

Acknowledgment

**Praise and thanks are to ALLAH the lord and creator
of the world.**

**I would like to specify my acknowledgement to my
supervisor Dr. Mohammed Ahmed Ali for sincere
supervision and guidance. Also much thanks and
gratitude to my colleagues at Medical Heart Center,
and to the most generous, encouraging persons in my
life, My mother and My Father**

Dedication

Dedication

To my parents

To my teachers

To my sisters

To my brothers

To my friends

List of Figures

	Figure caption	Page
	Figure 1.1 shows the anatomy of the esophagus and the related abdominal structures	1
	Figure 1.2 shows the cross section of the esophageal wall and the lymphatic supply	5
	Figure 2.1 shows a patient of 71 years old presented with abdominal discomfort. (A) CT chest showed abnormal esophageal thickening from mid to distal esophagus. Endoscope revealed moderate well differentiated Adenocarcinoma 25-35 cm. (B, C) were PET scan and combined PET-CT, (C) showed abnormal uptake in same area. (D) Coronal PET showed extended microscopic foci of cancer with more obvious relative to CT.	12
	Figure 2.2 Localized esophageal carcinoma. A, Right anterior oblique esophagram. Small esophageal carcinoma. B, CT scan. Slight asymmetric thickening of esophageal walls.	15
	Figure 2.3 CT scan of large circumferential carcinoma of esophagus. Tissue planes are obliterated between esophagus, bronchi, and aorta indicating tumor invasion.	16
	Figure 4.1 shows the incidence percent of esophageal carcinoma distributed based on gender	18
	Figure 4.2 shows the incidence percent of esophageal carcinoma in the esophagus segments	19
	Figure 4.3 shows the frequency percent of esophageal carcinoma histology types	20
	Figure 4.4 shows the differentiation of common histopathology types based on CT number	21
	Figure 4.5 shows the distribution of esophageal carcinoma incidence in Sudanese states	22
	Figure 4.6 shows the correlation between the tumor size and the invasion profile in cm	23
	Figure 4.7 shows the correlation between the radiation field size and the tumor size in cm	24
	Figure 4.8 shows the correlation between tumor size in cm and the esophageal lumen percent	25

List of Tables

	Table caption	Page
	Table (1.1) demonstrates the Causative and Risk Factors for Adenocarcinoma AC and Squamous Cell Carcinoma SCC.	3
	Table 1.2: Clinical Usefulness and Accuracy of Modalities Used in Staging of Esophageal Cancer	8

Abstract

The following thesis is about an assessment of sub-mucosal invasions for esophageal carcinoma using CT. It has been carried out in 70 patients presented with ca. esophagus in Khartoum hospital, the summation of CT slice thickness taken to derive the tumor extension in submucosal as well the tumor size has been determine together with a CT number, histopathology and patients demography.

The collected data has been analyzed using SPSS and it revealed that: the esophageal carcinoma is predominant among male relative to female with a percent of 71.4 and 28.6 respectively and the most susceptible segment of esophagus for carcinogenesis is the lower 3rd. with a percent of 54.3, then the middle 3rd. taking a percent of 37.1 and the minimum incidence observed in the upper 3rd. with a percent of 8.6, while the common histopathology type of esophageal carcinoma is the Adenocarcinoma that involve the lower 3rd. with 64.3% in contrast with other types such as squamous cell carcinoma SCCa and carcinoma insitu CaIns which representing 34.3% and 1.4% respectively. And the CT scan revealed that the adenocarcinoma type has an average CT number of $42.3 \pm \text{St. Dev } 1.0$ greater than that of SCCa which was $37.6 \pm \text{St. Dev } 1.1$.

The distribution of ca esophagus in Sudan showed 27.1% in the East state, North of Sudan state 21.4% and 20% has been encountered in Khartoum. The study also showed that there is a linear proportional relationship between the tumor size and the sub-mucosal invasion in cm that fitted in the equation: $y = 1.6x + 1.5$ where x refers to invasion profile in cm and y refers to tumor size in cm, while the correlation between the radiation field size and the tumor size was so weak ($R^2 = 0.05$) and revealed that not all the tumor extension encompassed with the field size.

The study also revealed that there is a linear reversed relationship between tumor size in cm and the esophageal lumen percent as well as when the lumen diameter decreased to 1.3 cm, everyone could have solid food or regular diet dysphagia.

الخلاصة

تهدف هذه الدراسة الى تقييم غزو سرطان المريء للطبقة تحت المخاطية بواسطة الأشعة المقطعية للمقارنة مع ملائمة الحقل الإشعاعي العلاجي . أجريت الدراسة على 70 مريضا بمستشفى الخرطوم ، حيث تم جمع سمك صورة الأشعة المقطعية و رقم الأشعة المقطعية CT No لتحديد غزو السرطان تحت الطبقة المخاطية و حجم الورم و كذلك ديموقرافية المريض .

تم تحليل البيانات بواسطة برنامج Social Package for Statistical Science SPSS و الذي أوضح ان سرطان المريء يسود في الرجال بنسبة 71.4% مقارنة بالنساء و أكثر مقاطع المريء إصابة بالسرطان هو المقطع السفلي بنسبة 54.3% يليه المقطع الأوسط بنسبة 37.1% و أقلهم إصابة هو المقطع الأعلى بنسبة 8.6% كما أوضحت الدراسة ان نوعية السرطان الغدي أكثر شيوعا و يصيب المقطع السفلي من المريء بنسبة 64.3% مقارنة بالسرطان الحرشفي و السرطان البدائي (Insitu) بنسب 34.3% و 1.4% على التوالي . بينما أوضحت الأشعة المقطعية ان السرطان الغدي ذو رقم اشعة مقطعية (CT No) قدره 42.3 ± 1.0 أكثر منه في السرطان الحرشفي و الذي قدره 37.6 ± 1.1 ف المتوسط .

أوضح التوزيع الجغرافي ان سرطان المريء يمثل بكل من شرق السودان 27.1% ، شمال السودان 21.4%، الخرطوم 20% و نسب بسيطة في بقية الولايات . كما أوضحت الدراسة ان هناك علاقة طردية بين حجم الورم و الغزو تحت الغشاء المخاطي يتبع للعلاقة من نوع $y = 1.6x + 1.5$ حيث x تشير الى إمتداد الغزو السرطاني تحت الغشاء المخاطي و y تشير الى حجم الورم . أيضا أوضحت الدراسة ان العلاقة بين الحقل الإشعاعي و حجم الورم ضعيفة مؤكدة عدم تغطية الورم كاملا بحقل الإشعاع بمعامل ارتباط قدرة $R^2 = 0.05$ كما ان هناك علاقة عكسية بين حجم الورم و تجويف المريء تشير الى ان نقص التجويف الى 1.3 سم يؤدي الى صعوبة في بلع الأطعمة الصلبة .

Table of Content

CHAPTER	Contents	Page
	Acknowledgement	i
	Dedication	ii
	List of Figures	iii
	List of Tables	iv
	Abstract	v
	الخلاصة	vi
	Table of Contents	viii
1	Introduction, Problem of the study, Objectives and thesis outline	1
2	Literature Review	11
3	Methodology 3.1 Materials 3.2 Method	17
4	Results and Discussion	18
5	Conclusion Recommendation References Appendices	26 27 29 32