



आरोग्य खनिक AAROGYA KHANIK

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INSIDE THIS ISSUE

- From Director's Desk
- PME for RSMML miners
- Hexhlet
- Ergonomics
- Aarogya Khanik software

- ELISA
- Expression of Protein in Bauxite Dust Exposed workers by Induction of Heme Oxygenase - I
- R & D Projects
- P.G. Dissertation

Events

- Conferences/Visits
- Consultancy services offered
- Forthcoming Events

निदेशक की मेज से

शोर से उद्भूत श्रवण शक्ति का ह्रास (NIHL) अधिसूचना

केन्द्र सरकार द्वारा राजपत्र अधिसूचना क्रमांक S.O. 399 (E) तारिख 21 फरवरी 2011 में अधिसूचित शोर से उद्भूत श्रवण शक्ति का ह्रास (Noise Induced Hearing Loss), रसायनों के सीधे संपर्क द्वारा हुआ संस्पर्श त्वचा शोथ (Contact Dermatitis by direct contact with chemicals) एवं रेडियम अथवा रेडिओधर्म पदार्थों के कारण विकृतिजन्य प्रकटिकरण (Pathological manifestation due to Radium and radioactive substances) को खान अधिनियम 1955 के धारा 25 के उपधारा (i) के तहत सम्मिलित किया गया है।

खनिज उद्योग के लिये इस अधिसूचना के दूरगामी परिणाम होंगे। यह कोई रहस्य नहीं है, कि शोर का स्तर खनन प्रक्रियाओं में व्यापक मानदंड जो कि शोर के लिये 90 dB(A) है, उससे कहीं अधिक होता है।

बढ़ते मशीनिकरण ने खानों में कार्यरत व्यक्तियों के लिये शोर की समस्या को और बढ़ा दिया है। यह समस्या भूमिगत धातु खानों में कहीं अधिक है जिनमें ड्रिल द्वारा लम्बे छेदन का कार्य एवं भूमिगत कार्य करने वाले कशर आदि काम में लिये जाते हैं। पोखरिया खदानों में भी बड़ी क्षमता वाले HEMMs के उपयोग में भी शोर का स्तर निर्धारित मापदंड से कहीं अधिक आंका गया है।

खान सुरक्षा महानिदेशालय एवं दूसरी संस्थाओं, जिनमें राष्ट्रीय खनिक स्वास्थ्य संस्थान भी शामिल है, के सर्वेक्षण बताते हैं कि औसतन 20% से 25% खनिकों में शोर से उद्भूत श्रवण शक्ति का ह्रास (Noise Induced Hearing Loss) पाया गया है एवं यह करीबन 75% तक उन कर्मचारियों में हो सकता है जो विशेषतः शोर करने वाली क्रियाओं जैसे की ड्रिलिंग, ब्लास्टिंग, कशिंग, इत्यादि में कार्यरत हैं। Conferences on Safety in Mines ने Audiometry को नियमित स्वास्थ्य परिक्षण में शामिल करने का सुझाव दिया है, लेकिन यह अभी बड़ी खानों में भी पूर्णतः कार्यान्वित नहीं किया जा सका है।

Noise Induced Hearing Loss को खान अधिनियम 1952 के तहत अधिसूचित विमारियों में शामिल करने हेतु अधिसूचना हालांकि एक महत्वपूर्ण एवं सही कदम है, लेकिन इसको कार्यान्वित करना खनन उद्योग तथा खान सुरक्षा महानिदेशालय के लिये एक बहुत बड़ी चुनौती है। Noise Induced Hearing Loss के diagnosis के लिये परिभाषित audiometric मापदंड उपलब्ध हैं एवं इसका आसानी से Audiometry द्वारा पता लगाया जा सकता है। Field audiometry भी इस संदर्भ में उपयोग में लायी जा सकती है हालांकि इस जांच की अपनी सीमायें हैं। खनन उद्योग तथा खान सुरक्षा महानिदेशालय के समक्ष यह चुनौती है कि ऐसी कार्यवाही का निर्धारण किया जाए कि ज्यादा से ज्यादा Noise Induced Hearing Loss के मामलों का पता लगाया जा सके। मुआवजे के मुद्दे को भी कर्मकार, प्रतिकार अधिनियम, 1923 के प्रावधानों के अंतर्गत संदर्भित किया जाना होगा। खान सुरक्षा महानिदेशालय को Coal Mines Regulation, 1957 एवं Metalliferrous Mines Regulation, 1961 के तहत शोर की निर्धारित सीमा के लिये मापदंड स्थापित करने होंगे। खान सुरक्षा महानिदेशालय को Noise Induced Hearing Loss के detection एवं diagnosis के लिये मापदंड भी स्थापित करने होंगे तथा खनन उद्योगों को भी इसको कार्यान्वित करना होगा।

खनन उद्योगों को अपनी जिम्मेदारी समझते हुए ईमानदारी एवं लगन से कार्यस्थल पर शोर कम करना होगा तथा खानों में कार्यरत व्यक्तियों के लिये शोर संरक्षण कार्यक्रमों को लागू करने की आवश्यकता पर ध्यान देना होगा।

डॉ. पी. के. सिशोदिया

Periodic Medical Evaluation Programme for RSMML miners



National institute of Miners' Health completed Periodical Medical Examination of miners in RSMML. A total of 682 miners engaged in various sub occupations in various mines of Rajasthan State Mines and Minerals Limited (RSMML) were included. The medical examinations of workers were conducted as per the standards prescribed under Rule 29B of Mines Rules, 1955 and Recommendations of 10th Conference on Safety in Mines. A General Physical examination was carried out and recorded in Form "O". All Chest X-rays were evaluated as per ILO Classification 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 Conference on Safety in Mines were also included for assessment of renal function. Blood cholesterol and triglyceride estimations were done for Lipid Profile. Hematological tests like Total count, Differential count, percentage of Hemoglobin and Erythrocyte Sedimentation Rate was also done to diagnose Blood Dyscrasias.

NIMH is also contracted by Gujarat Minerals Development Corporation (GMDC) for conducting medical examination of about 2000 employees in various mines in Gujarat.

Dr. S. S. Nandi

REVIEW OF INSTRUMENTS

Historical Dust Sampling Equipment - Hexhlet



Investigation in to the mechanics of elutriation led to the development of a horizontal elutriator whose separation characteristics resemble closely that of the human respiratory system. The Hexhlet dust sampler as it was therefore called makes use of one such horizontal elutriator which when combined with a Soxhlet thimble collects the respirable dust which in turn can be said to be a representative sample. This device was provided with a vacuum pump or ejector with a critical orifice which provides the optimum air flow. Research had shown that there was good concordance when a comparison was done between the theoretical size penetration curve of the human lung and for the elutriator. This comparability was one of the most attractive features of this instrument which was frequently used for obtaining samples for comparative analysis of inhaled dust as against the total airborne dust concentrations which were obtained from other filtration

- G. S. Ravindra

Ergonomics-The Science of better living:

Ergonomics is the science of designing a task according to the capabilities and limitations of the workers in a way so as to improve the productivity without affecting the workers fitness. Derived from the Greek words, "ergon" (work) and "nomos" (natural laws), ergonomics can be scientifically defined as – “A scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance”.



The word ergonomics was coined in 1857 by Wojciech Jastrzebowski though way back in 1773, Bernardino Ramazzini had mentioned about a co-relation between musculo-skeletal injuries resulting from occupations engaged in. Even Frederick Taylor had in early 1900s advocated improving worker efficiency using the basics of ergonomics. However it was during the World War II that ergonomics actually took off with interest in human-machine interaction on the rise. Today globally, ergonomics is recognised as a major factor in improving worker efficiency. Many international and national bodies too have been established for its propagation. This discipline of ergonomics can basically be divided into the following sub branches:

Physical ergonomics concerned with human anatomical, anthropometric, physiological and bio mechanical characteristics.

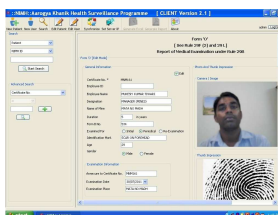
Cognitive ergonomics concerned with mental processes, and its effect on human interaction.

Organizational ergonomics concerned with the optimization of socio technical systems policies and processes.

NIMH is currently in the process of designing a project for studying and improving the work conditions of miners involved in underground mines.

- K. Sarkar

Aarogya Khanik Software:



NIMH has recently developed a software for health surveillance of miners and Form 'O' based data entry. The software has potential for being a useful tool in health evaluation studies as it can be used to generate reports as well as statistically evaluate data. The software has facility to attach a thumb scanner and web cam for storing records unique to each miner. The software has been developed with a search facility with miners' name, through his ID or any other parameters. Furthermore the software has been developed to operate in LAN for data access as well as data transfer from multiple users to the Administrator. This software, known as Aarogya Khanik will be used by the Occupational Health department for its PME project in Gujarat Mineral Development Corporation mines as it will allow field testing of the software.

In addition, the software also has been designed to extract data from PDF reports of spirometry and audiometry. This facility in software will simplify data analysis for NIMH scientists for epidemiological studies. The software has been incorporated with checks at the time of entry of medical history of the subjects for data security. As the report generation facility is available only to the administrator misuse of software is prevented.

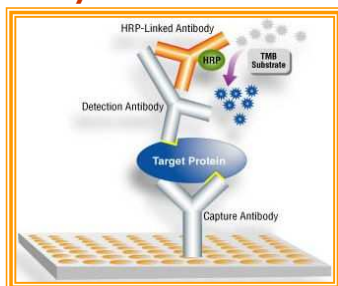
The Aarogya Khanik software therefore will not only reduce manual and paper work, but will also help in maintaining a database that can be utilized as and when the need arises. It is truly a milestone that NIMH has achieved in the Health Surveillance data management.

- S. C. Narwadiya

OUR VISION

“Safe Mines
and Healthy
Miners”

Enzyme Linked Immuno Sorbant Assay (ELISA):



ELISA also known as **enzyme immunoassay (EIA)**, is a rapid immunochemical test that involves an enzyme (a protein that catalyzes a biochemical reaction), and an antibody or antigen (immunologic molecules). The ELISA has been used as a diagnostic tool in medicine. In simple terms, in ELISA, an unknown amount of antigen is affixed to a surface, and then a specific antibody is applied over the surface so that it can bind to the antigen. This antibody is linked to an enzyme, and in the final step a substrate is added that enzyme can convert to some detectable signal, most commonly a colour change in a chemical substrate.

ELISAs are readily automated and thus capable of high output quantification of analyte concentrations. They are highly sensitive and specific and compare favorably with radioimmune assay (RIA) tests. They have the added advantages of not needing radioisotopes or a radiation-counting apparatus. ELISA has today become a fundamental tool for drug discovery, toxicology, animal studies, and clinical trials in the pharmaceutical industry because of its ability to assess large quantities of samples.

- R. G. Tumane

Expression of Protein in Bauxite Dust Exposed workers by Induction of Heme Oxygenase - I

Aluminum (Al) is present in very small amounts in living organisms but is abundant in the environment. During chronic, prolonged exposure, Al accumulates in various tissues, bones, spleen, heart, and liver. It is also speculated that aluminium might be interfering with haem biosynthesis as it can induce various abnormalities in porphyrin and haem metabolism. There have been several studies examining the health of workers in aluminum smelters, but none for workers in bauxite mining and alumina refining. The study by NIMH was aimed at investigating proteins fractions, which are expressed in response to elevation of heme oxygenase-I (HO-I) levels in the bauxite dust exposed miners. HO-I was analyzed in the serum samples of Bauxite dust exposed mine workers by ELISA. Controls (n=10) as well as Experimental (Bauxite exposed samples n=51), which were having high concentration of HO-I were selected for electrophoresis study.

In the study, unknown protein fractions were expressed in between the position of Molecular Weight markers 43 kDa (Ovalbumin) and 14 kDa (Soyabean trypsin Inhibitor), when compared with the control group. The molecular weights of the unknown proteins, expressed in blood serum of Bauxite dust Exposed mine workers, were determined by the use of graphical log method, and results showed it to be 35.76 kDa and 18.06 kDa respectively. The results showed that serum of about 70 - 80 % of bauxite dust exposed workers, expressed the 35.76 kDa and 18.06 kDa of the unknown protein.

- Y. Gadge

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

Post-graduate Dissertation Projects conducted:

No	Name of the Project	Student	Guide
1.	Induction of Heme oxygenase—I by Bauxite exposure	Yogita Gadge	Dr. Shubhangi Pingle
2.	Electrophoretic Studies on biomarkers in occupationally metal exposed workers	Ishrat Siddiqui	Dr. Shubhangi Pingle
3.	Effect of long term Bauxite dust exposure on selected biochemical parameters and hormones profile	Sandeep Rahangdale	Dr. Shubhangi Pingle
4.	Comparative analysis of different noise monitoring standards—A case study in open-cast Manganese mine	Tirthankar Saha	Debasis Chatterjee

CONFERENCES/VISITS:**Participation in the 85th workshop on Electrophoresis techniques:**

Dr. Shubhangi Pingle, Senior Research Officer and HoD, Biochemistry dept. along with Shri Pravin Soni, JRF participated in the 85th work shop on “Electrophoresis Techniques” held from 23rd May to 1st June 2011 at The Electrophoresis Institute, Salem, Tamil Nadu.

The program exposed participants to various electrophoresis techniques in addition to the advancements in electrophoresis. In addition to lectures on electrophoresis, specialized lectures on Western Blotting and PCR were delivered by experts. The participants were also exposed and provided hands on training in the techniques.

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

Forthcoming Events:

1. 7th EFCC Symposium for Balkan Region Biomarkers: From Standardization to Performance, Belgrade, Serbia, 23-25 June, 2011
2. 12th Iranian Congress of Biochemistry and 4th International Congress of Biochemistry and Molecular Biology, Mashhad, Iran, September 6-9, 2011
3. Xth Czech National Congress of Clinical Biochemistry, Pilsen, Czech Republic, September 20-22, 2011.
4. International Conference on Molecules to Systems Physiology, University of Calcutta, Kolkata, India September 21-23, 2011.
5. International Conference on Ergonomics and Human Factors, IIT-Chennai, India. December 13-17, 2011.

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