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GUEST EDITORIAL

Occupational Challenges in Extreme Environment

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The risks of extreme environmental exposure have historically been well recognised in occupational settings like in military, mining, firefighting, etc. These stressful environments can limit workers' productivity. Both physical and mental performance may perhaps deteriorate due to the complicated interplay of physiological and pathophysiological processes. The curtailment in ability to perform daily activities because of heat, cold or extreme weather should be considered a 'health effect' of climate conditions in light of the "WHO's definition of health ('Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity')". Thus, occupational extreme environment exposure threatens the health of a worker not only when ill due to environment condition occurs but also when productivity is undermined.

Heat (in case of high temperature) is one of the physical hazards that can cause health problems in the workplace. Daily heat exposure especially in the hot season in tropical and subtropical parts of the world is a trouble particularly for people working in jobs that cannot be, or are not cooled by air conditioning or other technical methods like in case of defence personnel. They experience excessive thirst and sweating. Apart from the environmental heat foisted on the workers, high metabolic heat load is additional in case of defence personnel who are also engaged in heavy physical work that involves intense arm and trunk work, carrying, pushing, and pulling heavy loads throughout their shifts, which categorises them as being at a high risk as far as heat stress is concerned. Heat exposure not only causes illness but worker's performance and work capacity is also impaired. Therefore, heat prevention strategies and thermal ergonomic standards are required to protect the worker. Prolonged heat stress may lead to loss of body fluid (hypo hydration), which in itself impairs performance, especially endurance. In addition, prolonged heat exposure may impair mental and psychomotor functions, thereby affecting performance.

Working in the cold is primarily a matter of maintaining thermal balance, since both energy metabolism and neuromuscular functions are temperature dependent. Body temperature is also subject to variations due to circadian rhythms. While local acclimatisation to cold is well established, and may be of considerable practical benefit, general acclimatisation to cold, if in fact a reality, is at best of limited practical value compared to know-how, experience and environmental protection. Outdoor work in the winter, cold stress frequently reduced working ability. Some of the major problems associated with the performance of physical work in the cold are consequences of the hobbling effect of the protective clothing, as well as the obstructive effects of snow and ice and the chilling effect of wind. Local cold injury may occur in the exposed parts of the body such as the face, hands and feet, either due to the freezing of tissue and formation of ice crystals, i.e. frostbite, or by vasoconstriction causing deprivation of the blood circulation to the exposed parts, leading to ischemic cold injury. Cold injury to the eyes, i.e. transitory epithelial damage to the cornea causes corneal edema and blurred vision.

Human being can become acclimatised to low air pressure. Nonetheless, there is no way to become biologically acclimatised to high air pressures, such as those encountered in deep sea diving or when a submarine crew tries to escape from inside the craft, where the pressure is normal, to the surface through sea where the air pressure is higher. Several occupational risks like accidents and maritime disasters, impaired treatment options for cardiovascular diseases, high shipboard stress levels including fatigue and isolation, communicable diseases and exposure to hazardous substances. The duration and the quality of sleep are also important.

It is, therefore, of paramount importance to be able to assess the magnitude of the environmental condition in the working atmosphere and the worker's physiological reaction to it, in order to ensure optimal conditions for health and productivity. Research regarding the current and future risks of impacts of extreme environmental exposure is of outmost importance to develop comprehensive evidence-based policies for protecting current and future working populations from the adversities of stressful environment. Additional preventive strategies should be designed like establishing an alert program and providing auxiliary body cooling/warming and protective clothing. Medical and physiological monitoring program is vital to prevent adverse outcomes and for early identification of symptoms. This program should include pre-placement and periodic medical evaluations, as well as a plan for monitoring workers on the job. Our major focus should be in the field of

area to design strategies or preventive techniques for the soldiers who needs to be protected from environmental stresses.

It has been both a great pleasure and an honour to serve as the Guest Editor of current special issue of Defence Life Science Journal. This special issue of Defence Life Science Journal on "Extreme Environment: Occupational Challenges and Interventions" showcases both basic and applied research to assess the effects of exposure to severe cold, extreme heat, high terrestrial altitude along with nutritional factors, occupational tasks, physical training and deployment operations on the health and performance of military personnel. Contributions for this issue are the ones that have made a strong and positive impact on the well being of soldiers as well as the common man dwelling at high altitude and other occupationally stressful conditions. Finally, I would like to thank all the authors and reviewers for their hard work and outstanding contributions. I am grateful to the Editor-in-Chief, the Editorial Board, and the Editorial Team of the Defence Life Science Journal for their support in bringing out this special issue.

Guest Editor

Dr Ekta Kohli is currently working as Scientist 'E' at DRDO-Defence Institute of Physiology and Allied Sciences, Delhi. Her major research area is nanotechnology and toxicology. She has publications in journals, chapters, and patent to her credit.