

AGSM training awareness and utilisation amongst Indian fighter aircrew

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A questionnaire survey was carried out among fighter aircrew to assess the awareness of Anti G Straining Manoeuvre (AGSM). Aircrew who had undergone training in AGSM at Institute of Aerospace Medicine (IAM) were specifically asked about the practical use of AGSM in operational flying. Aircrew not trained in AGSM were asked about any procedure adopted during flying. Involvement of aircrew in regular physical training was also assessed in the survey. The practical utility of High G training of Indian fighter aircrew is discussed.

Keywords: High G training, human centrifuge, aircrew performance.

Anti G straining manoeuvre [AGSM] training is being conducted for Indian Air Force (IAF) fighter aircrew since 1991 [1]. During the course at Institute of Aerospace Medicine (IAM), Bangalore, aircrew are indoctrinated into the practice of AGSM under high G forces in the human centrifuge. They are also trained in physical conditioning at the multigym. Since the first high G course, more than 200 aircrew have been trained at IAM. Several articles about AGSM training have been published in recent literature [2,3,4]. A questionnaire survey was carried out in operational units to gauge the awareness of AGSM among fighter aircrew. The aim of the study was to determine the utilisation of AGSM by aircrew in actual flying.

Methodology

A questionnaire was circulated among aircrew of 8 different fighter squadrons of the IAF. The aircrew were explained about the aim of the survey. Aircrew trained in AGSM were asked to give their

views on the usefulness of High G course in operational flying. They were also asked to describe the AGSM practised during operational flying. The survey also covered aircrew who had not undergone the course at IAM. They were asked to describe any manoeuvre being practised by them during exposure to high G forces. Lastly, they were asked about any physical conditioning programme carried out by them at the squadron, and how it benefited them in flying.

Results

A total of 74 aircrew of different fighter squadrons responded to the questionnaire survey. The composition of aircrew surveyed is given in Table 1. Twenty nine (39%) of the respondents had undergone High

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Table 1. Details of aircrew

A/c type	No. of pilots	Trained in AGSM	Not trained in AGSM
MiG 21	33	8	25
MiG 27	14	3	11
MiG 29	08	8	00
Jaguar	07	1	06
Mirage 2000	12	9	03
Total	74	29 (39%)	45 (61%)

Table 2. Aircrew trained in AGSM (n=29)

	Yes	No
Practises AGSM		
As taught	19	06
Modified	04	00
Total	23 (80%)	06 (20%)
Wants to repeat High G Course	6 (20%)	23 (80%)

G training at IAM. 19 of the them practised AGSM as it was taught at IAM, while 4 of them practised modified versions of AGSM (Table 2). Six of the trained aircrew did not practise AGSM. Out of these six aircrew, one was currently flying Jaguar aircraft, one was flying Mirage aircraft and four flew MiG 21 aircraft. All the 29 trained aircrew found AGSM useful in actual flying. However, only 6 (20%) of them wanted to repeat the course at IAM.

Forty five (61%) aircrew comprised the untrained group. Out of them, 41(91%) practised some manoeuvre while pulling G (Table 3). Majority of them (80%) tightened their muscles or resorted to screaming or yelling (68%). Eight (20%) of them practised forceful exhalation. Ten aircrew (24%) maintained a crouched posture during exposure to high G forces. Some of the aircrew used a combination of these four major manoeuvres for combating G forces. Majority of aircrew (77%) showed their willingness to be detailed for AGSM training at IAM.

Table 3. Aircrew not trained in AGSM

	Yes	No
Practises some manoeuvre (n=45)	41 (91%)	04 (9%)
Manoeuvre practised (n=41)		
Muscle tensing	33 (80%)	
Screaming/shouting	28 (68%)	
Forceful exhalation	08 (20%)	
Crouching	10 (24%)	
Wants to be detailed for High G course (n=45)	35 (77%)	10 (23%)

Table No. 4 Physical conditioning

	Aircrew trained in AGSM (n=29)	Aircrew not trained in AGSM (n=45)
Uses multigym		
Yes	7 (24%)	10 (22%)
No	22 (76%)	35 (78%)
	(n=7)	(n=10)
Physical conditioning is beneficial for AGSM		
Yes	6 (86%)	10 (100%)
No	1 (14%)	0

Out of 29 aircrew trained in AGSM, only 7 (24%) regularly utilised the multigym facility (Table 4). Out of these 7 aircrew, most of them (86%) found physical conditioning beneficial in practising AGSM. Only 10 (22%) of the untrained aircrew utilised the multigym facility. All of them found it beneficial for combating G forces.

Discussion

High G training on human centrifuge for aircrew flying high performance aircraft has proved a valu-

able method of combating G stress in actual flying [5]. Views of fighter aircrew of a number of squadrons, flying 5 different varieties of fighters were analysed.

Out of 74 respondents, 29 had undergone the course at IAM. Majority of aircrew flying high performance aircraft like MiG 29 and Mirage 2000 were trained in AGSM. Most of them practised AGSM as it was taught to them, or used modified versions of AGSM. Only 6 aircrew did not practise AGSM. Four of them were currently flying MiG 21 aircraft. As high G loads are restricted in MiG 21 aircraft, most probably AGSM was not required by the aircrew, as anti G suit provided sufficient protection.

All the trained aircrew found AGSM a useful tool to combat high G forces in actual flying. However, only few of the trained aircrew wanted a repetition of the course at IAM. One reason for the reluctance of the aircrew for repeating the course could be that centrifuge training at IAM is unrealistic due to old equipment. With better simulator facility, aircrew may find it more alluring to ride the centrifuge.

Out of 45 respondents who were not trained in AGSM, majority of them (91%) practised some manoeuvre during exposure to high G. Most of the aircrew of this group were from MiG series of aircraft (MiG 21 and 27). Thus there is a requirement for training these pilots in AGSM, even though they are not flying high performance aircraft.

Out of the untrained group, majority used muscle tensing (80%) and screaming (68%) as a means of countering G forces. Few of them (20%) used forceful exhalation into the mask, while some (24%) resorted to crouching. Though all these methods do lead to increase in G tolerance, crouching is not justified as it leads to decreased front vision, disorientation and risk of head impact [6].

AGSM has proved to be an useful means of countering G forces in flight. In this study, it was found that majority of trained aircrew practised AGSM in operational flying. Most of these aircrew were currently flying high performance aircraft, like MiG 29 and Mirage 2000 aircraft. With the induction of high performance Su 30 aircraft in IAF, it is even more likely that High G training will prove to be indispensable for fighter aircrew.

As most of the aircrew resort to some straining manoeuvre when exposed to G forces, it is very much justified that they are trained in performing AGSM. Unwanted and potentially dangerous manoeuvres like crouching or ill timed breathing techniques can be eliminated by proper training. The interest shown by young untrained pilots in the course at IAM proves the need of AGSM training of all fighter pilots.

Usefulness of physical conditioning has been taught to aircrew since their training stages. As AGSM is similar to isometric exercises like weight lifting [7], physical conditioning helps in practising AGSM. Aircrew undergoing AGSM training at IAM have been exposed to physical conditioning with the help of trained instructors using the multigym. It is disheartening to note that only a minority of aircrew surveyed utilised the multigym regularly. Most of the aircrew using the multigym found that it was beneficial for increasing G tolerance.

There are several reasons for this aversion of physical conditioning. Most of the aircrew quoted lack of time or motivation. Aircrew of one of the squadrons pointed out the lack of multigym facility in their station. Though AGSM is an effective method of combating G-stress, it consists of severe muscular effort. Repeated performance of AGSM leads to fatigue, which is one of the main limiting factors of this method [8]. Physical conditioning leads to a better performance of AGSM. This fact should be brought to the notice of aircrew, and they

should be motivated for regular physical conditioning exercises. Facilities like multigym should be provided to all flying squadrons, and trained instructors should help the aircrew in keeping themselves fit.

Conclusion

AGSM has been found to be a valuable method of increasing G tolerance. It has been found to be effective in operational flying. Majority of aircrew of high performance aircraft are using AGSM during flying. Even aircrew of other fighter aircraft resort to some form of anti G manoeuvre. Hence, there is a need to train all aircrew the correct AGSM technique. Even though physical conditioning facilities are available in most of the squadrons, aircrew have been found to neglect their physical fitness. There is scope in improving their physical fitness with proper indoctrination and motivation.

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