



आरोग्य खनिक AAROGYA KHANIK

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निदेशक की मेज से

खान श्रमिकों में Musculoskeletal Disorders

Musculoskeletal Disorders शरीर के उन विकारों को संदर्भित करते हैं जो शरीर के किसी अंग पर बार बार एवं लम्बे समय तक चोटिल होने के परिणाम स्वरूप विकसित होते हैं। इन विकारों का असर आम तौर पर शरीर की मांसपेशियों, नसों, tendons, cartilage, रीढ़ की हड्डी, इत्यादि भागों पर होता है। Musculoskeletal Disorders, साधारणतया लम्बे समय बाद धीरे-धीरे प्रकट होते हैं। उनके लक्षण शुरुआत में बेचैनी, मामूली दर्द से शुरु होकर एक अवधि के बाद गंभीर पीड़ा में भी विकसित हो सकते हैं तथा अक्षम स्थिति में गहन चिकित्सा की भी जरूरत हो सकती है। इन विकारों से ज्यादातर गर्दन, घुटने, कोहनी, कमर, कलाई, इत्यादि शरीर के अंग प्रभावित होते हैं तथा इन अंग का प्रभावित होना आम तौर पर कार्य एवं काम करने के तरीके पर निर्भर करता है।

हाल ही में, Musculoskeletal Disorders खनन उद्योग के लिए एक महत्वपूर्ण एवं महंगी समस्या के रूप में उभर कर सामने आयी है तथा खनन संबंधी व्यवसाय में ergonomic खतरों का होना इसका प्रमुख कारण माना जाता है। कुछ देशों में खनन उद्योग में इन विकारों को लगभग 40% man days lost के लिये जिम्मेदार माना जाता है। लगभग सभी खनन गतिविधियां ergonomic health risk होने की वजह से Musculoskeletal Disorders के होने में महत्वपूर्ण भूमिका निभाती हैं। सामान्यतम बार बार आगे की ओर झुकना, गर्दन एवं कमर को घुमाना, कोहनी से कंधे के उपर काम करना, भारी वजन उठाना, आदि को Musculoskeletal Disorders के लिये जिम्मेदार माना जाता है। अनुमान है कि 35% से अधिक खदान श्रमिक इन जोखिम कारकों से प्रभावित रहते हैं। Musculoskeletal Disorders का खतरा धातु खानों की तुलना में कोयला खानों में अधिक होता है।

हमारे देश में खदान श्रमिकों पर Musculoskeletal Disorders के बारे में कोई व्यापक अध्ययन नहीं किया गया है, तथापि अनुभवजन्य प्रमाण यह दर्शाते हैं कि खदान श्रमिकों का एक महत्वपूर्ण अंश Musculoskeletal Disorders से पीड़ित हो सकता है। खनन उद्योग में Musculoskeletal Disorders के प्रसार में खानों का बढ़ता हुआ यंत्रिकरण एवं श्रमिकों की बढ़ती उम्र महत्वपूर्ण कारणों में शामिल हैं।

राष्ट्रीय खनिक स्वास्थ्य संस्थान द्वारा संचालित HEMM के अध्ययनों से यह पता चला है कि ज्यादातर डम्पर्स, टिप्परों, डोजरों एवं लोडरों में Vibration की वजह से स्वास्थ्य को क्षति होने का जोखिम रहता है। अध्ययन के दौरान, लगभग 85% HEMM ऑपरेटरों में पीठ दर्द तथा अन्य Musculoskeletal Disorders की शिकायत पायी गई। यह भी अनुमान है कि, कोयला खानों में LHDs एवं SDLs के संचलन से ऑपरेटरों को Musculoskeletal Disorders होने का गंभीर खतरा रहता है।

कई देशों में Musculoskeletal Disorders को compensable एवं notified बीमारी अधिसूचित किया गया है लेकिन ऐसा अभी हमारे देश में नहीं है। देश में खदान श्रमिकों में Musculoskeletal Disorders की रोकथाम एवं निवारण के लिये बड़े पैमाने पर अध्ययन की जरूरत है।

डॉ. पी. के. सिषोदिया

हिंदी दिवस :



कार्यालय में दिनांक 21.09.2011 से 27.09.2011 तक हिन्दी सप्ताह का आयोजन किया गया जिसका समापन समारोह 28.09.2011 को आयोजित किया गया।

कार्यक्रम का औपचारिक उद्घाटन संस्थान के निदेशक डॉ. प्रल्हाद कुमार सिषोदिया ने अपने भाषण से किया। कार्यक्रम के मुख्य अतिथी डॉ. राम प्रकाश सक्सेना, सेवानिवृत्त प्राध्यापक, भाषा एवं हिन्दी भाषा विभाग, नागपुर विश्वविद्यालय, नागपुर ने हिन्दी के प्रयोग पर मार्गदर्शन किया। प्रतियोगिता परीक्षक के रूप में श्री आर. एस. मिश्रा, वरिष्ठ वैज्ञानिक, जवाहरलाल नेहरू अल्यूमिनियम शोध विकास एवं अभिकल्प केंद्र, नागपुर का बहुमूल्य योगदान रहा। हिन्दी दिवस पर सभी कर्मचारियों एवं अधिकारियों ने आयोजित की गयी प्रतियोगिताओं ('हिन्दी कविता पाठ' एवं 'चित्र पर आधारित कहानी लेखन') में सक्रिय रूप से भाग लिया। कार्यक्रम का समापन निदेशक महोदय द्वारा पुरस्कार वितरण के साथ किया गया।

Historical Dust Sampling Equipment - Konimeter (Watson Type)



The Konimeter consists essentially of a spring loaded plunger pump, a dust chamber a glass plate, an air inlet jet and a built-in viewing microscope.

Essentially of the Watson type, the Konimeter was used to analyze atmospheric dust samples, wherein the sample of atmosphere to be tested is obtained by releasing a knurled collar which released the spring loaded pump when 5 cc of air is drawn. This caused the particles to be deposited on an accompanying glass slide. The counting was then done with the help of a graticule at a magnification of x160. This instrument was known to be highly efficient for particles up to 10 micrometer size.

G. S. Ravindra

Mines of Neolithic period:

Since the inception of civilization man used various types of tools, implements and weapons. The early tools, implement and weapons were from stones and ceramics, which were later replaced by metals. Most of the early utility articles of mankind were manufactured from flint found in northern France and Southern England. The first flint mines of Neolithic origin (ca4000BC – ca3000BC) were Grimes Graves.



Grime's Graves is the largest Neolithic flint mining complex located near Brandon in England close to border between Norfolk and Suffolk. The production in these mines continued even after 1900BC in Bronze and Iron ages. The scheduled monument of these mines extends over 37ha (96 acres) and consists of 433 shafts. The largest shaft is 14m (40 feet) deep and 12m diameter at the surface. The calculated overburden was more than 2000 tonnes of chalk. The upper 'top-stone' and middle 'wall-stone' seam of flint was dug through on the way to the deeper third 'floor-stone' seam.

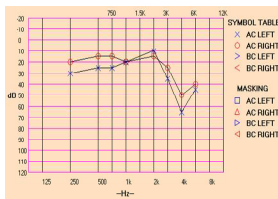
The ancient miners built wooden platform and ladders to remove the overburden chalk. They piled the spoil around the shaft opening using turf revetments to hold it in place for seasons. The shaft and all its galleries were thoroughly and meticulously backfilled for stability purpose. The landscape around Grime's Graves has a characteristic pockmarked appearance caused by in-filled shafts. The picks used by the miners were fashioned from the antler of red deer. They used wooden shovels which is inferred by analogy with other flint mines. The archaeological excavation of 28 pits revealed an average yield of 142.5 antler picks used in mining. The miners dug the lateral galleries outwards following the flint seam. Extrapolation across the site suggest that Grime's Graves produced around 16,000 – 18,000 tonne of flint across the 433 shafts recorded to date.

Debasis Chatterjee

OUR VISION

“Safe Mines
and Healthy
Miners”

Noise Induced Hearing Loss (NIHL):



Noise is a hazardous industrial pollutant causing hearing loss in workers of every country in the world. The workers in industries like mining, construction, printing, saw mills, crushers, etc are at risk. Workers are exposed to high levels of noise throughout their lifetime of work. Occupational hearing loss includes acoustic traumatic injury and Noise-Induced Hearing Loss (NIHL). NIHL is generally used to denote the cumulative, permanent loss of hearing that develops gradually after months or years of exposure to high levels of noise. NIHL is the second most common form of acquired hearing loss after age-related loss (presbycusis). Studies have shown that people who are exposed to noise levels higher than 85 db can suffer from NIHL. A typical NIHL is of a sensory neural type involving injury to the inner ear. It is bilateral and symmetrical, usually affecting the higher frequencies (3k, 4k or 6k Hz) and then spreading to the lower frequencies (0.5k, 1k or 2k Hz).

Impairment of hearing at high frequencies will initially cause a loss of clarity in perceived speech and then interfere with daily activities as hearing loss progresses. Hearing loss-related symptoms, such as trouble in normal and telephone conversation, turning up the radio/television volume and tinnitus, usually occur in the early stages of NIHL. Other major health effects due to the noise pollution are lack of concentration, irritation, fatigue, headache, sleep disturbances, etc.

The risk of hearing loss and injury to the ears increases with the sound intensity, the length of time an employee is exposed to noise and the individual susceptibility to NIHL. Audiometry is a standard test to detect and evaluate hearing loss

Exposure to excessive noise is the major avoidable cause of permanent hearing impairment worldwide. Awareness should be created among workers about the harmful effects of noise on hearing and other body systems by implementing education and training programs. Research studies are needed to know the exact prevalence of NIHL among various industries in India. The Central Govt. vide notification S.O.399 (E) dated 21/2/2011 has included NIHL as one of the notified diseases connected with the mines operation.

S. S. Nandi

Chemiluminescence Immuno-Assay:



Chemiluminescence immunoassay (CLIA) has today been established as one of the best alternatives to conventional colorimetric and radioimmunoassay techniques for the quantification of low concentrations of analytes in biological samples. The growing success of this technique in analysis has been due to its low detection limits, in addition to good precision.

CLIA detection using Microplate luminometers provides a sensitive and accurate output.

It involves a chemiluminescent substance as a label for the generation of electromagnetic radiation as light by the release of energy from a chemical reaction. The resultant emissions of photons is measured by a light detector.

Among the various enzyme assays that employ light-emitting reactions, one of the most successful assays is the enhanced chemiluminescent immunoassay involving a HorseRadish Peroxidase (HRP) labeled antibody or antigen and a mixture of chemiluminescent substrate with hydrogen peroxide and other enhancers. The series of the assay covers Hormone panels, such as thyroid, hCG, LH, FSH, and other panels. This can in turn also be used to replace the conventional colorimetric ELISA that is widely used in many research and diagnostic applications.

S. Pingle

Effect of long term bauxite dust exposure on parathyroid hormone in miners:

Aluminium oxides are key components of bauxite ore, and which can be processed to make aluminum products. The long term exposure to bauxite dust can lead to serious health effects. Damage to the central nervous system, dementia, loss of memory, listlessness, and severe trembling symptoms have been reported in employees of aluminium industries.

In healthy subjects, only 0.3% of orally administered aluminum is absorbed via the gastrointestinal tract. Mayor *et al.* suggested that parathyroid hormone (PTH) may increase intestinal absorption of aluminum. Aluminium overload leads to PTH suppression. However, it is unclear whether a decrease in synthesis or release of the hormones is mainly involved. Aluminium exposure also disturbs the function of hypothalamus-pituitary axis, which is in turn known to alter the serum Parathyroid levels.

For this study, PTH, creatinine, urea and calcium were estimated in the serum of control as well as experimental subjects. SDS-PAGE electrophoresis with a set of MW standards was used for determination of the molecular weight of unknown protein.

An elevated level of the PTH (>50 pg/ ml) was observed in 15.6% of experimental subjects. SDS-PAGE was performed and subjects were divided into >50 pg/ ml and <50 pg/ ml PTH value groups for evaluation of protein profile to detect some novel proteins that maybe lost or changed. Three different unknown protein fractions (UN1, UN2, UN3) were identified in the gel. These lay between the positions of Standard Molecular Weight marker 43 kDa (Ovalbumin) to 10 kDa (PTH protein marker). Molecular weight of the UN1, UN2 and UN3 was 9.39, 33.5 and 37.95 kDa respectively. It was observed that unknown fractions were expressed in the samples showing >50 pg/ ml concentration of PTH. These proteins were not expressed in the samples showing <50 pg/ ml PTH value.

The results of this experiment showed that 60% expression of UN1 and 70 % expression of UN2 and UN3 bands was observed in exposed subjects, who were having >50 pg/ ml concentration of PTH and only 30% of experimental control showed presence of the same bands. Standard marker of PTH was utilized for the determination of UN1, identified as 9.39 kDa protein band resembled with the PTH marker. It can be noted that this may be a PTH band which is expressed more in the experimental samples. The interesting facts observed in the experimental subjects were expression of UN2 and UN3 which were present only in the subjects having high value of PTH. The same protein was however absent in the experimental control and control.

S. Rahangdale

R & D projects

Ongoing S & T projects

No	Name of the Project	Sponsoring Agency	Remarks
1.	Development of protocol for evaluation of vibration hazard potential of mining equipment.	Ministry of Mines S&T Division, GOI	Study in progress
2.	Systematic study of potential biomarkers of occupational diseases in miners.	Ministry of Mines S& T Division, GOI	Analysis in progress

OUR MISSION

“Indian Mining &
Mineral Industries
sans Occupational
Diseases”

PME of GMDC Miners:

National Institute of Miners' Health completed the first phase of Periodical Medical Examination of Miners' in GMDC mines. A total of a **424** miners engaged in Mata No Madh and Panandhro Lignite mines of GMDC in the district of Kutch, Gujarat were included. The medical examination of workers were conducted as per the standards prescribed under Rule 29B of Mines Rules, 1955 and Recommendation of 10th Conference on safety in Mines. A General Physical examination of every employee was carried out and recorded in Form “O”. All chest x-rays were evaluated as per ILO Classification of Radiographs of Pneumoconiosis, 2000 for detection of pneumoconiosis as recommended by Conferences on Safety in Mines. In addition to routine urine and blood sugar, Serum Urea and Creatinine as recommended in 10th Conferences on Safety in Mines were also included for assessment of renal function. Blood cholesterol and triglyceride estimation were done for Lipid Profile. Haematological tests like Total Blood Count, Differential count, percentage of Haemoglobin and Erythrocyte Sedimentation rate was also done to diagnose blood dyscrasis.

CONFERENCES/VISITS:**Participation in International Conference on Molecules to Systems Physiology:**

Shri Pravin Soni, JRF, Biochemistry dept. attended the International Conference on Molecules to Systems Physiology: 100 years journey at the Calcutta University, Kolkata (W.B.) from September 21—23, 2011. He also gave an oral presentation on his work titled “Studies on Protein Biomarkers in municipal solid waste exposed workers at this conference”

CONSULTANCY SERVICES OFFERED BY NIMH:**Occupational Hygiene Surveillance**

- Airborne Respirable Dust studies in accordance with MMR—124
- Area & Personal Noise Monitoring studies
- Noise Mapping
- Illumination studies in accordance with MMR 148(2) of 1961
- Whole-body and Hand Arm vibration monitoring studies
- Free Silica analysis on FTIR
- Metal analysis using AAS

Occupational Health Surveillance

- Periodic Medical Examination of miners in accordance with DGMS guidelines
- Evaluation of X-Rays as per ILO classification for Pneumoconiosis
- Audiometry testing for evaluation of Noise Induced Hearing Loss (NIHL)
- Spirometry for Lung Function Tests
- Testing for various biochemical parameters

Editor

N. P. Kulkarni

Associate Editor

R. Tumane

Advisory Board

B.B. Mandal G. S. Ravindra
D. Chatterjee Dr. S. Nandi
Dr. (Mrs.) S. Pingle

Published By

National Institute of Miners' Health
JNARDDC Campus, Wadi, Nagpur-440023 (M.S.) India
Website: www.nimh.gov.in
Email id: directornimh@gmail.com