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Padmalochini S[1]

Dr. Abirami Arthanari[2*]

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[1]Undergraduate student, Saveetha Dental College and Hospital. Saveetha Institute of Medical & Technical Sciences (SIMATS) Saveetha University , Chennai -77, Tamil Nadu, India.
[2]Senior Lecturer, Department of Forensic Odontology Saveetha Dental College and Hospital. Saveetha Institute of Medical & Technical Sciences (SIMATS) Saveetha University , Chennai -77, Tamil Nadu, India.

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Knowledge On Sex Determination Using Condylar Process Width On Left Side In South Indian Population- A Short Study.

Padmalochini S[1], Dr. Abirami Arthanari[2*]
[1]Undergraduate student, Saveetha Dental College and Hospital. Saveetha Institute of Medical & Technical Sciences (SIMATS) Saveetha University , Chennai -77, Tamil Nadu, India.
[2]Senior Lecturer, Department of Forensic Odontology Saveetha Dental College and Hospital. Saveetha Institute of Medical & Technical Sciences (SIMATS) Saveetha University , Chennai -77, Tamil Nadu, India.
[*]Corresponding Author
Email : 152001059.sdc@saveetha.com[1], abiramia.sdc@saveetha.com[2]

ABSTRACT
Aim: The aim of the study is to identify gender using the width of the left side of the mandibular condylar process.
Introduction: Forensic anthropology is the branch of forensic science which deals with the physical anthropology of the dead remains and helps in the analysis of the skeletal remains with the anatomical knowledge. The mandible is the strongest and the hardest bone of the skull which remains intact. It provides the accurate information to whom it belongs and its has the greater sexual dimorphism among the other skeletal structures. The condyle is the growing interest of the anthropologist because they eventually reported that the condylar width of males is comparatively more than that of females. Sex determination in forensic is foremost because the age and the stature are resting on each other.To do sex determination, the dead remains and the state of dimorphism play a critical role. There is paucity in literature regarding the width of the condylar process in gender determination.
Materials and methods: The study consisted of 60 individuals (30 males, 30 females, Age group: 22-25 years). This study was performed using Orthopantomographs images acquired from patients who were chosen for a variety of dental complaints and needed to be viewed with OPG. The research plan was confirmed by the administration of the Faculty of Dentistry. The study was carried out at the Department of Forensic odontology, Saveetha Dental college, Chennai. Data were analyzed using the Statistical Package for Social Sciences (SPSS), version 20. Regression analysis and chi square tests were performed. Plan maker software was utilized for measuring the condylar process width from OPGs.
Results: The mean absolute error of the study came out to be 1.121. The standard deviation for male is 1.63 and for females is 1.69. Chi- square analysis for gender determination was found to be insignificant. One way anova analysis for gender determination is and it was found to be insignificant. Males have higher condylar process width compared to females.
Discussion: Ramesh et al in their study suggested that the parameters such as condylar height and coronoid height using orthopantomographs are reliable in gender determination and concluded that the condylar height of the right side is the best parameter in gender determination In the present study of the chi square analysis, one way anova analysis was found to be insignificant. But the condylar process width (left side) of the males were comparatively higher than females. Therefore, this ideology could help in sex determination.
Conclusion: Within the limits of the study it can be concluded that condylar process width (left side) of male were comparatively higher than females. But the study is not significant due to Sample insufficiency and less time duration. Since this study was circumscribed to a particular region and population, with more sample size, extended period of time for analysis and with different ethnicity can make the study significant.

Keywords: Condylar process width (left side), sex determination, anthropometry, OPG

INTRODUCTION

Forensic anthropology is the branch of forensic science which deals with the physical anthropology of the dead remains and helps in the analysis of the skeletal remains with the anatomical knowledge[1]. In certain cases the teeth structure and the skull are the only state of evidence [2]. Therefore the mandible is the strongest and the

hardest bone of the skull which remains intact. It provides the accurate information to whom it belongs and its has the greater sexual dimorphism among the other skeletal structures [3].
The Condylar process, which is also known as the condyloid process, is one of the processes of the mandible. It is a round projection which articulates with glenoid fossa of the temporal bone. It is well differentiated from the coronoid process as it is more round and has a fibrous layer whereas the coronoid process has a sharper protuberance. The condylar process and the coronoid process are separated by the sigmoid notch or the mandibular notch. The coronoid process is placed anteriorly whereas the condylar process is placed posteriorly. The lateral pterygoid muscle has its insertion in the condylar process [4]. The condylar process has significant differences in every individual which can be a great tool in gender determination [5]. The condyle is the growing interest of the anthropologist because they eventually reported that the condylar width of males is comparatively more than that of females [6]. Tadej et al described that the major difference in male and female condyle arises due to huge size changes in medio- lateral dimension than the anteroposterior dimension [7] [8].
Sex determination in forensic is foremost because age and the stature are resting on each other.To do sex determination, the dead remains and the state of dimorphism play a critical role [9]. In the mass disasters, determination of sex depends on the skeletal remains available for analysis. The commonly used bones in sex determination are the pelvis, skull, and mandible [10]. Among them mandibles is the study of interest among the researchers because they do not destroy easily like the other bones and they have great strength. Mandibles have greater sexual dimorphism because they differ in size, shape and even the masticatory forces [11] [12].
In a previous research conducted by Jyothsana et al, they concluded that the height of the condylar process in the right side of the mandible showed significant sexual dimorphism [13]. There is paucity in literature regarding the width of the condylar process in gender determination. Therefore, the aim of the study is to identify gender using the width of the left side of the mandibular condylar process.

MATERIALS AND METHODS

The study consisted of 60 individuals (30 males, 30 females, Age group: 22- 25 years). This study was performed using Orthopantomographs images acquired from patients who were chosen for a variety of dental complaints and needed to be viewed with OPG. The study was carried out at the Department of Forensic odontology, Saveetha Dental college, Chennai. Exclusion criteria were: pathological changes in mandible, fractures, bone tumors, systemic diseases affecting bone metabolism; growth disorders; severe osteoporosis, missing teeth, cleft lip or palate. Inclusion criteria:Ideal orthopantomographs of patients with complete dentition were considered. Measurement of condylar process: press the line and draw a parallel line extending from the outermost point of the mesial condyle to the distal outermost point of the condyle. Press measurement (length) and draw straight lines from the two parallel lines. Data were analyzed using the Statistical Package for Social Sciences (SPSS), version 20. Regression analysis and chi square tests were performed. Plan maker software was utilized for measuring the condylar process width from OPGs.

RESULTS

The mean absolute error of the study came out to be 1.121. Standard deviation for both the genders is shown in table 1. The standard deviation for male is 1.63 and for females is 1.69. Chi- square analysis for gender determination is shown in table 2 and it was found to be insignificant. One way anova analysis for gender determination is shown in table 3 and it was found to be insignificant. The comparison of condylar process width differences in gender determination is shown in graph 1. The X axis represents the participants of the study and Y axis represents the condylar process width of the participants. Males have higher condylar process width compared to females.

Table 1: Standard deviation of both male and female gender.

		Male	Female
N	Valid	30	30
	Missing	2	2
	Standard Deviation	1.630	1.098

Table 2: Chi- square analysis for gender determination.

Chi- Square Test

	Value	df	Asymptotic significance (2 sided)
Pearson Chi- square	355.000	357	0,520
Likelihood Ratio	139.797	357	1.000
Linear- by- linear association	0,115	1	0,734
N of valid cases	30	-	-

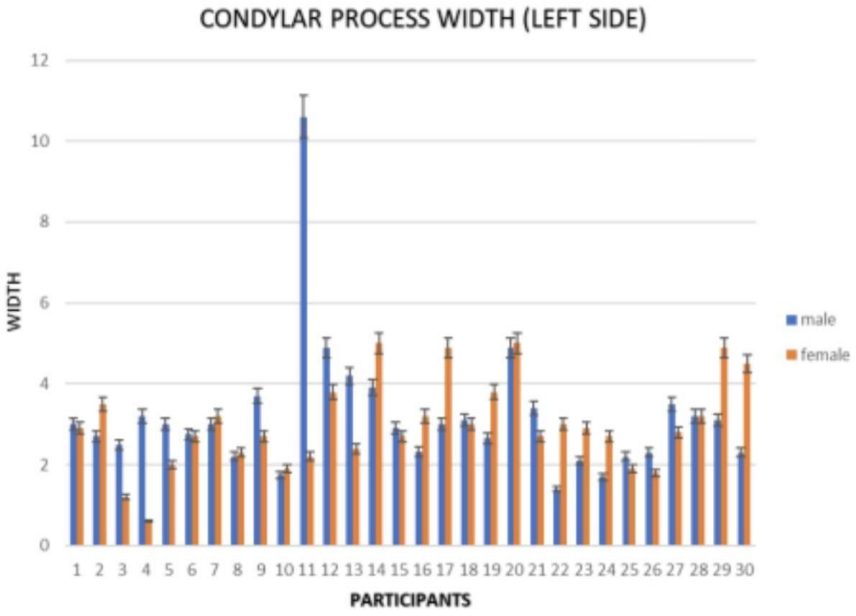
396 cells (100.0%) have expected count less than 5. The minimum expected count is 0.03.

Table 3: One way anova analysis for gender determination

ANOVA

Model	**Sum of squares**	**df**	**Mean square**	**F**	**Sig**
Regression	**0.306**	**1**	**0.306**	**0.112**	**0.741**
Residual	**76.80**	**28**	**2.743**	**-**	**-**
Total	**77.11**	**29**	**-**	**-**	**-**

Dependent variable: male
Predictors: (constant), female



Graph 1 depicts the comparison of condylar process width differences in gender determination. The X axis represents the participants of the study and Y axis represents the condylar process width of the participants.

DISCUSSION

Forensic odontology is an application of principles of dentistry to legal issues and crime scenes. It is an investigative procedure of dentistry that will analyze the available dental evidence for the identification of the

victim. Sex determination is a subclass perspective of forensic odontology. It is important especially when the required information regarding the victim or the deceased is unavailable. Sex determination is the first priority of a forensic expert in the cases of mischievous acts, chemical materials and bomb explosions, natural disasters, and crime. Sex determination using skeletal remains pose a great problem to forensic experts when only fragments of the body are recovered. But, forensic odontologists assist them to determine the sex of the remains using mandible and skull traits [14].

Gender determination using the fragments of bone is an important process in the identification of the unknown and unclaimed bodies. Since the earlier days mandibles have played a vital role and have great significance as a forensic tool in estimation of age, sex and etc. Among the parameters available, the condylar process has been an option for anthropologists for analysis because they have greater accessibility and with higher accuracy than any other parameters used for sex determination [9]

Ramesh et al in their study suggested that the parameters such as condylar height and coronoid height using orthopantomographs are reliable in gender determination and concluded that the condylar height of the right side is the best parameter in gender determination [13] [15]. Indira et al in their study concluded that the mandibular ramus plays an important role in gender determination due to its unique high sexual dimorphism and suggested that the use of mandibular ramus is recommended as an aid for sex determination in forensic science [9]. Shwetha et al in their study concluded that the maximum anteroposterior diameter of the mandibular condyle can assist in gender determination [16]. Fabian et al did sex estimation using the femur of Austrians born in the 19th to the middle of the 20th century and concluded that sex estimation was better with condylar length compared to width [17]. Saini et al compared and contrasted all the parameters and concluded that all the parameters have accuracy of 80% and condylar process height as a single parameter with the highest accuracy of 74% [18] [19].

But in the present study of the chi square analysis, one way anova analysis was found to be insignificant. But the condylar process width (left side) of the males were comparatively higher than females. Therefore, this ideology could help in sex determination. In the other studies the some authors stated that the study is significant and can be used for sex determination. Others say parameters like condylar process height, anteroposterior diameter are better than condylar process width for sex determination. So, it can be concluded that more samples and more time duration is required for assessing the condition and a proper conclusion can be drawn only after correct comparison and assessment of the studied samples.

CONCLUSION

Within the limits of the study it can be concluded that condylar process width (left side) of male were comparatively higher than females. But the study is not significant due to Sample insufficiency and less time duration. Since this study was circumscribed to a particular region and population, with more sample size, extended period of time for analysis and with different ethnicity can make the study significant.

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Conflict Of Interest

All the authors declare that there was no conflict of interest in the present study.

Authors Contribution

PADMALOCHINI S: Literature search, data collection, analysis, manuscript drafting.
Dr. ABIRAMI ARTHANARI: Data verification, manuscript drafting.

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