

Characterization of macroscopic measures in the articular disc of the temporomandibular joint in different age groups: A morphological and statistical analysis in fresh temporomandibular joints

Caracterização das medidas macroscópicas no disco articular da articulação temporomandibular em diferentes faixas etárias: Uma análise morfológica e estatística em articulações temporomandibulares frescas

Caracterización de medidas macroscópicas en el disco articular de la articulación temporomandibular en diferentes grupos de edad: Un análisis morfológico y estadístico en articulaciones temporomandibulares frescas

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Abstract

Perforation of the temporomandibular joint disc is a condition that can lead to severe pain and functional impairments. This project aims to study the changes present in the articular disc during human aging, considering its macroscopic dimensions, perforation rates, age, and sex. Using an observational study, 16 temporomandibular joints were collected from 08 lifeless bodies by bicoronal post-auricular access. Articular discs were analyzed and recorded via photography. A digital caliper was used to analyze the dimensions of thickness and depth. Sex, age, laterality, thickness in millimeters, extension from medial to distal, and presence of perforation were observed. Pearson's and ANOVA tests were performed. Results show a mean age of 69.75 years (44-87 years, ± 12.5), mean thickness of 2.99 mm (2.07-4.23 mm, ± 0.628), and mean side-to-side dimension of 21.77 mm (11.40-26.38 mm, ± 3.785) and only one piece with disc perforation present (6.25%) – other results suggest at a moderate correlation between variables. The

results of this project are in harmony with other studies in terms of variability in the dimensions of the articular disc related to disc perforation. Given the context, it is suggested that other factors to be investigated in subsequent studies, in addition to those studied in this project, may individually influence the presence or absence of perforation.

Keywords: Temporomandibular joint; Temporomandibular joint disorders; Temporomandibular joint disc; Joint capsule.

Resumo

A perfuração do disco da articulação temporomandibular é uma condição que pode levar a dor intensa e comprometimento funcional. Este trabalho propõe estudar as alterações presentes no disco articular durante o envelhecimento humano, considerando suas dimensões macroscópicas, taxas de perfuração, idade e sexo. Utilizando um estudo observacional, 16 articulações temporomandibulares foram coletadas de 08 corpos sem vida por acesso pós-auricular bicoronal. Os discos articulares foram analisados e registrados por meio de fotografia. Um paquímetro digital foi utilizado para analisar as dimensões de espessura e profundidade. Sexo, idade, lateralidade, espessura em milímetros, extensão de medial para distal e presença de perfuração foram observados. Foram realizados testes de Pearson e ANOVA. Os resultados mostram uma idade média de 69,75 anos (44-87 anos, $\pm 12,5$), espessura média de 2,99 mm (2,07-4,23 mm, $\pm 0,628$) e dimensão látero-lateral média de 21,77 mm (11,40-26,38 mm, $\pm 3,785$) e apenas uma peça com perfuração discal presente (6,25%) – outros resultados sugerem uma correlação moderada entre as variáveis. Os resultados deste projeto estão em harmonia com outros estudos em termos de variabilidade nas dimensões do disco articular relacionadas à perfuração discal. Dado o contexto, sugere-se que outros fatores a serem investigados em estudos subsequentes, além daqueles estudados neste projeto, podem influenciar individualmente a presença ou ausência de perfuração.

Palavras-chave: Articulação temporomandibular; Transtornos da articulação temporomandibular; Disco da articulação temporomandibular; Cápsula articular.

Resumen

La perforación del disco de la articulación temporomandibular es una condición que puede llevar a dolor severo y deterioro funcional. Este trabajo propone estudiar los cambios presentes en el disco articular durante el envejecimiento humano, considerando sus dimensiones macroscópicas, tasas de perforación, edad y sexo. Mediante un estudio observacional, se recolectaron 16 articulaciones temporomandibulares de 08 cuerpos sin vida mediante acceso postauricular bicoronal. Los discos articulares fueron analizados y registrados mediante fotografía. Se utilizó un calibrador digital para analizar las dimensiones de espesor y profundidad. Se observó sexo, edad, lateralidad, espesor en milímetros, extensión de medial a distal y presencia de perforación. Se realizaron pruebas de Pearson y ANOVA. Los resultados muestran una edad media de 69,75 años (44-87 años, $\pm 12,5$), un espesor medio de 2,99 mm (2,07-4,23 mm, $\pm 0,628$) y una dimensión media de lado a lado de 21,77 mm (11,40-26,38 mm, $\pm 3,785$) y sólo una pieza con perforación discal presente (6,25%) – otros resultados sugieren una correlación moderada entre las variables. Los resultados de este proyecto están en armonía con otros estudios en cuanto a la variabilidad de las dimensiones del disco articular en relación con la perforación discal. Dado el contexto, se sugiere que otros factores a investigar en estudios posteriores, además de los estudiados en este proyecto, pueden influir individualmente en la presencia o ausencia de perforación.

Palabras clave: Articulación temporomandibular; Trastornos de la articulación temporomandibular; Disco de la articulación temporomandibular; Cápsula articular.

1. Introduction

The temporomandibular joint is a modified ginglymus-type synovial joint. (Drake et al., 2010; Moore & Dalley, 2003) Unlike most synovial joints in which the articular surfaces are lined with a layer of hyaline cartilage, the joint's lining is fibrocartilage. (Dym & Israel, 2012; Moore & Dalley, 2003). The articular disc divides the joint into two compartments, the superior compartment allows the movement of depression and elevation of the mandible, and the lower compartment allows the movement of protrusion and retrusion. (Drake et al., 2010; Moore & Dalley, 2003). The temporomandibular joint has three extracapsular ligaments, the lateral ligament, the sphenomandibular ligament, and the stylomandibular ligament. (Alomar et al., 2007; Griffin et al., 1975; Sava & Scutariu, 2012).

The articular disc is the most important anatomical structure of the temporomandibular joint, with a biconcave and fibrocartilaginous shape and its long axis being directed transversely. (Hansson et al., 1977; Hatcher, 2022; Iturriaga et al., 2023) The disc is attached to the articular capsule, and to the mandible at its poles of the mandibular condyle. In this way, the condyle-disc complex moves in unison in laterality and protrusion (Dworkin & LeResche, 1992; Gallo, 2012; Nitzan et al.,

1990; Okeson, 2003). The anatomical divisions of the articular disc consist of an anterior, intermediate and posterior bands. (Alomar et al., 2007) In the classification of temporomandibular disorders by Dworkin and Le Resche (1992), we have the division into three groups, namely: (I) muscular disorders, (II) disc displacement (internal derangement) and (III) arthralgia, arthritis and osteoarthritis. Among the three groups, the most common incidence is the displacement of the medial or anterior articular disc, with or without recapture during mouth opening movement (Pontes et al., 2019; Paglio et al., 2018). Clinical manifestations include pain of varying intensity, negatively impacting on quality of life. (Alomar et al., 2007; Pontes et al., 2019; Hansson et al., 1977; Nitzan et al., 1990; Paglio et al., 2018; Pereira et al., 1994). Additionally, literature correlates clinical manifestations with the degree of intra-articular pathological changes (Wilkes, 1989). Given the possibilities of internal joint disorders, there are different types of clinical and surgical approaches, but they depend on an adequate diagnosis. (Dolwick & Widmer, 2023; Zhang et al., 2023).

Histologically, the articular disc has dense connective tissue in its composition, whose fibrillar extracellular matrix is made up of type I and III collagen, in addition to a network of elastic and oxytalan fibers, giving it tensile strength. (Molinari et al., 2007; Shu et al., 2022). Fibroblasts and fibro chondrocytes are the cells responsible for producing this extracellular matrix. The peripheral portions of the articular disc are thick, vascularized, and abundantly innervated, while the central portion is thin and avascular (Griffin et al., 1975). The articular disc is characterized by a high level of water in its composition, approximately 80%, contributing to its malleability and permeability. In contrast, it has a lower glycosaminoglycan content, approximately 3.2%, compared to conventional human articular cartilage, making it more flexible (Singh et al., 2017; Stanković et al., 2013).

When in homeostasis, the vascularization of the articular disc is limited to its edges and peripheral zones. The primary sources of blood supply to the temporomandibular joint disc are the vascular branch of the superficial temporal artery, branches of the anterior auricular artery, and capillaries of the articular capsule (Drake et al., 2010; Moore & Dalley, 2003; Paegle et al., 2002). It is important to note that the central portion of the articular disc is avascular. This means that nutrition to this disc region occurs by diffusion from blood vessels in the peripheral areas. The intrinsic avascularity of the disc contributes to its low capacity for regeneration and recovery in cases of injury or degeneration (González-García, 2015; Jo, 2007). Regarding the venous drainage of the temporomandibular joint and the articular disc, the external jugular vein, the retromandibular vein and the pterygoid plexus, formed by the pterygoid, inferior alveolar, masseteric, deep temporal, palatine, sphenopalatine and infraorbital veins, are responsible (Drake et al., 2010; Moore & Dalley, 2003; Sava & Scutariu, 2012).

The main functions of the articular disc include distribution of tensions, lubrication, movements, absorption of loads, and protection of the underlying bone and cartilage from damage. In the study published by Paglio et al. (2018), the temporomandibular joint discs of 18 lifeless bodies were evaluated in terms of length, thickness and width, with the measurements obtained and ensured with a digital caliper. The result was an average side-to-side dimension of 20.41 mm and a thickness of 2.14 mm. The results showed that the length and thickness of the left articular disc were inversely correlated and there were direct correlations between the right articular disc and the thickness of the mandibular ramus.

Hansson et al. (1977) presented a study in which 115 temporomandibular joints were collected on the right side only, aged one day to 93 years, obtained through autopsy and measured through histological sections, demonstrating that the average thickness of the articular disc in the posterior portion presented the value obtained through sampling of 2.99 mm. However, the authors indicate that the central portion of the disc presented the most negligible thickness and pointed out that a thinning of the thickness of the articular disc in the lateral portion is evident, where such a finding is considered the result of significant functional stress, similar to changes observed in other joints of the human body under identical conditions.

Perforation of the articular disc of the temporomandibular joint is a condition that can lead to severe pain and

contribute to diseases of the temporomandibular joint. Studies show that perforation of the articular disc is not extremely common, but its occurrence is significant in patients with chronic temporomandibular disorders. Studies show that prevalence varies between 5% and 16% in different populations. However, some studies demonstrate rates close to 35% (Iwanaga et al., 2024; Pereira et al., 1994; Widmalm et al., 1994).

Regarding the etiological factors that contribute to disc perforation, we have direct trauma to the jaw, such as falls, car accidents, or assaults, which can cause immediate damage to the articular disc, leading to its perforation. Bruxism, characterized by grinding or clenching of the teeth, exerts excessive pressure on the temporomandibular joint, causing accelerated wear of the articular disc and increasing the risk of perforation. Degenerative arthritis and other chronic inflammatory diseases can cause progressive degradation of the articular disc. Losing structural integrity due to continuous inflammation and enzymatic degradation can lead to perforation. Advanced age also presents a factor that favors the finding of disc perforations. Although controversial, as several studies already demonstrate that the hypothesis is invalid, occlusion disorders can alter the distribution of forces in the temporomandibular joint, leading to uneven wear and excessive stress on the articular disc, culminating in perforation (Al-Ani, 2020; Holmlund & Axelsson, 1994; Kuribayashi et al., 2008; Nebbe et al., 1998; Werner et al., 1991; Widmalm et al., 1994).

The current literature shows a shortage of descriptive observational anatomical studies of careless bodies without applying fixatives. Therefore, discussions are needed between the results obtained by this original study to compare them with those obtained. Most studies on the temporomandibular joint aim to evaluate internal degenerative processes, biomaterials and immunological markers, based on diagnoses, symptoms, clinical findings and through complementary imaging exams such as computed tomography and nuclear magnetic resonance (Al-Moraissi, 2015; Cai et al., 2011; Goiato et al., 2016; Katzberg et al., 1996; Legemate et al., 2016; Wang et al., 2022; Zhang et al., 2023).

Although temporomandibular joint dysfunctions are highly prevalent, and there are numerous discussions in the literature about therapeutic modalities and biomaterials, reports are scarce in the literature about the performance of morphological analyses of the articular disc of the temporomandibular joint in lifeless, fresh bodies, without fixation methods. The hypothesis of the present study envisions the possible association between the constant microtrauma present in this structure throughout human aging, which may or may not be altering the morphology regarding the dimensions of the articular disc. However, having extensive knowledge in the literature that the articular disc is one of the main factors to be considered and evaluated in the face of intra-articular diseases of the temporomandibular joint, this article proposes to study its anatomical dimensions about the chronology of life.

This project aims to study the changes present in the articular disc during human aging, considering its macroscopic dimensions, perforation rates, age, and sex.

2. Methodology

The macroscopic morphological dimensions of the articular disc of the temporomandibular joint were analyzed and a comparative analysis between the variables obtained from the research were performed, correlating them with age along with bibliographic references of similar studies.

Study Design

The proposed study design for this article was an observational descriptive study, a type of study well defined in the scientific literature that allows the elucidation of biological phenomena through observation without intervention and well analyzed by Turner and Houle (2019). 08 lifeless bodies, extracted from 16 temporomandibular joints were collected. Samples

were collected from 4 male and 4 female individuals. The inclusion criteria were fresh lifeless bodies, without fixation methods, previously released by the Death Verification Service of the Capital of the University of São Paulo (SVOC - USP). An informed consent form was filled out, authorized and signed by the responsible family member. The exclusion criteria were lifeless bodies below the second decade of life, those with temporomandibular joint prosthesis, fixation material in the temporomandibular joint region, temporomandibular joint fracture and/or temporomandibular joint ankylosis.

Collection Procedures

The anatomical pieces were removed through a subperiosteal dissection of the bicoronal postauricular access previously performed by the autopsy team of the University of São Paulo's Death Verification Service (SVOC-USP), without requiring new incisions, running through the periosteum to the external surface of the temporal bone up to the root of the zygomatic arch and then entering the articular surface of the temporomandibular joint (Figure 1), without causing any damage to the integrity of the lifeless bodies and without changes in their physical appearance, not affecting the funeral rites. The articular discs removed from the corpses were subjected to analyses comparing their dimensions and individual morphological properties concerning the existence of perforations. All specimens were obtained before the first case of death diagnosed by COVID-19 in the city of São Paulo, with collections beginning in October 2019 and ending in January 2020.

Figure 1 – Temporomandibular articular disc in dissection.



Source: Authors (2019).

As seen in Figure 1, Temporomandibular Joint expresses a lot of specific structures which promote irrigation, innervation and movement. Its dissection reserves the propose of enhance understanding about how connected blood vessels, nerves, cartilage and different muscle bundles are. At the same time, oral and maxillofacial surgeons may refine knowledge and surgical techniques.

The articular disc specimens were analyzed and recorded via photography regarding their macroscopic characteristics, assessing the dimensions of thickness and depth using a digital caliper (Figure 2) and recording their particularities. The specimens were stored in a 10% formaldehyde solution protected from light and a single operator made the records.

Information regarding anthropometric data and age was added to the database.

Figure 2 – Disc dimensions evaluation with a digital caliper.



Source: Authors (2020).

This study was submitted to and approved by the research ethics committee of the Faculty of Medicine of the University of São Paulo through the Plataforma Brasil, under CAAE: 15163119.0.0000.0065 and opinion: 3,485,715, dated August 5, 2019. The ethical principles proposed by the Declaration of Helsinki were followed.

The SVOC-USP registration number was arbitrarily replaced for data analyses. A new generic registration was assigned to preserve and minimize any form of exposure and/or recognition of the lifeless bodies, to which the family members kindly consented and released the dissection and removal of the aforementioned articular discs to promote an immeasurable contribution to this research and data collection, objectively informing that the real SVOC-USP registration numbers are in the researcher's possession for possible consultations if necessary.

Regarding the probabilistic tests, the Pearson test and the ANOVA test related to one factor (laterality) were used, with a p-value lower than 0.05 as the parameter to be considered significant. (Fox & Weisberg, 2020; Jamovi, 2022; Jarek, 2012; Kim, 2015; R Core Team, 2021; Singmann, 2018). Dimension, Thickness, Gender, and Age are variables considered and correlated with themselves.

3. Results

An average age of 69.75 years (44-87 years \pm 12.5), a thickness of 2.99 mm (2.07-4.23 mm \pm 0.628) and a dimension (side-to-side) of its entirety of 21.77 mm (11.40-26.38 mm \pm 3.785) were observed (Table 1). It's interesting to point out that only one disc presented perforation, totaling 6.25% of the total sample (n=16). Tables 1, 2 and 3 are obtained using the referenced software and programs, referring to the Pearson Correlation Matrix and ANOVA associated with one factor (Laterality) (Fox & Weisberg, 2020; Jamovi, 2022; Jarek, 2012; Kim, 2015; R Core Team, 2021; Singmann, 2018).

Table 1 – Collection data.

SVOC	G	I	L	E	D	P
A1	F	70	LEFT	2.10	16.77	NO
A2	F	70	RIGHT	2.55	11.40	NO
B1	M	76	RIGHT	2.07	20.97	NO
B2	M	76	LEFT	2.93	19.55	NO
C1	M	60	LEFT	2.83	25.65	YES
C2	M	60	RIGHT	3.87	24.10	NO
D1	F	80	LEFT	4.23	21.66	NO
D2	F	80	RIGHT	3.18	22.88	NO
E1	M	44	LEFT	2.31	24.32	NO
E2	M	44	RIGHT	3.38	24.40	NO
F1	F	87	RIGHT	3.72	20.85	NO
F2	F	87	LEFT	2.18	20.68	NO
G1	F	62	LEFT	3.33	26.38	NO
G2	F	62	RIGHT	2.78	23.86	NO
H1	M	79	RIGHT	3.37	23.22	NO
H2	M	79	LEFT	3.01	21.76	NO

SVOC = identification of the lifeless body, in generic form; G = gender; I = age (years); L = laterality, E = thickness in millimeters, D = dimension in millimeters; P = perforation. Source: Authors (2024).

The results obtained by the tests (Tables 2 and 3) indicate that there is not enough statistical evidence to state that there are significant correlations between the variables entered. The correlation coefficients are insignificant and the p-coefficient values are higher than the 0.05 significance level. In both cases, the results suggest that the observed variability can be attributed to chance, not a fundamental difference between the groups.

Table 2 – Correlation Matrix – Pearson.

		DIMENSION	THICKNESS	GENDER	AGE
DIMENSION	R (Pearson)	—			
	Df	—			
	p-value	—			
	N	—			
THICKNESS	R (Pearson)	0.350	—		
	Df	14	—		
	p-value	0.184	—		
	N	16	—		
GENDER	R (Pearson)	0.366	-0.030	—	
	Df	14	14	—	
	p-value	0.163	0.913	—	
	N	16	16	—	
AGE	R (Pearson)	-0.357	0.075	-0.391	—
	Df	14	14	14	—
	p-value	0.175	0.783	0.134	—
	N	16	16	16	—

Nota. * $p < .05$, ** $p < .01$, *** $p < .001$. Pearson correlations (R), degrees of freedom (df), statistical significance values (p-value), and the number of observations (N) between the variables Dimension, Thickness, Gender and Age. Source: Authors (2024).

Table 3 – ANOVA Laterality – One-way ANOVA (Welch).

	F	df1	df2	p
THICKNESS	0.577	1	13.7	0.460
DIMENSION	0.186	1	13.1	0.674

F: ANOVA F statistic; df1: degree of freedom between groups; df2: degree of freedom within groups, adjusted by the Welch method; p: p-value, indicating the probability that the observed difference is due to chance. Source: Authors (2024).

Concerning Table 2, there are moderate positive correlations between Dimension and Thickness, but not significant and moderate negative correlations between Dimension and Age, but not substantial. Although the Pearson variable in Table 2 presents results suggestive of an inversely proportional relationship between the age and dimension factor, as well as gender, assuming that there is a possibility of the articular disc of the temporomandibular joint in its dimension presenting a relationship in decreasing size within the chronology of life and being smaller in the female gender and the positive correlation assuming that there are directly proportional variables between dimension and thickness, it is not possible to affirm with statistical reliability that this trend is sustained or attributed to chance.

4. Discussion

Size and Age

In the study by Paglio et al. (2018), the results demonstrated an average value of side-to-side dimension of 20.41 mm and thickness of 2.14 mm and that the length and thickness of the left articular disc were inversely correlated and direct correlations between the right articular disc and the thickness of the mandibular ramus. Data that were not evidenced within the results obtained by the present dissertation research highlighted that the disc's relationship with the mandibular ramus was not collected and considered. However, the proposal of the work by Paglio et al. (2018) was to study the morphology of the joint elements and investigate the viability of a new technique for modeling the articular disc in a biocompatible way to synthesize and apply a biomaterial for replacing irreversibly damaged articular discs. Fresh cadavers were not used, diverging from the proposal and method of the dissertation research.

Comparing the results of the study by Paglio et al. (2018), we have a percentage difference of 28.43% smaller in thickness and a percentage difference of 6.25% smaller in the lateral-lateral dimension. However, it is worth noting again that the collection methods do not present similarity and there is no analysis of the dimensions between the age groups, only a comparison between the sides and the other anatomical structures. Compared with the results of Hansson et al. (1977), it was demonstrated that the average thickness of the articular disc in the posterior portion presented the same value obtained through the samples of this dissertation (2.99 mm). However, data and information, such as the thinning of the thickness of the articular disc in the lateral portion, were not analyzed and quantified in this project. Thus, the collected material raises possibilities for future collections and new analyses.

The results of the collections of Pereira et al. (1994) show that the average thickness of the posterior band of the temporomandibular articular disc is 3 mm, presenting proximity to the value of 2.99 mm found in this study (n=16). Take into account the survey by Alomar et al. (2007) where they describe the dimensions of the thickness of the articular disc as presenting a variable thickness in its portions, with the anterior portion being approximately 2 mm thick, the posterior portion being 3 mm thick and the central intermediate portion being thinner at 1 mm thick, the work does not describe the method in

detail for measuring these data, anthropometric data and case studies, however, it explains that they were obtained through parasagittal, para coronal and axial sections of nuclear magnetic resonance of lifeless bodies, without application of fixation means and asymptomatic from autopsy of temporomandibular joints and compared the corresponding images with coronal and axial cryosections of the joints.

A comparative analysis with the study by Jacomo et al. (2019) was carried out with previously frozen lifeless bodies, where a total number of twelve articular discs were evaluated. Presenting mean values of side-to-side dimension of 24.63 mm and thickness of 4.59 mm, diverging from the results of this dissertation as well as from the studies of Alomar et al. (2007), Hansson et al. (1977) and Pereira et al. (1994). It is worth noting that the collection method of Jacomo et al. (2019) differs from all the studies compared in this discussion and literature review. It is possible to suggest that the technique of freezing and storing lifeless bodies may have altered the dimensions of the tissues. The values obtained through the dissections and measurements of this dissertation present, regarding the value of the thickness of the articular disc, similar to the results of this dissertation, corroborating Pereira et al. (1994), Hansson et al. (1977) and Alomar et al. (2007), with a significant difference concerning the study of Paglio et al. (2018), and with a marked divergence from the results of Jacomo et al. (2019).

Perforation

Regarding the disc perforation rate, the research collected for this dissertation obtained an incidence of 6.25% (one disc), lower than the 17.25% (three discs, out of a total of eight evaluated) reported in the study by Jacomo et al. (2019), and also presenting lower numbers than Widmalm et al. (1994), where the authors report that disc perforation was significantly more prevalent in women (34.3%) compared to men (13.5%) with a probability coefficient (p) value of 0.038 and suggesting a statistically significant difference between the two groups and also demonstrating that indicating that older individuals are more likely to present perforation, having a total of 248 temporomandibular joints. This dissertation also presents lower percentages of disc perforation, however, with a more negligible difference between the data, compared to the study by Touré et al. (2005), which shows a total of 10 disc perforations out of a total of 70 temporomandibular joints evaluated, corresponding to 14%.

A study with lifeless bodies, such as the one carried out in this dissertation, is somewhat restricted because a series of data are not observed due to the lack of clinical information. There is no possibility of having previous reports on the lifeless bodies studied, whether they suffered from symptoms in their temporomandibular joints. However, in our research, the occlusions and the relationships between the dental arches were not considered, given the controversy and several authors have already considered it an obsolete concept with no statistical difference in obtaining and quantifying samples (Al-Ani, 2020; Touré et al., 2005; Widmalm et al., 1994).

Strengths and Weaknesses

Descriptive and analytical studies conducted on lifeless bodies have as their strength matrix greater control over environmental and biological variables, reducing the interference of external factors that may affect the data; they provide direct and detailed access to the internal structures of the temporomandibular joint and articular disc, allowing their complete removal and precise measurements of the dimensions of the articular disc; standardized dissection and measurement protocols on lifeless bodies facilitate comparison between different studies and anthropometric data.

However, studies conducted on lifeless bodies also present factors that demonstrate weaknesses, such as objections to the collection of previous history about joint and systemic diseases that may cause changes to the articular disc and adjacent structures. Autolysis and decomposition processes may alter the integrity of the tissues, affecting the measurements and

interpretation of the results, just as preservation techniques may cause shrinkage or other changes in the tissues, affecting the accuracy of the measurements. Obtaining cadavers from different age groups may be limited, leading to a small and potentially unrepresentative sample size.

Confirming that the articular disc is one of the main factors to be considered and evaluated in the face of diseases and intra-articular internal disorders of the temporomandibular joint, justifies the proposal for collecting and researching its anatomical dimensions concerning the chronology of life. Therefore, the proposal and principle that motivated this dissertation were to evaluate and measure, in the macroscopic anatomical aspect, among different age groups and correlate to discuss the data obtained about the findings of the literature to receive and evaluate the results to support future studies with expanded margins and methods, based on the analyses and discussions performed.

However, most reviewed studies focus on living individuals or use fixed lifeless bodies, which may introduce different biases. This dissertation makes a significant contribution by using fresh, lifeless bodies without the use of fixation methods, offering a unique perspective on the morphological changes of the articular disc of the temporomandibular joint.

To mitigate possible biases, it is necessary to expand the sample sizes in future studies, considering the age groups collected and the method used. Expanding the sample size and carefully considering anthropometric variables are capable and necessary to enable more robust and statistically significant results. In addition, adjusting and refining data collection methods has the potential to provide greater precision in identifying possible significant correlations between the variables studied, since with a statistically small sample, moderate correlations were evidenced about disc size and age, and when compared with similar studies in the literature presenting similar results.

5. Conclusion

This project concludes that, consequently, within the samples of articular discs obtained and analyzed, it was not feasible to state with considerable statistical reliability that the variables dimension, thickness, laterality, perforation, and age are significantly related. Although some correlations are moderate, none of them are statistically significant. This indicates that, for this data set, it was impossible to state that there are strong and significant relationships between these variables statistically and reliably. The comparison with the existing literature shows that the results of this article are in harmony with other studies in terms of variability in the dimensions of the articular disc and in relation to disc perforation.

For future studies, we suggest larger samples and studies that evaluate other signs of temporomandibular disorders as condylar degenerations and disc positional alterations considering movement dynamics.

Conflict of Interest

The authors declare no conflict of interest regarding this study.

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