



VIBRATION DISEASE , IT CAUSES, MANIFESTATIONS, PREVENTION.

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VIBRATION

- Vibration is a rhythmic oscillation of solid bodies of different frequency and intensity, at which alternate relatively time increase and decrease of characterizing values take place.
Vibrations are characterized by amplitude of vibration, speed of vibration in mm/sec, vibration acceleration in m/sec^2 .
- Vibration is oscillations of elastic bodies with frequency over 1 Hz.
- It is characterized by amplitude, frequency, direction.

CLASSIFICATION

- Vibration is classified into: general and local.
According to frequency vibration is subdivided into:
low-frequency vibration
middle-frequency vibration
high-frequency vibration
According to direction vibration can be:
 - horizontal
 - vertical

- general vibration of workplace (floor, seat) that can be vertical (“up and down”) and horizontal (“onward – backward”, “lateral”);
 - local vibration of control mechanisms (scales, handles of instruments), which affects hands and legs, and often a chest when it is necessary to press instrument both by hands and the chest
- Local vibration is expressed by letters XL that corresponds the axis that runs through the place, an instrument, where a steering wheel is grasped and axes ZL and YL correspond to direction of hand’s force application.

Impact of vibration

there are functional changes in the human body of the operator:
pathologies of the vestibular apparatus,
visual impairment, hallucinations, fatigue.

Negative sensations due to vibration occur at vibration accelerations,
which are 5% of vibration acceleration from the force of human body
weight – 0,5 m/s.

Vibration with frequencies close to the frequencies of natural
oscillations of the human body is especially harmful. Resonant
frequencies of individual parts of the body, Hz: eyes 22-27,

throat 16-12, chest 2-12, legs and arms – 2-8, head 8-27, face and
jaws 4-27, lumbar spine – 4-14, abdomen 4-12.

STAGES OF VIBRATION ILLNESS AT EFFECT OF GENERAL VIBRATION

- Slight pain and paresthesia of extremities;
Expressed paresthesia, decrease of skin sensitivity;
Vascular and trophic disorders of fingers, changes of CNS;
Generalized sharp vascular disorders, vasospasms of heart and CNS.
- Degrees of Severity of Vibration Illness at Effect of Local Vibration
- Peripheral angiodystonic syndrome, sensory polyneuropathy of fingers.
- Expressed angiospastic syndrome of fingers.
- Expressed generalized angiospastic syndrome, dystrophic changes of bones, muscles of arms, deformation of finger joints.

DEGREES OF SEVERITY OF VIBRATION ILLNESS AT EFFECT OF LOCAL VIBRATION

- Peripheral angiodystonic syndrome, sensory polyneuropathy of fingers.
- Expressed angiospastic syndrome of fingers.
Expressed generalized angiospastic syndrome, dystrophic changes of bones, muscles of arms, deformation of finger joints.

CAUSES

- Nervous – reflectory disorders;
- disorders in microcirculation;
- disorders of rheological properties of blood;
- disorders in obtaining and utilization of oxygen;
- disorders in hypothalamic-pituitary-adrenal system;
- functional activity of sympathoadrenal system due to activation of adaptation mechanisms;
- overexcitation of peripheral vegetative formations.

CAUSED BY PHYSICAL AGENTS

- polishers
- grinders
- cleaners

high-frequency
local vibration

- croppers
- riveters
- tree breakers

high-frequency
local vibration

- drivers of heavy machines
- concrete workers

low-frequency
general vibration

- croppers
- riveters
- tree breakers

low-frequency
local vibration



- drivers of heavy machines
- concrete workers

low-frequency
general vibration



Whole-Body Vibration occurs in workers who regularly operate or ride in helicopters.



Regular exposure to WBV from heavy equipment can lead to lower back pain in equipment operators



CLINICAL MANIFESTATIONS

- Angiodystonic
angiospastic
syndrome of vegetative polyneuritis
vegetomyofascitis
- myositis
- Osteoarthrosis
- osteochondrosis
- Vestibular
- encephalopathy (diencephal with neurocirculatory disorders)



EXPERTISE OF WORKABILITY

- 1* DEGREE – temporary (for 1 month) employment without contact with vibration
- 2 DEGREE – treatment in hospital (in-patient) and further temporary (for 1-2 month) employment without contact with vibration
- 3" DEGREE – limited working capacity, possible 3d (or even 2) invalidity group

CLINICAL MANIFESTATIONS (LOCAL)

- 1* DEGREE – initial manifestations: 1) peripheral angiodystonia of upper extremities, rare acrospasms; 2) sensory (vegetosensory) polyneuropathy of upper extremities. 1* DEGREE – initial manifestations: 1) peripheral angiodystonia of upper extremities, rare acrospasms; 2) sensory (vegetosensory) polyneuropathy of upper extremities. Complaints: - transient paresthesia (numbness, tingling, creepyness), - dull pain in distal parts of hands, chilliness of fingers, - rare whitening of fingers on cooling Physical examination: - cyanosis or mottled skin & hypothermia of hands – hyperhidrosis or dryness of hands – hyperesthesia → hypoesthesia for vibration – hyperkeratosis
Complaints: - transient paresthesia (numbness, tingling, creepyness), - dull pain in distal parts of hands, chilliness of fingers, - rare whitening of fingers on cooling

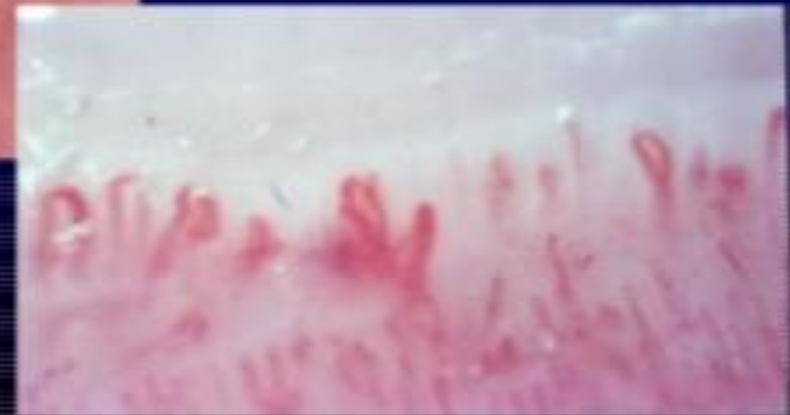
- Physical examination: - cyanosis or mottled skin & hypothermia of hands – hyperhidrosis or dryness of hands – hyperesthesia → hypoesthesia for vibration – hyperkeratosis
- : 2n DEGREE – moderate manifestations:
- 1) peripheral angiodystonia of upper extremities, often acrospasm;
- 2) vegetative-sensory polyneuropathy of upper extremities:
 - a) with often angiospasm of fingers;
 - b) with stable vegetative-trophic disorders of hands;
 - c) with dystrophic disorders of locomotor system;
 - d) with cervicobrachial plexopathy;
 - e) with cerebral angiodystonie syndrome.



norm



1st degree



2nd degree

PREVENTION

- Technical measures
- water procedures (bathes for hands)
- gymnastics
- periodical medical checkups

What is “green economy” for prevention of occupational diseases

- Greening the economy is expected to create a series of health, economic, social and environmental benefits, including a reduction of greenhouse gas emissions and a better adaptation to climate change

'Green/clean energy production can Improve the quality of the environment'

Coal mining is one of the most hazardous industries:

14,000 deaths annually are attributed to coal workers' pneumoconiosis

occupational injuries, noise induced hearing loss, vibration disease, musculo-skeletal disorders

WHA Resolution 60.26 “Workers’ Health: Global Plan of Action

- The health of workers is an essential prerequisite for productivity and economic development
- Work towards access of all workers with essential interventions and basic occupational health services for prevention of occupational and work-related diseases and injuries
- Incorporate measures for workers’ health economic development policies, poverty reduction strategies and national plans and programs for sustainable development.

- Balance benefits against risks and compare to conventional technologies
- Jobs in green technologies are not free of hazard, nor in many cases are they any less hazardous than jobs in conventional technologies.
 - The cost of disabling diseases and injuries may compromise the sustainability of the green economy
 - The predictable risks of green technologies is manageable.
 - The solutions to occupational health and safety risks in green jobs are the same as for conventional technology.
 - A green economy that does not adequately protect workers will be perceived as exploitive and therefore unsustainable.

