CONTRIBUTIONS TO ESTIMATING THE INTENSITY OF NEURO-PSYCHO-SENSORIAL OVERLOAD IN TELEVISION WORKERS

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INTRODUCTION

The present paper presents the methodology of appreciating the intensity of neurological, psychological and sensorial overload in television employees (editors, presenters, image directors and editors, production operators, broadcast operators), insisting on subjective and objective indicators which can pinpoint this neuro-psycho-sensorial overload.

OBJECTIVES

We want to check out the role played by the physiological indicators which are easy to measure (heart rate, cardiac rhythm and conduction modifications, changes in the ST-T segment on an EKG, hormonal indicators) but also the role of psycho-fisiological indicators relating to the **visual** and **auditory** segments, and that of the psychological and behavioral indicators which predict with great accuracy the neuro-physiological exhaustion.

We also want to demonstrate the importance of prophylactic means for occupational illness or those relating to the work environment through neuro-psycho-sensorial overload for television workers.

METHOD

We selected television employees such as directors, presenters, image directors and editors, production operators, broadcast operators with a work experience of 5 to 10 years - **10 subjects for each position.**

The content and the intensity of the mental effort of these workers has been studied according to:

- The content and nature of the work
- The nature and complexity of information they have to receive and process
- The abstract nature of the information which they have to process and the possible need to express this information through symbols.
- The nature, complexity and difficulty of their responses (pressing different keys, sticks for filming or editing, etc.)

Studying the professional factors of neuro-psycho-sensitive overload has begun with recording during the completion of their **employee file** of the elements which can become elements of overload for the neurological and sensory segments.

Such overloads have been grouped in:

- Main overload factors
- Secondary overload factors

Main overload factors are represented by:

- Working the segments which perceive information
- The need to process information at the central nervous system level and taking professional decisions

We monitored the nature, number, frequency, intensity and significance of the information the workers are required to perceive, such as : light signals, sound signals, following certain markers which have overworked the visual and auditory segments and require attention and vigilance.

Also, of great importance was the study of the way in which the professional decision is manifested as:

- A motor act (pressing different buttons for recording image or sound, editing, mixing) according to the speed and rhythm in which this act must be performed
- Verbal response
- The need for higher attention

Secondary Factors:

- The sitting position for a long time, without motor movement (broadcasting operators, reporters during live shows, presenters during a show)
- Environmental factors (unfit microclimate, light)
- Unfit work shifts

The times of the measurements to observe this overload were established as follows:

- *Before going on shift* for editors and presenters
- *Before beginning filming* for image directors
- *Before going on shift* for image editors, production operators, broadcast operators

This way, there were established a base level reading for the subject, when he is rested. The following measurements were compared to the base levels for each subject, during his work.

The following indicators were measured:

A. **Physiological indicators**

1. **Heart rate**
2. **Heart rhythm and conduction changes, modification in the ST-T segment on the EKG bigger than 1mm during the professional work**
3. **Changes in blood pressure levels**

B. **Hormonal indicators**

1. Changes in the urine and blood catecolamine and vanil-mandelic acis concentartions (VMA)
2. Changes in concentration for corticosteroids hormones (saliva cortisol)

C Biochemical indicators

1. Seric triglicerides
2. Total seric cholesterol
3. HDL-cholesterol
4. Fibrinogen
5. Blood clotting time

E. Psychological indicators

From the many psychological indicators which can show neuro-psycho-sensitive tiredness, three were used:

1. The distribution and concentration of attention
2. Short and medium term memory
3. The efficiency of high neurlogical processes (analysis-synthesis, rational thinking, logic, spatial representation)

F. Behavioral indicators

The selected indicators for behavior were those who referred to the neuro-vegetative complaints, changes in sensitive-sensorial areas and sleep pattern modification.

RESULTS

The neuro-psycho-sensitive overload has been more intense for image directors, image editors, broadcast operators who have received light stimuli, multiple moving images, sound signals which have led to intense effort for the auditory and visual segments but also a higher need for attention and vigilance.

The characteristics of social and personal factors, especially the family relations (peacefully or conflict filled) have influenced in a big way the general energy levels of the individual during the work shift.

Work relations and particularly relations with the supervisors, work motivation and reward have influenced the neuro-psychological exhaustion.

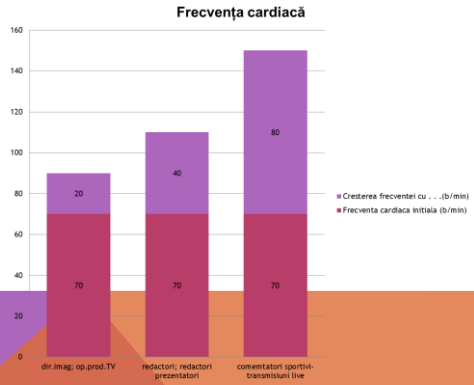
Acute afflictions and especially chronic, pre-existing afflictions of workers have determined in a large way the lowering of the work capacity and the appearance of the neuro-psychological exhaustion during the professional activity. Pre-existing manifestations of neurotic type illnesses, neuro-astenic syndromes, anxiety syndromes, led to a more rapid appearance of neurological, hormonal, cardiac or digestive syndromes.

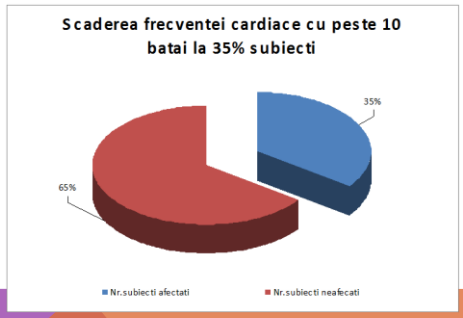
Symptoms have not been specific if they were interpreted separately, but including them in sensitive-sensorial syndromes, neuro-vegetative and psychological syndromes have been much more relevant to investigating chronic exhaustion.

RESULTS OF PHYSIOLOGICAL INDICATORS

1. Cardiac frequency went through the following changes:
- there was an increase in heart rate/minute with more than 20 beats compared to reference values (the end of the work shift vs. The beginning) for image editors, production operators.
- This reveals a stress reaction brought on by cognitive (mental) overload and/or a build up of bad factors (stress, neuro-psychological work, noise, inadequate microclimate, or field work)

- **There was an increase of heart rate with more than 40 beats per minute** compared to reference values for producers, presenters during live broadcasts
- **There was a high increase up to 140-150 beats** per minute for the cardiac frequency of sports commentators during live broadcasts of a sports event
- **A drop in heart rate with more than 10 beats per minute** in over 35% of image editors (4 subjects) during long editing hours (an editing work shift takes 8 hours)





2.Modification in heart rhythm and conduction (extra systolic arrhythmia, left or right branch blocks, depending on the increase of cardiac frequency) were present in producers, presenters during taped and live shows, but also for image editors during actual work shifts – in more than 35% of the subjects.

3. Modifications in blood pressure

- There were elevations in blood pressure levels for both systolic and diastolic BP with more than 10 mmHg for the duration of the work shift, compared to the reference value for all mentioned job types, when the professional work required an increase in cognitive abilities. If the work was associated with noise, inadequate microclimate such as field work, the elevation in blood pressure was 40mmHg higher than reference values.

RESULTS FOR BIOCHEMICAL INDICATORS

The results were surprising with 85% of the subjects (27 people) showing:

- elevated blood triglyceride levels
- elevated total cholesterol
- elevated fibrinogen
- lower clotting time

These results were interpreted as a prologues stress reaction to specific television work requirements with high demand for neuro-psychological and sensorial effort.

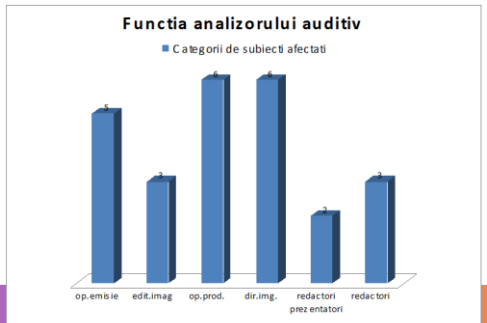
RESULTS FOR PSYCHO-PHYSIOLOGICAL INDICATORS

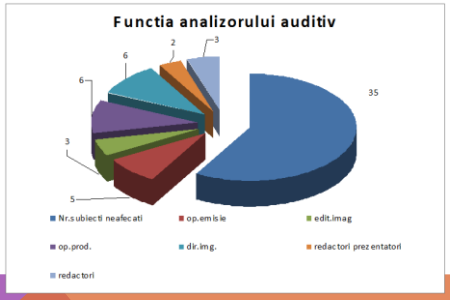
1.**Relating to the visual segment** there were modifications in 55% of the subjects at the end of their work shift as opposed to the beginning:

- a drop in visual acuity
- a drop in accommodation and ocular convergence
- narrowing of the visual field
- elevated number of blinks/minute

These results were recorded in image directors, image editors, broadcast operators and production operators.

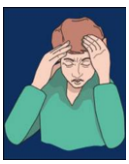
2. **In relation to the auditory segment** there were temporary shifts in auditory levels with 5 to 10 dB for high frequencies (4000 and 8000 Hz) at the end of the work shift compared to the beginning in 41.6% of the subjects (25 workers of which 5 broadcast operators, 3 image editors, 6 production operators, 6 image directors, 2 presenters, 3 directors).

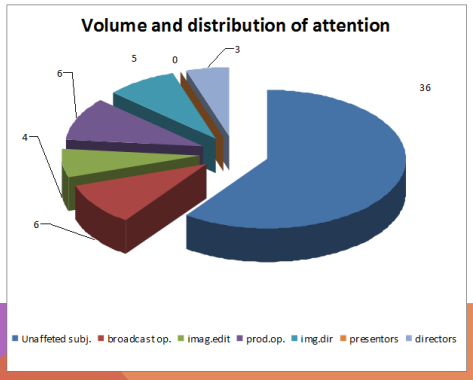




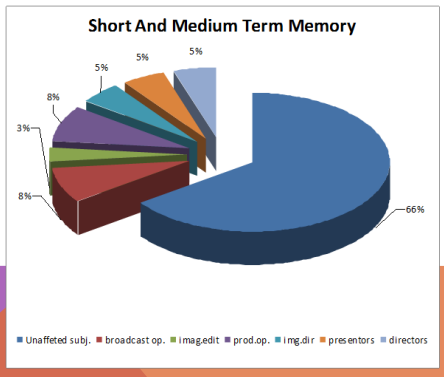
RESULTS FOR PSYCHOLOGICAL INDICATORS

1.The indicator for **„Volume and distribution of Attention"** has shown a drop in attention and concentration in 40% of the subjects after the work shift compared to the beginning, meaning in 24 subjects: 6 broadcast operators, 6 production operators, 5 image directors, 4 image editors, 3 directors.

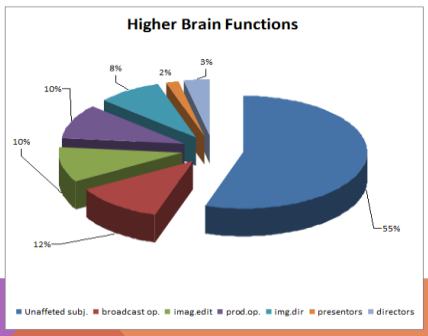




2. The indicator for „Short and medium term memory" has shown drops in the ability, length and volume of reproduction in 35% of the subjects (21 works: 5 broadcast operators, 5 production operators, 3 image directors, 2 image editors, 3 directors, 3 presenters)



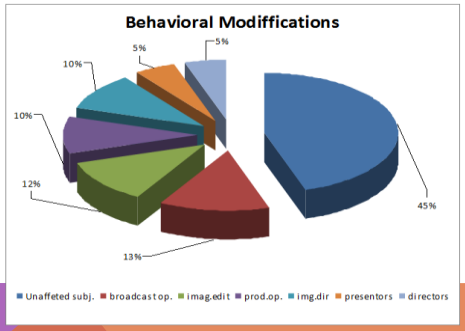
3 The recording of „Higher brain functions" has shown a drop in the ability to analyze and synthesize, of logic thinking process and a difficulty of spatial representation in 45% of the subjects (21 workers: 7 broadcast operators, 6 image editors, 6 production operators, 5 image directors, 2 directors, 1 presenter)

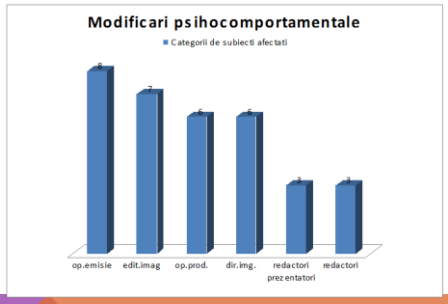


RESULTS FOR BEHAVIORAL INDICATORS

1. Neuro-vegetative symptoms (palpitations, sweating, weakness)
2. Sensitive-sensorial symptoms (numbness of extremities)
3. Sleep pattern modifications (difficulties for sleep induction and maintaining, tiredness on awakening)

These changes appeared in 55% of the subjects (33 workers): 8 broadcast operators, 7 image editors, 6 production operators, 6 image directors, 3 directors, 3 presenters.





DISCUSIONS

Pinpointing the mental effort in the professional activity relating to television work is a difficult process, but necessary to this activity in which there is a neuro-psycho-sensitive overload.

The time frame pressure which are imposed in the production of a television show, the complexity-speed relation in such an activity, attention, precision, responsibility which comes from the broadcast of such a production are factors which ***contribute, in different measures, to the set-in of neurological and physiological exhaustion.***

Of great importance in appreciating the intensity of the neuro-psycho-sensitive overload can be indicators and subjective evaluation techniques which include **scales of subjective evaluation** of neuro-psychological effort, **scales for appreciating the physical and psychological state throughout the professional activity** and at its end, as well as **scales to appreciate the state of the individual during their off time.**

These scales will be the subject of future research relating to professional activity in the production of television shows.

CONCLUSIONS

In the professional activity of television workers ***there are different degrees of neuro-psycho-sensitive overload*** which can be objectified and quantified through different methods, using complex categories of indicators, as the present paper has shown.

The professional psycho-sensorial overload in television includes:

- **professional overload of the visual segment** which can lead to accommodation or convergence astenopy (especially in bad lighting conditions, relating to quality and quantity) – this affliction is included in the table of occupational hazards – as well as worsening preexisting myopia.
- **professional overload of the auditory segment** which can lead to professional hypoacusis or deafness, an illness also included in tables for occupational hazards.

Also, the neuro-psychological overload is a professional causing factor for high blood pressure, cardiac ischemia, nervosas and neuro-psychological illnesses.

Relating to psycho-physiological indicators in connection to the visual and auditory segments, which are very overworked in the line of work of television production it was noticed that **sound stimuli have the highest physiological value,** having a shorter reaction time than visual stimuli.

Shifting the auditory limits, especially for high frequency, is common for television workers, at the same time noticing an increase in reaction time for sound stimuli, a drop in the ability to differentiate these stimuli and verbal error.

The matter of greater importance with professional overload relating to television work, neuro-psycho-sensitive overload, is the issue of prophylaxis for professional illness, which, in the current Romanian legislation includes:

- **Technical and organizational measures**
- **Medical measures**

1. Organizational measures

- Ensuring an activity regime to correspond to psycho-physiological biorhythm of the human body
- Organizing work activity as to ensure the rest and recovery of overworked segments
- Analyzing light comfort, as for chromatic, sound and thermal comfort in work spaces (television sets, editing rooms, broadcasting booths, etc.)
- Optimal assimilation of the eye-motion work stereotype
- Enforcing minimal health and safety requirements in work dealing with equipment with viewing screens

- Enforcing minimal health and safety requirements in work dealing with exposure to sound generated risks
- Improving orientation and professional selection activities and as a follow-up, perfecting knowledge through adequate psychological teaching methods.
- Diversifying professional and personal activity to ensure the motor release and recovery of psycho-energetic levels

More than that, through the Law 319/14.07.2007 “employers are advised to create adequate spaces in which the employees can spend their break time”.

2 Medical measures

a. Recognizing the risk of professional illness
b. Medical exam at the beginning of the employment – according to HG 355/2007

□ **File 126 – Overload of the visual segment:**

- according to the medical file (visual acuity overload)
- eye exam at the indication of the labor medicine specialist

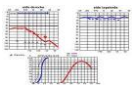
Warnings:

- a drop of visual acuity below 0.5% for both eyes or 0.7% in both eyes with efficient optic correction (the difference in correction bigger than 3D for both eyes)
- narrow angle unoperated glaucoma
- wide angle glaucoma (anterior diagnosed)
- severe dysfunctions of the eye movement equilibrium
- disturbance of color perception for jobs where mistaking color is a risk
- pigmented retinopathy
- any acute eye condition until it is fixed

☐ **File 109 – Noise**

a. according to data from the medical file
b ear exam – at the recommendation of the labor medicine specialist
c. audiometry

Warnings:



- chronic illness of the medium and internal ear
- manifested psychopaths or neurotic conditions
- medium or high blood pressure, associate with other risk factors

☐ **File 149 – Decision making personnel**

Medical exam at the beginning of the job
a. according to the medical data
b. psychological exam
c. psychiatric exam

Warnings:
- psychosis

Periodic medical exam

- **File 126 – Overload of the auditory segment**
  - overall clinical exam – once a year (attention to the visual acuity)
  - eye exam – at the recommendation of the labor medicine specialist

- **File 109 – Noise**
  - overall clinical exam – once a year
  - audiometry – once a year
  - ear exam – once a year at the recommendation of the labor medicine specialist
  - EKG and heart exam – at the recommendation of the labor medicine specialist
  - Psychological evaluation once every 3 years – at the recommendation of the labor medicine specialist

- **File 141 – decision making personell**
  - overall clinical exam – once a year
  - psychological exam (behavioral tests, personality tests) – once a year
  - psychiatric exam – at the recommendation of the labor medicine specialist

d.Medical education (informing and teaching prophylactic measures)

☐ work-rest regime
☐ healthy eating
☐ free time
☐ sporting activities
☐ etc.

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