

Survey Of Aircraft Accidents Over Siachen Glacier

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There has been considerable flying over Siachen Glacier in the recent years. A survey of aircraft accidents over this high altitude, inhospitable terrain and hostile environment was carried out to analyse the various causes and their trends. Records of the accidents provided only limited information from 1964 onwards. In some of the inquiries, even the Medical Officer was not detailed. There was no accident of the fighter or the transport aircraft. A total of 18 helicopters had met with accident which included 2 Chetak and rest all were Cheetah. 16 of these accidents have occurred 1984 onwards. Only in 12 of the 18 accidents, the records of flying hours were available in respect of the first pilot. 9 out of these 12 had more than 500 flying hours. Pilot error has been determined to be the main cause in 50%. This rate by itself is less than the overall 85% incidence of pilot error in the IAF so far. Other recurring factor was Down Draught, having been responsible for 4 accidents. Pilot error and down draught were also contributory factors in few other accidents. Hypoxia, a very important hazard in this area, has not been deliberated upon (except where a specialist in aviation medicine was detailed) especially when there have been problems of the oxygen system in Cheetah helicopters.

The Indian sub-continental shelf is creeping ever northwards since time immemorial causing the Himalayas to grow even more higher and formidable. Siachen Glacier is one area in the higher reaches of the Himalayas where attention and considerable activity is focussed in the recent years, unparalleled in the world. One, a very important activity has been the use of flying machines at the very roof of the world to guard and air maintain our interests. The flying has included the use of fighters, fixed wing transport aircraft and the helicopters. Here, the use of helicopters in the extreme limits of its flying envelope is unique. The landings of the helicopters at various table top helipads at altitudes ranging from 14000-19500 feet in the most inhospitable terrain a flyer can come across, is of more consequence for the helicopter flying. This study was thus taken up to analyse the

aircraft accidents over Siachen Glacier for various factors and to determine if there was any trend.

Methods

Accident records at the Directorate of Flight Safety were referred to and the data of all the accidents over Siachen was collected. Some of the data was also obtained from the publications of Institute of Flight Safety. The accident reports of the Air Observation Post (AOP) aircraft were obtained from the Directorate of Army Aviation. In few cases, information on aeromedical aspects was incomplete.

Results and Discussion

The records revealed that there was no accident of the fighter or fixed wing transport aircraft over Siachen, whereas there have been 18 accidents of helicopters on Siachen so far. Out of these, the first 2 were of Chetak and the rest 16 were of Cheetah helicopters of both the IAF and the AOP (Table I). Type of the accidents ranged from cat 1 to cat III and only 3 were fatal.

Table I: Flying Experience vis-a-vis Cause of Accident (n = 12)*

Flying Hours	No of Accidents	Cause of Accidents (Primary - Secondary)
200	1	DD - PE
500	2	CAT, PE - DD
1000	4	PE - HE, PE - DD, Arctic whiteout (disorientation) Bad Weather (? DD)
2000	3	DD, EJ, DD
2000	2	PE (Gross Overloading), ? Flame Out

*Experience of pilots in six other accidents are not known

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DD	-	Down Draught
HE	-	Hostile environment
PE	-	Pilot Error
EJ	-	Error of judgement
CAT	-	Clear air turbulence

Flying Experience

Flying experience of the pilots in 6 of the 18 accidents was not available (Table I). 'Mean' 'on type' flying experience of the first pilots in the rest of the 12 accidents is 1076.6 hrs (sd+799) and the Range is from 160 to 2579 hrs. Data was even more limited for second pilot, being available in 6 cases only. The 'on type' flying experience of second pilot ranged from 38 to 1965 hrs and the Mean is 591 hrs (sd±671). The maximum number of accidents i.e., 9 out of 12 were found to be amongst the first pilots having more than 500 hrs of flying (Table I). Actually, one would expect the number of accidents to reduce with increase in experience on type. However, there has been an increase in accidents after 500 hrs experience. Thereafter, as the flying experience increased further, the number of accidents decreased.

Table II: Aetiological Analysis of the Accidents (n=18)

Aetiology	Directly Contributory	Indirectly Contributory
Physical	Nil	Nil
Physiological	1	1
Behavioural	8	4
Pharmacological	Nil	Nil
Toxicological	Nil	Nil
Environmental	6	5
Technical	2	1

It has been reported^{1,2} that as a pilot becomes experienced, there is a tendency for attitudinal deficiency, over confidence or complacency. As the flying experience increases further, the number of accidents tend to reduce. Similar trend has been seen in this study. In such cases, it is the ego and reputation that generally comes in the way of flying away from potentially dangerous situations, especially when ops requirements are pressing. Vulnerability of the experienced aircrew has also been seen to be

due to stress generally unrelated to flying e.g., stress resulting from role & relationship in the organisation or concern with career development. Monotony would not be expected during flying over Siachen but shuttles between the camps and the helipads at higher altitudes may cause fatigue. The data in Table I also shows that the number of pilot error as a primary cause of accidents is less than that recorded in the IAF and the world literature²⁻⁵ i.e., 50% in this study as compared to 85% in the IAF. A fact which is relevant here is that the conclusions have been based more or less on the statements of the pilots involved in the accidents. In many cases, the crashed air craft were inaccessible to the investigating teams, as a result of which the material facts to the cause of accidents could not be ascertained. Aircraft accident investigating teams also look into the blameworthiness of the personnel connected with flying. It is possible that the real sequence of events and the actions taken by the pilot may not have been forthcoming in cases where reason other than pilot error has been given².

Aetiological Analysis of the Accidents

Aetiological analysis of the accidents shows (Table II) that 8 accidents belonged to the behavioural group and 6 were caused by environmental factors as the primary cause. The same two factors were the contributory factors in few cases also. In the behavioural group, all were the 'pilot error', which included two of 'error of judgement', two of 'faulty technique' and one each of 'delayed action', 'poor airmanship' and 'breach of flying discipline' by grossly overloading the helicopter. A sudden sink of the helicopter has been felt short of the approaching helipad, close to the transition in some situations. In four of these situations, 'down draught' has been stated to have caused this. Only in few cases, the inquiry team was able to establish a failure on part of the pilot to respond quickly to the situation. 'Faulty technique' and inability to take quick decisions especially under emergency conditions have been seen in the past also^{5,6}. The methods to improve on such short-comings have been suggested in the same report but these type of errors continue despite adequate flying experience 'on type' and

over that terrain. The only consolation is that very few lives have been lost.

Hypoxia Factor

Hypoxia is inherent in this area and could influence the flying skill of the pilot. All Cheetah pilots of the Air Force are using a modified EROS mask with integrated R/T. Hence one is always on oxygen. Only problem in this system has been the worn out masks with varying inward leak and increased inspiratory resistance⁷. AOP pilots on the other hand, flying the same type of aircraft in the same area are always under the threat of hypoxia as they have to lift their masks during R/T conversations. In some of the accidents, the oxygen system has not been elaborated upon. This point is significant enough, as all the accidents except one have taken place at altitudes above 16400 feet AMSL.

Other Factors

Other factors which could influence the 'flying skill' and his coping with flying emergencies are the 'personality of the pilot' and existence of any 'life event' as a stressor⁸⁻¹², like the monotony of living in the remote, barren and high altitude fields areas. These factors also need elaboration as these are equally relevant in this stressful flying.

Conclusion

The records of most of the accidents are incomplete, especially with regard to Human Factors. Aeromedical aspects were not looked into in many of the accidents due to the absence of Medical Member. Hypoxia factor as the cause of accident has not been deliberated upon in majority of the accidents. Behavioural factor

remains an important cause of accidents in this study as well. Environmental factor in the form of 'down draught' has been found to be recurring. This needs further objective substantiation by the concerned agency.

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