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Assessment of Lung Functions in Air Attendants & Normal Adults: An Observational Study

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ABSTRACT

Background: In air attendants, due to increased prolonged exposure to radiation they are prone to lung cancers and other health issues. Some of these job related problems become more severe with the number of years of service. Study of lung function is necessary in order to prevent further causes such as lung cancers, breast cancers in female flight attendants due to prolonged radiation exposure.
Method: A total of 20 Air attendants & 20 normal adults performed in Pulmonary function testing using Spirometer to predict the ratio of Forced expiratory volume in first few seconds (FEV1) & Forced vital capacity (FVC) in healthy female and male air attendants and normal adults ranging from age 25 - 35 years. The values of ratio of FEV1 and FVC were monitored and noted using Spirometry device.
Results: The readings were taken with the help of Infotech software for spirometry. The appropriate statistical tests i.e. parametric unpaired t test were applied and analysis showed that p value for FEV1 was <0.05 which was considered to be significant, the p value for FVC was <0.05 which was also significant. However, the ratio of FEV1/ FVC had Mann-Whitney test applied in which p value was >0.05 which is considered to be non-significant. It means that FEV1/FVC ratio of air attendants and normal individuals had no statistical difference.
Conclusion: The study concluded that lung functions i.e., FEV1, FVC, FEV1/FVC ratios were said to be compromised in air attendants than in comparison of normals. The various factors like hours of air travel, years of experience in aviation, exposure to second hand smoke and lifestyle are the ones which are said to contribute in decrease of lung functions.

Keywords: Pulmonary function testing, Air attendants.

INTRODUCTION

A flight attendant is someone whose primary duty is to ensure the safety and comfort of passengers during an airline flight.

They are a part of the cabin crew for the plane, a team of personnel who operate a commercial, business, or even military aircraft.

Working conditions mainly include being substantially responsible for health and safety of passengers & co-workers. Working performance of an air attendant mainly depends on making decisions on a daily basis.

A flight attendant may work part or full time. Schedules are usually fairly regular. They usually fly 75 to 85 hours a month.

The altitude at which commercial planes normally fly is about 31,000-38,000ft i.e. about 5.9 to 7.2 miles. Planes can fly much higher than this altitude. Normally the lung response to acute altitude exposure is mainly hyperventilation which, together with elevated heart rate, aims at achieving an adequate supply of oxygen to the tissues. At high altitudes, the outside air pressure is lower than inside your lungs, making it more difficult to pull in the thinner air and

your veins to pump oxygen throughout the body.

Does flying affect your lungs? According to studies, at high altitudes blood oxygen levels tend to fall and some people may feel a little breathless. [1]

There are studies of the effects of commercial air travel on the lung that suggest cabin air pressure in all passengers are exposed to slightly lowered O_2 levels equivalent to an altitude of approximately 5,000 to 8,000ft.

The reason of flying at a 35,000ft or little higher is because of presence of sweet spot in air where the air is then enough to greatly reduce drag .Thus, increasing the fuel efficiency and decrease operational costs and hence there is enough oxygen to feed the engines. As of for light engines, they normally stay below 10,000ft, as they don't have pressurized cabins.

Thus, aircraft cabins are designed with pressure differentials, which represent to compromise between physiological ideal and the optimal technological design. Regulatory governmental agencies require aircraft cabins to be pressurized stimulating an altitude of 2438m (8000ft cabin altitude) and allow only short diversions to a cabin altitude of 3048m (10,000ft) for safety reasons. The primary difference between the aircraft cabin and ground environment is the atmospheric pressure and in most passenger aircrafts, the cabin pressure at cruising level corresponds to an ambient altitude of 1500-2450 m (5000-8000ft). This specific cabin pressure causes hypobaric hypoxemia. As a result of low barometric pressure, the inspired oxygen tension decreases in turn leading to a fall in alveolar oxygen tension and subsequently arterial oxygen tension. The risk of flying is relatively low in for a healthy individual. But, one has to bear in mind that initial effects of unrecognised hypoxemia are usually insidious, with reduced cognitive function and other mild symptoms occurring some time before significant and more readily occurring symptoms such as chest pain, shortness of breath, seizures and loss of consciousness. [2]

Also common lung disorders occurring in Air attendants are some communicable diseases that can cause respiratory symptoms may be transmitted during air travel. Some common respiratory symptoms amongst air attendants include stuffy or runny nose, dry throat, chest illness, cold or flu, wheezing, bronchitis. Whereas, second hand smoke in aircraft may cause asthma, worsening of asthma control, respiratory symptoms, COPD (chronic obstructive pulmonary disease), and decline in lung function in adults. Several studies have investigated pulmonary function changes in flight attendants and pilots. One report found that higher a group of Miami and New York based Pan American World Airways flight attendants, had Spirometric abnormalities than of age- and sex matched Michigan group. [3]

Purpose of study: Due to increased prolonged exposure to radiation, young flight attendants are prone to having lung cancers. When flight attendants fly at an altitude of 30,000 feet in the air from one continent to another, and from one state to another, these attendants expose themselves to a small amount of cosmic radiation and sometimes to solar flares. Both CDCs Pinkerton and Grajewski pointed out that in some countries, flight attendants, pilots and other aircrew are actually considered as radiation workers as they are exposed to as much as radiation as some nuclear plant workers. Shift work and chronic jet lag reduce mental acuity and increase the risk of medical problems which may include cancer, peptic ulcers and sleep disorders. Some of these problems become more severe with the number of years on the job. Increased risk of mortality and may have been led by the risk of decrease in lung function. Study of lung function is necessary in order to prevent further causes such as lung cancers, breast cancers in female flight attendants due to prolonged radiation exposure.

Aims and Objectives:

Aim: To assess the lung function in normal adults and air attendants

Objectives: 1. To assess lung function in normal adults and air attendants using FEV1, FVC and FEV1/FVC ratio

2. To compare the lung function of normal adults versus air attendants using FEV1, FVC, FEV1/FVC ratio

MATERIALS AND METHODOLOGY

The study design was observational and was carried out at Pune Airport. The sampling method was Purposive and sample size was 40. The target population was 25 - 35 years old air attendants and normal adults. The study duration was for 6 months.

MATERIALS USED: Chair, Spirometry (InfoTech), Consent form

Inclusion criteria: 1. Age group 25-35 years 2.Both female and male attendants 3. Professional air attendants with <=5 years of experience.

Exclusion criteria: 1. Individuals suffering from any lung disorder like bronchial asthma, COPD etc. 2.Pregnancy 3.Smokers.

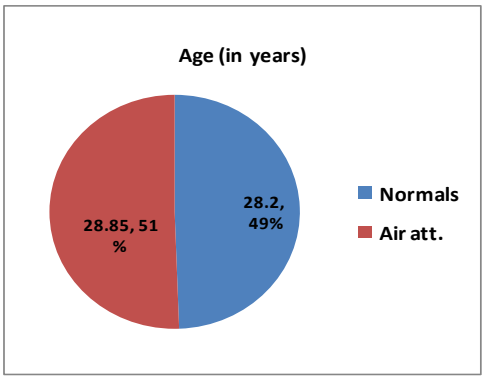
PROCEDURE:

Ethical clearance was obtained from the institute. Individuals fulfilling the inclusion criteria were selected. Spirometry been used for predicting the lung functions of air attendants and normal adults. The procedure of the test was explained to every individual prior to the testing. They were allocated in Group A and B respectively. Group A included normal individuals and Group B included air attendants. Spirometry was done to assess lung functions. Participants were positioned in an upright sitting posture. Procedure was explained to the participant. Nose clip was used to avoid leakage of air. The participants were asked to make an airtight seal around the mouthpiece and breathe normally in spirometer until normal rhythm was established. Then, participant were asked to take rapid full inspiration to total lung capacity from room air through mouth and without hesitation, perform expiration with maximum force until no more gas could be expelled for 6 seconds, followed by a quick maximum inspiration. At this point the maneuver was finished. Maximum of 3 trials were given with 5 min of interval and the best reading was chosen. FEV1, FVC and FEV1 /FVC ratio were the outcome measures. Data was collected and entered in excel spreadsheet. Appropriate statistical test was applied and data was analyzed.

RESULTS

Table 1: Average age in between both the groups

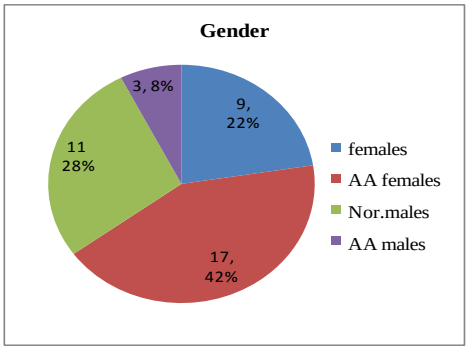
	Air attendants	Normals	t	P
Mean age in years	28.85	28.2	0.58	0.56



Graph 1

Table 2

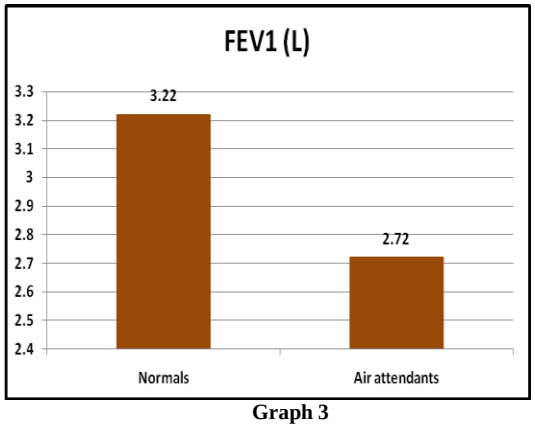
Gender	Normals	Air attendants
Females	9	17
Males	11	3



Graph 2

Table 3

FEV1 (L)	Normals	Air attendants
Mean	3.22	2.72
SD	0.63	0.49
t	2.72	
p	0.0096	

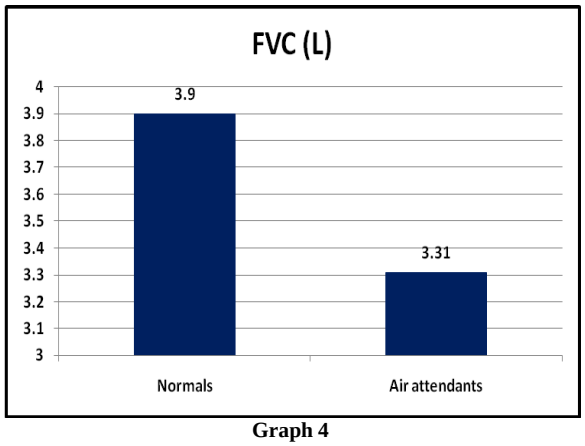


Graph 3

Interpretation: Graph 3 & Table 3 shows comparison of FEV1 values of both the groups. As the data was parametric unpaired t test was used where p value was <0.05 which is considered to be significant. It means that FEV1 of air attendants was less as compared to normal individuals.

Table 4

FVC (L)	Normals	Air attendants
Mean	3.9	3.31
SD	0.78	0.55
t	2.72	
p	0.0097	

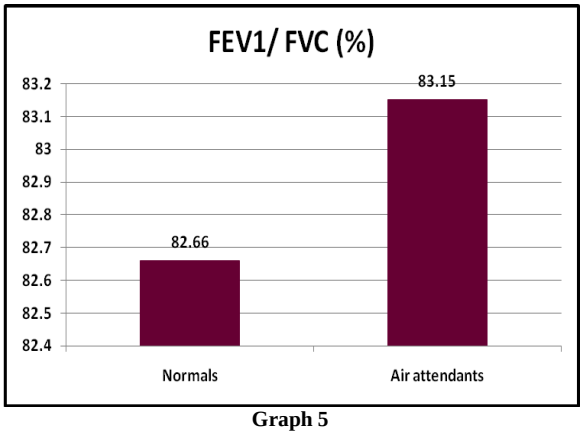


Graph 4

Interpretation: Table 3 and Graph 4 show comparison of FVC values of both the groups. As the data was parametric unpaired t test was used where p value was <0.05 which is considered to be significant. It means that FVC of air attendants was less as compared to normal individuals.

Table 5

FEV1/ FVC (%)	Normals	Air attendants
Mean	82.66	83.15
SD	5.44	12.3
t	0.1625	
p	0.8718	



Graph 5

Interpretation: Table 5 and Graph 5 show comparison of FEV1/FVC ratio values of both the groups. As the data was non parametric Mann-Whitney U test was used where p value was >0.05 which is considered to be non-significant. It means that FEV1/FVC ratio of air attendants and normal individuals had no statistical difference.

DISCUSSION

The objective of the study was to compare Lung functions in Normal adults and Air attendants. As table 3 & 4 & graph 3 & 4, shows that the lung function was significantly decreased. The reason for this might be air cabin related occupational SHS exposure. A study supporting my result was done by Mehrdad Arjomandi et al. (2009), [4] which was "Pulmonary Function Abnormalities in Never Smoking Flight attendants to second hand tobacco smoke in the Aircraft cabin". It suggests that flight attendants presented with high intensity SHS exposures within the relatively confined space of commercial aircraft. Studies based on urine and serum concentration on continue, a biomarker of exposure to tobacco smoke have shown that the flight attendants experienced 6-7 times the second hand smoke exposure compared to airlines ground based workers & 14 times that of the average person. A study done by Ebbert et al., showed that never smoking flight attendants who have a significant history of occupational SHS exposure have abdominal pulmonary function suggestive

of long term damage to their lungs as seen in COPD. Another reason for reduced lung function exposure to ozone, low atmospheric pressure or low humidity can be the contributing factors. The study supporting this reason was done by E.A. Whelan (2003) [5] which was "Prevalence of Respiratory Symptoms among Female Flight attendants & teachers which concluded that flight attendants were significantly more likely to report chest illness during prior 3 years, reason being indoor air quality problems in aircraft cabins, occupant density, reduced air pressure and humidity, passage of air supply first through an aircraft engine, shift lengths for flight attendants that can legally extend for 14 hours. In a study of commercial aircraft cabins, more than 86% gate to gate flight average carbon dioxide concentration exceeded 1000ppm, a level above which increased building related symptoms have been shown and 39% exceeded 1500ppm. An aeroplane's environmental control system can be a source of contamination particularly under abnormal operating conditions. Engine lubricating oils, hydraulic fluid or de-icing fluids can unintentionally enter the cabin through the bleed air supply system from engine. Laboratory data suggests that many compounds are released when these fluids are heated to the high temperatures that occur in the bleed air system.

CONCLUSION

The study concludes that the lung functions, i.e., the ratios of FEV1, FVC & FEV1/FVC are found to be compromised in air attendants as compared to normal individuals.

Limitations: 1. Small sample size.

2. Females and males were not homogenous in both the groups

Future Scope of Study: 1. Study can be done in other flight attendants.

2. Comparison between males and females can be done.

REFERENCES

1. Gil A. Air transport deregulation and its implications for flight attendants. Int'l Lab. Rev. 1990; 129:317.
2. Payne P, Fiering S, Leiter JC, Zava DT, Crane-Godreau MA. Effectiveness of a novel qigong meditative movement practice for impaired health in flight attendants exposed to second-hand cigarette smoke. Frontiers in human neuroscience. 2017 Feb 21;11:67.
3. Tashkin DP, Coulson AH, Simmons MS, Spivey GH. Respiratory symptoms of flight attendants during high-altitude flight: possible relation to cabin ozone exposure. International archives of occupational and environmental health. 1983 Jul 1; 52(2):117-37.
4. Arjomandi M, Haight T, Redberg R, Gold WM. Pulmonary function abnormalities in never smoking flight attendants exposed to secondhand tobacco smoke in the aircraft cabin. Journal of occupational and environmental medicine/American College of Occupational and Environmental Medicine. 2009 Jun;51(6):639.
5. Whelan EA, Lawson CC, Grajewski B, Petersen MR, Pinkerton LE, Ward EM, Schnorr TM. Prevalence of respiratory symptoms among female flight attendants and teachers. Occupational and environmental medicine. 2003 Dec 1;60(12):929-34.

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