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Barodontalgia: A Study on its Etiology in Saudi Population

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Abstract

***Aim:** To study the etiology of Barodontalgia in Saudi population.*

***Methods:** A total of 369 individuals having dental restorations and a history of flight journey were randomly selected for the study. 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 pre existing 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. The data was collected and statistical analysis was made. Because of the descriptive nature of the study, no adjustments after multiple comparisons were made.*

***Results:** The study sample included 241 females and 128 males. Out of the 369 individuals, 59 patients reported tooth pain during flight and nearly 50% of these cases reported pain during the middle of the flight. Around 55% of patients had an existing restoration in the tooth, 28.8 cases % with dental caries, 12.8 % cases with periapical abscess, and 25% of them had pre existing migraine headache. The pain was of throbbing type and the duration of pain lasted for few seconds in about 79 % of the cases and throughout the entire flight in 21 % of these cases.*

***Conclusion:** A good number of participants in our study presented with barodontalgia. This phenomenon is found to be reported frequently due to an increase in air travellers in recent times and resultant dental barotraumas can cause significant morbidity necessitating special precautions to prevent any kind of in-flight incapabilities that can potentially endanger lives. It is therefore important for all allied personnel such as aircraft crew, family dentists, etc be aware of this phenomemon and initiate appropriate preventive measures to reduce complications.*

Keywords: *Barodontalgia,Barotrauma, Periapical Pathologies, Restorations*

Introduction

Barodontalgia is the term used to describe tooth pain occurring due to variations in Environmental pressure (barometric pressure). Barodontalgia was first observed among air crew during World War II and was initially given the name “aerodontalgia” It was later discovered among deep sea divers too and a large number of personnel working in hyperbaric environment such as pilots, divers, submariners and hyperbaric oxygen therapy report with split teeth, displaced restorations and pain probably attributable to dental barotraumas.

Barotrauma is the pressure-induced damages that occur at high and low pressures and is best explained with relation to Boyle’s law. Boyle’s law states that the volume of a fixed mass of an ideal gas is inversely proportional to the pressure of the gas at constant temperature. These volumetric pressure changes in gas –filled cavities (Lungs, Middle ear Paranasal Sinus) lead to barotraumas, clinically resulting in pain,

oedema, or vascular gas embolism.[1-3]

Barotraumas in the orofacial area include barotitis media, barosinusitis, pressure-induced headache, barodontalgias, and dental barotraumas. Dental barotraumas are defined as pressure induced damages to the teeth and dental restorations whereas barodontalgia is referred to as intraoral pain elicited by changes in pressure.[4]Barosinusitis (Barotrauma of the maxillary sinus) causes headaches, numbness and /or dental pain in the region of the maxillary posterior teeth. Clinically it is difficult to differentiate between barosinusitis and barodontalgia on the basis of maxillary teeth pain alone. It is reported that dental pain occurring during ascent is suggestive of non vital pulp tissue (pulpitis), whereas dental pain during descent can be either due to pulp necrosis or facial barotraumas.

The reported incidence of barodontalgias is 0.26–2.8% among aircraft personnel, air passengers, and divers. Barodontalgia is reported to occur at flying altitudes of 600–1500m and at diving depths of 10-25m.[5-9]

The exact mechanism that causes pain in barodontalgia is not clear, except for the exposure to altered atmospheric pressure. It is postulated that changes in pressure acts as a precipitating factor, in a tooth with pre existing pulpal/periapical disease &/ or dental restorations.[6-7] Some authors believe that barodontalgia can occur in apparently healthy teeth when the alterations in pressure is atleast 3 levels of atmospheric pressure, [10] whereas few authors suggest that teeth with normal pulp is not associated with pain irrespective of the presence of restorations or caries.[11]

Barodontalgia is broadly categorised into direct and indirect types. The direct type is well localised and occurs when reduced atmospheric pressure directly affects the tooth resulting in moderate to severe pain, usually during ascent, whereas the indirect type is characterised by dental pain secondary to stimulation of the superior alveolar nerves by maxillary barosin usitis resulting in dull, poorly defined pain during descent that generally involves the posterior maxillary teeth.[12]

The pain associated with barodontalgia can be severe enough to affect the health and ability of the personnel to apply them at work (especially associated with high risk), endangering the life of the personnel as well as other individuals such as aircraft with crew or passengers.[13-14]

The present study was conducted to find plausible dental risk factors of barodontalgia by evaluating dental and orofacial symptoms in individuals exposed to pressure changes using questionnaires and personal interviews.

Materials and Methods

A total of 369 individuals (241 were females and 128 were males) having dental restorations and a history of flight journey were randomly selected for the study.

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 pre existing 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.

The data was collected and statistical analysis was made. Because of the descriptive nature of the study, no adjustments after multiple comparisons were made.

Results

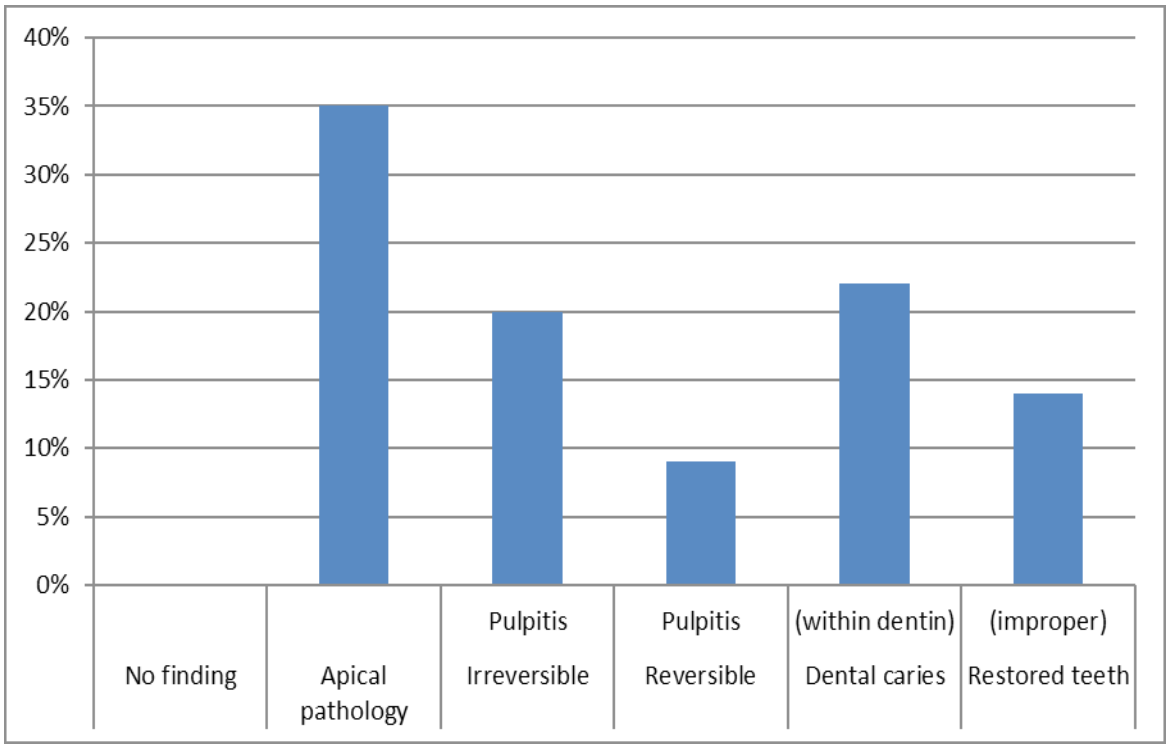
The study sample included 241 females and 128 males. Out of the 369 individuals, 59 patients reported tooth pain during flight and nearly 50% of these cases reported pain during the middle of the flight. approximately 55% of these 59 patients had an existing restoration in the tooth, 28.8 cases % had dental caries, 12.8 % cases presented with periapical abscess, and 25% of them had an account of pre existing migraine headache. The reported pain was of throbbing in type lasting for few seconds in about 79 % of the reported cases and throughout the entire flight in 21 % of these cases. (Table 1 &2)

Table 1. *Questionnaire data of the study group*

Questions	Response
Did you have tooth pain while boarding the plane?	Yes: 16% No: 84%
If yes, what do you think the reason for pain	
- Tooth decay	28.8%
- Tooth abscess	12.8%
- Tooth was RCT treated	28.7%
- Tooth had filling	26.6%
- Tooth was fine	19.1%
When the pain started	
- During take off	12.4%
- During landing	38.2%
- During middle of the flight	49.4%

Questions	Response
What was the duration of pain	
- For few seconds	79%
- During the entire flight	21%
-	
Do you have any systemic diseases?	
- Migraine	25%
- Hypertension	8.8%
- Heart disease	7.5%
- Others	26.3%
- Healthy	32.5%
Total sample	369
- Male	128
- Female	241

Table 2. *Clinical findings of Barodontalgia patients*



Discussion

Barodontalgia is the term used to describe tooth pain occurring due to variations in Environmental pressure (barometric pressure) in otherwise healthy individuals.Barodontalgia is considered to be a flare-up symptom of pre-existing subclinical oral disease such as dental caries with or without pulp involvement, faulty dental restorations,periapical pathologies[5,14-16]

The present study was conducted to find plausible dental risk factors of barodontalgia by evaluating dental and orofacial symptoms in individuals exposed to pressure changes using questionnaires and personal interviews.In our study, barodontalgia was reported in 55% of patients with an existing restoration in the tooth followed by 28.8 cases % with dental caries and 12.8 % cases with periapical pathologies. Indirect referred pain was reported in 25% of patients who had pre existing migraine headache.

Our findings are similar to that of studies by kollman [5] who in a high altitude simulation series reported tooth pain in pre existing restored teeth(36%) and periapical pathologies(14%) [5] and by Zadik Y et al [6] who reported barodontalgia in restored teeth (29.6%) followed by periapical pathologies(18.5%) and barosinusitis (18.5%) whereas in a study by Gonzalez-Santiago Mdel et al [9], the incidence of barodontalgia in teeth with periapical pathologies was 39% and 23 % in faulty restorations.

The reported incidence of barodontalgias is 0.26–2.8% among aircraft personnel, air passengers, and divers. Barodontalgia is reported to occur at flying altitudes of 600–1500m and at diving depths of 10-25m.[5-9]

Various theories have been suggested to describe the poorly understood mechanism causing barodontalgia Pulpal ischemia &/or elevated intracanal gas gas pressure is believed to be the underlyng mechanism causing barodontalgia in a tooth with dental caries with inflamed pulp.[15,17,18,19] However, this fails to explain the cause of barodontalgia in periapical pathologies and elevated pressure within the bony lesion is reasoned as the cause for barometric changes and pain in such cases.[14]

Cases of dental barotraumas such as pressure induced fractures of dental teeth, dental restoration ,vertical root fracture in endodontically treatment teeth have been reported in literature.[20]These complications and the morbidity that is associated with pain due to barodontalgia can be severe enough to affect the health and ability of the personnel to effectively engage at work (especially associated with high risk), endangering the life of the personnel as well as other individuals such as aircraft with crew or passengers. It is therefore important for all allied personnel such as aircraft crew, family dentists, etc be aware of this phenomemon and initiate appropriate preventive measures to reduce complications.

Our study was restricted to a limited sample of aircraft passengers and further studies with larger samples involving aircraft personnel, divers, etc needs to be done to better understand this phenomenon.

Conclusion

A good number of participants in our study presented with barodontalgia. This phenomenon is found to be reported frequently due to an increase in air travellers in recent times and resultant dental barotraumas can cause significant morbidity necessitating special precautions to prevent any kind of in-flight incapabilities that can potentially endanger lives. It is therefore important for all allied personnel such as aircraft crew, family dentists, etc be aware of this phenomemon and initiate appropriate preventive measures to reduce complications.

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