Turk Thorac J 2015; 16(Suppl 1): S21-S24 DOI: 10.5152/ttd.2015.006

Role of Occupational Physician in Mining Accidents

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Abstract

As in all work areas, the activity of protecting worker health must be done together with monitoring of the workplace and health surveillance at the mine. Health surveillance must configure with the correct recruitment examination and periodic examinations on time. It is necessary if we aim for occupational safety at mines, where the industrial accident frequency is very high. A true and real first aid schedule is very important for helping decrease the severity after accidents. These facts must create the basic rules of an occupational physician's work at a mine.

KEYWORDS: Mining accidents, role of occupational physician, first aid activity

Mining is one of the most important sectors of the economy in the world, including Turkey, has advanced technology, and requires innovative solutions, requires an organized team effort; however, it brings about important changes in nature, although it damages, it involves hard work, workers are injured, workers fall sick, workers experience physical pain, and kills. On average, 2 million people die from occupational diseases worldwide annually, and of the 337 million occupational accidents that occur, 358,000 result in deaths. The figures for mining are eight times higher than these averages [1].

According to the Social Security Institution's statistics, 74,871 occupational accidents occurred in 2012 and 9,919 of them occurred under the headings of coal and lignite extraction, metal ore mining, other mining and quarries, and supportive mining services. Independent of the number of workers, these figures reflect an excess of occupational accidents in the mining profession compared with other professions [2]. Furthermore Turkey ranks 1st in Europe and 3rd in the world regarding accidents in the mining sector [3].

According to the distribution of the causes and consequences of occupational accidents that occur in mines, a vast majority of them occur in underground coal pits. Falling of material is the leading cause and falling, electrocution, accidents that occur while using machines and in benches resulting from a collapse, poisoning, and explosive materials are among the other causes [4].

Authorities must enforce the complete implementation of laws and regulations that govern the supervision of workers' health. Supervision of workers' health must be conducted by consulting employees and/or their representatives, and the main goal should be to primarily prevent occupational injuries and diseases. Every factor that might affect employees' health and every risk and danger regarding work should be investigated holistically, and the state of health required by the job and that of the employees should be taken into consideration. According to the No 6331 law, transmission to the employees of the results obtained from the workplace inspection is an obligation on the employer. Supervision results and records regarding workers' health should be revealed to employees. In closed businesses, records regarding workers' health must be safely stored.

Supervision of the workplace should be conducted by defining the dangers and risks that may affect the health and safety of employees, by evaluating workplace hygiene conditions and factors that may lead to dangers and risks regarding the health and safety of employees in the organization, and by evaluating the exposure of employees to detrimental agents using monitoring methods applicable in appropriate situations and are generally accepted.

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Planning, developing, and implementing to minimize the risk of occupational diseases and to maximize safety, goals must be set and preventative precautions must be planned and implemented with the appropriate prevention priority. We must focus on continuously improving the protection of employees in order to achieve the best occupational health and safety performance. It must be realistic and achievable; a consensus must be reached with people who receive these services; and communication that enables notification at every level must be established, periodically checked, and updated when necessary.

The causes of occupational injuries, health problems, and diseases and factors that lead to them must be investigated. The most commonly observed occupational diseases in mining are noise-induced hearing loss; bursitis; epicondylitis; lower back disorders; carpal tunnel syndrome; musculoskeletal injuries such as vibration white finger injury; diseases due to biological agents such as heat stress, occupational cancers, tetanus, leptospirosis, and fungal infections; miners' nystagmus; psychosocial problems; and respiratory system diseases such as occupational lung diseases due to dust and occupational asthma.

In the mining workspace, the emission of breathable agents such as gas, dust, smoke, steam, and aerosols is possible. These agents constitute irritants, chemical asphyxiants, fibrinogens, allergens, carcinogens, and systemic toxins. The most commonly observed air pollutants are breathable coal dust and crystal silica [5].

Similar to any workspace, the dangers must be identified and health and environment supervisions must be conducted within the framework of risk evaluation regarding health and safety that will be conducted after the investigation of the sources of these dangers. The algorithm that also emphasizes the differences regarding mines at the start of employment and periodic inspections is shown in Figure 1 [6].

In the clinical evaluation predominantly conducted within the context of occupational lung diseases, history, profession, exposure to dust, and smoking habits are questioned. Crackles, dyspnea, clubbing, cyanosis, anatomical defects, respiratory function tests, the type of problem (obstructive/restrictive), and the prevalence of the disease are investigated as clinical findings. In monitoring, examinations such as chest radiography (normal at the beginning), pulmonary opacities, HRCT, tuberculin skin test, and AFB are performed. According to the initial and intermittent examination results, the approach regarding the things that need to be done to people who cannot work or for those who require changes in the workspace is very important. Accordingly, after the risk assessment conducted in people with the following diseases, the occupational physician must decide whether these people cannot/will not be employed in jobs that involve dust and gas: with the pulmonary functions;

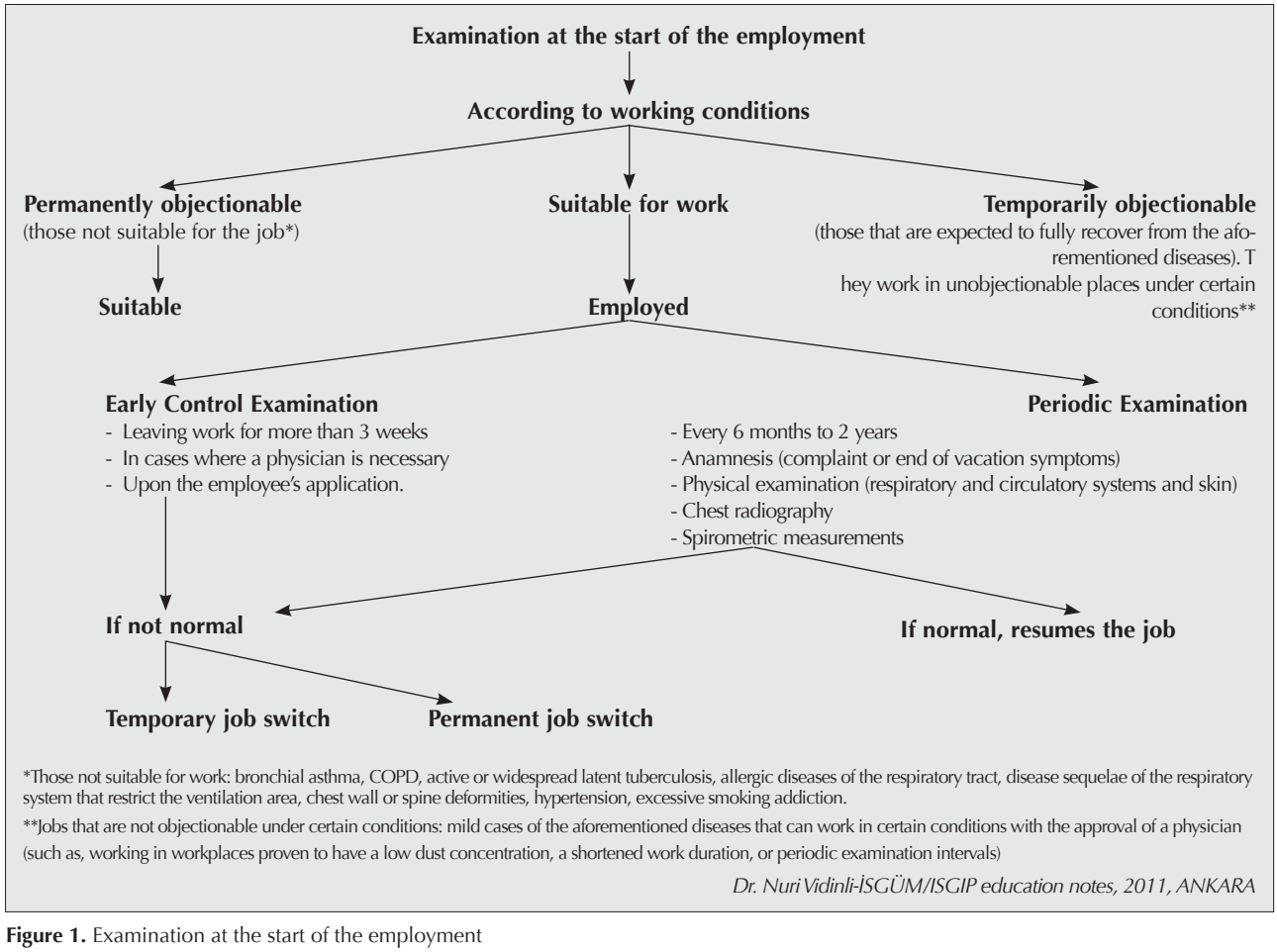

Figure 1. Examination at the start of the employment

severe disorders of the cardiovascular system; chronic bronchitis; asthma; pulmonary emphysema; chronic pleurisy; fibrosis and similar fibrotic and granule-based changes detectable on x-ray; anomalies that can negatively affect the respiratory tract or pulmonary functions or that can facilitate the generation of bronchopulmonary system diseases; tumors; chronic inflammations; pleural thickenings; adhesions; the presence of cor pulmonale or other agents; chest wall or spine deformities that affect respiration; pulmonary resection and injury sequelae that affect the functions of thoracic organs; active, closed, or widespread latent tuberculosis; undernourishment and frailness; anatomical insufficiency; obesity; established or expected heart function defects; established valvular heart lesions or other organic heart diseases or a recent history of heart diseases suspected to present as heart failure soon; hypertension (especially uncontrollable); chronic diseases that weaken the immune system; immune deficiency; and the use of immunosuppressants.

Excluding the latest accident that occurred in Ermenek, among the 18 major mining accidents that took place since 1983 where 937 people had died, 15 were firedamp explosions, one was a collapse, and two were fires, including Soma.

In firedamp explosions, the surrounding oxygen is depleted because of a very powerful explosion and burning, and shock and the impact effect cause death. Survivors can suffocate because of hypoxia if they do not use personal protective equipment, a proper mask, or an oxygen tank for respiratory protection.

In fires, thermal damages, exposures to a hypoxic environment, the inhalation of gases that cause asphyxia, and inhalation damage due to chemical irritants occur.

In CO exposures, significant symptoms begin to be observed when blood values reach above 20%. However, although in 2.5–5% of healthy people, CO exposure can be tolerated with a compensatory increase in vital organs, which may disrupt in severe cardiac patients. Angina can occur with minimum exertion. Although an exposure of 10–20% does not cause significant symptoms in healthy people, it can be lethal in severe cardiac patients.

In addition to ischemic heart disease, in the following cases, CO susceptibility increases: cases in which the need for oxygen increases, such as anemia, hemoglobinopathies, fever, hyperthyroidism, and pregnancy; systemic hypoxia due to pulmonary diseases; cerebral or general atherosclerosis; children; youth; and smokers. Employees with health problems with a higher susceptibility to CO must be carefully identified and monitored at the start of employment and during health supervisions.

For chronic exposure surveillance, measurement at the end of the shift using a pulse CO-oximeter reflects daily exposure. Measurements on weekends are significant because they reflect the explore of the entire week. Its biological half-life is on average 5 h [7].

Acute inhalation injury occurs by accident. Therefore, for prevention, primarily accident scenarios must be investigated and safeguard measures and emergency plans must be prepared. During these investigations, comprehensive accident scenarios must be focused on. Monitoring and controlling of hazardous substances in the environment require engineering studies. Education on personal prevention must be provided at the start of employment and during periodic examinations. Any exposure can be diagnosed by performing an exposure investigation via anamnesis. Acute exposure cases must be kept under 24–48 h of surveillance, should not be asked to work in an irritating environment until permanent functional damage is ruled out, and should be given a controlled amount of work, where there would be no exposure.

It is important to define potential emergency states and determine the processes that need to be performed.

1. Controls and preparations must be made regarding first aid that will be applied to frequent emergencies and injuries. The necessary equipment and educated personnel must be present to that end.
2. An appropriate emergency plan must be prepared, roles and duties must be delegated, and employees and other individuals must be informed regarding these.
3. Emergency teams must be formed consisting of experts for first aid, firefighting, and rescue, and these teams must be sufficiently educated so that they can respond to foreseeable emergencies.
4. Education and drills that include all possible emergencies must be conducted in order to make everyone understand what they should do and what their roles are in case of an emergency.
5. They must prepare for accidents and should cooperate with institutions that offer emergency services as well as with neighboring businesses.

In summary, health supervision in mines should include the following:

1. A health supervision is performed on the basis of a risk evaluation conducted in the workplace.
2. A physical examination is performed at the start of employment and periodically.
3. The occupational physician keeps the medical records of employees with confidentiality.
4. If the occupational physician determines that an employee's medical condition is not suitable for performing his/her duties, the physician ensures his/her transfer to another job where similar risk factors are not present.
5. The occupational physician follows-up with an employee who is injured or who has an occupational disease.
6. There are suitable areas and facilities for toilets, bathing, leaving work clothes and protective gear, and eating, and their maintenance is performed.

Peer-review: This manuscript was prepared by the invitation of the Editorial Board and its scientific evaluation was carried out by the Editorial Board.

Acknowledgements: I thank to Prof. Dr. Metin Akgün for helping me to control and to complete the missing parts of this article.

Conflict of Interest: No conflict of interest was declared by the author.

Financial Disclosure: The author declared that this study has received no financial support.

REFERENCES

1. ÇSGB, 27th Occupational Work and Safety Week, Vision Zero, Matthias Stenzel, May 2013, Izmir.
2. SGK Statistics. http://www.sgk.gov.tr/wps/portal/tr/kurumsal/istatistikler/sgk_istatistik_yilliklari
3. ÇSGB, İSG Assistant Expert Mert Durşen, May 2013, Izmir.
4. ÇSGB, Reports on 2005, 2008 and 2012 Programmed Inspections of the Committee of Labour Inspection Directorate
5. Diagnostic Guide for Occupational Diseases and Diseases Related to Work: 13. http://www.csgb.gov.tr/csgbPortal/ShowProperty/WLP%20Repository/isggm/dosyalar/isgip_saglik_tani
6. Dr. Nuri Vidinli, İSGİP Education Notes, 2011, Ankara.
7. Diagnostic Guide for Occupational Diseases and Diseases Related to Work: 114. http://www.csgb.gov.tr/csgbPortal/ShowProperty/WLP%20Repository/isggm/dosyalar/isgip_saglik_tani