of workers in the study group and significant increases in systolic blood pressure ( $r = 0.794$ ,  $p < 0.0001$ ) and diastolic ( $r = 0,721$ ,  $p < 0,0001$ ).

MAP system TA registration allowed SBP and DBP values monitoring for 24 hours, both during the work shift and during rest. In the study group, there were values of systolic blood pressure (67.5%) and diastolic (55.83%) above the normal range, to a much larger number of workers than the control group, more workers belonging to the group 46-55 years old (34.16%). At the exit of turn, it was recorded a weak Crampton index, corresponding to a weak reactivity of the cardiovascular and autonomic nervous tone.

In the classic ECG at the end of the shift, 44.16% of workers had sinus tachycardia, 11.6% ventricular premature beats and 5.83% atrial one, prevailing in the group aged 46-55 years. Holter ECG recording showed the existence of arrhythmias and driving disturbances during working hours, but also during rest. Sinus tachycardia and ventricular and atrial extra systolic arrhythmias were noticed for a larger number of workers, respect to the classic ECG (52.5%, 17.5% and 15% of workers), predominantly in the age group 46-55 years.

For Doppler examination on the right and left common carotid arteries, I noticed a discreet reduction (insignificant) of the VS with 2% in the study group than the control group and an increase in IR with 3.21% and 4.05% per ACC right or left. VS decrease was observed in 39 workers (32.5%) and in 37 workers (30.83%) was observed an increase in IR. These changes might be explained by the hypertonia in the vertebral basic system.

The results obtained in psychological tests (test Pieron, Prague, Labyrinth test, spatial view) showed a decreased ability to concentrate attention on the task and the capacity to process stimuli, decrease in prompt reactions, decrease in the perceptual ability, storage capacity and perceptive discrimination in the study group, out of turn, explained by the

presence of neuropsychiatric overloading and professional fatigue. The results are confirmed by statistical analysis performed on the values obtained for the two groups (t-Student,  $p < 0,0001$ ).

#### **4. CONCLUSIONS**

1. In the present study research, there were involved 120 workers in traffic safety, Dolj County, the research being carried out over a period of 3 years. The study group consisted of 67 (55.83%) engine drivers and 53 (44.17%) vehicle drivers, aged 35-55 years, the most numerous being in the age group 46-55 years (78 workers representing 65% of the entire study group), the average age being 46.53 years.

2. The study group was examined both clinically and paraclinically. To conduct the study, there were used classical methods such as ECG BP measurement, and modern methods such as MAPA or Holter ECG monitoring, noninvasive cerebral vascular Doppler exploration, EEG and psychological tests (Pieron, Prague, Labyrinth, spatial view) which revealed the cardiovascular and neuropsychiatric changes, both during activity and at rest period and assessing cognitive function and brain irrigation to this category of workers.

The results were analyzed according to age groups and workers' occupation and were compared to a control group consisting of 120 people from a different industry (TESA personnel, administrative personnel, doctors, residents, nurses, students).

3. By the BP measurement by the classical method, there were identified increases in SBP and DBP, most of them in the age group 46-55 years. TAS increases were between 141-189 mmHg at the study group, 65 workers (54.16%). Regarding increases in TAD, they were between 81-119 mmHg and were registered in 60 workers (50%).

4. MAPA allowed the observation of the influence of neurological strain present in traffic safety workers on the values of SBP and DBP, for 24 hours, both during the work shift and during rest. Maximum TAS values above the normal were recorded for 81 workers (67.5%), most of them from the 46-55 years age group (40.83%), and DBP values above the maximum normal value were recorded for a total of 67 workers (55.83%), most of all in the age group 46-55 years (34.16%). Most values of SBP and DBP maximum above the normal range were registered during working hours or immediately after the shift ends (52,50% and 32,50%), but also during rest (16.66 % and 12,50%).

5. Classic ECG at the beginning of the shift and out of turn, highlighted that at the end of the work shift, 53 workers in the study group (44.16%) had values of heart rate between 90-120 beats / minute, that is sinus tachycardia, more in the age group 46-55 years (30%). In 11.66%

of workers, ventricular premature beats were recorded at the end of work shift and only 5.83% had atrial extra systolic arrhythmia. Cardiac arrhythmias also prevailed in the age group 46-55 years (11,66%).

6. Holter ECG recording / 24 hours allowed recording of arrhythmias and driving disturbances both during working hours and during rest. Thus, sinus tachycardia was recorded at 52.5% of workers, extra systolic ventricular were registered at 17.5% of workers and premature atrial in 15% of workers. These ECG changes were recorded more often in the age group 46-55 years, in engine drivers.

7. For the studied group, poor IC value out of turn showed a weak reactivity of the cardiovascular and autonomic tone, both in engine drivers and vehicle drivers.

8. Regarding vascular Doppler exploration on the right and left common carotid arteries, we noticed a discreet reduction (insignificant) of VS with 2% in the study group compared to the Doppler parameter values in the control group and an IR increase of 3.21% and 4.05% in the ACC right or left. VS lowering on the right and left carotid arteries were observed in 39 workers (32.5%) and in 37 workers (30.83%) there was an increase of IR, predominantly in the age group 46-55 years and engine mechanics. The changes observed in the study group could be explained by hypertonic (sympathicotonia) of the vertebral-basilar system, which increased the IR, lowering systolic velocities also due to increasing resistance in the cerebral circulation.

9. In the present study, neuropsychological strain did not significantly change EEG trails. Psychological tests Pieron, Prague, Labyrinth, spatial view showed that out of the shift (compared to the beginning of the work with the control group) significantly decreased attention, concentration, memory, spirit of observation and perception, predominantly in group age 46-55 years and engine drivers (t-Student,  $p < 0.0001$ ), highlighting neuropsychological strain during activity, which led to professional fatigue.

Statistical analysis revealed a significant positive correlation between the age of individuals included in the study group and the maximum increase in systolic blood pressure ( $r = 0.794$ ,  $p < 0.0001$ ), peak of diastolic blood pressure ( $r = 0.721$ ,  $p < 0.0001$ ), and sinus tachycardia ( $r = 0.778$ ,  $p < 0.0001$ ) at the end of the shift.

TAD parameter is also correlated with Crampton index ( $r = 0.624$ ,  $p < 0.01$ ) and heart rate ( $r = 0.694$ ,  $p = 0.099$ ). Also, statistical analysis revealed a statistically significant positive correlation between the occurrence of arrhythmias out of the shift and workers' age ( $r = 0.589$ ,  $p < 0.001$ ). There are observed statistically significant positive correlation between TAS and IR ( $r = 0.761$ ,  $p < 0.0001$ ), TAS and the Pieron result ( $r = 0.648$ ,  $p < 0.0001$ ), and between

Pieron test results and Prague ( $r = 0.617, p < 0.0001$ ), or Labyrinth accuracy and speed of execution ( $r = 0.685, p < 0.0001$ ).

***The final conclusion - originality of the thesis***

- This complex clinical and paraclinical research in traffic safety workers is less mentioned in literature.

- I point out the use of the method based of noninvasive cerebral vascular exploration with Doppler ultrasound which showed, in this case, a reduction of the irrigation and an increase in resistance in the cerebral circulation to about 30% of workers as a result of stress and neuropsychological overload.

The study revealed the cardiovascular and neuropsychiatric manifestations present in traffic safety workers, predominantly in the age group 46-55 years and in engine drivers, drawing attention to strain and professional fatigue.

Statistical analysis of the results obtained revealed good significant correlations between increasing SBP and DBP and worker's age, between arrhythmias occurring and age, between increases in TAS and IR, between increases in TAS and psychological tests Pieron, Prague between psychological tests Pieron, Prague, Labyrinth, at the end of the work shift, compared to the beginning of the activity and control group, demonstrating the existence of stress factors that have led to fatigue, deficit in cognitive functions and cardiovascular events. Based on the foregoing, a program to improve working conditions and compliance with the eating and rest rules to prevent occupational diseases must be established.

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