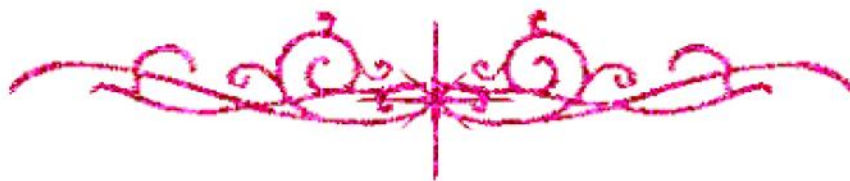


بسم الله الرحمن الرحيم





شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



**"Accuracy of Cone Beam Computed Tomography for Evaluation
of Gingival Biotypes in maxillary esthetic zone"**

(Prospective study)

Thesis

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List of content

List of Abbreviations	I
List of Tables	II
List of Figures	IV
Introduction	1
Aim of the work	3
Review of literature	
Gingival Biotypes	4
Cone Beam CT	13
Patients and methods	36
Results	43
Discussion	57
Summary and Conclusion	64
References	65
Arabic Summary	

List of Abbreviations

2D	Two dimensional
3D	Three-dimensional
CBCT	Cone-beam computed tomography
CCD	Charged coupled device
CT	Computed tomography
FOV	Field of view
FPI	Flat panel imager
GT	Gingival thickness
ICC	Intra class Correlation coefficient
IIT	Image intensifier tube
kVp	Kilovoltage
mA	Milliampere
MDCT	Multi-detector CT
MIP	Maximum intensity projection
MPR	Multi-planar reformation
ROI	Regions of interest

List of tables

Table No.	Title	Page No.
Table (1)	Distribution of the subjects according to demographic data	44
Table (2a)	Descriptive statistics of clinical and radiological assessment	45
Table (2b)	Comparison between clinical and radiological assessment	45
Table (2c)	Intra class correlation coefficient for different parameters regarding the two readings	46
Table (3a)	Summarizes descriptive statistics of clinical assessment and radiological assessment according to gender	47
Table (3b)	Comparison between males and females according to clinical and radiological assessment	48
Table (4a)	Descriptive statistics of clinical assess and radiological assess at inter-observer variation	49
Table (4b)	Comparison between clinical assess and radiological assess regarding inter-observer variation	49
Table (4c)	Intra class correlation coefficient for different parameters regarding the two readings	50
Table (5a)	Descriptive statistics of clinical assess and radiological assess at intra observer variation	51
Table (5b)	Comparison between clinical assess and radiological assess at intra-observer variation	51
Table (5c)	Intra class correlation coefficient for different parameters regarding the two readings regarding inter-observer variation	52
Table (6a)	Descriptive statistics of clinical measurement and radiological measurement	53
Table (6b)	Comparison between clinical assess and radiological measuremen	53
Table (6c)	Intra class correlation coefficient for different parameters regarding the two readings	54

Table (7a)	Descriptive statistics of clinical measurement and radiological measurement	55
Table (7b)	Comparison between clinical assess and radiological measurement at the three different regions	56
Table (7c)	Intra class correlation coefficient for different parameters regarding the two readings	56

List of Figures

Figure No.	Title	Page No.
Figures in Review		
Figure (1)	Clinical photograph shows thin-scalloped biotype with long papillae	6
Figure (2)	Clinical photograph shows thick biotype with denser and more fibrotic soft tissue curtain	6
Figure (3)	Clinical photograph demonstrates measuring gingival thickness using digital caliper	10
Figure (4)	Clinical photo graph shows insertion of the graduated probe into the sulcus.	10
Figure (5)	Clinical photograph shows free application of ultrasound probe at right angle to the tissue	11
Figure (6)	CBCT image acquisition; the X-ray tube and detector move concomitantly around the rotation axis	13
Figure (7)	X-ray beam projection scheme comparing acquisition geometry of conventional or “fan” beam (right) and “cone” beam (left) imaging geometry and resultant image production	17
Figure (8)	Volumetric 3D representation of hard tissue showing the three orthogonal planes in relation to the reconstructed volumetric data set	18
Figure (9)	Bilateral oblique reformatted images of the temporomandibular joints (A, C) created from an axial cut	19
Figure (10)	Axial CBCT image showing the position of cross-sectional images perpendicular to the panoramic curve & cross-sectional images at various positions along the curve, panoramic reconstruction (bottom left), VR (3D) image reconstruction	20
Figure (11)	Construction of ray sum images	21
Figure (12)	Comparison of volume data sets obtained isotropically (left) and anisotropically	22
Figure (13)	Blurring and double cortices caused by motion artifact	25

Figure (14)	Examples of metal artifacts on CBCT images in clinical practice	25
Figure (15)	Axial CBCT image with cupping artifact near a large metallic restoration	27
Figure (16)	Beam hardening artifact adjacent to a silver point and metal artifact streaks from the metal coping	27
Figure (17)	CBCT axial image with a ring artifact caused by calibration error	28
Figure (18)	CBCT mid-sagittal section image demonstrating the cone beam effect; peripheral “V” artifact of increased noise, distortion, and reduced contrast	29
Figure (19)	Aliasing artifact	30
Figure (20)	CBCT axial image of a phantom head: high-dose (A) & low-dose with higher noise level	30
Figures in Patients and Methods		
Figure (1)	CBCT sagittal window shows radiographic indentation made on the stent	37
Figure (2)	Clinical photograph shows patient positioning while wearing radiographic stent	37
Figure (3)	Scout image	38
Figure (4)	CBCT axial window shows sagittal plane passes through an imaginary line connecting radiographic marker, tooth, labial and palatal bone plate.	39
Figure (5)	CBCT coronal window shows sagittal plane is parallel to the long axis of the tooth	40
Figure (6)	CBCT sagittal window shows linear measurement from radiographic marker to external tooth surface	40
Figure (7)	Clinical photograph shows clinical measurement of gingival thickness	42
Figure (8)	Thickness of the radiographic stent. B. shows clinical measurement of g. thickness using digital caliper	42
Figure in Results		
Figure (1)	Diagram showing comparison between males and females according to clinical and radiological assessment	48

Introduction

Gingival biotype is one of the key elements for deciding a successful treatment outcome in many dental procedures **(Kois, 2004; Kao et al., 2008)**. The clinical appearance of healthy periodontal tissue differs from subject to subject. The bulky and slightly scalloped marginal gingiva with thickness more than 1.5 ml is classified as thick biotype and the highly scalloped marginal gingiva with thickness less than 1.5 ml is classified as thin biotype. **(De Rock and Egabali, 2009)**

There are many clinical applications for gingival biotype assessment as: In crown lengthening procedures, the amount of tissue exposure required for further rehabilitation of the tooth dictates the amount of bone removal during the procedure. Significant postoperative tissue rebound has been observed in cases of thick biotype as compared to thin biotype. Thus, tissue biotype is an important feature to be assessed in such cases, and slight overcorrection or immediate rehabilitation may be advised in such cases. **(Esfahrood and Kadkhodazadeh, 2013)**

Also in the course of orthodontic therapy, teeth are moved in various directions (buccally, lingually and coronally,). In an attempt to bring teeth in an ideal position, it may sometimes lead to soft tissue recession or hard tissue dehiscence and fenestration. It has been observed that such tooth movement results in increased recession and increased incidence of dehiscence and fenestration formation in cases with thin biotype. **(Esfahrood and Kadkhodazadeh, 2013)**

Moreover, in thick biotype cases immediate placement of an implant can be completed with predictable results while in thin biotype cases, the possibility of significant resorption, which may have an impact on esthetics, is high. A delayed implant placement should be preferred

when the thickness of the periodontal tissues is not sufficient. In thin biotype cases, preemptive biotype correction may be considered. The tissue biotype is considered a key factor in implant esthetics, preventing future mucosal recession, and improving immediate implant success. Also the thickness of soft tissue can negatively influence the outcome of regenerative surgery. **(Kois, 2004; De Rock, 2009)**

The difference in gingival and osseous architecture has been shown to exhibit a significant impact on the outcome of periodontal, restorative and implant therapy. **(Esfahrood, 2013; Ardekian, 2009)** In a study by De Rock et al revealed that the thin gingival biotype occurred in one third of study population and most of them were females while the thick biotype occurred among the two thirds and most of them were males. **(De Rock, 2009; Ardekian et al., 2009)**

Many methods had been used to measure the gingival thickness which includes: Direct measurements of the gingiva using endodontic spreader with a rubber stop/caliper inserted at a point at the center of the gingival margin and muco-gingival junction in a perpendicular direction and this measurement is recorded against a digital caliper. It is an accurate method of measurement; however it is an invasive technique. **(Kan et al., 2010)**

CBCT is used to visualize and measure the thickness of both hard and soft tissues. Highly accurate results can be achieved using CBCT and there is no inter-examiner variation. **(Sunil et al., 2016, Barriviera et al., 2009)**

Aim of the work

The study aims to evaluate the validity of CBCT in determination of gingival biotype in maxillary esthetic zone.

Gingival Biotypes

Gingiva is the clinical term for gums. These are found in the oral cavity or mouth of a human being. They consist of mucosal tissue that covers the alveolar processes of the maxilla and mandible and finish at the neck of each tooth. There are two anatomical types of gingiva that are clearly recognizable and they are known as the marginal gingiva that is mobile and the attached gingiva.

The marginal gingiva is a 1.5 mm strip of gingival tissue which surrounds the neck of the tooth and is known as such due to the fact that the inner wall forms the gingival wall of the sulcus. This means that when a probe is placed at the gingival margin in a healthy mouth, it can be inserted up to three millimeters into the sulcus formed between the tooth and the mucosa, due to the fact that the soft tissue is moveable. The second type is the attached gingiva which is the gingival tissue which lies between the mobile gingiva and the alveolar gingiva. It is four to five millimeters in width and is irremovable from the underlying structures without causing damage. (Ochsenbein et al., 1969)

Histologically, the **gingival epithelium** forms the external surface of the gingiva including the mobile and fixed areas as well as the gingival sulcus and the junctional epithelium. It is divided up into three major sections known as the oral epithelium, sulcular epithelium and the junctional epithelium. (Eke et al., 2009)

The **oral epithelium** is comprised of **stratified squamous keratinizing epithelium** and covers the oral and vestibular gingival surfaces. It is limited by the mucogingival junction and the gingival margin and also merges with the palatal epithelium at the borders of the palate. The **sulcular epithelium** is continuous with the oral epithelium

and lines the gingival sulcus. At the bottom of the gingival sulcus in its apex, the junctional epithelium lines the dento-epithelial junction. **(Eke et al., 2009)**

Gingival biotypes are of two types. They are scalloped and thin or flat and thick gingiva. The contour of the gingiva closely followed the contour of the underlying bone, also the gingiva categorized into “thick - flat” and “thin – scalloped” biotypes. **(Ochsenbein et al., 1969)**

A gingival thickness of ≥ 2 mm (measurements of 1.6–1.9 mm were not accounted for) was considered as thick tissue biotype and a gingival thickness of < 1.5 mm was referred as thin tissue biotype. **(Seibert and Lindhe, 1989)**

Three different periodontal biotypes are also proposed: flat, scalloped and to the height at the direct mid-facial, their findings are as follows: flat = 2.1 mm, scalloped = 2.8mm, pronounced scalloped = 4.1 mm. **(Rasperini et al., 2014)**

The thick periodontal biotype was more prevalent than the thin scalloped form (15%). **(Barriviera et al., 2009)** Thick periodontal biotypes are usually associated with periodontal health. The tissue here is dense and fibrotic with a large zone of attached gingiva. Patients with thick-flat biotypes demonstrate short papillae whereas thin-scalloped biotypes show long papillae. This morphometric disparity could result in a more papilla loss in the latter (Fig. 1). The other distinctive features of a tissue with thick biotypes include flat soft tissue and bony architecture, denser and more fibrotic soft tissue curtain, large amount of attached masticatory mucosa (Fig. 2), resistance to acute trauma and respond to disease with pocket formation and infra bony defect. Moreover, the teeth are squarer in shape and shows flatter posterior cusps. The contact areas