

ALTERNATING SHIFT WORK. MEDICAL AND SOCIAL ASPECTS

NICULINA CRĂCIUN¹, D. I. BARDAC²

^{1,2}„Lucian Blaga” University of Sibiu

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Abstract: *In the alternating shift work, a way of organizing in time the work of workers, there are both medical problems relating mainly to melatonin secretion and outphasing the biological rates and social, family issues leading finally to a specific state of mental stress, an increase in the levels of anxiety, all of them being exacerbated or dimmed by the worker's adapting abilities.*

Cuvinte cheie: *munca în schimburi alternante, ritmuri biologice, melatonina, perturbarea vieții de cuplu, cronobiologie*

Rezumat: *În munca în schimburi alternante, această modalitate de organizare în timp a activității profesionale a muncitorilor, apar atât probleme medicale legate în principal de secreția de melatonină și defazarea ritmurilor biologice, cât și probleme sociale, familiale, care duc în final la o anumită stare de tensiune psihică, creșterea nivelului de anxietate, toate fiind exacerbate sau estompate de capacitățile de adaptare ale muncitorului.*

Alternating shift work represents a way of timely organizing the occupational activities.

The Labour Code provides several types of labour according to the mode in which they are undertaken.

One of these, we mention the alternating shift work, regulated by the provisions of Article 136. This supposes any way of organizing the working programme in which employees succeed one another in the same work station, according to a certain schedule established by the employer.

By means of the rules of internal procedure, alternating shift work is supported by:

1. technical reasons (processes that cannot or should not be turned off, or that should be supervised permanently);
2. economic grounds (increase profits, increase labour productivity by the full use of the plant in a 24 hour day).

This article aims at presenting aspects related to alternating shift work in cases in which biological overstress may occur, related to the phenomenon of de-synchronisation of the professional activity and inconsistency between certain functions of the body.

Overstress takes place at the same time with shifting because the body tries to adjust its biological rhythm to the new circadian rhythm, and to return to its original rhythm once the shift schedule alternates.

Our biological rhythm of work and rest (wake-sleep) is dictated by the light. It influences the functioning programme of all organs and systems. The sleep-wake cycle rhythm is decided by this factor, and induces the following body changes:

- heart rate;
- respiration rate;
- blood pressure;
- concentration of certain elements in blood;
- pH of the blood, performance and sensory-motor systems.

All of these biological systems are synchronized with the work developed in day time. Alternating shift work may overstress the biological rhythm although adaptation seems to be easy. Meanwhile, chronic diseases may occur.

Alternating shift work may alter certain functions of the body. Body adaptation take account of several factors, two of the most important are the age and the type of work. Young people will adapt more easily than the elderly, and those who do mainly physical tasks will adapt more easily than those who do mainly sensory activities.

Digestive disturbances are the most common pathology related to alternating shift work, and this is seen particularly among young people, due to the gap between the meals which modify gastric secretion and the appetite. Ultimately, this may lead to neuropsychiatric disorders (nervousness, headache, vertigo, decreased attention, anxiety, depression), which seem to appear mainly in the older people. The most severe disorders are those of sleep which underlie other problems of health, according to the conclusions made by most specialists. Sleep quality depends largely on the type of activity, insomnia occurring more frequently, especially in those who do intellectual work. Those who usually have a refreshing sleep adapts more easily to alternating shifts.

Romanian Government Decision No. 355/2007, amended and restated by the Government Decision No. 1169 of XII/2011, provides a special set of blood cultures for those working in alternating shifts (glycaemia, ECG), as well as psychological and psychiatric examinations.

The adaptation to the new rhythm of work depends, to a large extent, on the quality and quantity of sleep. Good sleep is a factor of tolerance, essential for the shift work. Chronobiology is the science that measures and explores the mechanisms of the biological time structure and their relations in the rhythmic manifestations of the body.

¹Corresponding author: Crăciun Niculina, Str. Mihai Popescu, Bl. 33, Sc. B, Ap. 13, Târgoviște, county of Dâmbovița România; E-mail: craciun_veronica@yahoo.com, Tel: +4074434566

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Chronomedicine represents a specific chapter, which studies the relations between the variables of chronobiology and chronopathology of the biological rhythms of the human body and work.

The biological rhythms represent the subject of Chapter 2. Special attention shall be paid to chronoanatomy and chronophysiology of the central nervous structures that occur in the chronoregulation of the biological functions through the central horologe - the suprachiasmatic nucleus - functionally accompanied by the pineal gland through the melatonin secretion. Synchronization and de-synchronisation are relevant properties of the biological rhythms.

Melatonin N-acetyl-5-methoxytryptamine is a chemical substance produced by the pineal gland and is involved in signalling "the daytime", a kind of chronological peace-maker. It is synthesised from tryptophan (an amino acid), the reaction being catalyzed by two enzymes (arilalkilamine N-acetyltransferase and hidroxiindol-o-metiltransferase) and is encountered in all living bodies, from algae to humans at varying levels.

Melatonin is quickly metabolized by the liver. It is produced by the pineal gland, as well as at the level of retina, bone marrow, lymphocytes, and the digestive tract. The production and release of melatonin is stimulated by darkness (it is the chemical expression of darkness perception by man) and inhibited by light.

The information linked to the presence of the light or dark is transmitted to the pineal gland by retina through the hypothalamus suprachiasmatic nucleus and through the central nervous system.

Melatonin secretion is determined by the presence of serotonin, a neurotransmitter released in the presence of tryptophan.

The level of this hormone, also called the "hormone of darkness" registers variations during the night. It starts to grow when darkness occur, reaching the peak maximum production between 2 and 4 o'clock in the morning and it starts decreasing in the second half of the night.

The body's production of melatonin decreases with aging. Even low-light levels may affect the production of melatonin, while over-lighting can inhibit it. The blue light affects most the hormone synthesis.

The primary roles of melatonin are:

- sleep triggering;
- biological clock adjustment;
- is one of the most powerful anti-oxidant, and is a terminal antioxidant (in reaction with the free radicals, it produced stable final forms);
- it regulates the endocrine system;
- it increases the body's defence ability (acting on the MT1 and MT2 receptors of the immunocompetent cells);
- it stimulates the osteoblasts;
- low levels of melatonin are found in those with anxiety, anorexia, and depression disorders;
- subtracting melatonin is a risk factor for the production of the breast cancer;
- it decreases the rate of protein hyper-phosphorylation (hyper-phosphorylation which causes the production of neurofibrillar degeneration involved in the mechanism of the development of Alzheimer disease);
- it facilitates the adaptation to time zones changes;
- those who suffer from autism have low levels of melatonin (because of low activity of the ASMT, gene involved in hormone's synthesis);
- it increases the level of prolactin;
- it inhibits the FSH formation having antigonadotropic role.

Performing alternating shift work can lead not only to problems of desynchronized biological rhythms but also can disturb the couples' life, by directly affecting the accomplishment of the family and social parts, leading to the occurrence of conflicts and to a certain mental stress, increased level of anxiety, altering self-esteem, all of them being exacerbated or dimmed according to each one's adaptation skills.

The quantity and quality of the social interactions are in a direct relation to the physical and mental health.

Shift work can adversely affect marital stability, in particular in couples with children.

Activity planning is made more difficult due to the non-standard hours of work, reducing thus the time to spend with each one's family.

Furthermore, alternating shift work can affect the relationship between parent and child, because of the parents' limited free time.

The "emotional download" effect is also a possible outcome, which occurs when stress and exhaustion of the job are taken out on the members of the family.

In conclusion, alternating shift work can lead to complex medical and social disorders.

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