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Prevalence of barodontalgia in Indian origin pilots: A survey

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ABSTRACT

Barodontalgia, a dental pain evoked by a change in barometric pressure in an otherwise asymptomatic tooth, may be severe enough to cause in-flight vertigo, incapacitation, and premature cessation of flights and altitude-chamber simulations. The aim of this study was to measure the prevalence of barodontalgia among Indian pilots. Five hundred questionnaires consisting of demographic data and questions about the occurrence of tooth pain during flying were distributed among pilots. Almost 20.6% of the sample experienced barodontalgia at one point in time during their practice. More pilots had an occurrence of pain while flying. Pilots had higher incidence of pain while ascending than descending. The highest percentage of tooth pain occurred in pilots while flying at an altitude that ranged from 11,000-20,000 ft. Recurrence of tooth pain after treatment occurred in few pilots. Conclusively, barodontalgia is common in India with a prevalence rate is high. Pilots reported high occurrence and it was common on ascent while flying and descent.

Key Words: Barodontalgia; tooth pain; pilots; India, treatment.

INTRODUCTION

The number of air trips is increasing so dentists may encounter oral conditions need immediate treatment which one of them is barodontalgia . During World War II, tooth pain experienced by air crew in flight was given the name aerodontalgia. However, as this tooth-related pain was also observed in divers, a broader, more appropriate term, barodontalgia, was subsequently given to this phenomenon (1).

Barodontalgia, which affects air crew and aircraft passengers as well as underwater divers, is pain or injury affecting teeth due to changes in pressure gradients. Boyle's law, which states that "at a given temperature, the volume of a gas is inversely proportional to the ambient pressure", may be used to explain barodontalgia (2). Although rare, dental pain during flying has been recognized as a potential cause of an aircrew member or a diver suddenly becoming incapacitated, thus jeopardizing the safety of the affected person as well as others (3-5).

Barodontalgia was reported in 0.7% to 2% of the United States Army Air Force altitude-chamber simulations during the 1940s. During these simulations, barodontalgia ranked fifth among the physiological complaints of the trainees and third as a causative factor of premature cessation of the simulation (6). The number of US Air Force trainees suffered from barodontalgia during altitude-chamber simulations in 1964 and 1965, respectively are 0.23% and 0.3% (5).

At present, it seems that occurrences of in-flight dental manifestations of pressure changes are relatively low (compared with the

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reported occurrences from the first half of the 20th century) because of the current pressurization of airplane cabins, high-quality dental care, and the improvement of oral health in the second half of the 20th century (5, 7). Prevention of barodontalgia is based on maintenance of higher standards in preventive and restorative dentistry (8).

In the last decade, 2.4%, 8.2%, and up to half of 499 Spanish, 331 Israeli, and 135 Saudi Arabian and Kuwaiti Air Force aircrews reported at least one episode of barodontalgia, respectively (7). No information regarding barodontalgia in India has been reported to date. The aim of the present study was to measure the prevalence of barodontalgia among pilots in Indian.

MATERIALS AND METHODS

Indian pilots working in governmental and private sectors were selected. A questionnaire was developed in English and distributed among all pilots. The survey contained inquiries about age, sex, type of practice (pilots), and years of experience. Questions about the occurrence of tooth pain during flight or diving were presented as well as inquiries regarding whether the pain was during ascending or descending (pilots), the altitude or depth at which the pain occurred, whether they had visited a dentist to treat the pain or not, what the dentist diagnosed the pain as, what kind of treatment was rendered at the dental office, and if they had any recurrence of the pain after treatment.

A total of 500 questionnaires were distributed. The collected data were analyzed using the Statistical Package for Social Science (SPSS) software, version 12. Descriptive statistics were performed and Chi-square test was used to determine the relationship of pain among pilots.

RESULTS

Three hundred and four subjects responded. The response rate was 60.8%. The age of the pilots ranged between 27 and 37 years with the mean age of 34 years.

Distribution regarding years of experience showed that 40.2% had 5-10 years of experience, while 40.5% reported only 1-5 years of practice, and 19.3% had more than 10 years of practice.

20.6 % of the sample had incidence of barodontalgia at least at one point in time during their activities. Most of the participants (11.6%) indicated that they had experienced pain while flying several years previously, while 5% indicated that they had pain one year previously and only 2.7% indicated they felt pain while flying several months previously. Pilots had a higher incidence of pain while ascending than descending ($P<0.05$). The highest percentage of tooth pain with pilots was while flying with an altitude that ranged from

Table 1: The incidence of occurrence of barodontalgia versus altitude

Altitudes	% of pilots	
Below 10000ft	17.4	
11000-20000	33.6	
21000-30000	26.3	
31000-40000	22.4	

11.000-20.000 ft Table-1.

A total of 81.8% of pilots visited their dentists after they had tooth pain. The diagnosis that was rendered by their dentists are 73.6% tooth pain, 19.3% maxillary sinus pain,5% tooth and maxillary alrus pain, 2% nothing, and 0.1% others Figure-1.

Restorative treatment was provided significantly more than any other treatment (P<0.001), as was root canal therapy, extraction and others. Recurrence of tooth pain after treatment occurred in 10.2% in pilots during their practice. Comparison of diagnosis with other countries has been shown in Table 2.

Figure 1: The percentage of the various etiological factors of barodontalgia

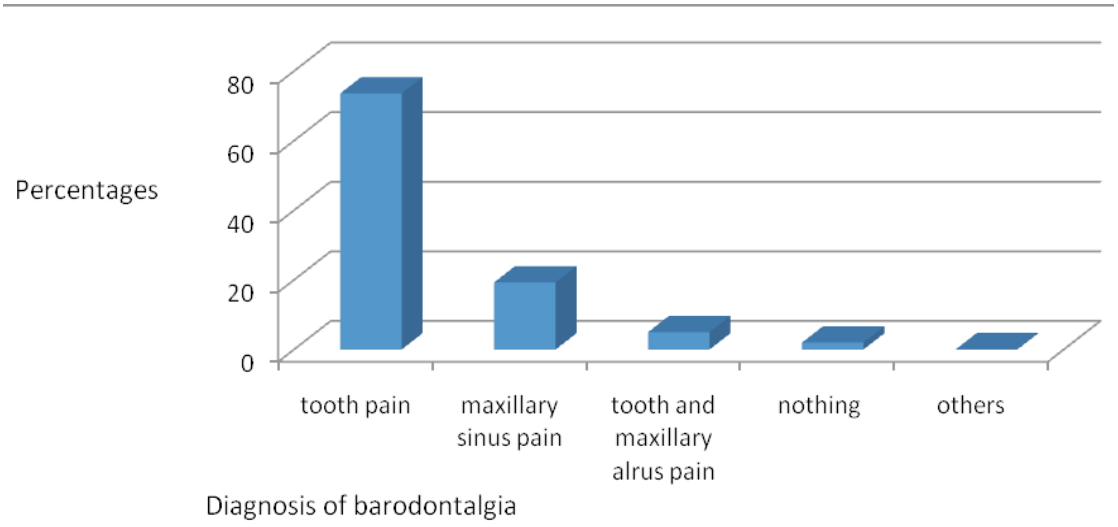

Table 2: Diagnosis of in-flight barodontalgia in the United States, Canadian, German, Spanish, Israeli, and Turkish Air Forces, US Navy and Indian

Diagnosis	US Army Air Forces 1944 (10) (%)	Royal Canadian Air Force 1945 (11) (%)	US Army Air Forces 1946 (7)	US Navy 1982 (12) (%)	German Luftwaffe 1993 (13) (%)	Spanish Air Force 2004 (14) (%)	Israeli Air Force 2007 (7) (%)	Turkish Air Force 2007 (15) (%)	Indian (%)
Recent restorative treatment	NI	5	+	NI	NI	NI	30	NI	10
Defective restoration	NI	NI	NI	NI	NI	23	NI	28	0.2
Deep caries without pulp exposure	NI	37	NI	NI	36	NI	NI	16	12
Vital pulp exposure	NI	17	+	NI	29	NI	NI	NI	5
Pulpitis	74	28	NI	64	14	NI	7	22	3
Pulp necrosis and/or periapical periodontitis	22	NI	+	36	14	39	19	22	2
Barosinusitis	3	NI	NI	NI	NI	NI	19	6	2

DISCUSSION

This study was conducted to measure the incidence of barodontalgia among pilots in Indian. The study design depended on questionnaires distributed to the target population inquiring about incidence, nature of the incident and the treatment rendered, as this was a pioneer study in this field in the area, and preliminary data was required about the incidence of this phenomenon before more elaborate studies can be designed.

The barodontalgia rate was lower than that reported by others authors (14, 16). This difference in rate may be related to difference in genetically factors and study design. Although all flight personnel are initially examined and treated dentally before flying, poor oral hygiene, maintenance and recall may be factors that significantly increased prevalence of barodontalgia during subsequent flights.

There was no correlation between both the age of the pilots and their age as reported in previous study (8). The prevalence among pilots was more common with an altitude that ranged from 11,000-20,000 ft as in previous studies (8, 13, 16). The prevalence among pilots was common on ascent in the study as in previous study (8). It had been suggested that pain on ascent was associated with an inflamed tooth, while pain on descent was associated with a necrotic tooth (13). The pain was mostly diagnosed as tooth pain as contrast to other study, found the most common pain was earache followed by pain from teeth and from the paranasal sinuses (14). This difference could be attributed to the fact that many centers internationally have flight surgeons as the primary health personnel performing the diagnosis, whereas in this study all pilots reported to a dentist who was expected to be more adept at diagnosing dental pain (14).

Most of the pilots included in our study had restorative treatment done after reporting to the dental office. It may be that their complaint was an obvious one that could have been apparent on ground level and not present a diagnostic difficulty.

In this study, recurrence of pain after treatment was reported by relatively smaller groups of pilots, which indicated that proper diagnosis and treatment was done. For the cases in which there was recurrence, the causes might be non-odontogenic pain or another offending tooth than was treated.

In this study, no clinical examination was conducted. Correlation of the information obtained from the questionnaires with clinical findings obtained from examination could provide more specific results in term of incidence and causes of barodontalgia. No attempt was made to specify the type of planes as this was considered classified information and this could limit any attempt to generalize pilots flying different kind of war planes.

Although it may seem that this issue was neglected in dental education and research in recent decades, familiarity with and understanding of these facts may be of importance for dental practitioners. Dentists should employ the described preventive measures when treating pilot and diver patients, and should use the data available for diagnosing the causes of barodontalgia.

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