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Morbidity Patterns of Aircrew of Bangladesh Air Force that Impacts Flying Fitness

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Abstract
Background: *Serving as a military pilot is an exceptionally demanding and high-pressure occupation that necessitates optimal mental and physical well-being. Physical health is not merely a desired quality but an essential prerequisite for pilots. Aircrew of Bangladesh Air Force go through a set process of periodic medical check-up to ensure that everyone is maintaining the optimum health status. The aim of this study is to determine the morbidity pattern of aircrew that resulted in unfitness for flying in last five years.*
Methods: *The retrospective study was conducted in the medical squadron of Bangladesh Air Force Base Bashar. A total of 79 aircrew who were placed in either temporary or permanent low medical category by the Central Medical Board of Bangladesh Air Force during the period June 2019 to November 2024 were included in this study.*
Results: *In this study the systemic illness category constituted the majority of cases (45.57%) followed by the musculoskeletal disorders (17.72%). In the systemic disease category, essential hypertension was the cause of most (10) down categorization. Within the musculoskeletal disorders, traumas and injuries accounted for 73.68% of cases, whereas spinal disorders comprised the remaining 26.31%. Among severe injuries, fracture of the lower limbs was the predominant diagnosis. The data indicates that the most down categorization occurred in the 31-40 age group, while above 50 years age group suffered the fewest occurrences. A total of 56 patients (70.88%) received various temporary low medical category while 23 patients (29.11%) were granted permanent low medical categories.*
Conclusion: *During recruiting and service period aircrew go through meticulously planned periodic medical check-up process. Because of the change in lifestyle, stress and other factors young pilots are being identified with morbidities more than the older pilots now.*
Keyword: *Morbidity, temporary low medical category, permanent low medical category*

I. Introduction

The aircrew of the Bangladesh Air Force are exposed to unique occupational and environmental stressors that predispose them to specific morbidity patterns, which may directly impact their flying fitness. Commonly observed health issues include musculoskeletal disorders, visual and auditory impairments, sleep disturbances, and neuropsychiatric conditions such as anxiety and fatigue. These morbidities not only affect mission readiness but also pose serious risks to flight safety if left unaddressed. Identifying and analyzing these morbidity trends is essential for implementing targeted preventive measures, enhancing aeromedical evaluation, and maintaining operational efficiency. The stringent requirements of piloting advanced high-speed fighter jets or enduring extended flights in transport aircraft necessitate an exceptional level of physical fitness among aircrew members. Typically, pilots are regarded as having superior health compared to the general populace; nonetheless, the occupational characteristics of military pilots may pose distinct dangers that could adversely affect their health.[1] The aviation workplace is distinct from other occupational settings due to specific aviation pressures, requiring aircrew to uphold elevated standards of physical and mental health. Regular medical evaluations assist in identifying any ailments that may jeopardize an aviator's flying fitness and even lead to a

disaster. Therefore, regular health examinations are a crucial component in ensuring flight safety.[2] The aircrew undergo training at a substantial expense. The majority of aircrew conclude their flying careers without major health concerns; yet, they cannot be entirely insulated from the health risks inherent in daily living.[3] In contrast to other professions, their medical condition may result in an extended duration of incapacity and complete or partial seclusion from their occupational setting.[4] The emphasis on maintaining optimal health is reflected in detailed medical standards and examination protocols enforced by air forces globally to ensure flying fitness[5-14].

II. Materials and Methods

The cross-sectional observational study was performed in the medical squadron of the Bangladesh Air Force Base Bashar, Dhaka. The data for this study was sourced from the archived medical board records of the Central Medical Board of the Bangladesh Air Force. A total of 79 officer aircrew/pilots and airmen aircrew have been assigned to various low medical categories due to varied medical issues from 2018 to 2024. Their medical records were compiled for analysis. Data pertaining to each aircrew member encompassed age, medical diagnosis and medical classification. The tabulated data encompasses diagnostic category, specific diagnosis and flying category. In instances where the low medical category progressed to a higher or lower medical category, the most recent medical category was utilized for the study. Non-flying and technical individuals were omitted from the study.

III. Results

Total of 79 distinct cases of low medical categorization were examined. Of these, 49 (62.03%) were officer aircrew, while 30 (37.097%) were airmen aircrew (Fig 1). Table 1 illustrates the distribution of cases by types of diseases, diagnosis and age group. The analysis indicates that the age group of 31-40 years experienced the highest number of disqualifications, while the group of over-50 years experienced the lowest number of cases. The systemic disease category included the majority (36) of cases counting (45.57%) followed by the musculoskeletal system with 14 cases (17.72%). 56 cases (70.88%) were granted temporary low medical categories while 23 cases (29.11%) were granted permanent low medical categories.

In the systemic disease category (Table 1), primary hypertension was the cause of down gradation in 10 (27.78%) of the 36 cases primarily in the 31-40 age group (n=7). Ischemic heart disease was also present in 10 cases (27.78%), although it was not concentrated in a specific age group. (Table 1).

Traumas and injuries accounted for 73.68% of the cases in the musculoskeletal system, while spinal conditions accounted for the remaining 26.31%. Fracture of lower extremities was the most prevalent diagnosis within the subgroup of traumatic injuries and all the cases were clustered within the age group of 21-40 years.
A total of 56 patients (70.88%) received various temporary low medical category while 23 patients (29.11%) were granted permanent low medical categories. Officer aircrew and airmen aircrew showed similar tendency of being affected by different disease conditions (Fig-III & IV).

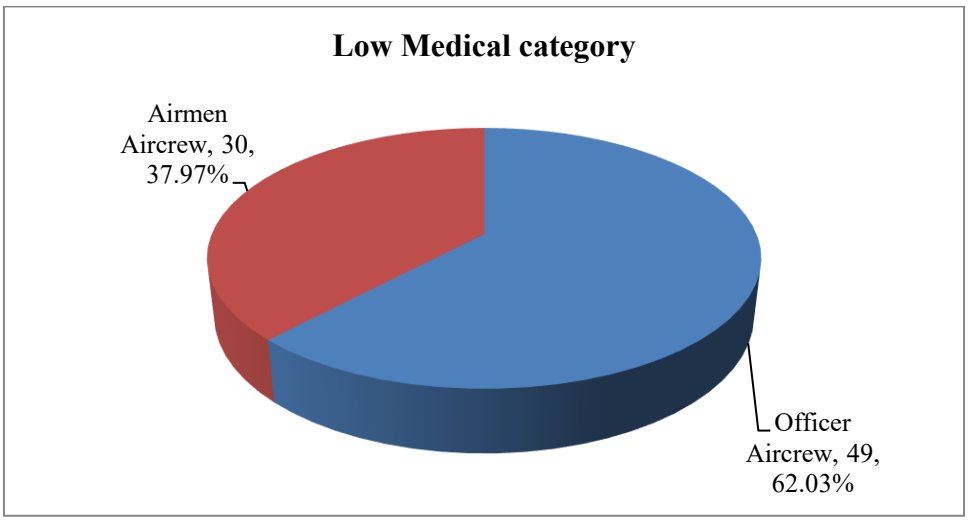

Figure I: Category of study respondent (n=79)

Figure shows 56 cases (70.88%) were awarded various temporary low medical category while 23 (29.11%) were awarded permanent low medical categories.

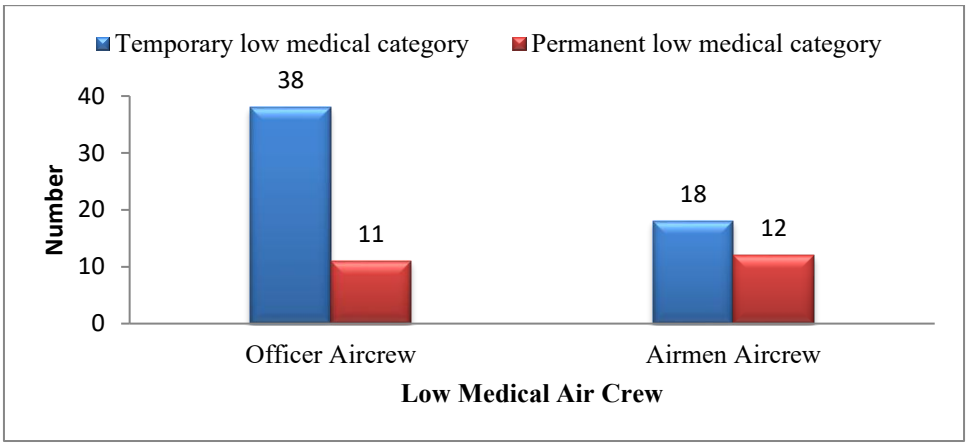

Figure II: Distribution temporary and permanent low medical category among officer aircrew and airmen aircrew (n=79)

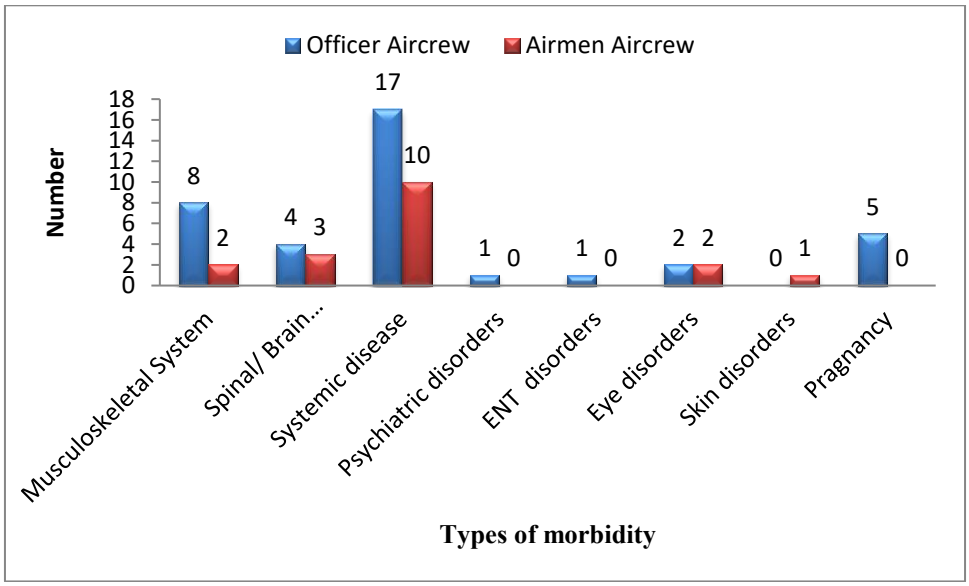

Figure III: Distribution temporary low medical category between officer aircrew and airmen aircrew.

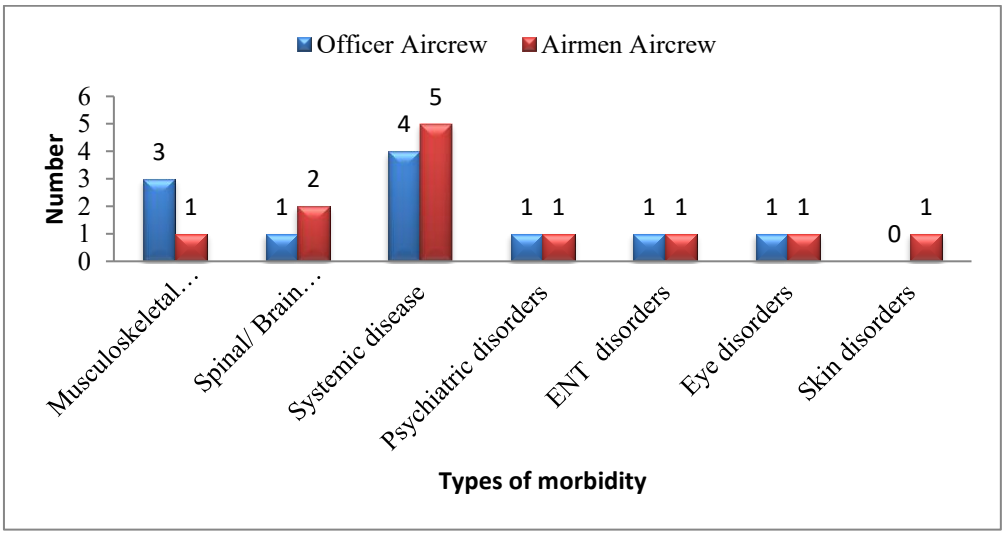

Figure IV: Distribution of permanent low medical category between officer aircrew and airmen aircrew

Table 1: Morbidity patterns officer aircrew and airmen aircrew

Morbidity Patterns	Age in years				Total
	21-30	31-40	41-50	>50	
Musculoskeletal					
• Fractures (Upper extremities)	0	2	--	--	2
• Fractures (Lower extremities)	3	2	--	--	5
• Soft tissue injuries	1	2	--	--	3
• Dislocations (Upper extremities)	2	0	--	--	2
• Dislocations (Lower extremities)	1	1	--	--	2
Total	7	7	--	--	14 (17.72)
Spinal/ Brain Conditions					
• PLID	0	5	0	--	5
• Brain condition	2	2	1	--	5
Total	2	7	1	--	10 (12.66)
Systemic disease					
• Essential Hypertension	0	7	3	0	10 (27.78)
• IHD	1	3	5	1	10 (27.78)
• Syncope	2	0	0	1	3 (8.33)
• DM	0	0	1	2	3 (8.33)
• Other	4	3	1	2	10 (27.78)
Total	7	13	10	6	36 (45.57)
Psychiatric disorders	1	2	0	0	3 (3.80)
ENT disorders	1	1	1	0	3 (3.80)
Eye disorders	1	2	2	1	6 (7.59)
Skin disorders	0	1	1	0	2 (2.53)
Pregnancy	2	3	0	0	5 (6.33)
Grand Total	21 (26.58)	36 (45.56)	15 (18.98)	7 (8.86)	79(100)

IV. Discussion

This retrospective study aimed to delineate the morbidity patterns leading to temporary or permanent unfitness for flying among Bangladesh Air Force (BAF) aircrew over a five-year period (June 2019 to November 2024). Our findings underscore the critical impact of various health conditions on flying fitness and provide valuable insights into the health challenges faced by BAF aircrew. The study identified 79 distinct cases of low medical categorization, with systemic illnesses and musculoskeletal disorders being the most prevalent causes, accounting for 45.57% and 17.72% of cases, respectively.

The high proportion of systemic illnesses (45.57%) as a cause for low medical categorization is significant. Within this category, essential hypertension and ischemic heart disease (IHD) each accounted for 10 cases (27.78% of systemic cases). This highlights a substantial burden of cardiovascular health issues among BAF aircrew. While pilots are generally considered to have superior health compared to the general populace, the unique occupational stressors of military aviation can contribute to distinct health risks[1]. The prevalence of hypertension, especially concentrated in the 31-40 age group, suggests that lifestyle factors, operational stress, and potentially inadequate early detection or management may play a role. The presence of IHD across various age groups also points to the persistent threat of cardiovascular disease, which demands stringent monitoring given the critical nature of flying duties. This aligns with the broader understanding that despite regular medical evaluations, aviators are not immune to general health risks inherent in daily living[3]. Indeed, assessing cardiac disease among Air Force pilots is a critical aspect of fitness-to-fly evaluations[11].

Musculoskeletal disorders emerged as the second leading cause of unfitness (17.72%). A striking finding within this group is that traumas and injuries constituted 73.68% of cases, with fractures of the lower limbs being the predominant diagnosis. These injuries were notably clustered within the younger 21-40 age group. This suggests that non-flying activities, sports, or other high-risk behaviors outside of direct flight operations might be significant contributors to incapacitation. While the study doesn't specify the cause of these traumas, it emphasizes the vulnerability of aircrew to physical injuries that directly impact their ability to perform flying duties. Spinal conditions, including PLID (Prolapsed Lumbar Intervertebral Disc) and brain conditions, also contributed to unfitness. The occurrence of PLID primarily in the 31-40 age group might be related to cumulative stresses from flying, physical training, or lifestyle factors, consistent with observations of musculoskeletal issues in other aviation contexts, such as low back ache among helicopter pilots[6]. A systematic review has further highlighted the significance of musculoskeletal injuries in military aircrew[10], including specific burdens like cervical spine conditions[9].

The finding that the 31-40 age group experienced the highest number of disqualifications aligns with the specific morbidity patterns observed. This age bracket saw the highest incidence of essential hypertension

and a significant clustering of lower limb fractures and PLID. This contrasts with the lowest occurrences in the above-50 years age group. This could indicate a higher susceptibility to certain conditions at mid-career, possibly due to a combination of sustained occupational stress, cumulative physical demands, and the onset of certain chronic conditions, or perhaps more rigorous screening catching issues at this stage. It also suggests that early career (21-30) pilots might be more prone to acute injuries, while older pilots may be better screened or have already been removed from active flying status if they developed chronic conditions. The role of age in aeromedical decision-making is a recognized area of study[12].

A substantial proportion of the aircrew (70.88%) received temporary low medical categories, while 29.11% were granted permanent low medical categories. This distinction is crucial for human resource planning and pilot retention. Temporary categorizations allow for rehabilitation and potential return to flying duties, preserving valuable training investment. However, a significant percentage of permanent disqualifications still represents a considerable loss of highly trained personnel, emphasizing the need for robust aeromedical policies that balance flight safety with pilot retention. Studies on permanent flying disqualifications in other air forces, such as the USAF, provide a broader context for evaluating these rates[7]. The fear of losing flying status due to medical conditions can also lead military pilots to avoid seeking necessary healthcare, underscoring the importance of transparent waiver policies[13].

This study highlights the effectiveness of the BAF's meticulously planned periodic medical check-up process in identifying medical conditions that impact flying fitness. The morbidity patterns identified, particularly the prevalence of systemic and musculoskeletal issues, underscore the dynamic nature of aircrew health throughout their careers. The results reinforce the notion that vigilance for chronic conditions like hypertension and IHD is paramount, as is preventing musculoskeletal injuries. The identification of younger pilots being impacted by morbidities, while not explicitly compared to older pilots in terms of rates, suggests that comprehensive medical monitoring and preventative health measures should be adapted across different age groups and career stages. This aligns with the broader challenge of preventive medicine in military aviation and the need for updated medical standards in BAF[6,15].

V. Conclusion

Stringent annual and recurring medical assessments for aircrew lead to reduced morbidity rates. Nonetheless, due to increasing operational demands, there is a requirement for additional screening protocols for systemic diseases, encompassing prevalent illnesses, musculoskeletal disorders, spinal and brain conditions, in that sequence. On the other hand, a waiver protocol needs to be designed for Bangladesh Air Force so that the skilled pilots placed in permanent low medical category have chances to get back to cockpit if their disease conditions permit.

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