Ensuring Medical Fitness on Entry and During Service in Aircrew in IAF

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THE primary function of the medical branch of the Indian Air Force is to keep the aircrew in top physical and mental condition in order to improve the operational efficiency of the force. The present day aircraft are very sophisticated with complicated systems and require optimum physical condition, alert mind and quick reactions to handle them. These machines are very costly (approx 2 crores per aircraft) and the cost of training a fully operational pilot runs into several lakhs. Periodic medical examinations of the flier, therefore, is an essential part of any aircrew maintenance programme and flight safety.

Flying, though adventurous, is a dangerous profession and its training costs are prohibitive. It is therefore, necessary to select the right material, so that the rejection rate during training is reduced to minimum. This selection is done at 3 Selection Centres where pilot aptitude tests are conducted to select suitable candidates. These tests perhaps will require modifications for future sophisticated aircraft.

It is thus desirable that rejection rate due to medical causes is reduced to zero. Initial task therefore is to select healthy individuals who are free from organic disease or susceptible to disease. Subsequent aim is to maintain proper conditioning and fitness and to detect disease at the earliest to take proper remedial measures for reversing the disease process. All these aspects require a proper medical evaluation system at various stages of service career.

Presently, following periodic medical evaluations are carried out:

—Entry medical evaluation.
—Annual medical examination.
—Daily pre-flight checks.
—Assessment of physical and mental disabilities at regular intervals at specialised centres.

Entry Aero Medical Evaluation :

This is carried out at AF CME/IAM where requisite Specialists and specialised equipment are available. The purpose of this evaluation is to ensure that each candidate meets the medical qualifying criteria for his future flying career. Like other two sister services, maximum physical and mental fitness is a basic requirement. In addition, following special tests are carried out to reduce the wastage due to medical causes at a later date.

Vision : Apart from good visual acuity and field of vision, emphasis is also laid on colour perception, accommodation and good ocular muscle balance.

E N T : To ensure good hearing standards apart from routine tests, audiometry is also conducted. Patency of Eustachian tubes and infection free middle ear is mandatory. It is also ensured that airways are clear and all the sinuses are normal. Any dysfunction of the internal ear is a cause for rejection. With the introduction of low level high speedflying audio-visual and speech problems due to vibrations have assumed greater importance. Research in this regard is in progress at I.A.M., the results of which may lead to modification of present test procedures.

General Medical Examination : Great emphasis is laid on the personal and family history. Any history of fits after childhood, bed wetting, nail biting and other signs of nervousness are thoroughly gone into. Any family history of diabetes mellitus calls for

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checking of metabolic parameters. A routine E.C.G. both at rest and after double Masters exercise is taken. Inspite of taking E.C.G. at entry, we do detect cases who show changes in E.C.G. during and after training and it causes great concern and loss of man-hours in deciding the future of such persons. Perhaps double Masters screening is not adequate and some other sensitive stress test may be called for. This aspect requires further consideration with proper research backing to introduce new test procedures.

Previously, we were quite satisfied with minimum, maximum height and minimum leg length standards. However, with further sophistication in machines and the fact that designers make a machine and then put men into it (ideal would be to build a cockpit around the man), certain parameters become critical for proper use of controls and escape systems. Thus today we have standards for height, sitting height, leg length and thigh length. Perhaps with further complex development in this direction, a time may come when we will have to measure the reach of the arms and muscle strength etc. also.

Escape system from a modern aircraft involves catapulting the seat along with the pilot from the aircraft with cartridges and rockets thus putting enormous G loads on the spine. These ejections cause spinal injuries. It is therefore, necessary that defects in vertebral column are detected at entry and persons with deformities like Scoliosis, Kyphosis, undue lordosis are weeded out. A research project has already been initiated to assess the extent of spinal injuries in ejection and their relation to pre-existing spinal deformities.

Amongst serving aircrew disabilities like solitary fit and head injury pose follow up problems without base line E.E.G. This investigation has therefore been included for all new entrants to keep a base line E.E.G. record. Persons with specific E.E.G. abnormalities are eliminated.

Tables I & II give the number of cases examined, total rejection and causes for rejection at AFCME during 1971–1975.

TABLE I

Total examined (1971–75) at AF CME	:	1950
No. permanently unfit	:	397
Percentage unfit	:	20%

TABLE II
Causes for Rejection

Eye	ENT	Medical	Surgical	MISC.	Total
201	39	43	99	15	398

Annual Medical Examination :

These are conducted at Unit and Station levels by the Squadron and Station Medical Officers.

The aim of this examination is to detect the disease in its earliest stage as there are many diseases which remain asymptomatic for a long time before the individual becomes aware of them. The findings at these examinations are compared with previous records and the individuals are advised accordingly. With the advancement of medical knowledge, additional tests are introduced for the same purpose. The following are a few of the important diseases where early detection by routine checks is possible.

—Obesity.
—Diabetes Mellitus.
—Hypertension.
—Ischaemic Heart Disease.
—Eye, ear and psychiatric diseases.

These checks also give the opportunity for discussion on various health aspects and thus enhance the mutual confidence between the aircrew and the medical staff. These examinations therefore play a definite role in maintenance of positive health by early detection of diseases and suitable corrective action. All those having disabilities requiring frequent observations are kept under the surveillance by specialised centres. Various preventive measures for ensuring positive health are implemented by Unit and Station Medical Officers, specially trained in this role.

Daily pre-flight checks :

It is a very brief examination to see that the aircrew is in good general health and is free from any acute illness, colds, sore throat or effects of alcohol. This check is carried out since some aircrew due to over enthusiasm or ignorance, do not realise the serious consequences of flying, when they are not well. It is also useful in detecting early signs of flying fatigue.

Assessment of physical and mental disabilities at specialised centres

Certain percentage of aircrew become non-effec-

tive for flying due to injuries and other medical disabilities. It is, therefore, necessary that such aircrew are kept under surveillance and are put back to flying in the minimum period of time. While assessing the serving aircrew for fitness to fly, due consideration is given to their experience and the normal aging process, in relation to their disabilities commensurate with flight safety. These assessments are carried out in special centres where better facilities and trained Specialists with specific knowledge of aviation problems are available. The basic aims of medical assessment at these centres are :-

—Early detection of disease.

—Early institution of remedial measures and periodic checks to review progress.

—Early return to flying status.

The major disabilities detected are grouped under the following heads :-

—Surgical disabilities.

—Medical disabilities.

—Eye disabilities.

—ENT disabilities.

—Psychiatric disabilities.

Assessment criteria for these disabilities are discussed below.

Surgical Disabilities :

The bulk of the cases are head injuries, spinal injuries and limb injuries.

Head Injuries : are mostly due to two wheeler accidents, though they are now showing slight downward trend with the use of protective helmets. Major problem posed by these injuries is the danger of post Traumatic Epilepsy. However, in uncomplicated, simple concussion cases, where there is no neurological deficit and the E.E.G., P.E.G. and Psychometric tests are within normal limits, the aircrew is put back to restricted flying in 1-2 years time and to full flying after 2 years of close observation. It is generally believed that the risk of PT Epilepsy comes down appreciably after one year. Moderate to severe head injury cases require longer period of observation and some of them may be made fit for transport flying only, whereas cases with sequelae may have to be grounded permanently.

Spinal Injuries : These injuries are mostly due to ejections from aircraft. If the compression of the body of the vertebra anteriorly is 1/3 or less and there is no neurological deficit the pilot is put back to full flying in 3-6 months time. It is also ensured that the spinal movements are full and free and spinal muscles are normal. If the wedging is more than 1/3rd, the chances are that individual will not be able to fly aircraft fitted with ejection seat because the spine may not be able to withstand ejection forces.

Limb Injuries : As long as the fracture has united well, there is no restriction of movement and the muscle power is good, there is no bar to flying. However, if there is shortening of leg, fighter/bomber flying is not permissible. The basic principle of assessing the type of flying is that the individual should be able to operate all controls with all the four limbs, muscle power should be adequate, ability to reach for various switches and ability to escape through emergency hatches/exits in minimum time. To reduce the period of non-effectiveness of aircrew, various Rehabilitation Centres are necessary where adequate supportive and physiotherapy could be given for speedy recovery in such cases.

Medical Disabilities

Majority of them are :-

—Ischaemic Heart Disease, E.C.G. abnormality and Hypertension

—Diabetes Mellitus, G.T.T. abnormality.

—Obesity.

Ischaemic Heart Disease, E.C.G. abnormality and Hypertension :

These cases are periodically assessed. All these cases except those who have suffered from transmural infarction are assessed fit for some type of flying, provided they show satisfactory progress and stress tests carried out on treadmill and in hypoxic chamber are within acceptable limits.

Cases of hypertension are investigated to identify the aetiological factors. Their control is assessed after weight reduction (if obese) and low salt diet. In cases where blood pressure is not controlled by the above methods, diuretic therapy is instituted. Provided the serum electrolytes and +Gz Tolerance values are within normal limits such cases can be permitted flying. Presently cases on other hypotensive drugs are not permitted flying.

For proper assessment of asymptomatic E.C.G. abnormality cases, E.C.G. monitoring in actual flying conditions is desirable. This can be achieved by Biotelemetry and action is in hand to start such investigations. Similarly cases of ventricular extra systoles will require 24 hrs. continuous monitoring.

Diabetes Mellitus and G.T.T. abnormality :

These cases are periodically assessed and are advised suitable diet depending on body weight and physical activity. Cases showing Grade II control without drugs are awarded restricted flying category with periodic review. Unrestricted flying is permitted only when Gd. I control is reached without drugs. It is worthwhile to consider flying status atleast for aircrew other than pilots whose mild diabetes mellitus is controlled with restinon group of drugs provided there are no diabetic complications.

Obesity : The cases who are overweight by more than 10% above the permissible limit, are investigated to detect any metabolic or cardiovascular abnormality. These cases are advised suitable restricted diets and exercise. Only such cases who are grossly obese or have associated metabolic or cardiac problems are awarded temporary ground category.

Likewise other medical disabilities are investigated and appropriate category granted to aircrew.

Eye Disabilities

Minor defects in visual activity in trained aircrew can be accepted. However, for High Performance aircraft flying with glasses cannot be permitted mainly due to their incompatability with pressure clothing assemblies. Greater relaxation can be given in this regard for transport flying. Possession of an extra pair of glasses on the person is mandatory. With the present day knowledge and development of contact lenses, their use in flying cannot be permitted as they may get dislodged during flying manoeuvres apart from their causing discomfort after long use. Pilots with total loss of vision in one eye are grounded.

ENT Disabilities

Normal auditory function is necessary for RT operation. However, hearing may deteriorate with age and due to repeated exposures to aircraft noise in certain susceptible cases. When audiogram shows moderate hearing loss, assessment in trained personnel is made by the aid of speech audiometry with simulated background noise.

Fits and Psychiatric Disorders

These cases are most difficult to assess and are by and large made unfit for flying unless it is proved that the fit was solitary and was due to bio-chemical/metabolic causes. These cases are put back to flying after the cause has been eliminated and they have stabilised. Similarly a solitary, acute psychiatric breakdown where the causal factor is exogenous and has been removed can be returned to flying status after adequate observation. Fortunately, such cases are very few and thus the rejection rate due to this cause is low.

Appended below is the summary of cases awarded various categories during the period 1971–75 at AF CME :—

Final Medical Category Awarded During 1971-75

	Med	Sur	Psy	Eye	Ent	Total	Percentage
Full Cat	165	201	11	23	25	425	39.2
Rest (P**)	40	83	3	36	29	191	17.4
Rest (T)	81	92	9	7	6	195	17.7
*Ground (T***)	123	79	20	9	8	239	21.8
Ground (P)	20	10	2	6	5	43	3.9
	429	465	45	81	73	1093	100%

*Mainly 1975 cases (observation period too short)
P=Permanent T* temp.

In the end I would like to stress that performance of modern military aircraft at times exceeds the limits of human tolerance and thus makes the man controlling the machine the weaker link. He is therefore required to be physically and mentally fit at all times.

In the aircrew maintenance programme, therefore, major role is played by the Squadron Medical Officer, who not only looks after the preventive aspects of physical health but also deals with diet, rest and immediate environment of the aircrew. He indoctrinates the aircrew into the various requirements of Aviation Medicine.