

Barodontalgia among Aircrew of Bangladesh Air Force

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Abstract

Introduction: Barodontalgia pathology but a symptom of a subclinical oral problem that, although rare, may affect patients subjected to atmospheric pressure changes and have an influence on flights. Barodontalgia is caused whenever the pulp is exposed to differential pressure gradient.

Objective: To see the barodontalgia among aircrew of Bangladesh Air Force.

Methodology: A cross-sectional study was carried out in Dental wing medical squadron BAF base Basher Dhaka. The study participants were recruited during one year among all the pilots and crewmembers attending departments specializing in medical follow-up at the study period from the Bangladesh Air Force.

Results: Among the 50 barodontalgia group, most 39(78%) of the respondents were found technical and military flying whereas 50 without barodontalgia group 38(76%) specifically in military flying. In barodontalgia, 62% respondents were found in moderate pain (4-6), 26% in mild pain (1-3) and 32% in severe pain (7-10). In barodontalgia, 50% respondents were descent of barodontalgia, 52% were altitude where barodontalgia was reported to appear during the flight was <4000 meters and 70% were flight speed was 500-1000 km/h. Most of the respondents were found specifically in commercial flights in patients with barodontalgia. Majority pain intensity was found moderately in barodontalgia

Key word: Barodontalgia, Air Crew of Bangladesh Air Force

Introduction

Barodontalgia (also known as aerodontalgia) is defined as a barometric pressure-induced oral pain, which may be dental or nondental¹. It is not pathology but symptoms of a subclinical oral problem that, although rare, may affect patients subjected to atmospheric pressure changes and have an influence on flights². Barodontalgia is caused whenever the pulp is exposed to differential pressure gradient. In the service men it can occur when they are in aviation (Air force) or when they have to dive deep for recreation, training or duty (Navy seals). Currently as air travel becomes affordable and common more passengers also complain of discomfort during the takeoff and landing time³. This condition is mostly a symptom of pre-existing oral or maxillofacial disease. The exact mechanism of pain is still unclear⁴. Although quite rare, barodontalgia may be severe enough to suddenly incapacitate aircrew member, which could jeopardize the safety of flight^{5,6}. Military aviators, especially fighter pilots, who perform flights constantly alternating acceleration and atmospheric pressure, are the most susceptible to this phenomenon, and therefore maintaining dental health is important for them. Proper oral health reduces the occurrence of barodontalgia,

since diseases such as dental cavity; apical periodontitis, root fracture, residual cysts, pulpitis, pulp necrosis and defective restoration are related to this etiology⁷⁻¹¹.

Materials and Methods

A cross-sectional study was carried out in Dental wing medical squadron BAF base Basher Dhaka. The study participants were recruited during one year among all the pilots and crewmembers attending departments specializing in medical follow-up at the study period from the Bangladesh Air Force. A total of 100 individuals (10 were females and 90 were males) having dental restorations and a history of flight journey were randomly selected for the study. Pilots and crewmembers came to the medical center for a routine medical examination, independently of any medical problem. The participants gave their informed consent to participate in this study before completing the questionnaires and all the collected data was strictly anonymous. Only the participants involved in more than one flight per month were included in the study. The test pilots and the parachutists were excluded because they are usually subjected to specific and extreme flying conditions. A questionnaire was used to collect general data such as age, gender, flight experience and a specific set of questions related to pain during flight and dental risk factors such as dental caries, dental restorations and preexisting dental pain conditions were given to all participants. Those patients affected by barodontalgia were further subjected to a personal interview and clinical examination for identification of dental risk factors.

Results

Among 100 participants 50 were barodontalgia group and 50 cases had without barodontalgia group. Majority 64% respondents were belonged to age <40 years in barodontalgia group and 70% in without barodontalgia group. Majority 88% respondents were male in barodontalgia group and 92% in without barodontalgia group. Twenty (40%) respondents were found several flights per month in barodontalgia group and 38% in without barodontalgia group. Twenty five (50%) respondents were found dental visit at every 7-12 month in barodontalgia group and 52% in without barodontalgia group. The difference were not statistically significant ($p < 0.05$) between two group (Table-I). Among the 50 barodontalgia group, most 39(78%) of the respondents were found Technical and military flying whereas 50 without barodontalgia group 38(76%) Technical and military flying. The difference was not statistically significant ($p > 0.05$) between two groups (Table-II). In barodontalgia, 62% respondents were found in moderate pain (4-6), 26% in mild pain (1-3) and 32% in severe pain (7-10) (Table-III). In barodontalgia, 50% respondents were descent of barodontalgia, 52% were altitude where barodontalgia was reported to appear during the flight was <4000 meters and 70% were flight speed was 500-1000 km/h (Table-IV).

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Table-I: Characteristics of the participant (n=100)

Characteristics		Barodontalgia		Statistics
		Yes	No	
Age in years	<40	32(64)	35(70)	$\chi^2 = 0.524$ df = 1 p > 0.05
	≥40	18(36)	15(30)	
Sex	Male	44(88)	46(92)	$\chi^2 = 0.505$ df = 1 p > 0.05
	Female	6(12)	4(8)	
Activity	Civilian	30(60)	31(62)	$\chi^2 = 0.838$ df = 1 p > 0.05
	Military	20(40)	19(38)	
Frequency of flights	Several per day	12(24)	9(18)	$\chi^2 = 0.564$ df = 2 p > 0.05
	Several per week	18(36)	23(46)	
	Several per month	20(40)	18(36)	
Frequency of dental visit	Every ≤6 month	15(30)	10(20)	$\chi^2 = 0.430$ df = 2 p > 0.05
	Every 7-12 month	25(50)	26(52)	
	<1 visit/years	10(20)	14(28)	

* Percentage in parenthesis

Table-II: Specific positive of the participant (n=100)

Activity	Barodontalgia		Statistics
	Yes	No	
Technical and military flying	39(78)	38(76)	$\chi^2 = 0.749$ df = 3 p > 0.05
Civilian instructors	5(10)	7(14)	
Military instructor	4(8)	2(4)	
Military transport	2(4)	3(6)	

* Percentage in parenthesis

Table-III: Distribution of pain intensity in barodontalgia group (n=50)

Pain intensity	Frequency	Percentage
Mild (1-3)	13	26.0
Moderate (4-6)	31	62.0
Severe (7-10)	16	32.0

Table-IV: Distribution of moment, altitude and flight speed in barodontalgia group (n=50)

Characteristics		Frequency	Percentage
Moment of barodontalgia	Ascent	9	18.0
	Cruise	16	32.0
	Descent	25	50.0
Altitude at barodontalgia (meters)	<4000	26	52.0
	4000-8000	16	32.0
	>8000	8	16.0
Flight speed at barodontalgia (km/h)	<500	13	26.0
	500-1000	35	70.0
	>1000	2	4.0

Discussion

Majority 64% respondents were belonged to age <40 years in barodontalgia group and 70% in without barodontalgia group. Majority 88% respondents were male in barodontalgia group and 92% in without barodontalgia group. Twenty (40%) respondents were found several flights per month in barodontalgia group and 38% in without barodontalgia group. Twenty five (50%) respondents were found dental visit at every 7-12 month in barodontalgia group and 52% in without barodontalgia group. The different were not statistically significant (p<0.05) between two group. Laval-Meunier et al¹⁰ study found that the median age of the sample was 37 years old and 208 (21.9%) were female. Most of the respondents were involved in civilian activities (59.2%), more specifically in commercial flights at a frequency of at least one flight per week.

In this study observed that most 78% of the respondents were found specifically in commercial flights in barodontalgia group and 76% in without barodontalgia group. The different was not statistically significant (p<0.05) between two group. Nakdimon and Zadik¹ reported that the overall barodontalgia experience of civilian aircrews and divers (10.4%) was significantly higher than the military aircrews and divers 6.4% (P= 0.001). Laval-Meunier et al¹⁰ result was consistent with some previous studies^{12,13} but diverged from others¹⁴⁻¹⁶. The discrepancies between studies may be due to the variation in inclusion criteria, in the definition of barodontalgia used in the questionnaires, or to a real difference between groups in relation with the performance of dental prevention programs in pilots and aircrew members¹⁷. Gonzalez et al have shown that barodontalgias were more frequent in patients having several dental restorations¹³. However, it can be difficult to evaluate the causal tooth and the specific cause of in-flight barodontalgia during dental examination at ground level^{17,18}.

In this study barodontalgia, 62% respondents were found in moderate pain (4-6), 26% in mild pain (1-3) and 32% in severe pain (7-10). Laval-Meunier et al¹⁰ in the group where barodontalgia was reported, 28.4% of the participants scored the pain as mild (1 to 3), 37.8% as moderate (4 to 6) and 33.8% as severe (6 to 10). Five persons reported maximal pain intensity; four of them had civilian positions. Zadik have refined this hypothesis, saying that pain during ascent would reveal inflammation of a vital pulp (pulpitis) and pain in descent would be indicative of a pulp necrosis¹⁹.

In barodontalgia, 50% respondents were descent of barodontalgia, 52% were altitude where barodontalgia was reported to appear during the flight was <4000 meters and 70% were flight speed was 500-1000 km/h. Laval-Meunier et al¹⁰. barodontalgia was more frequent on descent (N =35; 47.3%) than on ascent (N =18; 24.3%) or cruise (N =21; 28.4%). The altitude where barodontalgia was reported to appear during the flight was below 26,247 ft (8000 m) in most cases (N =58/71; 78.4%: 0-13,123 ft/0- 4000 m, N =31; 13,123-26,247 ft/4000-8000 m, N =27; 26,247-39,370 ft/8000-12000 m, N =11; higher than 39,370 ft/12000 m, N =3; 2 subjects had missing data). Flight speed was between 500 km/h and 1000 km/h for 48 (67.6%) participants out of 71, below 500 km/h in 22 cases, and over 1000 km/h in 1 case (3 subjects were missing data). Acceleration was below 2 G in 95% (N =67) of the cases where barodontalgia was reported. Also, the reported frequency of barodontalgia in divers was similar to in-flight barodontalgia, even if the pressure changes are of more consequence during diving¹². Other parameters like

speed, altitude, acceleration, temperature, vibration, and/or stress could also be involved in the generation of barodontalgia²⁰.

A significant example is given by the prospective study of Sipahi et al¹³ who have reported a low frequency of barodontalgia, which is probably the result of the close medical follow-up that the fighter pilots received in that study. Finally, before researchers can provide tools to predict barodontalgia, thorough periodic clinical and radiographic oral and dental examinations are necessary to reduce the occurrence of barodontalgia in pilots and crewmembers¹². Nakdimon and Zadik reported aircrew of pressurized aircrafts suffer more from barodontalgia than those of non-pressurized aircrafts¹ (7.3% vs. 3.2%; $P = 0.002$). This finding agrees with the assumption that cabin pressurization reduces the rate of barometric-related conditions, including barodontalgia, because even after pressurization, standard intracabin pressure is compatible to an altitude of 8000 to 18,000 ft (2438 to 5486 m), which is much higher than the pressure found in routine non-pressurized aircrafts (i.e., helicopter, 3000–5000 ft or 914–1524 m).

Conclusion

Most of the respondents were found specifically in Military flights in patients with barodontalgia. Majority pain intensity was found moderately in barodontalgia.

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