

SPECIAL ARTICLE**Prevalence of the Talon Cusp at the Lateral Incisors of Two Individuals of Greek Origin - a Case Study****Vasiliki Zafiri, PhD,**

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Corresponding author: Th. Pitsios, Medical School-University of Athens, Mikras Asias 75, 11527-Athens**ABSTRACT****Background**

Dental morphological traits are useful for providing information for phylogenetic and genetic studies within and among species and populations. Studies of dental traits in the very interesting geographic area of Greece can provide important data on the genetic constitution and the profile of the dental traits of this particular geographic population. Talon cusp is a rare dental trait in deciduous and permanent dentition and is expressed in several degrees and different frequencies between humans, thus being useful in comparing populations.

Aims

The aim of the present study is to detect the presence and degree of expression of the morphological trait of the Talon cusp in a demographic group of adult individuals of Greek origin residing in Athens.

Methodology

The data were collected by examination of a demographic group of 113 adult individuals of Greek origin residing in Athens.

Results

The age range of individuals belonging to this demographic group was from 12 to 71 years (i.e. 37 ± 5 years mean age). Of these individuals, 55 were women and 58 men. The examination focussing on the presence or absence of Talon cusp was carried out according to the system developed and suggested by Hattab et al. (1996). Following the examination the 113 individuals, two cases of Talon cusp were recorded (i.e. a frequency of 2.6%). In both cases, the tooth displaying the trait was the lateral incisor of the maxilla. In the first case, the Talon cusp was located on the lateral incisor of the right maxilla. The degree of expression was 2 and its shape was a V, according to the Hattab et al.(1996) scoring system. In the second case, the Talon trait was located on the lateral incisor of the left maxilla. The degree of expression was 2 and its shape a V, again according to the Hattab et al. (1996) scoring system.

Key Words: Dental Anthropology, dental trait, biodiversity, genetic factors, environmental factors,

Introduction

The study of the biodiversity of human teeth provides very important information for the comparative analysis of various demographic populations, ancient skeletal findings and contemporary forensic investigation, as well as contributing to clinical dental practise (Pitsios. 2003).

Despite the general impression that the teeth of different demographic groups are extremely similar in terms of the development of their dental characteristics, a closer look at these features immediately points to remarkable differences in size, form and specific morphological traits, on an individual as well as on an inter-group, inner-group and population level (Berry 1978). The differences in teeth phenotype in individuals from different demographic groups can be found in the number and extent of expression of the main and secondary morphological characteristics of the teeth of these various groups reflecting their genetic constitution, a fact which is a direct result of their genetic purpose and their functional response to the necessity of chewing food and ensuring nutrition. The frequency of expression of each genetic, non-metric dental trait points to a remarkable diversity among different demographic groups, as well as within one and the same demographic group (Scott and Turner II, 1977, Hillson 1996, Pitsios 2003).

Background

Talon cusp is a dental morphological anomaly of the anterior teeth. It is expressed by the presence of a separate additional cusp in the lingual or labial surface of the teeth, appearing or projecting as an aciculate structure located in the cervical region ranging from the cemento-enamel junction to the incisory edge of an incisor tooth. This irregular tooth structure consists of regular enamel and dentin. However, there is always a comparative difference in the morphological extension of the pulp tube, with some patients even displaying a complete absence of the pulp tube. A typical case of Talon cusp resembles the nail of an eagle, although it may also occur in a pyramid or conical form,

or even simply as a small extension of tooth enamel. Mitchell was the first to describe a case of Talon cusp in 1892, referring to it as a corneous extension in the lingual surface of a central incisor of the maxilla. Talon cusp tends to occur chiefly in the incisors of the maxilla and the mandible, in the permanent as well as in the deciduous teeth. The Talon cusp phenomenon has also been recorded in the canines of the upper jaw. Moreover, the frequency of appearance in the permanent teeth of adults has been found to be higher (approx. 92%) than that in the deciduous teeth of children (approx. 8%, respectively) (Mecon 1990). As to the percentages of which specific teeth tend to display the talon trait, the permanent lateral incisors of the maxilla exhibit the highest frequency, at nearly 55%. The frequency of appearance in the permanent central incisors is 36%, followed by the permanent canine teeth.

Furthermore, the aetiology of the Talon cusp is almost entirely unknown, although it is considered to be the result of a combination of genetic and environmental factors, which probably cause the cusp to be develop. Similar to other defects in tooth form, it is assumed that the talon cusp originates during the morpho-differentiation stage of tooth development and could conceivably be the result of a faulty enamel organ or of hyper-productivity of the dental membrane (Hattab 1996). It has been suggested that this anomaly is primarily polygenetic, with some environmental influence.

The frequency of occurrence is higher in men than in women, with the highest geographic distribution of all amongst Asian populations. The Talon cusp can be an independent condition in a specific individual, or it may occur in conjunction with other dental abnormalities, such as Peg form lateral incisors, pin-shaped teeth, retained canines, odontomes, mesodontes, gigantodontia, shovelling incisors, dens evaginatus, supernumerary teeth or tavorodontism (Hattab et al.1996). Certain genetic syndromes can also be accompanied by Talon cusp. These are the Mohr syndrome and the Rubinstein-Taybi, Sturger-Weber and Ellis-van Creveld syndromes. Talon cusp has even been

observed in certain patients suffering from monochromatism or color blindness. It has also been found to coexist with cases of generalized short roots, a condition which may occur in connection with systemic diseases, Stevens Johnson syndrome, thalassaemia and exposure to radiation (Davis and Brook 1986).

The frequency of appearance of Talon cusp differs considerably among different human populations, with a variance ranging from 0.06% to 7.7%. The appearance of Talon cusp has been found to be more frequent in Asian demographic groups, but an increasing number of cases of this trait have also been detected beyond the boundaries of ethnic Asian groups over the past years, due to the increased migration of various populations. Nevertheless, this localization, i.e. chiefly in Asian populations and in individuals belonging to the same family, reinforces the view that the Talon trait is subject to powerful genetic control.

In 1991, in a research study on the Talon cusp trait, the Paediatric Dentistry Department of the University of Malaya investigated a sample of 536 children from Malaysia and reported 28 cases of children with Talon cusp, that is a percentage of 5.2%. (Rusmah, Meon (1991)

Zhu et al. (1997), from the Paediatric Dentistry Department at Pittsburgh University reported on the case of a boy with a Talon cusp trait accompanied by supernumerary teeth.

Furthermore, McNamara et al (1997), from the St. James Hospital in Dublin published an article on two individual cases of Talon cusp. In one case, the Talon cusp was located on the labial surface of the central incisor, while in the other case it was situated on the maxilla canine.

Moreover, Hattab et al. (1996), from the University of Jordan, reported on the case of a Jordanian boy of 17 months of ethnic Arab origin with Talon cusp in all deciduous incisors, and specifically in the lingual surface of the two central deciduous incisors. The profile of the Talon cusp in the patient was a T-shaped crown, formed by the exterior

outline of the right tooth, while on the left side the cusp appeared to extend far beyond the tooth crown.

Abbot (1998) from the Dental Faculty of the University of Melbourne described the first case of a permanent maxilla incisor displaying a simultaneous presence of Talon cusp on the lingual and labial surface of the same tooth.

Additionally, McNamara et al. (1998) at St. James's Hospital in Dublin reported on the case of a 13-year-old girl of European origin with an extraordinary combination of dental abnormalities. In this patient, the Talon cusp was located in the lingual surface of the central and lateral incisors, a trait coexisting with short roots in central incisors and bicuspid, Carbelli's cusp in the first and second molars of the maxilla, as well as dentes invaginati and pyramid-shaped roots in three of the second molars.

In 1989, a research study carried out by the Dental Faculty of the University of Minnesota on dental anomalies in children of Mexican origin showed the percentage of Talon cusp in the sample investigated to be 0.6 per 1000. Sedano et al.(1989).

In 2001, Soares A.B. et al of the Dental Faculty of Sao Paulo in Brazil reported on a case of bilateral presence of Talon cusp in the central incisors in the maxilla, while Faiez et al. (1996), refer to an infrequent case of coexistence the Talon cusp in a twin left central incisor of the mandible in a 9-year-old boy of Arabic origin from Jordan.

Finally, Segura et al (2002) from the Stomatological Department of the University of Sevilla reported on a case of Talon cusp in a 10-year-old boy, displaying a pyramid-shaped form and coexisting with a large Carbelli's cusp in the maxilla.

Aim

The aim of the present study is to detect the presence and degree of expression of the morphological trait of the Talon cusp in a demographic group of adult individuals of Greek origin residing in Athens, to be evaluated from an anthropological and clinical perspective.

Method

The examination of the individuals took place at private dental clinics in Athens, Greece. Individuals gave permission for the data gleaned from their dental examinations to be used for the aims of this specific study. The method of examination chosen was macroscopic observation, using a dental examining mirror with reflective light. The examination focussing on the presence or absence of Talon cusp was carried out according to the system developed and suggested by Hattab et al. (1996). According to the proposed method, Talon cusp is evaluated and categorized according to three types (grades 0, 1, 2 and 3), depending on size and the configuration of its form, i.e. a V – or T-shape. The data collected was recorded in numerical tables, and the statistical analysis was carried out based on a t-test.

Material

During the period from 3. 3. 2003 to 30. 11. 2003, a biodiversity survey of the non-metric dental traits and dental anomalies of a demographic group of 113 adult individuals of Greek origin residing in Athens was carried out. The age range of subjects belonging to this demographic group was from 12 to 71 years (i.e. 37 ± 5 years mean age). Of these individuals, 55 were women and 58 men.

Table1

	Individuals of Greek origin residing in Athens with the Talon cusp dental trait	Individuals of Greek origin residing in Athens without the Talon cusp dental trait
	2 (2.6%)	111 (97.4%)
Total	2 (2.6%)	113 (100%)

Case 1

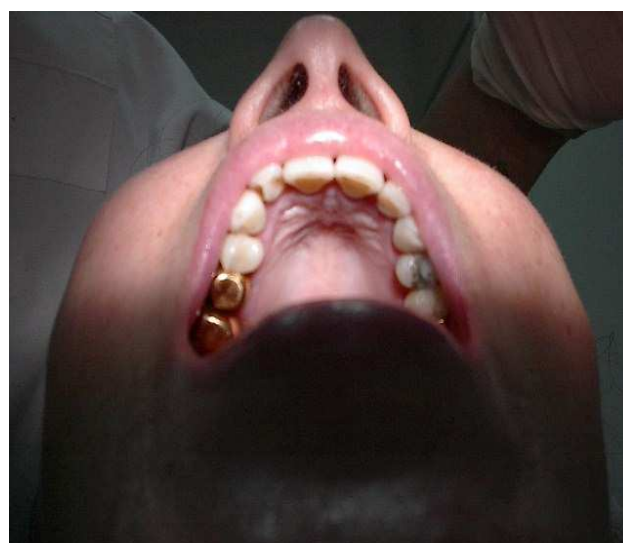
A 50 year-old woman of Greek origin, an engineer by profession, who was born in Ukraine and emigrated to Athens, Greece in 1992. Her birthplace, which is also the place

of birth of her mother and her maternal grandparents, is Mars Aerie, Ukraine. Moreover, her father's (and his family's) birthplace is Morianoupoli. The individuals paternal grandmother was from a region in Asia Minor, where both sides of her family lived.

The Talon cusp is located on the right lateral incisor of the maxilla. It extends along the lingual surface from the cervical portion of the tooth up to its cutting edge. It is pyramid-shaped and displays no grooves or recesses whatsoever. Its size, according Hattab et al. (1996), is grade 2 and its shape is Y type. A radiographic depiction of the lateral incisor showed the formal morphology of the root and the root canal of the tooth. The relation with the neighbouring mandible teeth is smooth, without traumatic contact.

The oral hygiene of the individual is excellent and her teeth showed no caries. All of her existing teeth, and specifically the 11 front teeth and the front molars, displayed typical morphology and the dental traits were visible, with the exception of the second right premolar and the first right molar, since these were covered with gold crowns. This dental restoration had been carried out in Ukraine. The subject's medical background showed that she does not suffer from any diseases, genetic or otherwise.

Photo1



Case 2

A 25 year old woman who is an office secretary by profession. The subject's birthplace is the village of Spolainta, located in the vicinity of Agrinio, a city in Western Greece. The place of birth of her mother as well as of both of her maternal grandparents was the village Spolainta in the Agrinio area. The birthplaces of her father and of both paternal grandparents are villages in the mountainous area around Agrinio.

In this case, the Talon cusp is located on the lingual surface of the left lateral incisor of the

maxilla. It extends from the cervical tooth portion up to the cutting edge of the teeth. The Talon cusp is pyramid-shaped, with no grooves or recesses. Its size, according Hattab et al. (1996), is grade 2 and its shape is V type. As has been mentioned, the frequency of Talon cusp varies from 0.06% to 7.7%, with higher figures applying to Asian populations

Furthermore, the same individual displays the Carabelli's cusp morphological trait at the first molars of the maxilla, which is grade 3 according to the ASUDAS scoring system (Turner II et al, 1991). A radiographic image of the lateral incisor showed a typical root formation and a normal root canal.

The Carabelli's cusp trait is most commonly observed in European populations, where frequencies range from 50% to 90% (Laatikanen and Ranta, 1996).

The relation to the neighbouring maxilla teeth is smooth, without any traumatic contact whatsoever as a result of the presence of the Talon cusp. The clinical examination and a panoramic X-ray of all teeth displayed a normal morphological image of all teeth.

The individual's oral hygiene is excellent, without any caries, dental fillings or prosthetic restorations whatsoever.

Results

Following the examination the 113 individuals belonging to this population of Greek origin and residing in the region of Athens in Greece, two cases of Talon cusp were recorded (i.e. a frequency of 2.6%),

which corresponds to a low frequency of occurrence (table1).

Photo 2



In both cases, the tooth displaying the trait was the lateral incisor of the maxilla. In the first case, the Talon cusp was located on the right lateral incisor of the maxilla. The degree of expression was 2 and its shape was a V, according to the Hattab et al. (1996) scoring system. In the second case, the Talon trait was located on the lateral incisor of the left maxilla. The degree of expression was 2 and its shape a V, again according to the Hattab et al. (1996) scoring system.

Conclusions and Discussion

Studies of dental morphological features as well as of metric characteristics are very important in anthropological research, since these provide information on the phylogenetic relation between types and races, as well as on biodiversity within one and the same population (Sharma 1983, Palomino et al, 1997). This is because it is generally accepted that dental characteristics, such as size, form or shape, the presence or absence of and the number of cusps, as well as the size of dental arcs, are determined genetically (Gouse and Lee, 1971). This is why the above- mentioned characteristics differ among geographic populations and types. Furthermore, dental types are subject to continuous change due to natural selection and genetic modifications.

Studies of dental traits in the very interesting geographic area of Greece can provide important data on the genetic constitution and the profile of the dental traits of this particular

geographic population. The Greek demographic group of 113 individuals residing in Athens was analysed in the framework of the present study according to control criteria which were as strict as possible, and hence the research results with respect to the presence or absence of the dental trait investigated, i.e. the Talon cusp, were correspondingly accurate. The results of the ensuing analysis are indicative for this particular Greek demographic group, but they also provide useful comparative material for future studies of other Greek populations encompassing larger numbers of individuals.

The clinical interest of the Talon cusp phenomenon for dentistry is that its presence on the surface of the teeth can cause irritation of the tongue and lips due to its abnormal morphology and anatomical location, as well as abnormal occlusion of the neighboring teeth, periodontitis, as well as caries on the cusp, particularly if this accompanied by grooves. Often, the presence of a Talon cusp requires special treatment, mainly by way of orthodontic intervention, or functional and aesthetic restoration of the tooth. In most cases, however, no dental intervention is required.

The anthropological interest of the Talon cusp phenomenon lies in the fact that its frequency of occurrence differs considerably among different populations, ranging from 0.06% to 7.7%, and occurring most frequently in Asian populations. Faiez Hattab et al.(2001)

Nevertheless, in recent years, due to the migratory movements of various ethnic populations all over the world, the Talon trait may well tend to occur beyond the limits of closely defined ethnic or geographical groups.

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