MEDICAL ASSESSMENT OF AIR CREWS - CIVIL AND MILITARY

by

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Introduction:

The medical assessment of air crew is gaining more and more importance with the advancement of aeronautical engineering. More sophisticated aircrafts with high speed and altitude are being manufactured. For example, Soviet 400 seater Jumbo Jet Boeing 747 is expected to be in operation this year. It has a range of 5,000 miles, a cruising speed of 625 mph and maximum taking off weight of 317 tons. Soviet Supersonic transport TU 144 and Anglo-French Concorde are already in operation. The former i.e. TU 144 has a maximum speed of 1,500 mph at 49,200 to 65,600 ft. and can accomodate 121 passengers. The later i.e. Anglo-French Supersonic transport Concorde has a cruising speed of 1,385 mph at a height of 5,500 ft - 62,000 ft., and can accomodate 144 passengers. In the same way, there has been tremendous development in military air-crafts also. Moreover, Soviet air-craft designer Alexi Tupelov thinks that superplanes which will be able to carry 1,000 passengers, fly at a speed of 4,000 to 6,200 mph and reach any point on earth in 2 hours will be in operation by 2,000 A D. Keeping these things in mind the battery of air-crew selection are to be changed accordingly.

Historical background:

This can be divided into three phases:

Phase I: It started when the first air-craft took off in 1903. Initially it was based in clinical assessment only. When the air-crafts crossed the barrier of 10,000 - 12,000' the question of oxygen mark came into consideration. But there was no radical change in the medical assessment of air-crew as such. Afterwards, the aeromedical assessments went on changing with the increasing complexity of modern aircrafts.

Phase II: The second phase of medical assessment of air - crew started actually after the world war II when Jet air-crafts with high speed and altitude came into operation.

Phase III: The third phase started in the later half of twentieth century with developments in launched type of Jet air-crafts and manned Space flights. With these developments in Jet air-crafts and manned Space flights, the aeromedical assessment teams are faced with the new problems and they have to develop and maintain new methods of assessments and standards.

Objectives of Assessments:

The main objectives of medical assessment of air-crew should be that:

(a) He should be medically fit to undergo various stresses of modern air-crafts e g. hypoxia, thermal stress, stress due to acceleration, spatial disorientation, noise, vibration etc.

(b) Longevity i.e. he should have well-motivated long-term flying carrier.

(c) He should be proficient and safe during his long-term flying carrier. These objectives are achieved under the following headings:

(i) Clinical assessment: Should maintain the high standard of physical health including eye, ENT., and other systems of the body.

(ii) Physiological assessment.

(iii) Neuropsychiatric assessment.

(iv) Psychological assessment.

The present day medical assessments of air-crew is said to give the candidates of state of health at the time of examination and do not give the long-term prognosis. Moreover, the examinations are based on the equipments and procedures which differ from country to country and air-lines to air-lines. So it becomes difficult to compare them. According to Colonel E.A. Lauschuer of German Air-force medical Service, 'Our proposed enlargement of current initial selection seems to be desirable in order to select the optimal number of well motivated healthy young men with a good prognosis to remain healthy and well-balanced during a long and efficient flying carreer.' According to him, the following are to be added in the initial medical selection of air-crew:

(a) Development of more efficient selection in depth;

(b) Co-ordination and even standardisation of equipments, methods of recording results and procedures;

(c) High level of professional standard of selection terms.

Importance of initial selection of air-crew:

Initial methods of medical assessments of aircrew counts much in this modern age of sophisticated high performance air-crafts. The elimination of one risky and endangered group in initial selection saves about 150,000 dollars in NATO countries. This amount of

money counts much specially for the underdeveloped nations At the same time, it saves many lives and properties which might be lost due to fatal accidents caused by human failure and in its turn due to improper medical selection.

The medical assessment of civil and military aircrews:

The medical assessment of civil aircrew is governed by an international organisation called "International Civil Aviation Organisation" (ICAO). There may be slight difference in standards of medical assessment from nation to nation and in different airlines which may issue their own regulations setting a higher standard than required by ICAO.

The classifications of various requirements by ICAO are:

— Physical requirements	No. 1,2 and 3
— Visual requirements	No. 1,2 and 3
— Colour perception requirements	No. 1
— Hearing requirements	No. 1 and 2

The requirements vary according to the type of aircrew.

(1) The requirements for commercial and transport airline pilots are:

— *Physical requirement*	No. 1
— Visual requirement	No. 1
— Colour perception requirement	No. 1
— *Hearing requirement*	No. 1

(2) The requirements for private pilots are:

— Physical requirement	No. 3
— Visual requirement	No. 3
— *Colour perception requirement*	No. 1
— Hearing requirement	No. 2

(3) For flight navigator, the requirements are:

— Physical requirement	No. 2
— *Visual requirement*	No. 2
— Colour perception requirement	No. 1
— Hearing requirement	No. 1

(4) Requirements for flight radio-operator and flight engineer are:

— Physical requirement	No. 2
— *Visual requirement*	No. 3
— Colour perception requirement	No. 1
— Hearing requirement	No. 1

The period of examinations also vary according to the type and class of aircrew:

(1) Senior commercial pilots and airline transport pilots - every 6 months.

(2) Other commercial pilots, flight navigator, flight radio-operator and flight engineer – every 1 year.

(3) Private pilots – every 2 years.

When the age of the pilot is over 40 years, the time for the commercial pilot should be reduced to 6 months and for private pilots to every 1 year.

So far the assessment of military aircrew is concerned it is done by the respective service organisations according to their own requirements. In U.S. Air force, it is divided into the following classes i.e. Class I, IA, II and III. The candidate applying for initial flying training must fulfil the hard and rigid standards of class I.

Trained aircrew have to fulfil the requirements of class IA and II according to job specified. Class III is for those aircrews who are not in the primary control of the air-craft e.g. flight engineer. The Royal air force have air, ground and zonal requirements. They are subdivided into Air 1-7, Ground 1-7 and Zonal 1-7. The medical standards differ from country to country but the basic principle remains the same. Some of the headings are summerised below:

(1) General physical standard:

We have to be specific about the height of the pilot including his sitting height, leg length and thigh length. This carries much more importance in high performance military aircrafts due to limited availability of space in the cockpit and the ejections they have to do in the time of emergency. In civilian aircraft's, ejection seat is not provided and this problem may not arise there. Weight is also important, because he may have to do unassisted escape in flight from the aircrafts, in which ejection seat is not provided. So also, muscles, bones and joints, skin, head, face and neck, teeth, spines, chest and lungs, endocrine system, abdomen and viscera, pelvis and rectum, genito-urinary system, extremitis, CNS etc should be thoroughly examined.

(2) E.N.T.:

From aviation point of view, ENT should not only be normal anatomically and functionally, but also it should be favourable from the point of flying. Any pathology in the ear, nose, throat should be searched for and assessed. For examination of ear, the following routine has been found helpful: (a) Otoscopy, (b) Tuning fork test, Rinnes' Test, Weber's Test and Absolute Bone Conduction Test, (ABC test) (c) Record of hearing by voice and whisper, (d) Inflation of the eustachian tube to note the patency of the Eustachian tube and mobility of drum by politzerization and Seideliz tion, (e) Hearing tested again by voice and whisper. (f) Permanent record of hearing by speech audiometry and pure tone audiometry. For vestibular function - (a) Cold Caloric test (b) and rotation

tests are done. For military aircrew of class I he should not have a hearing loss in quite room in either ear tested separately of more than 15 db at the frequencies of 500, 1000 and 2000 CPS. and not more than 35 db in 3000 CPS. While in civilian aircrew the hearing requirement no. 1 allows the hearing loss upto 25 db at 500, 1000 and 2000 CPS and 40 db at 3000 CPS.

(3) Eye Examinations:

Eye Examination also carries a lot of importance in aviation. The visual standards needs special consideration due to the advent of high performance military aircrafts. The examination includes (a) clinical examination, (b) ocular muscle balance tests e.g. Madox rod tests at 6 meter and 33 cm, Bishopharman diaphraagm test, subjective convergence, objective convergence, cover tests, (c) Field of vision, (d) Funduscopy, (e) Tests for convergence and accomodation, (f) Colour vision, (g) Other tests e.g. tests for night vision, steriopsis specially for high performance aircraft. The visual standards for civilian aircrew is a little relaxed than for military aircrews e.g. let us take the example of visual acquity. For military aircrew, it should be 6/6 or 6/6, 6/9 correctible to 6/6. For commercial and airline transport pilot it can be 6/18 BE correctible to 6/9. No standard has been laid down by ICAO for the phorias also, while there is strict standard for military aircrew.

(4) Cardiovascular Examinations:

We should look for any obvious or latent cardiovascular disease and also should determine the efficiency of cardiovascular system under determined stress conditions. E.C.G. and other tests should be done under the stress conditions a pilot is likely to be exposed and the data collected should tell us to some extent what would be the cardiovascular condition of that candidate for longterm flying carreer.

The aircrews are tested in decompression chamber in which they are exposed to altitudes they are likely to fly and the effect on the various systems in the body e.g. effects in BP., pulse, respiration, E.C.G., E.E.G. etc., are recorded by the computer. The effect of rapid decompression, hypoxia etc. also can be studied in decompression chamber. In the same way, effects of acceleration on different systems of human body are tested in human centrifuge by exposing them to different G's they are likely to be exposed. A television camera is fitted in the centrifuge by which the medical officer observes the subject. Here also the computer records the effects on respiration, pulse, BP., E.C.G., E.C.G. etc. A physicist sits side by side and controls the physical aspect of human centrifuge. The main aim of these tests is to study the effects on various systems in human body under simulated stress conditions in which the aircrews are likely to be exposed.

(5) Other lab. tests:

Halmatological, serological, biochemical, urine etc. should be done as needed.

(6) Neuropsychiatric examinations:

Neuropsychiatric examinations should be done with special reference to frank or incipient psycosis and evaluation of various personality traits. In military aviation, more importance is given to sense of balance and neurocirculatory stability. It should give us the information, how the candidate's mental condition will stand the various stresses of flying.

(7) Psycological Examinations:

Its main aim should be to know how a candidate will get on during the time of training and how long he will take to become a good pilot. They should be examined for judgement, allertness, foresight, planning and anticipation, memory and speed of decision. The following qualities are critical for military flying e.g. dependability, leadership motivation, attitude, orientation. Accuracy of speed and distance is specially needed for fighter pilots in combat area. Moreover, they should have devotion to duty, co-operation, ability to work in team and emotional stability. Accident-prone persons should be evaluated and discarded.

Conclusion

Keeping in mind the recent developments and developments which are likely to take place in future in civil and military aircrafts, we should evaluate and maintain the methods and procedures of medical assessment and standards so as to select more efficient and well motivated aircrews with long-term flying career. The military aircrews who are specially subjected to more stressful flying than civilian aircrews should be tested by various parameters under determined stress conditions to know their efficiency for long-term flying career.

So far the aviation in Nepal is concerned it was in the infancy stage till a few years back. There were few Dakotas and helicopters But in recent few years it is progresiing rapidly. From short-range transport planes like Dakotas (DC-3) it is having medium-range transport planes like Fokker in its fleet. Order has been placed for HS 748 planes. At the same time Tribhuban airport in Kathmandu is being expanded and is going to be converted into "International Airport." Night landing facilities are being arranged. The day is not far off when Nepalese aviation will have high performance jet aircrafts flying at high altitude with high speed, Hence, the medical aspect of aviation in Nepal should march side by side along with the progress in other aspects of aviation.

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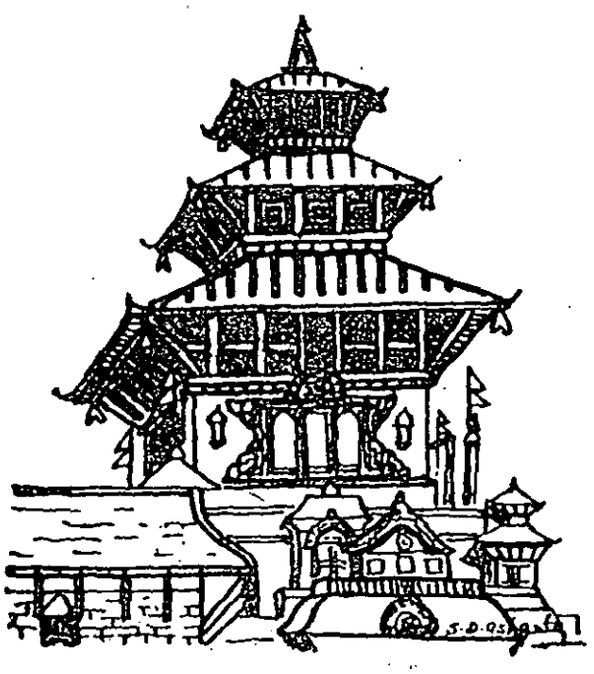

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