Current research

Occupational medicine, toxicology, biological monitoring, safety and environmental health, occupational hygiene

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It is not possible to present a comprehensive account of the enormous number of research topics done in our region. We can pick out only a few examples, selected on the basis of reflecting current trends and geographical representation.

Occupational medicine

In Japan, the Industrial Safety and Health Association provides interesting information about its research and survey themes for 1995 (Table I). Many of those themes are relevant to other Asia-Pacific countries as well.

In China a large number of studies have been conducted to test the efficacy of different drugs on silicosis. Several therapeutic trials of different preparations of PVNO (P240 or Ke-Xi-Pin) were prepared and administered to large numbers of silicosis patients. The results showed that there were improvement of symptoms and delayed progression of disease in some patients. Among thousands of drugs being tested for this purpose, tetran-drine, aluminim citrate, quinonyl-piperazine phosphate and quinonyl-piperazine hydroxyphosphate were found to be effective in inhibiting the progression of silicosis both in experimental animals and silicotic patients. Another new drug called “Xinin” is now being studied (Li, 1994).

An interesting animal study was also conducted in China on the effect of a herb, Salvia miliorrhiza Bge demonstrated a potential to prevent the process of skin ageing, which occurs both in senescence and extrinsic damage by environmental factors. However, further studies are required on humans to validate those findings (Zhou et al., 1995).

Table I

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<th>Research and surveys themes of the Industrial Safety and Health Association, Japan (1995)</th>
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| Safety and health measures for small and medium-sized enterprises | Safety and health measures of machine using operations in food processing industry
Press machine related industrial accidents cases
Safety measures for gravel industries |
| Safety and health measures in tertiary industry | Safety and health during the production of movies, television programmes, and commercials |
| Safety and health measures to meet technological innovations | Safety and health measures taken in non-routine operations (steel production facilities)
Safety and health measures taken in non-routine operations (automated production systems) |
| Safety and health measures for senior workers | Evaluation of ageing in terms of occupational health management |
| Measures to prevent occupational diseases (including occupational health management) | Diagnosis of pneumoconiosis using computer tomographic images
Safety and health measures for nurses
Measures to prevent lumbago
Measures against passive smoking at the worksite
Effects on health of organic solvents in the lacquer ware industry
Effect on health of organic solvents in the textile industry |
| Measures to handle chemical substances | Future approaches for managing chemical substances
Biological monitoring of chemical substances |
| Others | Statistics of occupational fatal accidents
Studies of OHS management systems
Techno-stress in the advertising industry |
India is also trying out herbs grown in that country for a long time against some environmental and occupational conditions. A herbal preparation, termed Herbal 95, consisting of volatile and naturally occurring oils, in combination with some plant products, was recently developed by the Environmental Research Laboratory in Lucknow. This preparation was applied to the skins of 180 human subjects, and appeared to have some desensitization effects (Saxena and Chandra, 1995).

Toxicology

The semiconductor industry is of vital importance to the economies of many Asia-Pacific countries. A new method has been devised for biological monitoring of low level exposures to arsenic through the concentration of inorganic arsenic in urine. Gallium arsenide and indium arsenide are important substances in the manufacture of semiconductor materials. Monitoring of arsenic in hair is also used for exposed workers (Yamauchi et al., 1996).

Whether living or working in deserts carries an appreciable risk of silicosis has been shrouded with controversy for some time. An interesting study from Gansu, China, indicated that such a risk can occur in inhabitants living in desert areas (Xu et al., 1996).

Lead still poses a threat to the health of thousands of workers in Asian developing countries. In a Taiwan study of women workers in lead battery companies, there were 363 (54.2 per cent) who had blood lead levels exceeding 30 micrograms/dl. It was calculated that from these women, there would be 15 newborn babies with a blood lead level between 10 and 30 micrograms/dl and 19 babies with a blood lead level over 30 micrograms/dl (Wang et al., 1996). These are rather disturbing findings, as we know from other studies that intellectual deficit could occur in babies born with high lead levels.

Cognitive dysfunction could occur in workers exposed to organic solvents in industries such as printing, spray painting and glue manufacturing. An Australian study has shown that the auditory evoked potential is a reliable and useful investigation in workers exposed to such solvents (Teo and Phoon, 1996).

Another Australian study focused on the very important subject of pesticide exposures among agricultural workers. It was found that approximately 25 per cent of agricultural workers in a study reported adverse health effects, such as headache, nausea, fatigue and eye, nose and throat irritation, although no worker exposed to organophosphates had a red blood cell cholinesterase below the reference range. Chlorpyrifos was the most commonly cited organophosphate pesticide associated with symptoms (Kenyon et al., 1996).

Case reports of pesticide intoxication are useful in helping the accumulation of knowledge for diagnostic criteria and interventive measures. In Japan, delayed neurotoxicity was described in a 70 year-old woman who ingested 40 ml of fenitrothion emulsion. No toxic symptoms were apparent initially but appeared after 48 hours. Impaired consciousness, fasciculations and muscle weakness were noted. Plasma and urinary 4-nitro-3-methyl-phenol (PMC) were considerably raised. Neither atropine sulphate nor PAM was effective. For three weeks the patient required ventilatory support. Muscle strength and neurological functions recovered with falling NMC levels (Sakamoto et al., 1984).

In Australia serum bile acids were studied for their usefulness as an indicator of liver dysfunction in experimental animals and workers exposed to hepatotoxic agents. An improved assay procedure using high-performance liquid chromatography trichloroethylene and ANIT, an experimental cholestatic agent, caused shifts in serum bile acid levels. Taurocholic acid was found to be the most sensitive indicator (Wang and Stacey, 1990).

In Thailand a study was conducted between the dietary lead intake and the blood lead level of battery workers with normal nutrition and those with calcium, iron or zinc deficiencies. The study showed that poor nutritional status, especially in iron deficiency, could increase the blood lead level of the workers. Moreover, the blood lead levels were positively related to dietary lead level, which was statistically significant (P value < 0.05), and cigarette smokers had higher levels of blood lead than non-smokers (P value < 0.05). Health education in nutrition and personal hygiene could improve workers’ health and reduce lead absorption (Rujirawat, 1995).

Biological monitoring

Biological monitoring is sometimes considered part of health surveillance and sometimes part of occupational hygiene. Notable advances in biological monitoring have been made in recent years in the region. One such advance is a new method of hair analysis for lead and other metals.

The method standardizes the method of washing the hair samples with the use of 0.25 per cent Triton X-100. The metal concentrations in hair are then determined by synchrotron radiation x-ray fluorescence
imaging with x-ray microprobe. The method appears to be able to differentiate between endogenous and exogenous exposures. Extensive studies are now proceeding to validate the method in lead-exposed and zinc-exposed workers and metal-treated rats (Shimojo et al., 1997).

### Safety

There is still insufficient research on safety in the region as a whole. Most of the scientific papers on safety presented at conferences tend to focus on services and descriptive data on incidences and prevalence of accidents only. There is still a tendency for the more technical papers on safety to be presented more by experts from outside the Asia-Pacific region than by those from within. Nevertheless, papers on many other aspects of occupational health, such as occupational medicine, ergonomics and toxicology, often have considerable bearing on safety.

### Environmental health

How a leakage of a poisonous substance affected an adjacent community is tragically illustrated by Bhopal. A comprehensive review of the disaster was published recently. More than 200,000 persons were exposed to methyl isocyanate over a period of one to two hours. Initial death toll was over 2,500 persons. Of 361,966 exposed persons traced, 173,382 had temporary injuries and 18,922 sons. Of 361,966 exposed persons traced, 173,382 had temporary injuries and 18,922 per manent damage to their health. Recorded deaths eventually totalled 3,828. According to the authors of this paper, the lessons learned from Bhopal are as follows:

1. Upgrading of relevant legislation. An Environment (Protection) Bill was passed in 1986 to prevent and combat environmental pollution.
2. Greater emphasis on health access of technology transfer. In 1991 the Tribunal on Industrial and Environmental Hazards and Human Rights emphasized the need to look beyond short-term gains in making decisions about technology transfer.
3. The need for emergency planning strategies. It was pointed out that these could have greatly reduced the mortality and morbidity of Bhopal.
4. The need for more responsible transfer of technology. There should be a greater role by countries and international agencies to help ensure a safe and responsible transfer of technology and a raising of the level of environmental awareness and education (Dhara and Dhara, 1995).

Rubbish dump sites can be a potential source of health risks to both workers in scavenging and the community around. Often scavengers and their families live in the immediate vicinity of rubbish dumps. A study in Thailand of such a solid waste scavenger community showed a high prevalence of respiratory disease, hepatitis B antigenaemia, intestinal protozoa and helminths, especially among the children. Several kinds of volatile organic compounds were also found but at rather low concentrations (Kungskulniti et al., 1991).

### Occupational hygiene

Indoor air quality is becoming a subject of increasing research in the Asia-Pacific area.

A large Singapore study of 57 air-conditioned offices found a risk of chronic health effects from long-term exposure to formaldehyde, as 45 per cent of measurements exceeded the threshold limit values (TLVs) recommended for industrial exposure. Moreover, in 60 per cent of the offices studied, there were carbon dioxide levels of more than 800ppm. Of the 669 workers in those offices 42 per cent felt that their office was too cold (Foo et al., 1995). This and several other papers on the same subject draws timely attention to the hazards of the office environment and to the fact that air-conditioning often aggravates the health problems of indoor air quality.

In Australia, several IAQ studies have been conducted, together with a refinement of study methodology for use by a multi-disciplinary team, involving medical, environmental, microbiological and psychosocial aspects (Phoon et al., 1995). This paper attempts to establish some degree of uniformity in a subject of increasing importance but characterized by a lack of criteria for diagnosis and a paucity of multi-disciplinary studies.

In the Philippines, field studies were undertaken using World Health Organization protocols to measure the exposure to methyl parathion and monocrotophos. Potential exposure to dermal exposure were determined by measuring the concentration of pesticide on pieces of clothing and gauze patches under the clothing. Hands were found to have the highest potential for dermal contamination and penetration. Other areas of contamination included the back and lower leg. Mixing and loading activities had the highest potential for dermal contamination. Protective
clothing, which was locally designed, was assessed for its effect. In one group of sprayers plastic vests were worn over their T-shirts, plastic bags covered their hands and plastic wrappings were wrapped around their legs. The control group wore the same clothing without the plastic protective clothes. In the application of methyl parathion, pesticide residue levels were lower in sprayers who used protective clothing than those who did not. In the application of monocryptos study, no conclusion could be drawn. Problems encountered with the locally designed clothes included a sensation of warmth and the ease with which the bags covering the hands were torn (Castaneda, 1993). This study draws attention to the problems of using personal protective equipment, such as protective clothing, in the hot, humid countries which constitute most of the developing world.

Conclusion

It has been very difficult and rather invidious for us to have to select only some scientific papers for specific mention in this article. Owing to lack of space, many papers of great merit have not been included. Here we have been able to include only some articles, largely selected on their focus on critical or emerging issues and partly on their geographical representation.

References


