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The effect of gender and site on the condylar head measurements in Diyala

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Abstract

Background: The condylar process of mandible is an ellipsoid hard tissue (bony structure) with a thin neckline that joins to the mandibular ramus. The condylar processes are a critical anatomic component of the mandible that development of mandibular bone is attributed in the sagittal and vertical directions by condylar process.

Objective: To radiographical assessment of condylar head measurements according to gender and site by uses cone beam computed tomography.

Patients and Methods: The study samples consisted of sixty-five individuals (19 male and 46 female) with age range from (20-50) years old. Width of condylar head, length of condylar head and condylar head height were measured in the study by using cone beam computed tomography from radiology archive in specialist dental center in Diyala.

Results: The results show condylar head width, condylar head height and condylar head length in sides (right and left), males have noted higher mean value than females. The results show condylar head width and condylar head length in left side, have recorded higher mean value than right side. While, condylar head height in left side, have recorded lower mean value than right side.

Conclusion: Condylar dimensions and sizes may be associated with gender and site. Males have higher condylar dimensions and sizes than females.

Keywords: Condylar head, cone beam computed tomography.

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Introduction

One of the most significant joints of the human body, temporomandibular joint (TMJ) is closely associated to the teeth and oral cavity. The oral structures and connected muscles directly regulate the position and role of the mandibular condylar part of the TMJ [1].

According to nearly definitions, the TMJ is a complicated apparatus in the human body that simplifies a number of functions, such as speaking, eating, and swallowing. It also preserves the mandibular site stable and avoids dislocation carried by infrequent or outside forces [2].

Mandibular condyle, articular eminence, glenoid fossa, and articular disc, which are situated between the glenoid fossa and condylar process. All these, are the essential parts of the temporomandibular joint (TMJ).[3].

Because the morphology, size, and interrelations of the TMJ's constituent tissues can vary importantly, anthropologists are interested in the condyle. Such alteration can

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be critical in the diagnosis of disorders affecting the temporomandibular joint.[4].

The condyle, which is the chief location of growth in the jaw, is replies to continuing stimuli during the remodeling process and is therefore critical to the last dimensions of the adult mandible. Both the final mandibular dimensions and the final relationship between the maxillary and mandibular arches might be associated to size and volume of condyle. Evaluating the anomalies and skeletal variations that influence the TMJ needs a radiographic investigation of the TMJ buildings [5].

Multidirectional or clear views of the TMJ are not likely with conventional radiographic imaging, such as panoramic and cephalometric radiography [6]. For oral and maxillofacial requests, cone-beam computed tomography (CBCT) is beneficial due to its high-resolution images and fast image time. TMJ subjects are one of the many conditions for which CBCT is working.[7,8,9].

Therefore, the aims of this study are to evaluation the variations in the mandibular condylar head dimensions involving condylar head width, length and height in sample of Diyala people using CBCT.

Patients and Methods

The study samples consisted of sixty-five individuals (19 male and 46 female) per age variety from (20-50) years.

Study samples were separated into:

1-Group 1 (males): - Nineteen.

2-Group 2 (females): - Forty-six.

Cone beam computed tomography (CBCT) scanner: A NewTom VGi TM CBCT scanner was used to get the pictures. The scanning parameters were (16 cm x 14 cm) or (24 cm x 19 cm) CBCT imaginings, 110VP, 24 seconds, 5.7mA, and a voxel size of 0.5mm.

The condylar height and length dimensions were determined based on the methods described by Krisjane,[10] height of condylar head lined distance between highest of the condylar head and cross-section line in sagittal plane as in Figure (1); length of condyle line distance between furthermost posterior and anterior point of condylar head in sagittal plane as in Figure (1); while the condylar width measurements were determined based on the methods defined by Hilgers,[11] which is the lined distance between the lateral and medial poles of mandible in the coronal plane as in Figure (2).

One investigator measured the condylar height, width, and length using CBCT pictures.

This study included individuals with normal occlusion, non-edentulous individuals, excluded individuals with (class I-II Kennedy classification, history of trauma, facial asymmetry, fracture and cystic lesion of TMJ).

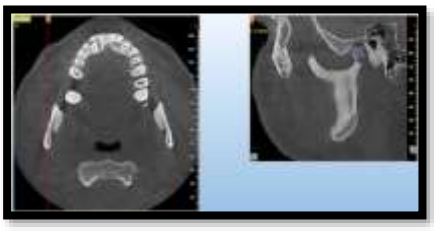

Figure (1): Measurement of condylar length and height in right side of 37 years old male on CBCT in sagittal section.

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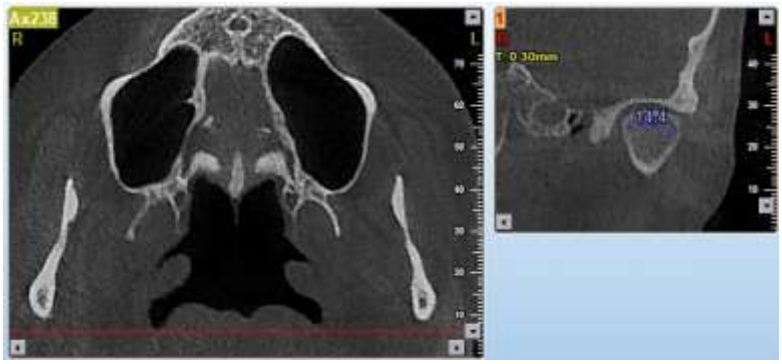

Figure (2): Measurement of condylar width in left side of 22 years old female on CBCT in coronal section.

Statistical Analysis

SAS (2018) -Statistical Analysis System- application was utilized to distinguish the outcome of difference groups (Site and Gender) in study parameters. In this study, the t-test was applied to compare means statistically.

Results

The results illustration condylar head width in sides (right and left), males have documented high mean value (right 15.26 mm, left 16.07 mm) than females (right 14.05mm, left 14.87 mm), with a statistically non-significant relationship as shown in Table (1).

Regarding to condylar head length in sides (right and left), males have documented higher mean value (right 7.48 mm, left 7.26 mm), than females (right 6.99 mm, left 7.23 mm), with a statistically non-significant relationship as shown in Table (2).

Also, condylar head height in sides (right and left), mean value of males (right 3.32 mm, left 2.99 mm) have recorded more than females (right 2.98 mm, left 2.93mm) with a statistically non-significant relationship as revealed in Table (3).

Table (1): Summary data, and t-test (matched paired) for test variances of (condylar width) about (Right and Left) among male and female.

Groups	Site	No.	Mean	SD	SE	MP (t-test)	Df	C.S. (*)
Male	Right	19	15.26	2.62	0.60	1.266	1	0.282 NS
	Left	19	16.07	2.74	0.63			
Female	Right	46	14.05	2.01	0.29	1.051	1	0.469 NS
	Left	46	14.87	2.42	0.35			

* NS: Non-Sig. at P>0.05

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Table (2): Summary data, and t-test (matched paired) for test variances of (condylar length) about (Right and Left) among male and female.

Groups	Site	No.	Mean	SD	SE	MP (t-test)	Df	C.S. (*)
Male	Right	19	7.48	1.19	0.27	0.588	1	0.507 NS
	Left	19	7.26	1.21	0.27			
Female	Right	46	6.99	1.25	0.18	0.602	1	0.244 NS
	Left	46	7.23	1.25	0.18			

* NS: Non-Sig. at P>0.05

Table (3): Summary data, and t-test (matched paired) for test variances of (condylar height) about (Right and Left) among male and female.

Groups	**Site**	**No.**	**Mean**	**SD**	**SE**	**MP (t-test)**	**Df**	**C.S. (*)**
Male	Right	19	3.32	0.68	0.15	0.108	1	0.097 NS
	Left	19	2.99	0.60	0.14			
Female	Right	46	2.98	0.80	0.12	0.391	1	0.745 NS
	Left	46	2.93	0.75	0.11			

* NS: Non-Sig. at P>0.05

Results show condylar head width in left side, have recorded higher mean value (left 15.22 mm), than right side (right 14.41mm), with a statistically non-significant relationship as shown in Table (4).

Regarding to condylar head length in left side, have recorded higher mean value (left 7.24 mm), than right side (right 7.13 mm), with a statistically non-significant relationship as shown in Table (5).

While, condylar head height in left side, have recorded lower mean value (left 2.95 mm), than right side (right 3.08 mm), with a statistically non-significant relationship as shown in Table (6).

Table (4): Effect of Site and Gender in Condylar width.

Measurement	**Gender**	**Mean ± SE**		**T-test (P-value)**
		Right side	**Left side**	
Condylar width	Male	15.26 ±0.60	16.07 ±0.63	1.266 NS (0.282)
	Female	14.05 ±0.2I	14.87 ±0.35	1.051 NS (0.469)
	T-test (P-value)	1.199 * (0.0493)	1.371 NS (0.0855)	---
	Total mean	14.41 ±0.28	15.22 ±0.31	1.22 NS (0.0971)

* S: Sig. at P<0.05, NS: Non-Sig. at P>0.05

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Table (5): Effect of Site and Gender in Condylar length.

Measurement	Gender	Mean ± SE		T-test (P-value)
		Right side	Left side	
Condylar length	Male	7.48 ±0.27	7.26 ±0.27	0.588 NS (0.507)
	Female	6.99 ±0.18	7.23 ±0.18	0.602 NS (0.244)
	T-test (P-value)	0.677 NS (0.219)	0.676 NS (0.471)	---
	Total mean	7.13 ±0.15	7.24 ±0.15	0.510 NS (0.628)

* NS: Non-Sig. at P>0.05

Table (6): Effect of Site and Gender in Condylar height.

Measurement	**Gender**	**Mean ± SE**		**T-test (P-value)**
		Right side	**Left side**	
Condylar height	Male	3.32 ±0.15	2.99 ±0.14	0.108 NS (0.097)
	Female	2.98 ±0.12	2.93 ±0.11	0.391 NS (0.745)
	T-test (P-value)	0.419 NS (0.111)	0.387 NS (0.732)	---
	Total mean	3.08 ±0.09	2.95 ±0.08	0.391 NS (0.655)

* NS: Non-Sig. at P>0.05

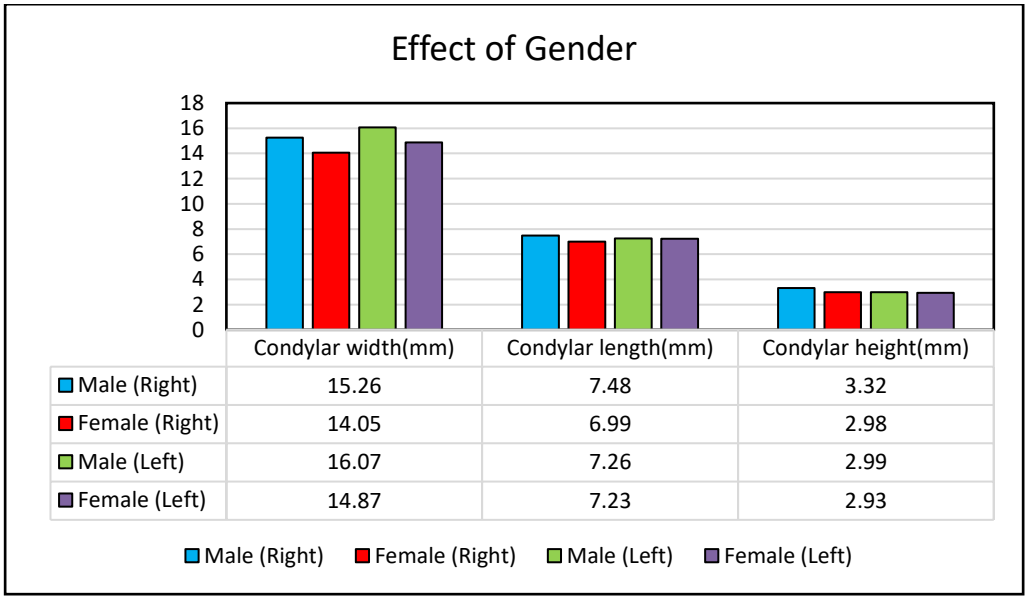

Figure (3): Gathering bar charts of dissimilar parameters among gender in studied groups.

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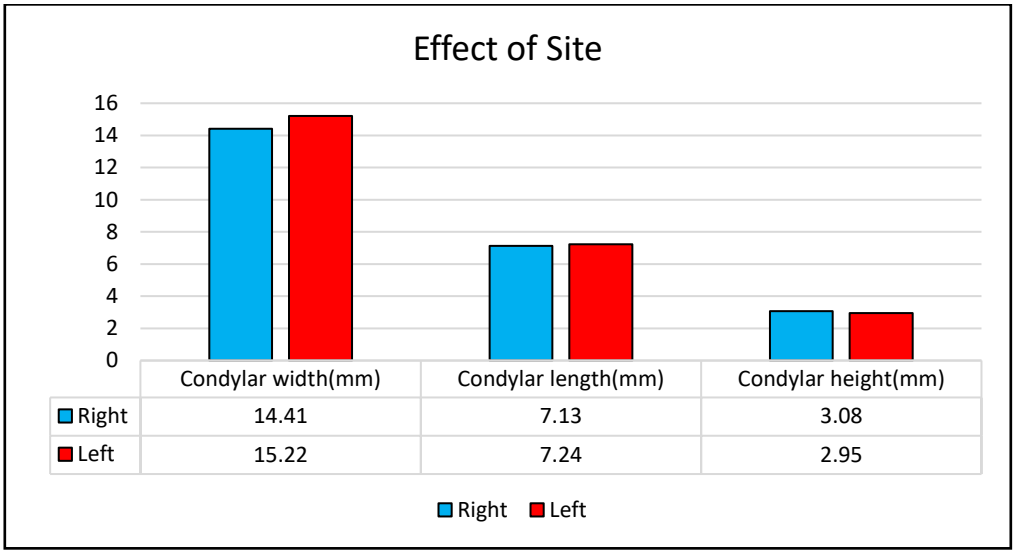

Figure (4): Gathering bar charts of dissimilar parameters among sites in studied groups.

Discussion

Growth of condyle was symmetrical in the age variety less 20 years old, rendering to Neto [12] with variations in front dimension happening during growth.

The presence of the condylar process of mandible may differ from one individual to another and among unlike age groups. A detailed information of the morphology, anatomy and structure is essential in order to differentiate between a normal variation and unusual condyle. Human condyles range in size from 8 to 10 mm antero-posteriorly and from 15 to 20 mm mediolaterally [13].

Compared to computed tomography (conventional), computed tomography (cone beam) exposures patients to fewer radiation and attains high accuracy levels in high-resolution imagery [14].CBCT imagery of TMJ composite, counting the condyle, permits for additional reliable and precise finding of additional delicate bone anomalies in TMJ, which shortens following clinical decisions [15].

Our results show condylar head width in left side and condylar head length have recorded higher mean value than right side. While, condylar head height in left side, have recorded lower mean value (left 2.94 mm), than right side (right 3.08 mm), this may be clarified by the fact that the mandibular condyle is affected by the functional load, occlusal force, kind of malocclusion, and left and right sides. It has understated differences in appearance that are manifest during normal growing or adaptive condylar remodeling to reason for trauma, malocclusion, endocrine diseases, differences in development, and radiation therapy [16,17].

Our results show condylar head length and condylar head height in sides (right and left), males have documented high mean value than females, these results approve with the results of El-Bahnasy,[18] they detailed that no statistically significant variance in the anteroposterior length of the head of condyle

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between males and females. Males had a mean condylar length of 9.20 mm and 9.08 mm on the sides (right and left), respectively more than females which had a mean condylar length of 7.35 mm and 7.24 mm on the sides (right and left), respectively.

These findings matched those of Ishwar Kumar ,[19] they definite that the anteroposterior length of the mandibular condyles was larger in males (9.23 mm and 9.57 mm on the right and left sides, respectively), while the females (8.73 mm and 8.66 mm on the right and left sides, respectively) had lesser values.

Our results show condylar head width in right and left side, males have documented higher mean value than females, this agrees with results of El-Bahnasy,[18] they specified that males had mean mandibular condyle mediolateral width dimensions of 22.17 mm and 22.22 mm on the sides (right and left), respectively; females had mean condylar width measurements of 16.74 mm and 17.03 mm on the sides (right and left), respectively with a statistically significant change.

Similarly, the study of Ishwar Kumar,[19] described that there was no statistically significant change between male and female (the mediolateral width determined on the left side, which was 17.81 mm for females and 18.11 mm for males. On the right side, the condylar width was measured to be 18.10 mm for males and 17.66 mm for females), this may be described by the fact that, the morphologic differences got crossways investigations showed on numerous populations propose that condylar head morphology may vary throughout ethnic groups. It is essential to report and exactly describe all variations. This could aid with the finding of several pathological conditions that affect TMJ [18].

Conclusions

Condylar dimensions and sizes might be linked with gender and site. Males have higher Condylar dimensions and sizes than females.

Recommendations

A new study comprises a larger number of people and compared them to patients suffering from temporomandibular joint disorders.

Source of funding: The current study was funded by our charges with no any other funding sources elsewhere.

Ethical clearance: This study was conducted according to the approval of College of Medicine/ University of Diyala and in accordance with the ethical guidelines of the Declaration of ethical committee of the College (Document no. 2024HMI833).

Conflict of interest: Nil

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تأثير الجنس والموقع على قياسات رأس اللقمة في ديالى

حيدر مهدي عيدان [١]

الملخص

خلفية الدراسة: النتوء اللقمي للفك السفلي عبارة عن نسيج صلب إهليلجي (بنية عظمية) ذو خط عنق رفيع يتصل بفرع الفك السفلي. تُعد النتوءات اللقمية مكونًا تشريحيًا مهمًا للفك السفلي حيث يُعزى تطور عظم الفك السفلي في الاتجاهين السهمي والرأسي من خلال الناتئ القمي.

اهداف الدراسة: لتقييم الشعاعي لقياسات رأس اللقمة حسب الجنس والموقع باستخدام التصوير المقطعي المحوسب بالحزمة المخروطية.

المرضى والطرائق: تكونت عينة الدراسة من خمسة وستين فرداً (١٩ ذكراً و ٤٦ أنثى) تتراوح أعمارهم بين (٢٠-٥٠) سنة. تم قياس عرض الرأس اللقمي وطول الرأس اللقمي وارتفاع الرأس اللقمي في الدراسة باستخدام التصوير المقطعي المحوسب بالحزمة المخروطية من أرشيف الأشعة في مركز طب الأسنان التخصصي في ديالى. تم استخدام تطبيق التحليل الإحصائي SAS (٢٠١٨) – نظام التحليل الإحصائي – لتمييز نتائج مجموعات الاختلاف (الموقع والجنس) في معايير الدراسة.

النتائج: أظهرت النتائج عرض رأس اللقمة، ارتفاع رأس اللقمة وطول رأس اللقمة في الجانبين (الأيمن والأيسر)، وقد لاحظ الذكور قيمة متوسطة أعلى من الإناث. أظهرت النتائج أن عرض رأس اللقمة وطول رأس اللقمة في الجانب الأيسر، قد سجلا قيمة متوسطة أعلى من الجانب الأيمن. بينما سجل ارتفاع رأس اللقمة في الجانب الأيسر قيمة متوسطة أقل من الجانب الايمن.

الاستنتاجات: قد ترتبط أبعاد وأحجام اللقمات بالجنس والموقع. الذكور لديهم أبعاد وأحجام لقمية أعلى من الاناث.

الكلمات المفتاحية: رأس اللقمة , التصوير المقطعي المحوسب بالحزمة المخروطية

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تاريخ قبول البحث: ٢ نيسان ٢٠٢٤

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