CASES OF VIBRATION DISEASE IN WORKERS EXPOSED TO PROLONGED VIBRATION

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Introduction

Vibrations are mechanical oscillations periodically repeated and characterized by different frequencies, as the energy is pressed by the vibrating neighboring material particles. Industrial vibrations are the main causative factor for vibration sickness in its two main forms - from general vibration impact and from local vibration impact. The accompanying unfavorable factors of the working environment (noise, cooling, muscle overstrain, toxic noxes) potentiate the effect of vibrations.

Vibration disease is characterized by a polymorphic clinical picture with involvement of the whole organism.

Aim

The aim of the study is to improve the diagnostics, treatment and prevention of occupational injuries from industrial vibrations.

Materials and Methods

The object of the study is 65 cases of vibration disease in workers of various enterprises in Northern Bulgaria. The persons were hospitalized in the Department of Occupational Diseases, University Hospital - Pleven in the period 2019 - 2022. The group was related with the action of vibrations and the length of service was more than 5 years. Clinical, laboratory, functional, imaging and statistical methods were applied in the study. Treatment with medication and physical factors was carried out. All participants signed informed consent forms for the study. Specific occupational pathology methods were used - occupational anamnesis and production characteristics; clinical methods - history, somatic and neurological status, local status of upper limbs; laboratory methods - FBP, blood sugar, uric acid, samples for rheumatic activity; instrumental methods - surface skin thermometry, biomicroscopy of capillaries, cold tsrovocation test, palesthesiometry, distal Doppler sonography, radiography of cervical vertebrae, fingers, wrists and other structures; electromyography; alternating dynamometry; audiometry.

Results and discussion

The total number of observed persons is 65, of which 60 are men and 5 are women. (Figure 1).

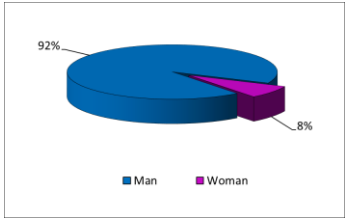

Figure 1.

The age distribution was from 28 to 64 years, with a mean age of 50,08 ± 4,82 years (n=65) (Figure 2).

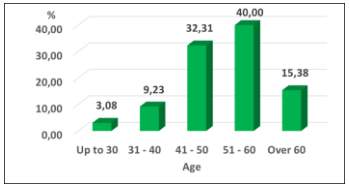

Figure 2. Distribution of cases by age

The work experience related to contact with production vibrations is more than 5 years (from 6 to 30 years), on average 15,94 ± 2,62 years (n=65) (Figure 3).

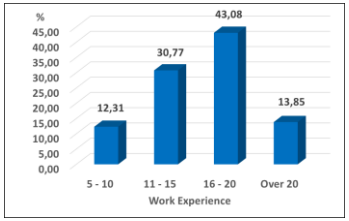

Figure 3. Distribution of cases by work experience

According to the localization of the vibration impact, 40 persons are exposed to mainly local vibration impact - a foundry - cast cleaner, carpenter, locksmith, sander, marble cutter, mosaicist, circular cutter, etc.; 25 subjects were exposed to mostly general vibration impact, in the professions of crane operator, agricultural machine operator, heavy truck driver, etc. (Figure 4).

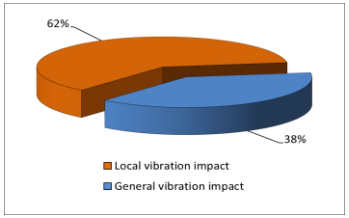

Figure 4. Distribution of cases by vibration impact

By branches of production, the distribution is as follows (Figure 5).

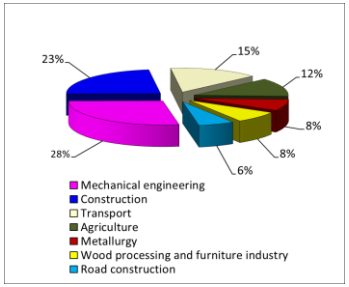

Figure 5. Distribution of cases by branches of production

Subjective complaints were present in all examined persons - pain in fingers, palms, wrists, forearms, elbow and shoulder joints; numbness in the fingers; attacks (spontaneous and provoked) of whiteness of the fingers - Raynaud's phenomenon; coldness, sweating, swelling and stiffness of the fingers and palms; decreased hand strength and dexterity; decreased hearing and tinnitus.

The following clinical syndromes developed in the examined workers:

1. Vascular syndrome - localized in the distal parts of the limbs, manifested by Raynaud's attacks - with whiteness and numbness of individual phalanges or entire fingers or with cyanotic color and swelling of the fingers and palms. The indicated manifestations are observed in varying degrees of expression in all 65 examined persons.

2. Neurological syndrome - characterized by hypopalesthesia (reduced vibration sensitivity), reduced sensitivity of the distal type for pain, temperature, touch. The upper and lower limbs are affected alternately in the form of "gloves" and "boots".
Hyperhidrosis and atrophic changes are a manifestation of the autonomic nervous system involvement. Additional complaints are fatigue, headache, insomnia, irritability, tightness and heaviness in the heart area. This syndrome was found in 57 people.

3. Bone-joint-muscle syndrome - is expressed in damage to the musculoskeletal system of the limbs (tendomyositis, tendovaginitis, epicondylitis, shoulder periarthritis, etc.) and reduced muscle strength. It was observed in 52 individuals.

4. Auditory-vestibular syndrome - characterized by reduced hearing and vestibular disorders. It is present in 48 examined persons (Figure 6).

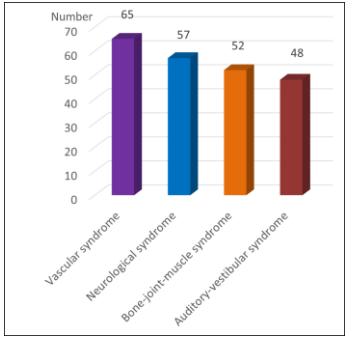

Figure 6. Distribution by syndromes

During the clinical observation of the studied patients, accompanying socially significant diseases were registered (some subjects had more than one co-morbidity) (Figure 7).

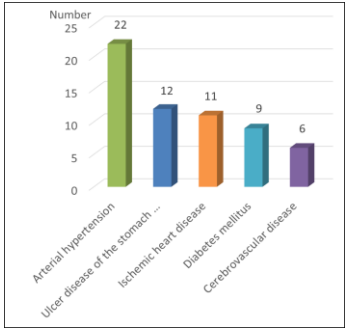

Figure 7. Accompanying diseases

Conclusions

- Injuries from industrial vibrations are a current health problem for workers in a number of branches of modern production.
- Damage to persons exposed to long-term (more than 5 years) vibration exposure is manifested by a variety of clinical symptoms, summarized in four main syndromes - neurological, vascular, bone-joint-muscular and auditory-vestibular.
- Prolonged vibration exposure predisposes to socially significant diseases such as diabetes mellitus, coronary heart disease, arterial hypertension, etc.

Recommendations

- It is necessary to maintain the technical serviceability of machines generating vibrations; compliance with optimal operating mode; use of vibration isolation.
- To ensure a rational regime of work and rest during work.
- To reduce the exposure to vibration impact by performing the risky manipulations in shifts.
- To use appropriate personal protective equipment - gloves, shoes with insulating soles, earplugs, etc.).
- To regularly conduct periodical medical examinations, with a view to the early detection of damage to the health of the workers due to the impact of vibrations.
- To rationally organize the weekly and annual vacation, and it is appropriate for those working at risk of vibration to carry out balneotherapy.

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