

UNIVERSIDADE DE SÃO PAULO
FACULDADE DE ODONTOLOGIA DE BAURU

MARIA CLAUDIA WAGNER

**Epidemiological survey of third molars in individuals
from the city of Bauru**

**Levantamento epidemiológico dos terceiros molares
em indivíduos da cidade de Bauru**

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Dissertação constituída por artigo apresentada a Faculdade de Odontologia de Bauru da Universidade de São Paulo para obtenção do título de Mestre em Ciências no Programa de Ciências Odontológicas Aplicadas, na área de concentração Ortodontia.

Orientador: Prof. Dr. Marcos Roberto de Freitas

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Dedico esse trabalho...

*... aos meus filhos Luiz Fernando e Maria Clara
Com todo meu amor, dedicação, carinho e respeito.*

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“A persistência supera o que os fracos consideram impossível.”

Tácito (historiador romano)

ABSTRACT

Objective: This study aimed to evaluate the prevalence, the eruption status and angulation of third molars in orthodontically untreated subjects.

Material and methods: Five hundred panoramic radiographs of individuals from the Bauru region of both sexes, aged between 18 and 50 years, untreated orthodontically, with all teeth present until the second permanent molar were retrospectively selected. It was evaluated the presence of the third molars, their eruption status and their angulation using Dolphin software. The comparison of the prevalence and eruption status between the maxillary and mandibular teeth was performed by the chi-square test and the comparison of the angulations between the eruption status by the one-way ANOVA and Tukey tests.

Results: The prevalence of maxillary third molars is 72.8% and of mandibular ones is 70.3%. There was a statistically significant difference between the eruption status in the maxillary and mandibular third molars. Most of maxillary third molars were erupted (63.19%), 29.94% unerupted, but considered with favorable angulation for eruption. The mandibular third molars had a higher prevalence of impaction than the maxillary molars (21.05% vs 3.85%).

Conclusion: The prevalence of maxillary third molars is 72.8% and of mandibular ones is 70.3%. The maxillary third molars were more erupted than the mandibular ones, which were more impacted and partially erupted than the maxillary ones. The impacted mandibular third molars were more mesially angulated than the other eruption status.

Keywords: Orthodontics, Third molar, Classification, Epidemiology.

RESUMO

Objetivo: O objetivo deste estudo foi avaliar a prevalência, o estado de erupção e a angulação de terceiros molares em indivíduos submetidos a tratamento ortodôntico.

Material e métodos: Foram selecionadas retrospectivamente 500 radiografias panorâmicas de indivíduos da região de Bauru, de ambos os sexos, com idade entre 18 e 50 anos, não tratados ortodonticamente, com todos os dentes presentes até segundos molares permanentes. Avaliou-se a presença dos terceiros molares, seu status de erupção e sua angulação com auxílio do software Dolphin. A comparação da prevalência e do status de erupção entre os dentes superiores e inferiores foi realizada pelo teste qui-quadrado e a comparação das angulações entre os status de erupção, pelo teste ANOVA a um critério de seleção e teste de Tukey.

Resultados: A prevalência dos terceiros molares superiores é de 72,8% e dos inferiores é de 70,3%. Houve uma diferença estatisticamente significativa entre o status de erupção nos terceiros molares superiores e inferiores. A maioria dos terceiros molares superiores se apresentaram erupcionados (63,19%), 29,94% não erupcionados, mas considerados com angulação favorável para erupção. Os terceiros molares inferiores apresentaram maior prevalência de impactação do que os superiores (21,05% vs 3,85%).

Conclusões: A prevalência da presença dos terceiros molares superiores é de 72,8% e dos inferiores é de 70,3%. Os terceiros molares superiores mostraram-se mais irrompidos do que os inferiores, que se mostraram mais impactados e parcialmente irrompidos que os superiores. Os terceiros molares inferiores impactados se apresentaram mais mesialmente angulados do que os demais status de erupção.

Palavras-chave: Ortodontia, Terceiro Molar, Classificação, Epidemiologia.

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1 INTRODUCTION

1 INTRODUCTION

The development of the third molars can impact the development of the dental arches and this change is of great importance, since the mesioangulated teeth may erupt for up to 24 years of age (HATTAB, 1997). The development of the mandibular third molars occurs in the mandibular ramus. Its occlusal surface is directed upward and forward and as the space becomes available, due to mandibular growth, the third molar erupts in a more upright position when normally developed (RICHARDSON, 1983 295).

Unerupted third molars have been associated with several pathological conditions including pericoronaritis, dentigerous cyst, tumor, dental caries, periodontitis, periapical infection and root resorption of adjacent teeth (PETERSON, 1992).

In the early stages of the development of the mandibular third molar, the crypt is deposited on the bone surface, submerged while calcifies and the age of eruption is variable, always after 16 years, with a mean age of 20.5 years (HUGGINS; MCBRIDE, 1978). Therefore, the mandibular third molar is usually impacted due to lack of mandibular growth to allow its eruption (CRYER, 1981).

The third molars in a mesioangulated or horizontal position could have an impact on mandibular anterior crowding and in the stability of orthodontic treatment (RICHARDSON, 1978 299). According to Richardson (1978), there are important changes in the inclination of the mandibular third molars between the ages of 16 and 18 years, the correct development of the third molars does not necessarily result in their eruption, since the contact with the second molar can preclude it and may cause mesioangulated impaction. Mandibular third molars in mesioangulated and horizontal impactions often have a longer distal root curved to mesial (RICHARDSON, 1978).

Engström et al. (1983) found no sexual dimorphism in third molars development, but it seemed to occur mildly earlier in boys than in girls. In general, there was a strong correlation between the chronological age and the mandibular third molars development with the skeletal maturity.

Bishara (1999) reviewed some studies concerning the third molars in the orthodontic context. He reported that the clinician, when deciding whether or not to extract the third molars, should be based in a more precise scientific information and in a more favorable treatment planning for each patient. He concluded that the influence of the third molars on the alignment of the anterior teeth can be controversial, and there is no evidence that these teeth are the only or major etiological factor of the posttreatment changes regarding the incisors alignment (BISHARA, 1999).

Yavuz (2006) found no significant difference between age and sex in the development of the third molars and that the early loss of the first molar is a factor that may also influence the development and eruption of the third molar. This loss is an accelerating factor for development and eruption of the third molar, not following the chronological development of the others (YAVUZ et al., 2006 242). Hattab (1997) also reported that the presence of the mesioangulated third molar may change its trajectory and it can come to erupt up to 24 years. This phenomenon occurs due to the residual growth of the mandible (HATTAB, 1997).

Marchiori et al. (2016) correlated the stage of mineralization and impaction of the third molars in patients aged from 17 to 24 years and the amount of retromolar space, considering that the lack of space for eruption can lead to the impaction of the third molar (MARCHIORI et al., 2016).

The science is advancing and third molars, with a high frequency of extraction, may become important for new reasons and discoveries. Ikeda et al. (2008) found from the collection of dental pulp of an extracted third molar, the presence of multipotent cells, the so-called stem cells. These cells were tested in vitro and responded favorably to tests differing in osteoblasts, neural cells and hepatocytes (IKEDA et al., 2008; ATARI et al., 2011).

2 ARTICLE

2 ARTICLE

The article presented in this Dissertation was formatted according to the American Journal of Orthodontics and Dentofacial Orthopedics instructions and guidelines for article submission.

EPIDEMIOLOGICAL SURVEY OF THIRD MOLARS IN INDIVIDUALS FROM THE CITY OF BAURU

ABSTRACT

Objective: This study aimed to evaluate the prevalence, the eruption status and angulation of third molars in orthodontically untreated subjects.

Material and methods: Five hundred panoramic radiographs of individuals from the Bauru region of both sexes, aged between 18 and 50 years, untreated orthodontically, with all teeth present until the second permanent molar were retrospectively selected. It was evaluated the presence of the third molars, their eruption status and their angulation using Dolphin software. The comparison of the prevalence and eruption status between the maxillary and mandibular teeth was performed by the chi-square test and the comparison of the angulations between the eruption status by the one-way ANOVA and Tukey tests.

Results: The prevalence of maxillary third molars is 72.8% and of mandibular ones is 70.3%. There was a statistically significant difference between the eruption status in the maxillary and mandibular third molars. Most of maxillary third molars were erupted (63.19%), 29.94% unerupted, but considered with favorable angulation for eruption. The mandibular third molars had a higher prevalence of impaction than the maxillary molars (21.05% vs 3.85%).

Conclusion: The prevalence of maxillary third molars is 72.8% and of mandibular ones is 70.3%. The maxillary third molars were more erupted than the mandibular ones, which were more impacted and partially erupted than the maxillary ones. The impacted mandibular third molars were more mesially angulated than the other eruption status.

Keywords: Orthodontics, Third molar, Classification, Epidemiology.

INTRODUCTION AND STATEMENT OF THE PROBLEM

The third molar has long been a subject of discussion, and has been considered a threat when it comes to orthodontics.¹

After the first publications, research began on their formation, development and germ maturation until it eruption in the oral cavity, and if there were differences between the sexes and formation. It was found that in males the formation begins at 8.7 years and ends at 20.2 years and in females starts at 8.6 years and ends at 19.9 years for complete apical formation.² The most commonly unerupted teeth are the third molars when compared to other teeth,^{3,4}

Currently this finding was also obtained in Brazil, a study in 2010 that evaluated patients between 5.5 and 21 years of age. It was observed that there was no difference between age and sex for the development of the third molar.⁵ In the same year a study compared different populations of Belgium, China, Japan, Korea, Poland, Thailand, Turkey, Saudi Arabia and South of India in order to verify if geographical influences could have an impact on the development of these teeth, and found that in males of all these regions the third molars develop early than in females.^{6 241}

It was observed that there is no significant difference between age and sex in the development of third molars and that the early loss of the first molar is a factor that may also influence the development and eruption of the third molar. This loss is an accelerating factor for development and eruption of the third molar, not following the chronological development of the others,⁷ and it can change its trajectory when mesioangulated favoring the irruption until the 24 years of age.⁸

The third molar autotransplantation to places with early losses has also been well studied and with a high success rate in the cases mainly performed when the transplanted tooth is still in apical formation,^{9,10} being a good option in rehabilitation.

In the literature there are several studies that correlate orthodontic treatments with the third molars.¹¹⁻¹⁶

The retromolar space and the position of the third molars change significantly during orthodontic treatment in growing patients, thus when orthodontic treatment with extraoral appliance is evaluated, there is a negative effect on the eruption space of the maxillary third molars,¹⁵ while extractions of premolars have a positive effect on the eruption space of maxillary and mandibular third molars.¹² Therefore, it is important to

take into account the position of the third molars during treatment planning, and above all to know how to conduct cases treated with extractions, considering the third molars position.

It has already been proven that mandibular anterior crowding is a multifactorial condition and that the mandibular third molars are not the responsible for this malocclusion.¹⁷⁻¹⁹ Therefore, to use the anterior crowding as reason for the indication of third molars extraction is not viable. Without a carefully analysis, the prophylactic indication of the third molars extraction is not justified.¹⁴ When planning Class II malocclusion treatment with extractions, the third molars should be analyzed since they contribute to stability.^{12,20}

Thus, knowing and understanding the prevalence of the third molars, their impaction, the eruption status and angulations is imperative to help planning orthodontic treatments and the prognosis of the status of these teeth in the long term.

This way, this study aimed to evaluate the prevalence, the eruption status and angulation of third molars in orthodontically untreated subjects.

MATERIAL AND METHODS

The present study was approved by the Ethics Committee in Humans Research of the Bauru Dental School, University of São Paulo, under the protocol number CAAE: 74515417.2.0000.5417.

Material

The retrospective sample comprised 500 panoramic radiographs of individuals who underwent dental procedures in the city of Bauru, aged between 18 and 50 years of both sexes. These subjects had already performed the panoramic radiography. Inclusion criteria were: presence of all permanent teeth except the third molars that could be absent; no previous orthodontic treatment; absence of orthodontic appliance or retainers.

Sample comprised 500 subjects, 268 females and 232 males, with mean age of 26.64 years (minimum 18.00, maximum 50.00, s.d. 8.04).

Methods

In the panoramic radiograph of each subject, it was evaluated: the presence or absence of the maxillary and mandibular third molars, the eruption status of the present third molars and measurements of the third molars angulation.

Regarding the presence and absence of the third molars: presence was considered when the third molar is present with complete or incomplete rhizogenesis or some indication of the germ of the third molar in formation; absence was considered when no indication of third molar presence, either by agenesis or extraction.

The eruption status was classified as:

Erupted (Figures 1 and 2): when the crown is fully exposed in the oral cavity, and in the radiograph the third molar is well visualized in the same occlusal height as the second and first molars.

Unerupted (Figures 3 and 4): when the tooth is in a favorable position for eruption, but still does not have the crown exposed in the oral cavity, radiographically appears below the occlusal height of the second molar and with the presence of soft tissue covering.

Partially erupted (Figures 5 and 6): when only a part of the crown is visible in the oral cavity, on the radiograph this tooth is generally inclined to mesial and with a slight shading of soft tissue in the distal region.

Impacted (Figures 7 and 8): when the tooth is in a totally unfavorable position to the eruption being very clear its ectopic trajectory, in radiography presents inverted, in horizontal position, severely tipped to mesial or distal.

The third molars angulation was measured in the panoramic radiograph with the Dolphin Imaging software (version 11.5, Dolphin Imaging, San Diego, Calif, USA). Two fixed points were established and reference lines were drawn: the higher point of mandibular condyles for the maxillary reference line and the center of the menton foramen for mandibular reference line (Fig. 9). In the third molars, a line was drawn following the long axis, passing through the pulpar chamber, extended till the reference line; the internal angle of each third molar with the respective reference line was measured (Figures 10 and 11).

Error study

To assess the measurement error, 50 randomly selected panoramic radiographs were evaluated twice by the same operator (MCW) with a month interval between the measurements. To evaluate the error of the third molars' angulation, the random error was calculated by Dahlberg's formula and the systematic errors were evaluated using dependent t tests. To evaluate the error regarding the eruption status, Kappa test was used.

Statistical analysis

Descriptive statistics was performed regarding the presence and absence of third molars, eruption status and the angulations of third molars.

To evaluate the distribution of the presence and absence and of the eruption status between the maxillary and mandibular third molars, the chi-square test was used.

Comparison of the angulation of the maxillary and mandibular third molars of each eruption status was performed with one-way ANOVA followed by Tukey tests.

Statistical analysis was performed with the Statistica Software (Statistica for Windows 7.0, Statsoft, Tulsa, USA). For all tests, the significance level was set at $P < 0.05$.

RESULTS

The casual errors varied from 0.20° (mandibular third molars angulation) to 0.22° (maxillary third molars angulation) and no systematic error was detected (Table I). Kappa coefficient regarding the eruption status showed an almost perfect level of agreement (Table II).

Regarding the prevalence of the third molars, 72.8% of the maxillary third molars and 70.3% of the mandibular third molars are present (Table III). There was no difference in the prevalence of the third molars in the maxillary and mandibular arches (Table III).

Table IV presents the descriptive statistics of the maxillary and mandibular third molars angulation.

Regarding eruption status, there was a statistically significant difference among eruption status in maxillary and mandibular third molars (Table V). For the maxillary third molars, 63.19% were erupted, 29.94% unerupted, 3.85% impacted and 3.02% partially erupted (Table V). For the mandibular third molars, 47.66% are erupted, 14.08% are unerupted, 21.05% are impacted and 17.21% are partially erupted (Table V).

Most of maxillary third molars were erupted (Table V). Mandibular third molars showed a greater prevalence of impaction than maxillary third molars (21.05% vs 3.85%; Table V).

For the maxillary third molars angulation, there was a difference between the erupted and impacted teeth when compared to the unerupted and partially erupted teeth (Table VI).

Mandibular third molars showed similar angulation for erupted and partially erupted status (Table VI). There was a statistically significant difference between the erupted and partially erupted teeth when compared to the unerupted teeth and to the impacted teeth (Table VI). Impacted teeth showed the lowest angulations, followed by the unerupted teeth and then for the erupted and partially erupted teeth, that showed more uprighted mandibular third molars (Table VI).

DISCUSSION

Sample and methodology

Sample was retrospectively selected from previous records regardless of the type of malocclusion and gender, and were excluded cases with tooth loss (except for the third molars) and previous orthodontic treatment, that could influence the position of the third molars.^{7,20} Age of the subjects was from 18 to 50 years, excluding young individuals that could have the third molars an earlier stage than the 9th of Nolla.^{1,2,21}

In the literature there are several methods for evaluation of third molars position, like Pell & Gregory and Winter.²²⁻²⁶ Considering the third molars unerupted, the most commonly used classifications are: regarding tooth angulation²² and regarding the degree of impaction.²³ According to Winter²² the third molars may be vertical, mesioangular, distoangular, horizontal, inverted and buccolingual angulation. The Pell

& Gregory classification²³ relates the occlusal surface of the mandibular third molars to the adjacent second molar (Positions A, B, C) and the mesiodistal diameter of the third molar in relation to the anterior border of the mandibular ramus (Class I, II and III).²⁷

In the present study, we chose not to use these classifications, since our main objective was not to classify and study only the impacted third molars, but find the prevalence of the presence of the third molars, and their eruption status.

The panoramic radiograph was chosen for evaluation of the third molars because it can show details of all structures in the orofacial complex that is important for this assessment.²⁸ It is known that the panoramic radiograph distortion can vary up to 5.37°.²⁵ Structures adopted for measurement of the third molars angulation were chosen according to previous study,²⁹ that evaluated in panoramic radiographs the mesiodistal angulations of all teeth until the second molars in normal occlusion subjects.^{29,30}

Results

Related to the prevalence of the presence of the third molars, 72.8% and 70.3% for the maxillary and mandibular respectively and the absence that were 27.2% and 29.7% for the maxillary and mandibular arches respectively (Table III), it seems a pattern that the maxillary molars shows a slightly greater presence than the mandibular ones.³¹⁻³³

Regarding the eruption status, there was a statistically significant difference among eruption status in maxillary and mandibular third molars (Table V). Maxillary third molars showed to be more erupted (63.19%) than mandibular ones (47.66%) (Table V). Mandibular third molars showed to be more impacted than the maxillary third molars (21.05% vs 3.85%; Table V).

Other studies also found that in the maxilla, the erupted third molars are more prevalent than the unerupted, impacted or partially erupted.³²⁻³⁵

The greater frequency of erupted maxillary third molars is probably because these teeth are more verticalized³² and it favors the vertical development and eruption. In the mandible, the percentage of impacted and unerupted third molars is usually high,^{31,36,37} often leading to the indication of extraction.³⁸⁻⁴²

These differences in eruption status frequency among maxillary and mandibular third molars can be justified by anatomic characteristics of the maxilla and mandible,

pointing out that the mandibular bone is thicker and the space for the eruption of the third molars is limited by more compacted walls.^{35,43}

In general, one can assume that unerupted, impacted and partially erupted teeth will probably not erupt with time, since most of the patients were above 25 years of age. This way, we can join these 3 status in one indicating teeth that will probably not erupt and need to be extracted.

Evaluating this, in the maxillary arch we have a percentage of the erupted third molars of 63.19% and 36.81% of third molars that will probably not erupt correctly and naturally in the oral cavity (Table V). In the mandibular arch, we have only 47.66% of erupted third molars and 52.34%, i.e., the majority, of third molars that will probably not erupt without intervention (Table V). Probably an orthodontic treatment that will improve first and second molars angulation or gain space of extraction and a consequent mesial movement of these teeth will favor the eruption of the third molars that are unerupted or partially erupted.^{12,13,20,44}

For the values of maxillary third molars angulation, there was a difference between the erupted and impacted teeth when compared to the unerupted and partially erupted teeth (Table VI). Mandibular third molars showed similar angulation for erupted and partially erupted status (Table VI). There was a statistically significant difference between the erupted and partially erupted mandibular teeth when compared to the unerupted teeth and to the impacted teeth in the mandible (Table VI). Impacted teeth showed the lower angulation, followed by the unerupted teeth and then for the erupted and partially erupted teeth, that showed more uprighted mandibular third molars (Table VI).

The similarity of the results between third molars erupted and partially erupted is due to the similar position in the mandible. Teeth mesially tipped and covered only by soft tissue are not considered to be pathological potential, unlike teeth that are positioned more distally and are covered by bone,⁴⁵ and this impaction may also be related to the proximity of the mandibular canal.^{46 292,47} Studies have shown that the impacted position of the mandibular third molars are of smaller percentage when compared to the erupted or vertical ones that are the greater percentage, and that the mesial position is the second more found, being often included.^{33,48}

There are authors who defend the prophylactic removal of the third molars in order to avoid future pathologies.^{41,42,49} There are others that suggest that third molars would be extracted only in cases with precise indications.^{14 47,38 97} And there is a more

conservative ones that are against third molars extraction and consider them as treatment option for agenesis or to replace loss of first and second molars or as an option of rehabilitation for tooth autotransplantation.^{10,50}

Several are the studies involving third molars and orthodontic treatment,^{12,13,18,20} which various types of mechanics but with the conclusion that the extraction of premolars as well as the early tooth loss can influence favoring the third molar eruption. Also, the orthopedic mechanics such as rapid maxillary expansion may also influence the position of third molars.¹³ In the mandibular anterior crowding subject, there is no indication that the presence or absence of the third molar can influence these malocclusion.^{17,19}

Final considerations

Panoramic radiographs are the most common radiography and the third molars can be greatly evaluated in these X-ray. Since most dental patients take the panoramic radiograph, it is indicated that third molars are always evaluated, mainly in patients above 18 years of age. Any alteration in the position of these teeth should be treated or followed with time. This way, the presence and the position of the third molars should be observed and correctly interpreted. Third molars in unfavorable positions that can cause injuries to adjacent teeth, resorptions, pathologic cysts, or other, should be extracted or accompanied in the short and long-term. In contrast, these teeth may be a treatment option in the case of early loss of the first or second molars,^{38,44,51} may also contribute to the stability in the treatment of Class II with extractions,^{11,12,20} or even serve as a treatment option for other conditions, since in its pulp just as other teeth contain stem cells.^{52,53} This way, knowing to correctly indicate the removal or permanence and preservation of the third molars is imperative.

CONCLUSIONS

Prevalence of the presence of maxillary third molars is 72.8% and of mandibular third molars is 70.3%.

Prevalence of impaction of third molars was 3.85% in the maxilla and 21.05% in the mandible, i.e., greater for the mandibular third molars. Prevalence of erupted third molars was 63.19% in the maxilla and 47.66% in the mandible, i.e., greater for the maxillary arch.

In the maxillary arch, the angulation of maxillary third molars are similar in erupted and impacted teeth and also similar in unerupted and partially erupted teeth. In the mandibular arch, erupted and partially erupted showed similar angulations, but different from unerupted and impacted teeth, that showed to be more mesially tipped.

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Figure 2 – Status Erupted in the Mandible

Figure 3 – Status Unerupted in the Maxilla

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Figure 9 – References Strutures in the Maxilla and Mandible

Figure 10 – Demonstration of Maxillary Third Molar Angulation Measurement

Figure 11- Demonstration of Mandibular Third Molar Angulation Measurement



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

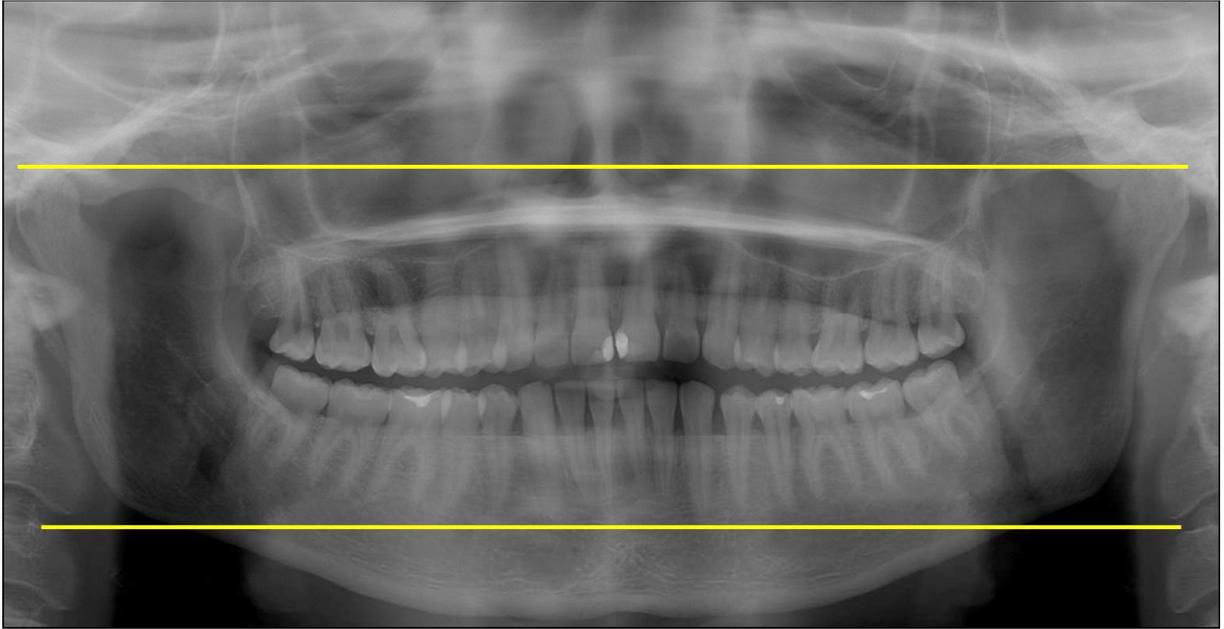


Fig. 9

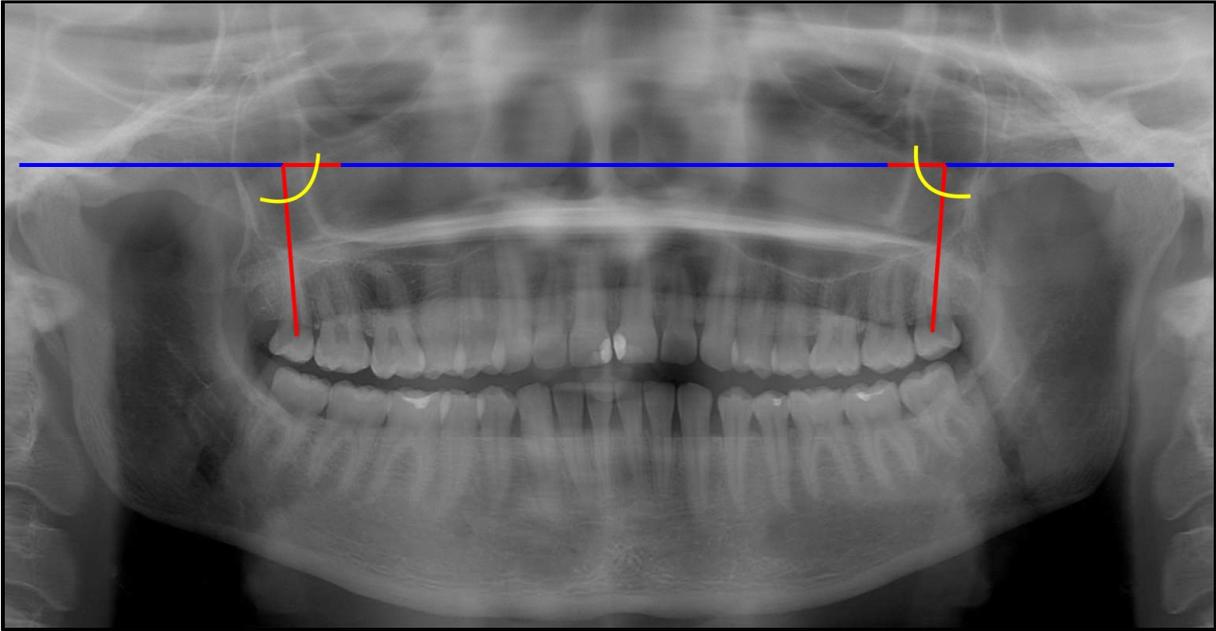


Fig. 10

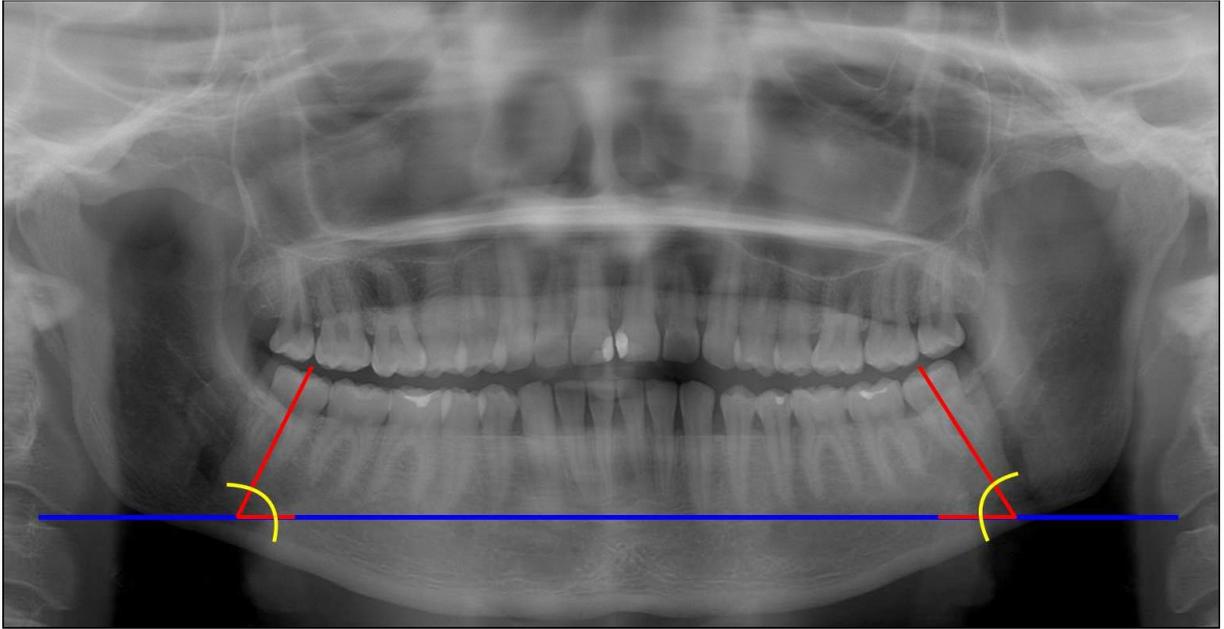


Fig. 11

Table I. Results of the error study; dependent t test for evaluation of systematic errors and Dahlberg's formula for casual errors.

Angulation	1st Measurement N=50		2nd measurement N=50		Dahlberg	P
	Mean	s.d.	Mean	s.d.		
Maxillary third molars (18-28)	106.76	24.18	106.72	24.14	0.22	0.307
Mandibular third molars (38-48)	52.24	22.11	52.25	22.23	0.20	0.820

Table II. Kappa coefficient evaluating level of agreement of eruption situation among the two evaluations.

Variable	Kappa coefficient	Level of agreement
Eruption status	0.91	Almost perfect

Table III. Comparison of distribution of presence or absence of maxillary and mandibular third molars (chi-square test).

Third molars	Present	Absent	Total
Maxillary	728	272	1000
Mandibular	703	297	1000
Total	1431	569	2000
X²=1.53			DF=1
			P=0.215

Table IV. Descriptive statistics of the angulation of maxillary and mandibular third molars.

Tooth	N	Mean	s.d.	Minimum	Maximum
18	357	106.84	16.12	1.5	166
28	371	105.64	15.24	63.2	165.7
38	358	50.85	24.08	0	174.8
48	345	52.34	23.38	0	180
Maxillary	728	106.23	15.69	1.5	166
Mandibular	703	51.58	23.73	0	180

Table V. Comparison of eruption status between maxillary and mandibular third molars (chi-square test)

Third molars present	ERUPTED	UNERUPTED	IMPACTED	PARTIALLY ERUPTED	TOTAL
18	224	105	16	12	357
28	236	113	12	10	371
38	168	49	78	63	358
48	167	50	70	58	345
Third molars present	ERUPTED N (%)	UNERUPTED N (%)	IMPACTED N (%)	PARTIALLY ERUPTED N (%)	TOTAL
Maxillary	460 (63.19%)	218 (29.94%)	28 (3.85%)	22 (3.02%)	728
Mandibular	335 (47.66%)	99 (14.08%)	148 (21.05%)	121 (17.21%)	703
Total	795	317	176	143	1431
X²=214.31		DF=3		P=0.000*	

* Statistically significant for P<0.05

Table VI. Comparison of the angulation of the third molars regarding the eruption status (one-way ANOVA and Tukey tests).

Maxillary Third molars	ERUPTED N=460	UNERUPTED N=218	PARTIALLY ERUPTED N=22	IMPACTED N=28	P
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	
Angulation	103.57 (10.92) A	112.01 (16.10) B	111.89 (14.79) B	100.32 (43.52) A	0.000*
Mandibular Third Molars	ERUPTED N=335	UNERUPTED N=99	PARTIALLY ERUPTED N=121	IMPACTED N=148	P
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	
Angulation	57.98 (11.21) A	46.49 (15.90) B	64.26 (17.09) A	30.14 (35.95) C	0.000*

* Statistically significant for $P < 0.05$

Different letters on the same row indicate the presence of a statistically significant difference.

3 DISCUSSION

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Sample was retrospectively selected from previous records regardless of the type of malocclusion and gender, and were excluded cases with tooth loss (except for the third molars) and previous orthodontic treatment, that could influence the position of the third molars (KIM et al., 2003; YAVUZ et al., 2006). Age of the subjects was from 18 to 50 years, excluding young individuals that could have the third molars an earlier stage than the 9th of Nolla (NOLLA, 1952; LEDYARD, 1953; GARN et al., 1962).

In the literature there are several methods for evaluation of third molars position, like Pell & Gregory and Winter (WINTER, 1926; PELL, 1933; QUERAL-GODOY et al., 2005; SANT'ANA et al., 2005; ALMENDROS-MARQUÉS et al., 2008). Considering the third molars unerupted, the most commonly used classifications are: regarding tooth angulation (WINTER, 1926) and regarding the degree of impaction (PELL, 1933). According to Winter (1926) the third molars may be vertical, mesioangular, distoangular, horizontal, inverted and buccolingual angulation. The Pell & Gregory classification (PELL, 1933) relates the occlusal surface of the mandibular third molars to the adjacent second molar (Positions A, B, C) and the mesiodistal diameter of the third molar in relation to the anterior border of the mandibular ramus (Class I, II and III) (FARISH; BOULOUX, 2007).

In the present study, we chose not to use these classifications, since our main objective was not to classify and study only the impacted third molars, but find the prevalence of the presence of the third molars, and their eruption status.

The panoramic radiograph was chosen for evaluation of the third molars because it can show details of all structures in the orofacial complex that is important for this assessment (PEDRO et al., 2014). It is known that the panoramic radiograph distortion can vary up to 5.37° (SANT'ANA et al., 2005). Structures adopted for measurement of the third molars angulation were chosen according to previous study (URSI et al., 1990), that evaluated in panoramic radiographs the mesiodistal angulations of all teeth until the second molars in normal occlusion subjects (URSI et al., 1990; STAGGERS et al., 1992).

Related to the prevalence of the presence of the third molars, 72.8% and 70.3% for the maxillary and mandibular respectively and the absence that were 27.2% and 29.7% for the maxillary and mandibular arches respectively (Table III), it seems a pattern that the maxillary molars shows a slightly greater presence than the mandibular ones (JÚNIOR et al., 2007; CANDEIRO et al., 2009; XAVIER et al., 2010).

Regarding the eruption status, there was a statistically significant difference among eruption status in maxillary and mandibular third molars (Table V). Maxillary third molars showed to be more erupted (63.19%) than mandibular ones (47.66%) (Table V). Mandibular third molars showed to be more impacted than the maxillary third molars (21.05% vs 3.85%; Table V).

Other studies also found that in the maxilla, the erupted third molars are more prevalent than the unerupted, impacted or partially erupted (ANDREASEN, 1997; JÚNIOR et al., 2007; CANDEIRO et al., 2009; COSTA et al., 2010).

The greater frequency of erupted maxillary third molars is probably because these teeth are more verticalized (CANDEIRO et al., 2009) and it favors the vertical development and eruption. In the mandible, the percentage of impacted and unerupted third molars is usually high (XAVIER et al., 2010; MARCHIORI et al., 2016; PINTO et al., 2016), often leading to the indication of extraction (MERCIER; PRECIOUS, 1992; ADEYEMO, 2006; FRIEDMAN, 2007; MARCIANI, 2007; CAMARGO et al., 2016).

These differences in eruption status frequency among maxillary and mandibular third molars can be justified by anatomic characteristics of the maxilla and mandible, pointing out that the mandibular bone is thicker and the space for the eruption of the third molars is limited by more compacted walls (UGBOKO et al., 2000; COSTA et al., 2010).

In general, one can assume that unerupted, impacted and partially erupted teeth will probably not erupt with time, since most of the patients were above 25 years of age. This way, we can join these 3 status in one indicating teeth that will probably not erupt and need to be extracted.

Evaluating this, in the maxillary arch we have a percentage of the erupted third molars of 63.19% and 36.81% of third molars that will probably not erupt correctly and naturally in the oral cavity (Table V). In the mandibular arch, we have only 47.66% of

erupted third molars and 52.34%, i.e., the majority, of third molars that will probably not erupt without intervention (Table V). Probably an orthodontic treatment that will improve first and second molars angulation or gain space of extraction and a consequent mesial movement of these teeth will favor the eruption of the third molars that are unerupted or partially erupted (KIM ET AL., 2003; DE ALMEIDA-PEDRIN et al., 2006; JANSON et al., 2006; SÖKÜCÜ et al., 2008).

For the values of maxillary third molars angulation, there was a difference between the erupted and impacted teeth when compared to the unerupted and partially erupted teeth (Table VI). Mandibular third molars showed similar angulation for erupted and partially erupted status (Table VI). There was a statistically significant difference between the erupted and partially erupted mandibular teeth when compared to the unerupted teeth and to the impacted teeth in the mandible (Table VI). Impacted teeth showed the lower angulation, followed by the unerupted teeth and then for the erupted and partially erupted teeth, that showed more uprighted mandibular third molars (Table VI).

The similarity of the results between third molars erupted and partially erupted is due to the similar position in the mandible. Teeth mesially tipped and covered only by soft tissue are not considered to be pathological potential, unlike teeth that are positioned more distally and are covered by bone (KNUTSSON et al., 1997), and this impaction may also be related to the proximity of the mandibular canal (CANAL, 2004 292; DE MELO ALBERT et al., 2006). Studies have shown that the impacted position of the mandibular third molars are of smaller percentage when compared to the erupted or vertical ones that are the greater percentage, and that the mesial position is the second more found, being often included (MARZOLA et al., 2006; JÚNIOR et al., 2007).

There are authors who defend the prophylactic removal of the third molars in order to avoid future pathologies (LYSELL; ROHLIN, 1988; ADEYEMO, 2006; FRIEDMAN, 2007). There are others that suggest that third molars would be extracted only in cases with precise indications (MARCIANI, 2007; ALMPANI; KOLOKITHA, 2015). And there is a more conservative ones that are against third molars extraction and consider them as treatment option for agenesis or to replace loss of first and

second molars or as an option of rehabilitation for tooth autotransplantation (MEJÀRE et al., 2004; OSTERNE et al., 2015).

Several are the studies involving third molars and orthodontic treatment (KIM et al., 2003; JANSON et al., 2006; SÖKÜCÜ et al., 2008; JANSON et al., 2011). which various types of mechanics but with the conclusion that the extraction of premolars as well as the early tooth loss can influence favoring the third molar eruption. Also, the orthopedic mechanics such as rapid maxillary expansion may also influence the position of third molars (SÖKÜCÜ et al., 2008). In the mandibular anterior crowding subject, there is no indication that the presence or absence of the third molar can influence this malocclusion (FREITAS et al., 2004; ALIAGA-DEL CASTILLO et al., 2018).

4 CONCLUSIONS

4 CONCLUSIONS

Prevalence of the presence of maxillary third molars is 72.8% and of mandibular third molars is 70.3%.

Prevalence of impaction of third molars was 3.85% in the maxilla and 21.05% in the mandible, i.e., greater for the mandibular third molars. Prevalence of erupted third molars was 63.19% in the maxilla and 47.66% in the mandible, i.e., greater for the maxillary arch.

In the maxillary arch, the angulation of maxillary third molars are similar in erupted and impacted teeth and also similar in unerupted and partially erupted teeth. In the mandibular arch, erupted and partially erupted showed similar angulations, but different from unerupted and impacted teeth, that showed to be more mesially tipped.

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APPENDIX

APÊNDICE A – DECLARAÇÃO DE USO EXCLUSIVO DE ARTIGO EM DISSERTAÇÃO/TESE

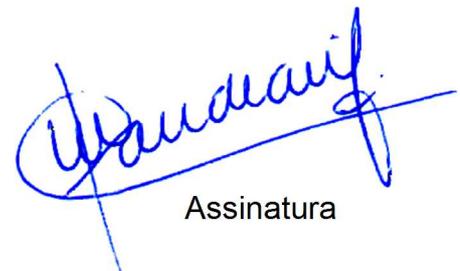
DECLARAÇÃO DE USO EXCLUSIVO DE ARTIGO EM DISSERTAÇÃO/TESE

Declaramos estarmos cientes de que o trabalho Levantamento epidemiológico dos terceiros molares em indivíduos da cidade de Bauru será apresentado na Dissertação da aluna **Maria Claudia Wagner**, não podendo ser utilizado em outros trabalhos dos programas de Pós -Graduação da FOB/USP.

Bauru, 30 de Novembro de 2018.

Maria Claudia Wagner

Nome do autor



Assinatura

Marcos Roberto de Freitas

Nome do autor



Assinatura

ANNEXES

USP - FACULDADE DE
ODONTOLOGIA DE BAURU DA
USP



PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: "Levantamento Epidemiológico dos Terceiros Molares em indivíduos da Cidade de Bauru."

Pesquisador: MARIA CLAUDIA WAGNER

Área Temática:

Versão: 1

CAAE: 74515417.2.0000.5417

Instituição Proponente: Faculdade de Odontologia de Bauru

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 2.274.678

Apresentação do Projeto:

Este estudo tem por objetivo avaliar a presença tanto intraoralmente quanto radiograficamente a angulações dos terceiros molares na população da cidade de Bauru, em indivíduos com idades entre 18 e 40 anos em ambos os gêneros. Para tanto serão selecionadas 1000 radiografias panorâmicas de indivíduos da cidade de Bauru com idade entre 18 e 40 anos em ambos os gêneros, as quais serão analisadas possíveis agenesias e classificadas as angulações conforme Classificação de Winter e Pell & Gregory e fotos intrabucais as quais serão quantificados os terceiros molares observados clinicamente. Para análise estatística dos dados obtidos usaremos a análise descritiva.

Objetivo da Pesquisa:

O desenvolvimento desse estudo objetiva quantificar na população de Bauru, a presença ou não dos terceiros molares, suas posições, permanência e exodontias necessárias por meio de análise epidemiológica, e impelindo e coadjuvando futuros trabalhos de pesquisa.

Avaliação dos Riscos e Benefícios:

Riscos:

Informa a pesquisadora que a pesquisa proposta respeitará toda a parte ética, uma vez que serão obtidos termos de livre esclarecimento para utilização das amostras. Em

Endereço: DOUTOR OCTAVIO PINHEIRO BRISOLLA 75 QUADRA 9
Bairro: VILA NOVA CIDADE UNIVERSITARIA **CEP:** 17.012-901
UF: SP **Município:** BAURU
Telefone: (14)3235-8356 **Fax:** (14)3235-8356 **E-mail:** cep@fob.usp.br

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relação aos riscos biológicos, as radiografias que serão utilizadas tiveram indicação para realização de algum procedimento ortodôntico, e/ou cirúrgico para avaliação, eximindo assim, o risco em excesso à radiação.

Benefícios:

O benefício da pesquisa será em quantificar e auxiliar na conduta dos terceiros molares, em relação a higienização se erupcionados, exodontia em casos de impactação e/ou inclusão, e avaliar se houve aceitabilidade da parte dos pacientes perante a indicação profissional.

Comentários e Considerações sobre a Pesquisa:

Não há.

Considerações sobre os Termos de apresentação obrigatória:

Não fora apresentado TCLE no projeto, devendo ser anexado (o documento intitulado TCLE refere-se a carta de encaminhamento ao CEP).

Recomendações:

Apresentar o documento (TCLE), conforme acima mencionado, encaminhando o projeto para nova análise no prazo legal.

Conclusões ou Pendências e Lista de Inadequações:

Tendo em vista a consideração acima descrita, sou de parecer que o projeto de pesquisa seja considerado PENDENTE.

Considerações Finais a critério do CEP:

Esse projeto foi considerado APROVADO na reunião ordinária do CEP de 06.09.2017, com base nas normas éticas da Resolução CNS 466/12. Ao término da pesquisa o CEP-FOB/USP exige a apresentação de relatório final. Os relatórios parciais deverão estar de acordo com o cronograma e/ou parecer emitido pelo CEP. Alterações na metodologia, título, inclusão ou exclusão de autores, cronograma e quaisquer outras mudanças que sejam significativas deverão ser previamente comunicadas a este CEP sob risco de não aprovação do relatório final. Quando da apresentação deste, deverão ser incluídos todos os TCLEs e/ou termos de doação assinados e rubricados, se pertinentes.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

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Bairro: VILA NOVA CIDADE UNIVERSITARIA **CEP:** 17.012-901
UF: SP **Município:** BAURU
Telefone: (14)3235-8356 **Fax:** (14)3235-8356 **E-mail:** cep@fob.usp.br

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Continuação do Parecer: 2.274.678

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_959475.pdf	28/08/2017 08:03:44		Aceito
Outros	Quest.pdf	28/08/2017 08:03:05	MARIA CLAUDIA WAGNER	Aceito
Outros	Carta_Encaminhamento.pdf	17/08/2017 11:11:22	MARIA CLAUDIA WAGNER	Aceito
Declaração de Pesquisadores	Dec_Pesq.pdf	20/07/2017 17:40:01	MARIA CLAUDIA WAGNER	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE.pdf	20/07/2017 17:38:59	MARIA CLAUDIA WAGNER	Aceito
Projeto Detalhado / Brochura Investigador	Projeto_Detalhado.pdf	20/07/2017 15:05:27	MARIA CLAUDIA WAGNER	Aceito
Folha de Rosto	FolhaMaca.pdf	20/07/2017 14:54:59	MARIA CLAUDIA WAGNER	Aceito

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

BAURU, 14 de Setembro de 2017

Assinado por:
Ana Lúcia Pompéia Fraga de Almeida
(Coordenador)

Endereço: DOUTOR OCTAVIO PINHEIRO BRISOLLA 75 QUADRA 9
Bairro: VILA NOVA CIDADE UNIVERSITARIA **CEP:** 17.012-901
UF: SP **Município:** BAURU
Telefone: (14)3235-8356 **Fax:** (14)3235-8356 **E-mail:** cep@fob.usp.br