*Field Study*

# Helicopter crew conditioning program : Our experience

Gp Capt G Gomez*, Sqn Ldr M Mukerji+

## ABSTRACT

**Low backache is a well documented problem among helicopter aircrew. At a forward Indian Air Force (IAF) flying base a new approach has been attempted to combat this affliction. An exercise program specifically targeting the pre and para vertebral musculature was conducted over a 20 day period with the premise that this would lead to core strengthening and thereby be an effective preventive measure against backache. In all, 23 military helicopter aircrew participated in the program. The course schedule was kept flexible and consisted of a limbering jog, stretch exercises, back strengthening exercises and relaxation techniques. Only 5 aircrew completed the entire course schedule; the balance 18 managed an attendance ranging from 2 to 18 days. Post course feedback was obtained by means of an anonymous questionnaire. In the final analysis, half the participants considered the course beneficial whilst the other half rated the course as extremely useful.**

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The problem of backache in helicopter aircrew has been well documented the world over [1,2,3].The poor sitting posture due to disposition of the cyclic and collective controls is the main reason for backache. Another significant cause is the vibration level [4,5,6].

The incidence of backache in various surveys carried out in rotary wing aircrew reveal that at some point or other in his/her flying career, a helicopter aircrew will be afflicted by this malady [1,2,3,7,8]. For many, the reason of backache is probably lumbo-sacral muscle spasm or strain which is self limiting and after a period of rest, normal activity can be resumed [3,9]. However, for others the problem may be severe enough necessitating a period of temporary grounding or even being put down from a flying career [3].

So far, the general approach to combat low backache in rotary wing crew has been to redesign better seats, change the age old Sikorsky's two stick controls to better seat mounted ones and advocate the use of lumbar pads [3,6,10]. The Indian Air Force (IAF) has not implemented any of the general measures to address the problem in helicopters and for that matter neither has the Indian Navy (IN) nor the Army Aviation Corps. At best, stop-gap measures have been suggested or resorted to, such as the use of a lumbar "backbuddy" support [10].

At this forward IAF flying base a new approach has been attempted to combat this

*Senior Adviser Aerospace Medicine & Deputy Principal Medical Officer HQ EAC, IAF

+Graded Specialist Aerospace Medicine 33 Wing AF C/O 56 APO

affliction. Strengthening of the girdle of supporting musculature of the spine has become a major trend in rehabilitation of both acute and chronic low backache cases [11]. Therefore conduct of an exercise conditioning program specifically targeting the pre and para vertebral musculature would most likely lead to core strengthening and thereby be an effective preventive measure against backache.

**The Course**

With this premise a helicopter aircrew physical conditioning program was organized and conducted with the aim of intervening in the causal cycle of backache in rotary wing aircrew. The course was run in for one hour per day, five days a week for four weeks (ie., for 20 workout days).

The daily one hour workout involved the following :-

(a) **Limbering jog.** A 1.6 km slow jog with limbering-up exercises was conducted under the guidance of a Ground Training Instructor (GTI) to loosen up.

(b) **Warm up exercises.** The limbering jog was followed up with a 10 minutes free hand exercises with whole body stretch. These exercises were also carried out under the supervision of the GTI.

(c) **Back exercises.** A set of specially selected back and abdominal exercises were done for 30-35 minutes which comprised of :-

(i) Knee to chest raise
(ii) Pelvic crunch
(iii) Straight leg raising
(iv) Press ups
(v) Half sit ups
(vi) Hamstring stretch
(vii) Half press ups
(viii) Hip and back stretch

(d) **Cool down.** Relaxation with awareness of breathing and Shavasana for 10 minutes.

(e) **Post Course Feedback.** An anonymous feedback questionnaire was distributed among the participating aircrew on completion of the course. The questionnaire solicited their views on a number of issues ranging from the problem of backache in rotary wing aircrew to suggestions on its alleviation. Completion of the questionnaire was voluntary and anonymity was ensured.

**Participants**

The course was attended by 23 aircrew from the helicopter units at this airbase. The flexibility of the curriculum ensured spontaneous and voluntary participation. The aircrew had the option to join or leave the program on any day during the course so as to accommodate flying schedules and operational commitments.

**Findings and Discussion**

Of the 23 aircrew, 5 completed the entire schedule; the balance 18 managed an attendance ranging from 2 days to 18 days. The latter was basically due to operational and other flying commitments. 15 completed feedback proformas were received, giving a return rate of 65.5%. The mean age of aircrew attending the course was 29.9 yr (range 23-37 yr), they had an average service duration of 8.1 yr (range 1-16 yr).The group flying experience ranged from 250- 3900hr with an average of 1914.5 hr.

All the respondents agreed that backache is a problem with rotary wing aircrew. Of these 60% had experienced backache at sometime or the other during their flying career. For the afflicted, the frequency of such episodes was on an average twice per year. So far this had not resulted in any of the aircrew losing man-hours

from flying or being grounded temporarily or permanently for this ailment. However it is seen that the Chetak aircrew were more vociferous with respect to backache as compared to the Mi-8 aircrew. This is in consonance with other reports and studies which reflect the incidence of backache ranging from 78 -100% in Chetak crew [3,8].

All respondents felt that backache is related to the extended duration of flying such crew are exposed to. Pinto in his survey of IN pilots found that sorties of more than 2:30 hr resulted in backache [3], the same has also been suggested by Malik et al [7].

Approximately one-fifth of the aircrew stated that backache interfered with the flying task. This finding can have serious flight safety ramifications because backache can be a major distraction in flight to the aircrew.

There was a unanimous feeling that backache was caused due to poor seat design. The same has been reported in a number of studies [3,6,7,8]. Further, 80% felt that the helicopter vibration also had some role to play in causation of this malady, especially in the frequency range of 12-15Hz [4,5,6]. This also has been well documented in literature.

No aircrew used oral pain relieving medication to relieve the backache. However, 50% admitted to the use of rubefacients and topical analgesics. In contrast, Pinto had determined in his study that 9.6% of Naval pilots reported the consumption of oral pain killers for relief of backache [3].

All aircrew claimed to be performing some form of physical conditioning, on an average of 3 days per week with duration of approximately 30 minutes per workout. All the aircrew were comfortable with the present course schedule, the 1.6 km limbering jog and the freehand warm up calisthenics. 80% of the aircrew felt that the back exercises worked up the spinal musculature, 60% felt that they had made gains in back muscle strength and 50% felt that there were improvements in spinal flexibility.

The aircrew were unanimous with respect to the feeling of relaxation induced by the meditative techniques. 80% of the aircrew felt confident that after completion of the program they were fully capable of following the schedule of back and abdominal exercises on their own.

Overall 50% of the participants considered the course beneficial whilst the balance rated the course as extremely useful.

**Suggestions mooted by the aircrew**

(a) Duration of the course should be increased from its present 4 weeks to 6-8 weeks.
(b) Back and abdominal exercises to be increased.
(c) Such courses to be conducted more often and/ or be an on-going process so that aircrew can participate at their convenience.
(d) Similar courses to be conducted at all training centres.
(e) Air Force to look into making improvement in seat design and cockpit ergonomics.

**Conclusion**

This program was designed to increase aircrew effectiveness by reducing the incidence of low backache through back muscle strengthening. The program structure was deliberately kept flexible to allow for operational commitments of the helicopter units. The duration of the course was pre-planned at 4 weeks to ensure sufficient number of days of participation of most aircrew. The contention was to inculcate

awareness of spinal hygiene and induce the philosophy of regular specific exercises to combat backache. The program aimed at training the aircrew sufficiently so as to enable them to pursue the routine on their own after the 4 weeks indoctrination.

All the participating aircrew had shown great enthusiasm for the course. The feedbacks indicate that the program did benefit the aircrew in combating backache. It was also able to generate awareness amongst helicopter aircrew about spinal health and hygiene. Such a course targeting rotary wing aircrew and specifically addressing the problem of backache has been conducted for the first time in IAF. Our review of scientific literature and search on the internet has so far not revealed a similar course in any Air Force, Navy or Army Aviation Corps around the world.

**Recommendations**

(a) Conduct of such programs at the base level does inculcate interest amongst all personnel about the role of regular exercise and improved physical fitness in overcoming backache and combating stress.

(b) Such courses need to be conducted at all stations having rotary wing aircraft.

(c) This course also needs to be taught at the basic stage for all helicopter aircrew.

(d) Similar programs may be conducted for other personnel wherein job related and postural stress is known to cause backache.

**References**

1. Bridger RS, Groom MR, Jones H, Pethybridge RJ, Pullinger N. Task and postural factors are related to back pain in helicopter pilots. Aviat Space Environ Med 2002; 73(8):805-11.

2. Hansen OB, Wagstaff AS. Low back pain in Norwegian helicopter pilots. Aviat Space Environ Med 2001;72(3):161-64.

3. Pinto LJ. Backache in helicopter pilots of the Navy. Ind J Aerospace Med 1993; 37(2):11-14.

4. Stott JRR. Vibration. In:Ernsting J, Nicholson AN, Rainford DJ eds. Aviation Medicine 3rded. Oxford: Butterworth Heinemann, 1999; 177-90.

5. Smith SD, Nixon CW. Vibration, Noise and Communication. In: Dehart RL, Davis JR eds. Fundamentals of Aerospace Medicine. 3rd ed. Philadelphia : Lippincott Williams & Wilkins, 2002; 154-83.

6. Navathe PD. Helicopter controls:an ergonomic approach. Ind J Aerospace Med 1994; 38(1):16-18.

7. Malik H, Kapur RR. Backache in helicopter pilots. Aviation Medicine 1981; 25:11-14.

8. Singh R. Backache in Chetak crew and suggested ergonomic improvements in aircraft seat design. Ind J Aviation Medicine 1983; 27:123-25.

9. Rayman RB, Hastings JD, Kruyer WB, Levy RA, editors. Clincal Aviation Medicine. New York: Castle Connolly Graduate Medical Publishing. 2001.

10. Sharma S, Upadhyay A. Low backache among Chetak helicopter pilots: Trial of lower lumbar cushion at a flying unit. Paper presented at the XLI Annual Conference of Indian Society of Aerospace Med; Nov 2000.

11. Walkowiak B. Lower back pain and the USAF flight crew. Flying Safety 1999 (Nov): 22-25.