Technical details of "Backpack" developed by DIPAS

Indian soldiers generally carry 21.4 kg load in distributed mode (multiple units) by using existing load carriage ensembles (ELCE). The distributed mode involves carrying 10.7 kg load in backpack (BP), 4.4 kg in haversack (HS) in the waist region, 2.1 kg in Web (in front/ near abdomen) and 4.2 kg rifle (in hand). Studies carried out in our laboratory and elsewhere have shown that distributed mode of load carriage demands higher cardio-respiratory responses and energy cost than compact mode. The existing BP (10.7 kg) used by Indian infantry soldiers cause excessive forward bend, hip rotation and other biomechanical changes which are injurious in the long run. Even carrying a 4.2 kg rifle in hand generates 6 % increase in impact force per stride which amounts to the absorption of about 31 KN impact force in each foot per km travel. The existing BP used by Indian infantry soldiers are also not properly designed as per their body dimension of Indian soldiers. The BP scaffolding external frame is shorter in size, thus incompatible with most of the soldier population, leading to discomfort and pain. The volume of the BP is quite less (about 30 lit) accommodates only about 10.7 kg load (inside the pack). The existing BP does not have any facility for carrying rifle, hydration pack, etc. There is no provision of Pouch Attachment Ladder (PAL) system for carrying accessories and additional load in the existing BP. Inadequate cushioning on pressure points at shoulders, back and waist regions.

Recent evidence suggests that the individual's load is increasing with advancing technologies and personal protective equipment. Since the last century, total loads carried by marching and/or combat soldiers have progressively increased due to mission requirement. In view of the above, Ergonomics group of DIPAS has ergonomically designed and developed one new backpack using the ergonomic principles based on body dimensions of Indian soldiers'. The volume of the new BP is 90 lit and accommodates about 30-40 kg load as compact mode (single unit with multiple compartments) without external frame. The newly developed DIPAS backpack has one detachable haversack can be removed at the time of emergency, integrated rifle carrying facility and hydration pack. Additional loads can be accommodated with pouch attachment ladder (PAL) systems. The newly developed DIPAS backpack has adequate cushioning on pressure points at shoulders, back and waist regions.

Important features of the new backpack

1. Advanced knowledge of Ergonomics principles have been used for improvement in compatibility, user friendliness, efficiency, health and safety of the individual.
2. Compact mode (single unit) of load carriage reduce energy expenditure, delay the onset of fatigue than carrying load as distributed mode (multiple units).
3. Integrated rifle carrying facility in the new backpack allowed normal swing of the arms and better stability during load carriage.
4. Hydration pack attached with backpack helps rehydrating individual during load carriage.
5. PAL system in the new backpack provide additional load carrying facility if required in any emergency situation.

Importance of the new backpack over existing improved backpacks available in the market Worldwide:

1. The new backpack from DIPAS is designed based on ergonomic principles and Anthropometric data of Indian Army population.
2. It has been scientifically proved to be more energy efficient than the existing load- carriage system.
3. It is an indigenously designed and developed product.
4. The backpack developed is cost effective and easily available.