

2 DRDO men to take part in Siachen trek

BY SRIDHAR
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NEW DELHI

Aug. 28: Two employees of the Defence Research and Development Organisation (DRDO) could be part of the second "high-altitude trek" to the Siachen glacier organised by the Indian Army this year which will take place in October.

The high-altitude trek is open to civilians and about 40 people in all could participate in the trek this year. South Block sources said that such a move would enable DRDO staff to have a first-hand experience of the hostile climatic conditions that Indian soldiers stationed in the Siachen glacier experience every year where temperatures drop to minus 40° Celsius during the peak of winter. The three-week trek is planned in October this year when temperatures are expected to be sub-zero at about -8° Celsius.

The DRDO officials told this newspaper that the organisation conducts a range of activities directed for the benefit of soldiers stationed at Siachen that include designing high-altitude winter clothing, growing food crops through trench farming in Leh (Ladakh region of J&K) as well as making packaged food that is consumed by the soldiers stationed in the region. The Indian Army had opened up the Siachen Glacier to civilians for the first time ever in 2007 and the Army's Adventure Wing had organised the "high-altitude trek" to the Siachen glacier last year. The announcement by the Indian Army in September

last year had also led to protests from Pakistan. Indian Army sources had said then that this was being done with the aim of promoting tourism now that there is peace in the Siachen Glacier region. Those who participated in the trek in 2007 included representatives from various mountaineering clubs, cadets from the NCC, Rashtriya Indian Military College and Indian Military Academy as well as those Armymen who were "trained glacial craft experts".

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REDEFINING ORTHOPAEDIC APPROACH

From defending tanks to replacing hips

Manoj K Das | ENS
Kochi, August 27

THEY first developed it to protect battle tanks from enemy fire and to build low-weight, fast-deployable bridges for the Army. But little did Dr Makarand Joshi and his team realise that the same carbon composite was to redefine the orthopaedic approach to one of the most challenging medical procedures — hip replacement surgery.

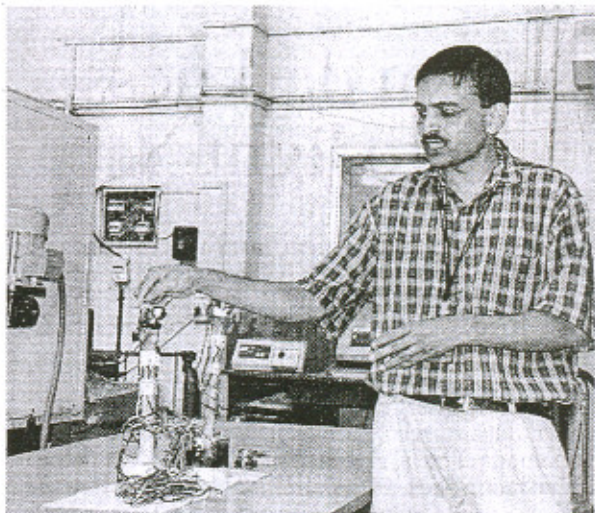
Weighing some 35 percent less than conventional implants moulded of surgical steel, cobalt chromium or tungsten, Dr Joshi's implant weighs less on the pocket too.

"The cost of the surgery now ranges between Rs 30,000 and Rs 1,50,000 depending on the metal used. But our design can be implanted through less invasive surgery and the total cost will be only around Rs 15,000," says Dr Joshi, a mechanical engineer specialising in composites at DRDO's Research and Development Establishment (R&DE), Pune.

But economics is just one facet of this spin-off. "It can be customised unlike the conventional Charnley prosthesis which has a life span of about 15 years. A mould geometry is generated from a CT scan of the individual patient's femoral bone and a customised implant is designed using carbon fibre. This approach enables us to design an implant that is in tune with the patient's bone symmetry and structure," says Joshi who holds a patent for this concept.

The DRDO is working with Pune-based orthopaedic surgeon Dr Shrirang Joshi to test this concept. "We've tested over 50 cases and our prostheses have consistently shown a superior match to conventional ones. It matches the natural stress state in the femur and will last much longer than the 10-15 years expected from the Charnley prosthesis. Our design will last a lifetime," says R&DE director B Rajagopalan.

The DRDO design uses a metallic bolt to lower the carbon implant into the femur. "At present there exists no solution that is customised to suit the bone character of a patient. Also, western implants are based on the Caucasian



Dr Makarand Joshi who redefined the orthopaedic approach to hip replacement surgeries

physique and not Indian bone topology. Our prosthesis is hundred percent designed for the Indian physique," Dr Joshi claims.

According to him, about 500,000 patients need hip replacement due to reasons varying from old age to accidents. Only a minority can afford the treatment at its current rate, leaving the rest to lean on crutches. The DRDO spin-off will make the implant affordable for more patients and perhaps expand the concept to other developing countries once Dr Joshi and his team complete the clinical trials expected to begin by the end of the year.

How much load can the Indian soldier carry?

Defence institute carries out Rs 1.5-cr study

Satyen Mohapatra
New Delhi, August 22

THE INDIAN soldier loaded with 21.7 kg on the move can look forward to carry much more load with higher comfort levels.

The Defence Institute of Physiology and Allied Sciences (DIPAS) has been evaluating the effects of military load on a soldier with six newly imported video camera-based 3-D Motion Analysis System costing Rs1.50 crore.

DIPAS director Ilavazhagan told HT, "While we could easily detect the physiological effect of load on the body like heart rate, blood pressure and energy expenditure, we did not have a device to evaluate the effect of bio-mechanical load till we procured the new system."

Bio-mechanical stress, he said, due to carrying unequally distributed heavy loads manifested itself as pain in muscles and joints and reduced the soldier's efficiency.

DIPAS additional director Dhurjati Majumdar said, "Preliminary findings of the recent evaluation have pointed to minor 'angular

problems' in the back pack. The 'one size back pack' for all soldiers may require improvement."

The soldier has to carry the back pack only when he travels from one place to another with a total load of 21.7 kg. Otherwise, he carries a (4.4 kg), web with grenades and magazines (2.2 kg), rifle (4.2 kg) or Light Machine Gun (6.8 kg).

"We are redesigning the total load a soldier is going to carry, all individual items and the distribution of load which includes making the back pack more flexible and suited to the large ethnic variation of the soldiers having different body sizes," he said.

"If a Korean or American soldier can carry a 50 kg back pack, why not an Indian soldier? We hope with the newly designed load carrying ensemble, our soldiers will definitely be able to carry a load of at least 30-40 kg," he added.

The studies are carried out in a studio-like room with infrared lights. The soldier is strapped with 25 retro reflective markers (tennis balls fitted with reflective tapes which reflect the infra red light) on different joints of the body like ankle, foot or knee.

Data is automatically fed into computers and feedback is received on the biomechanical and physiological stress on the soldier's body.

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LOAD MATTERS

■ Presently, Indian soldiers on the move carry a backpack weighing: **21.7kg**

When not traveling, an Indian soldier carries weights as:

■ Haversack: **4.4kg**

■ Web with grenades and magazines: **2.2kg**

■ Rifle: **4.2kg**

■ Light Machine Gun: **6.8kg**

■ Weight of an American

or Korean soldier's backpack: **50kg**

■ After redesigning load structure, Indian soldier will be able to carry: **30 to 40kg**

Weight analysis:

■ The Defence Institute of Physiology and Allied Sciences is evaluating physiological as well as bio-mechanical effects of load on a soldier.

■ **Physiological effects:** felt on heart rate, blood pressure and energy expenditure

■ **Bio-mechanical effects:** felt as pain in muscles and joints

How study is being carried out:

■ Soldier made to stand in a studio-like room with infrared lights

■ He is strapped with **25 retro reflective markers** on different joints of the body like ankle, foot or knee.

