



**Sudan University of Sciences and Technology**  
**College of graduate studies**



## **Diagnosis of Para-Nasal Sinuses Disease Using Computed Tomography**

**المقطعيه تشخيص امراض الجيوب الانفيه باستخدام الاشعه**

A thesis submitted for partial fulfillment of M.Sc. degree in diagnostic radiologic technology

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**2017**

# الآية

بسم الله الرحمن الرحيم

قال تعالى:

(وَمَا تَوْفِيقِي إِلَّا بِاللَّهِ عَلَيْهِ تَوَكَّلْتُ وَإِلَيْهِ أُنِيبُ)

صدق الله العظيم

[سورة هود الآية ٨٨]

# **Dedication**

*To my family*

*To my husband*

*To my little son*

*To my Teachers*

*To my friends and colleagues*

# Acknowledgments

Thank my God who enable me to realize the genuine meaning of success ,my gratitude to my supervisor Dr. Asma Ibrahim Ahmed, who did not hesitate to devote her knowledge and time for me, and giving her positive arguments in the field of radiology and computerized tomography.

Grateful acknowledge to the staff of Alyaa specialized hospital for their co operation.

Special thanks to everyone participated in this work by any way either encourages advising or appreciating our research.

## ABSTRACT

The cross –sectional descriptive study aimed to diagnose of paranasal sinuses disease using computed tomography. The study conducted at Alyaa specialized hospital during the period from (February to September 2016). The sample size was 100 cases- with different symptoms were chosen axial and coronal cuts, done to explain the suitable technique to demonstrate all the para-nasal sinuses disease clearly. Data was collected and analyzed by *SpssSoftware*.

The result of the study showed Rhino Sinusitis is the commonest sinus disease.

And the most age group affected with para-nasal sinuses disease is (31-40) years which account of 30% out of cases.

Rhino sinusitis was a large percentage in female group (31%) and as same as polyps in male (25%).

The study conducted that computed tomography was the best modality in diagnoses of paranasal sinuses disease.

The study recommended that two images planes (axial coronal )should be performed together for pt complain of paranasal sinuses problem.

## ملخص الدراسة

هذه دراسه وصفيه تهدف الدراسة لتشخيص أمراض الجيوب الأنفية باستخدام الاشعالمقطعيه .

أجريت هذه الدراسه بمستشفى علياء التخصصي في الفترة من فبراير وحتى سبتمبر ٢٠١٦ ، شملت الدراسة عدد (١٠٠) مائة حالة بأعراض سريرييه مختلفه عند اختيار الوضعين المحوري والتاجي لتوضيح كل أمراض الجيوب الأنفية بصورة دقيقة.

خلصت الدراسة إلى أن التهابات الجيوب الأنفية هي المرض السائد في العينة المختارة للدراسة كما أن أكثر مجموعة عمرية عرضه للإصابة بأمراض الجيوب الأنفية هي الفئة العمرية من (٣١ – ٤٠) بنسبة ٣٠% من الحالات.

التهاب الجيوب الأنفية أعلى في الإناث بنسبة ٣١% أما في الذكور فيتساوى مع لحمية الأنف بنسبة ٢٥%.

الاشعالمقطعيه هي افضل طريقه لتشخيص امراض الجيوب الانفيه.

اوصت هذه الدراسه بعمل الوضعين المحوري والتاجي مع بعض عند وجود اي مشاكل في الجيوب الانفيه.

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## **List of Abbreviations**

CAT	Computerized Axial Tomography
CT	Computed tomography
FESS	Functional Endoscopic sinus Surgery
MRI	Magnetic Resonance Imaging
PNS	Paranasal Sinuses

# CHAPTER ONE

## INTRODUCTION

### 1-1 Introduction:

Computer Tomography scan is a mandatory radiological investigation for patients undergoing FESS. CT scan helps identify these anatomic variations. Many centers use the three millimeter cuts for all views – coronal, sagittal and axial to assess the different anatomical structures of the lateral nasal wall and the paranasal sinuses. The coronal views are best for the sphenoid and the ethmoid cell variants such as the onodi or sphenoethmoidal cell. (Ramakrishnan2011)

CT scan are special\_ X ray tests that produce cross sectional images of the body using X ray and a computer, CT produces a volume of data that can be manipulated through a process known as " windowing" in order to demonstrate various body structures,CT is non invasive , safe, and well tolerated. It provides a highly details look at many different parts of the body.(Kennedy 2001)

Computed tomography (ct) of the sinuses to evaluate the paranasal sinus cavities- hollow ,air-filled spaces within the bones of the face surrounding the nasal cavity. Ct scanning is painless, and accurate. It,s also the most reliable imaging technique for determining if the sinuses are obstructed and the best imaging modality (radiologyinfo.org)

The para nasal sinuses are hollow air filled spaces locates within, the bones of face and surrounding the nasal cavity. And consist of four pairs of sinuses There are only two planes are common for imaging the sinuses coronal and axial ( Yousem 1993).

The anatomy of nose and para nasal sinuses is complex. This complexity makes difficult for detailed clinical assessment. Computed tomography (CT) has replaced plain radiography especially prior to functional endoscopic sinus surgery (FESS) due to anatomical precision required by surgeons. CT in

coronal plain simulates the endoscopic surgeon's view of sinonasal cavity. CT has also been found to be superior to magnetic resonance (MR) in planning FESS. Coronal CT has become the investigation of choice in evaluation of pathologies of nose and paranasal sinuses especially in planning FESS.(RESCounc 2015)

### **1-2problems of the study:**

Diseases of the Paranasal sinuses include wide spectrum ranging from inflammatory conditions to neoplasms, both benign and malignant. Plain film is inaccurate and inadequate in the diagnosis of non-neoplastic and neoplastic conditions of PNS.

CT has replaced conventional radiographs as imaging modality of choice for assessment of PNS diseases. CT scan series provides an excellent and comprehensive evaluation of PNS regarding the anatomy, anatomic variants and pathology of PNS.

### **1.3 Objective of the study:**

#### **1.3.1 General Objective:**

To Diagnosis of paranasal sinuses disease using computed tomography

#### **1.3.2 Specific Objectives:**

To diagnose the disease of PNS accurately.

To know association between disease and pt sex and age.

To evaluate the frequency of paranasalsinusesanomalies using ct..

### **1.4. Over view of the study:**

Chapter one: Introduction.

Chapter two: Theoretical background and literature review.

Chapter three: Material and methods.

Chapter four: Results.

Chapter five: Discussion, conclusion and recommendation.

## CHAPTER TWO:

### Theoretical background & previous studies:

#### 2.1 Anatomy

Paranasal sinuses are a group of four paired air-filled spaces that surround the nasal cavity.[1] The maxillary sinuses, the frontal sinuses, the ethmoidal sinuses, and the sphenoidal sinuses. The sinuses are named for the facial bones in which they are located. Located within the bones of the skull & face, they are central on the nasal cavity.

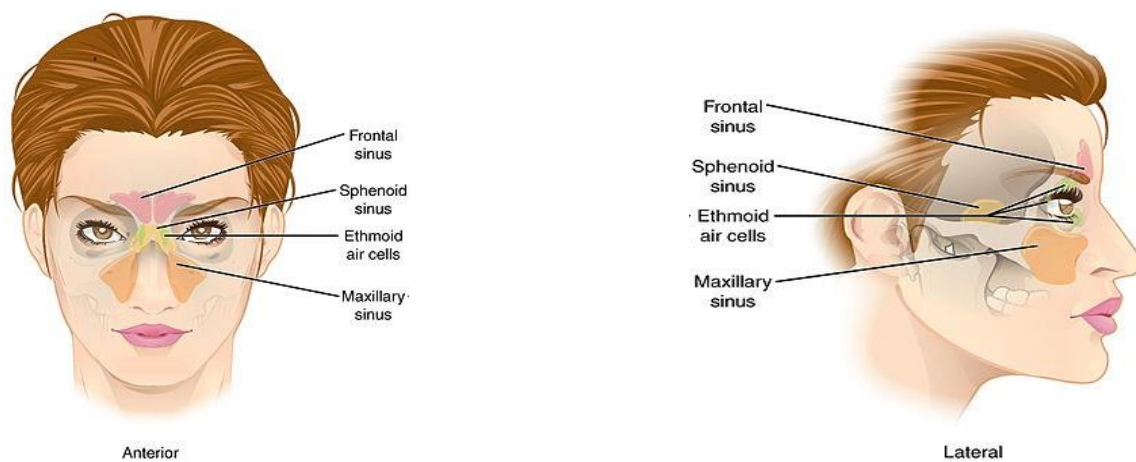


Figure (2-1): shows anatomy of the paranasal sinuses

( paranasal sinus anatomy gross anatomy wikipedia)

##### 2.1.1 . Maxillary sinus:

The maxillary sinus is the largest P.N.S and found inferior to the eyes in the maxillary bone, It is the first sinus to develop and filled with fluid at birth. The shape of the sinuses is a pyramid the natural osmium of the maxillary sinuses is located in the superior portion of the medial wall. The roof of the maxillary sinuses is the floor of the orbit. The maxillary sinuses is supplied by branches of the internal maxillary artery which include the infra orbital, alveolar, greater palatine, and sphenopalatine arteries. ( Ameetsingh et- al 2013)

##### 2.1.2. Frontal sinus:

The frontal sinus is housed in the frontal bone superior to eyes in the forehead. The frontal sinuses are funnel. Shaped structures with Ostia located in the most dependent portion of the cavities, The posterior Wall of the frontal

sinus much thinner than the anterior wall. It is supplied by sub orbital and supra orbital and subratrochlear arteries of the ophthalmic artery. ( Ameetsingh et- al 2013)

### **2.1.3.Ethmoide Sinuses**

The ethmoide Sinuses forming several distinct air cells between the eyes. The shaped like pyramids and divided by thin septa, The ethmoide labyrinth may extend a bove the orbit, lateral and superior to the sphenoid ,above the frontal sinuses and into the roof of the maxillary sinuses and supplied by the anterior and posterior ethmoidal arteries. ( Ameetsingh et- al 2013)

### **2.1.4 Sphnoid sinus:**

Originates in the sphenoid bone it's full size by late ten age years, The thickness of wall variable.It supplied by the sphenopalative artery. ( Ameetsingh et- al 2013)

## **2.2. Physiology:**

Paranasal sinuses decreasing the relative weight of the front of the skull, and especially the bones of the face. , increasing resonance of the voice.,providing a buffer against facial trauma.,insulating sensitive structures like dental roots and eyes from rapid temperature fluctuations in the nasal cavity.

humidifying and heating of inhaled air because of slow air turnover in this region.regulation of intranasal and serum gas pressures.And immunological defense.(jap.physiology.org)

## **2.3. Pathology**

### **2.3.1 Sinusitis**

The paranasal sinuses are joined to the nasal cavity via small orifices called ostia. These become blocked easily by allergic inflammation, or by swelling in the nasal lining that occurs with a cold. If this happens, normal drainage of mucus within the sinuses is disrupted, and sinusitis may occur. Because the maxillary posterior teeth are close to the maxillary sinus, this can also cause clinical problems if any disease processes are present, such as an infection in any of these teeth. These clinical problems can include secondary sinusitis, the inflammation of the sinuses from another source such as an infection of the adjacent teeth.[3] These conditions may be treated with drugs such as decongestants, which cause vasoconstriction in the sinuses; reducing inflammation; by traditional techniques of nasal irrigation; or by corticosteroid.

### **2.3.2. Rhinitis:**

Occurs when you breathe in something you are allergic to such as dusts-dander or pollen ( board 2014)

### **2.3.3 Mucosa thickening:**

Is a common occurrence. It suggests mild sinusitis if severe sinusitis can cause headaches. Is a self-limiting and non-dangerous condition. (Slide share ET – al 2010)

### **2.3.4: Polyps :**

Are sac-like consisting of inflamed tissue to sinuses. Large polyps can block the sinuses. ( Slide share et – al 2010)



### **2.3.5:Cancer:**

Malignancies of the paranasal sinuses comprise approximately 0.2% of all malignancies. About 80% of these malignancies arise in the maxillary sinus. Men are much more often affected than women. They most often occur in the age group between 40 and 70 years. Carcinomas are more frequent than sarcomas. Metastases are rare. Tumors' of the sphenoid and frontal sinuses are extremely rare.(slide share -2010)

### **2.4. Diagnostic tools:**

#### **2.4.1.Computed tomography CT:**

Computed tomography (CT) scanning, also known as computerized axial tomography (CAT) scanning, is a diagnostic imaging procedure that uses X-rays in order to present cross-sectional images ("slices") of the body. Cross sections are reconstructed from the measurements of attenuation coefficients of X-ray beams in the volume of the object studied. CT is based on the fundamental principle that the density of the tissue passed by the X-ray beam can be measured from the calculation of the attenuation coefficient. So, CT allows the reconstruction of the density of the body, by two dimensional section perpendicular to the axis of the acquisition system. (Goldman , 2008)



**Figure (2-2):** shows CT scan machine. (<http://www.infiniteunknown.net/wp-content/uploads/2009/12/ct-scan.jpg>)

### 2.4.1.1. CT generations:

First generation: used one detector, pencil-like X-ray beam and translate-rotate system with average duration of scan: 25-30 mins.

Second generation: used multiple detectors, fan shaped x-ray beam and translate-rotate system with average duration of scan: less than 90 sec.

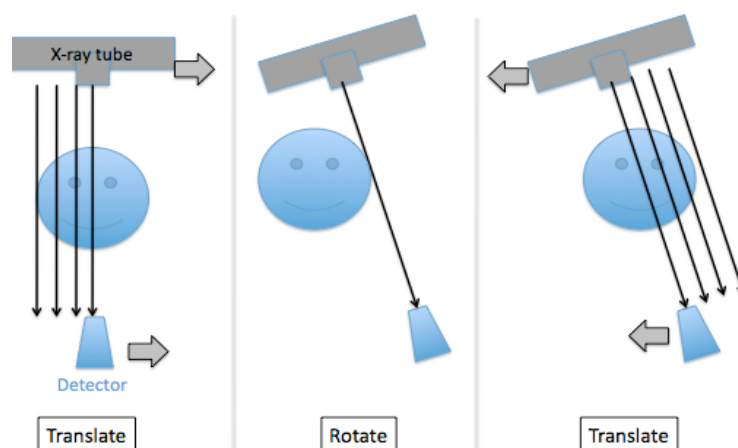
Third generation: used multiple detectors originally 288; newer ones use over 700 arranged in an arc, fan shaped x-ray beam and rotate-rotate system with average duration of scan: approximately 5 sec.

Fourth generation: used multiple detectors more than 2000 arranged in an outer ring which is fixed, fan shaped x-ray beam and rotate-fixed system with average duration of scan: few seconds.

Fifth Generation: used detector ring, electron beam scanner and stationary-stationary system with average duration of scan: 50 msec.

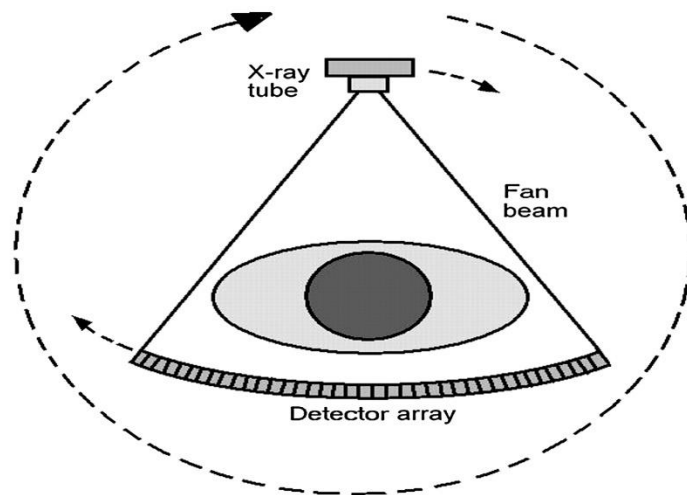
Sixth Generation: used slip ring technology, helical CT X-ray source and detector array rotate continuously as the patient table is moved progressively through the scanner.

Seventh Generation: the most recent generation of CT scanner consists of a multiple detector array and a cone shaped x-ray beam. (Saunders J, 2011) (Bushberg JT, 2002)

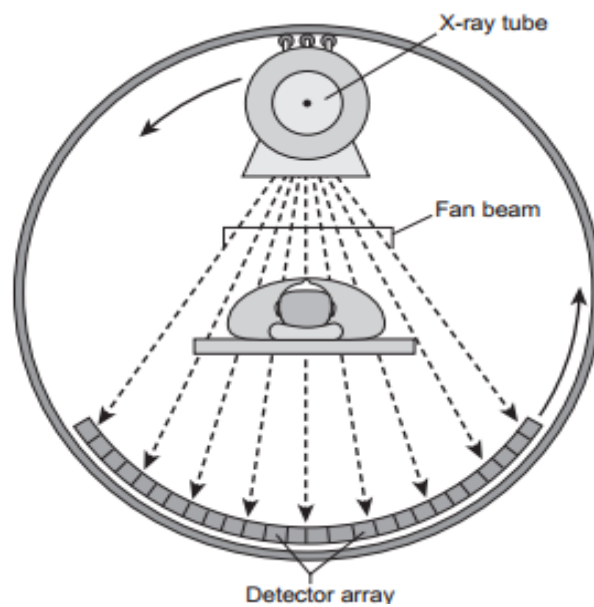


**Figure (2-3):** first generation scanners used translation and

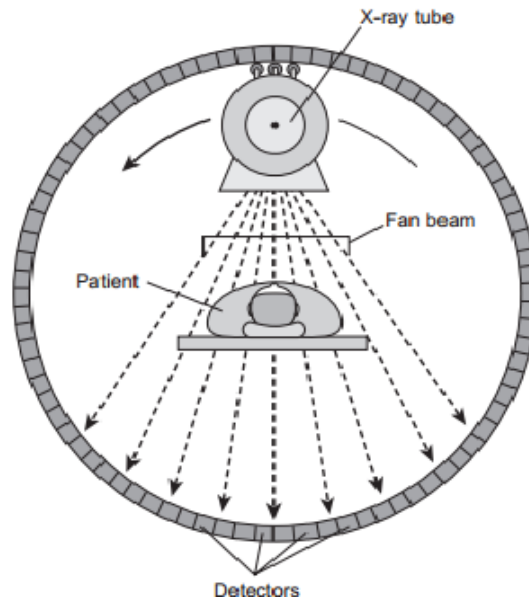
rotation. ([http://199.116.233.101/index.php/generations\\_of\\_ct\\_scanners](http://199.116.233.101/index.php/generations_of_ct_scanners))



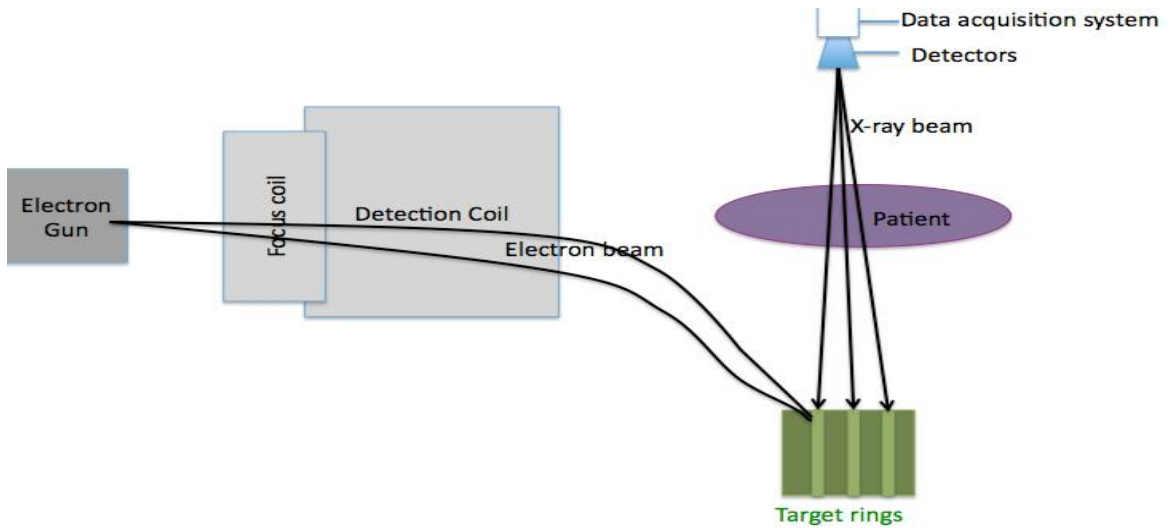
**Figure (2-4):** second generation CT scanners.(tech.snmjournals.org)



**Figure (2-5):** third generation of CT scanners.(Lois E. Romans 2011)

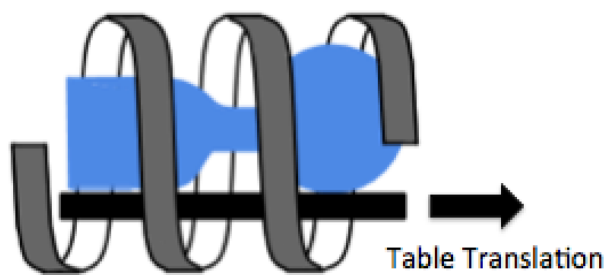


**Figure (2-6):** fourth generation of CT scanners.( Lois E. Romans 2011)



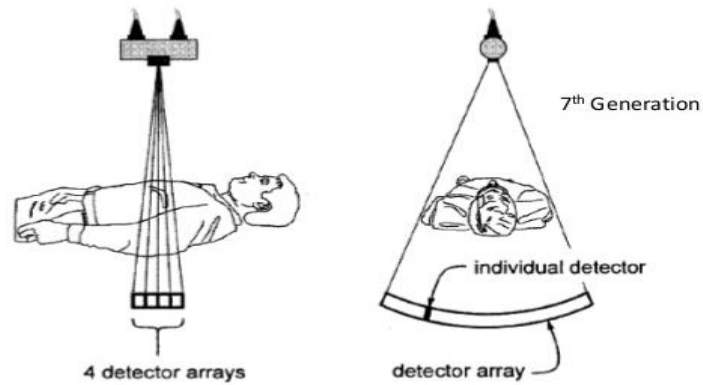
**Figure (2-7):** fifth generation of CT

scanners.([http://199.116.233.101/index.php/generations\\_of\\_ct\\_scanners](http://199.116.233.101/index.php/generations_of_ct_scanners))



**Figure (2-8):** sixth generation of CT

scanners.([http://199.116.233.101/index.php/generations\\_of\\_ct\\_scanners](http://199.116.233.101/index.php/generations_of_ct_scanners))



**Figure (2-9):** seventh generation of CT scanners. ([www.slideshare.net](http://www.slideshare.net))

#### **2.4.1.2. The procedure work:**

x-ray emitted from rotating x-ray tube pass through the patient's body. Different tissues absorb this radiation in different amount. Radiation leaving the body is recorded by an array of detectors that are mounted on the gantry along with the x-ray tube. During each rotation about 1000 images of x-ray beam are recorded. These images are then reconstructed by a computer into a very detailed two-dimensional view of the interior of the body. As the x-ray source rotates and, at the same time, the patient lying on the examination table advances through the scanner at constant rate, the x-ray beam follows a spiral path-hence, the term "spiral" CT scanning ([radiology info .org](http://radiologyinfo.org)).

### **24.2. CT technique for paranasal sinuses:**

#### **2.4.2.1. Preparation:**

patient should wear comfortable, loose –fitting clothing to your exam.you may be given agown to wear during the procedure. Metal objects ,includingjewelry,eyeglasses,and hairpins may affect the ct images should be removed prior to exam.Pt will be asked not to eat or drink anything for a few hours beforehand,as contrast material will be used in your exam. Women should always inform their physician or the x-ray technologist if there is any possibility that they are pregnant. The CT scanner is a large unit with a hole running directly through its center, patient lies on a table that can move up or down and can slide into and out of the center of the cavity. (AmelHegazi 2011)

#### **2.4.2.2.Positioning and procedure:**

The technologist begins by positioning patients on the ct examination table.

For act scan of the sinuses, the patient is most commonly positioned lying flat on the back. The pt may also be positioned face -down with the chin elevated. Straps and pillows may be used to help the pt maintain the correct position and to hold still during the exam.

Some ptrequires an injection of a contrast material to enhance the visibility of certain tissues or blood vessels. Nurse will insert an intravenous line into small vein in the patient's hand or arm contrast injected through this line.

Next the table will move quickly through the scanner to determine the correct starting position for the scans. Then, the table will move slowly through the machine as the actual ct scanning is performed depending on the type of CTscan.

You may be asked to hold your breath during the scanning. Any motion whether breathing or body movements, can lead to artifacts on the images and loss image quality.

The actual ct scan takes less than minute and the entire process is usually completed within 10 minutes.(radiologyinfo.org)

## 2.2. Previous studies:

( J F Linn el al 2007) Studied prospective analysis of incidental P.N.S a abnormalities on C T scans and result that : he correlated with symptomatic assessment- 27% has sinuses opacification. The study illustrates the importance of careful clinical correlation when interpreting C T scan of P.N.S.

( Regeetal 2012) Studied occurrence of maxillary C T in a symptomatic patients and result that abnormalities were diagnosed in 68.2% of cases. There was a significant difference between genders ( P= 0.001) and there was no difference in age groups, mucosal thickening was most prevalent (66%) followed by retention cysts (10.1%) and opacification (7.8%).

( J. Pediatr 2011) Studied the clinical progression of incidental tomography finding in P.N.S of a symptomatic individuals and result that (56%) of the 106 Pt enrolled in the study had opacity, the majority due mucosal thickening intense opacification was found ( suspected) score = 15 and patient in this subset had a greaten risk of developing symptoms during follow up ( oddsratio = 2.74. 95% ci 1.10 – 6.83) compared to those with no findings on discrete findings.

( olackan – 2013) studies incidental P.N.S. abnormality on coronal C T in a valerian population and result that : Total of 100 P t consist of 63 males and 37 females with age range of 11 - 76 years mucosal abnormality was commonest in anterior ethnocide 34% . Maxillary antrum (30%) frontal sinuses (13%) posterior ethomide(12%) and in sphenoid sinuses (11%)

J Nepal Health Res Counc 2015 May - Aug; A total of 44 patients were included in the study. The most common clinical diagnosis was sinonasal polyposis and chronic rhinosinusitis. Most common anatomical variation was deviated nasal septum (68.2%) followed by chonchabullosa(27%). In most cases more than one sinus was involved. Maxillary sinus was involved in 90.9% followed by ethmoid sinus in 81.8%. Inflammatory pathology was seen in 35 (79.5%) patients with sinonasal polyposis pattern being the most common

pattern of involvement. Findings of computed tomography were similar to surgical findings in 84.6% cases. The sensitivity and specificity of computed tomography was fairly good except for fungal rhinosinusitis.



## **Chapter three**

### **Material and Methods**

#### **3 . Material and Methods**

This study was descriptive cross sectional analytic study.

##### **3.1. Materials:**

###### **3.1.1. Patient:**

The target population of this study is series of 100 Sudanese patients , 55 male and 45 female requested to do HRCT by physicians, within age range from 20 to  $\geq$  77 years old.

###### **:3.1.2. Machine:**

Toshiba aquilion 64 slice CT made in Japan.

#### **3.2 Methodes**

##### **3.2.1. Preparation for the CT scan:**

patient should wear comfortable, loose –fitting clothing to your exam.you may be given agown to wear during the procedure. Metal objects ,including jewelry, eye glasses, and hairpins, since metal objects may affect the CT imageshould be removed prior to exam.. Women should always inform their physician or the x-ray technologist if there is any possibility that they are pregnant.

##### **3.2.2. Technique:**

The technologist begins by positioning the patient on CT examination table for scan the sinuses.

The patient is positioned lying flat on the back and may be also positioned face down with the chin elevated . Straps and pillows may be used to help the patient maintain the correct position and to hold still during the exam. Some patients require injection of contrast material to enhance the visibility of certain tissues or blood vessels. Next ,the table will move quickly through the scanner to determine the correct starting position for the scan, then the table will move slowly through is per formed , depending on the type of CT scan .

The actual CT scan take less than a minute and the entire process is usually completed within ten minutes.

### **3.2.3. Data collection:**

The patient data clinical information where obtain all the axial and coronal image Must by applicated to identify the pathological change The radiologist reported were collected all this information were analyzed and presented in the graphs and tables

### **3.2.4. Area and duration of the study:**

The study was carried out in Khartoum state hospital mostly at Alyaa specialized hospital during period from february-septemper2016.

### **3.2.5. Data analysis and presentation:**

Data was analyzed by using simple excel software and SPSS, and the data was presented as tables.

### **3.2.6.Ethical considerations:**

1. The study will be carried out only after approval by Hospitals and the University.
2. Those included in the study will be required to give an informed consent either by themselves or guardians .

# Chapter Four

## Results

Table (4-1): showed the study group

Gender	Frequency	Percent
Male	55	55%
Female	45	45%
Total	100	100%

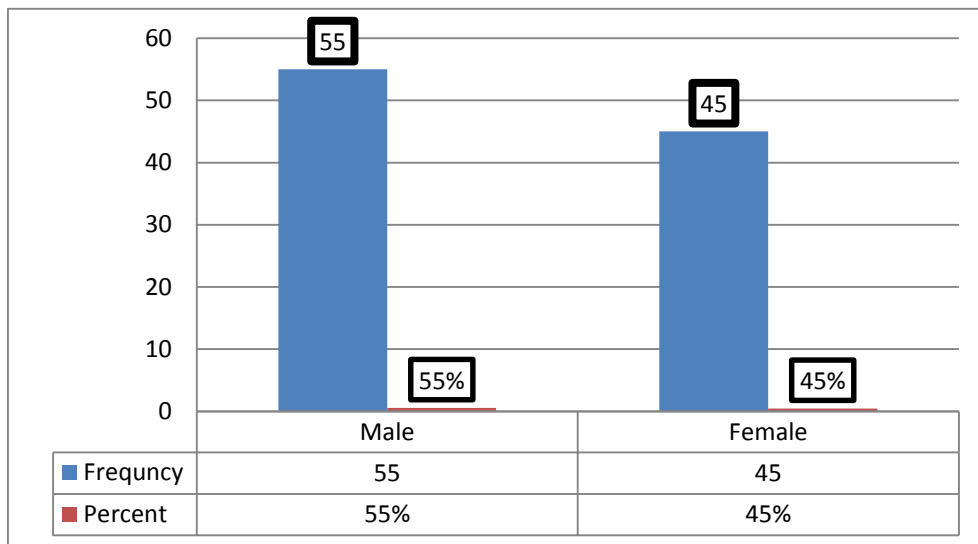


Figure (4-1): showed the study group.

Table (4-2): showed sinuses pathology in study group.

Disease	Frequency	Percent
Polyps	19	19%
Sinusitis	17	17%
Rhinitis	10	10%
Mass	4	4%
Rhino- Sinusitis	28	28%
Polyps-- Sinusitis	16	16%
Rhino- Sinusitis- Polyps	4	4%
Total	100	100%

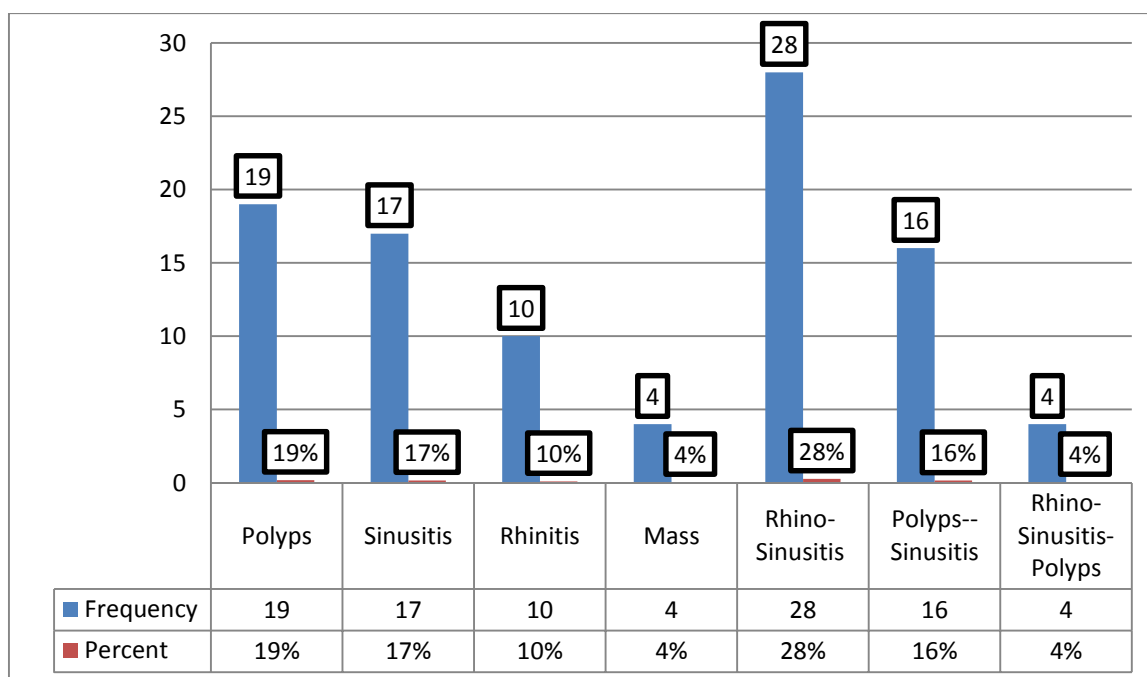


Figure (4-2): showed sinuses pathology in study group.

Table (4-3) showed age distribution of study group.

Rang of pt age	Frequency	Percent
20-30	24	24%
31-40	30	30%
41-50	26	26%
51-60	13	13%
61-77	7	7%
Total	100	100%

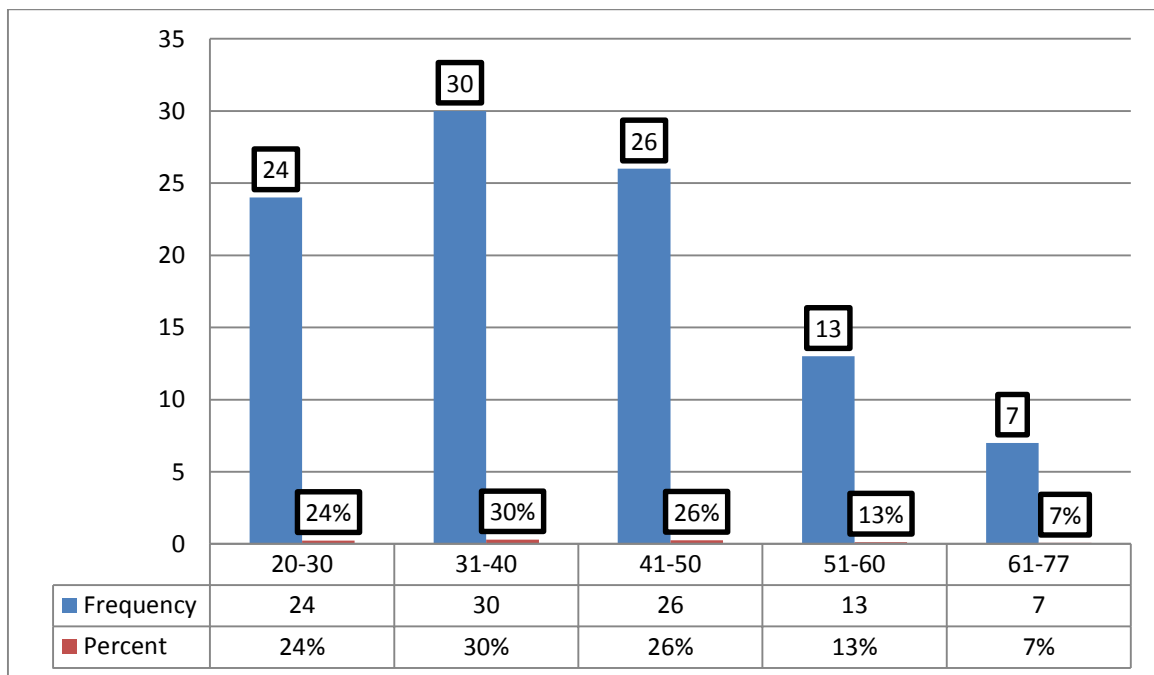


Figure (4-3) showed age distribution of study group.

Table (4-4) showed the sinus pathology in male group.

Disease	Frequency	Percent
Polyps	14	25%
Sinusitis	8	15%
Rhinitis	7	13%
Rhino- Sinusitis	14	25%
Polyps-- Sinusitis	5	9%
Rhino- Sinusitis- Polyps	3	6%
Cancer	4	7%
Total	55	100%

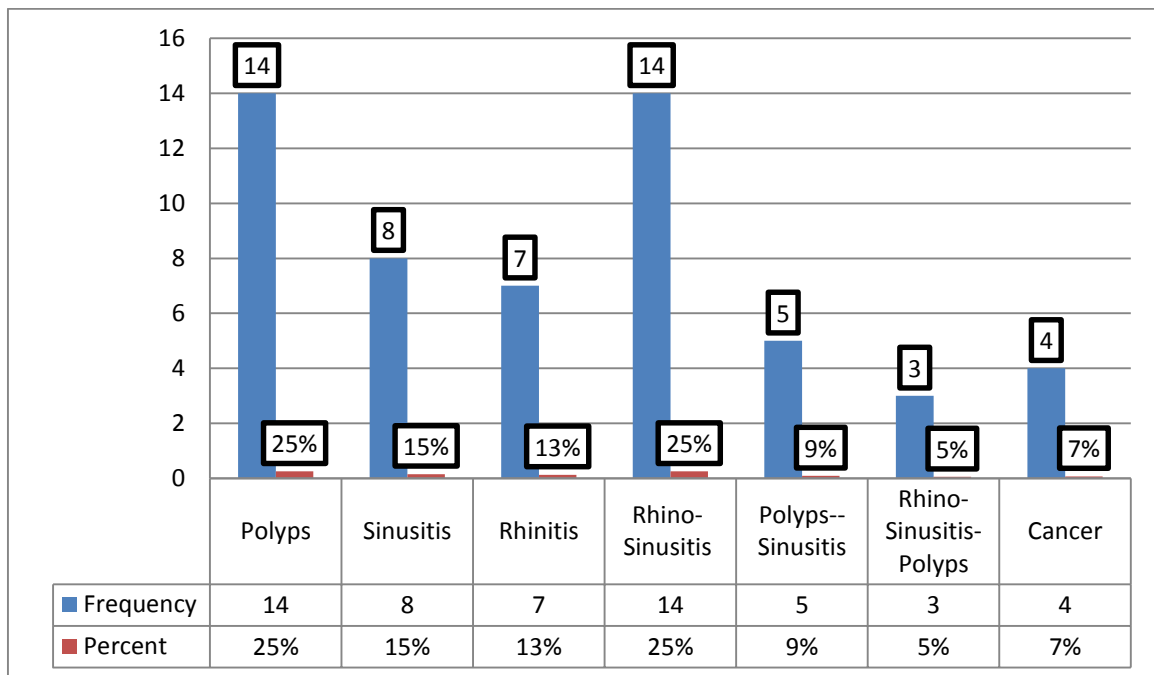


Figure (4-4) showed the sinus pathology in male group.

Table (4-5): showed sinus pathology in female group.

Disease	Frequency	Percent
Polyps	5	11%
Sinusitis	9	20%
Rhinitis	3	8%
Rhino- Sinusitis	14	31%
Polyps-- Sinusitis	11	24%
Rhino- Sinusitis- Polyps	1	2%
Cancer	2	4%
Total	45	100%

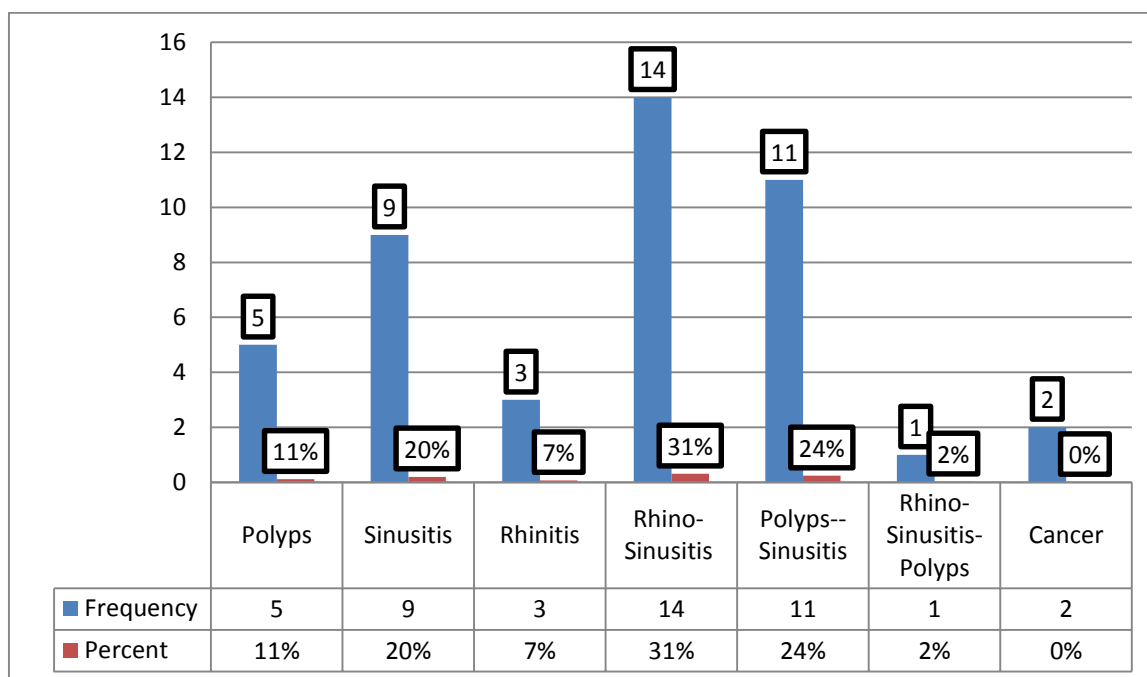


Figure (4-5): showed sinus pathology in female group.

Table (4-6): showed distribution of sinus pathology with age.

Age group	Polyps	Sinusitis	Rhinitis	R-S	P-S	R-S-P	Cancer
20-30	7	9	2	1	8	3	1
31-40	3	2	4	1	5	2	-
41-50	6	3	2	-	4	6	2
51-60	2	2	1	3	9	3	1
51-77	1	1	1	2	2	2	-
Total	19	17	10	6	28	16	4

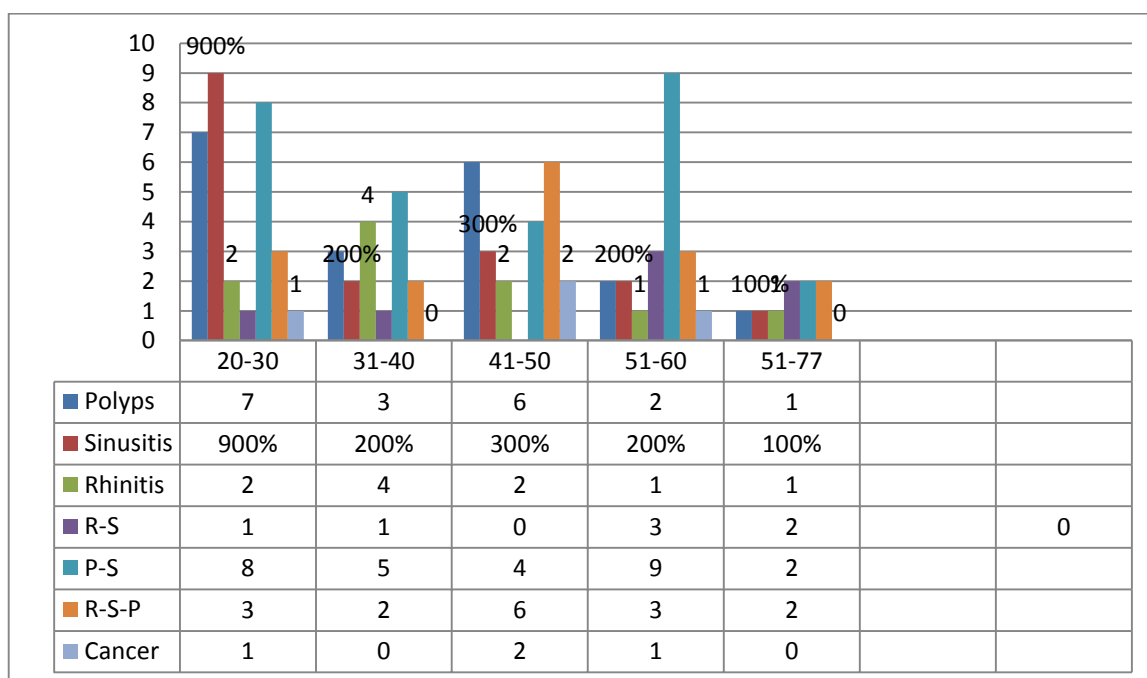


Figure (4-6): showed distribution of sinus pathology with age.



## Final Diagnoses-Association between Disease and Patient Sex:

### Group Statistics

	x1	N	Mean	Std. Deviation	Std. Error Mean
p	m	55	20.6073	48.11234	6.48747
	f	45	132.7467	35.68345	5.31938

Given the table, we find that the arithmetic average for males (20.6073) and females (132.7467) and standard deviation for males (48.11234) and females (35.68345) and the average standard error for males (6.48747) and females (5.31938), meaning exposed female disease polyps (p) more than males

### Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
p	.502	.480	-12.980	98	.000	-112.13939	8.63909	-129.28340	-94.99539
ial			-13.367	97.134	.000	-112.13939	8.38946	-128.78985	-95.48894
iances									
.med									
ial									
iances not									
.med									

Given the table, we find that the value of (F) = .502 and the level of significance = 0.480 which is not statistically significant.

Authorized no statistically significant differences between males and females in the sinus disease polyps

### Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
S	M	55	30.1109	59.40486	8.01015
	F	45	60.7689	10.70628	1.59600

Given the table, we find that the arithmetic average for males (30.1109) and females (60.7689) and standard deviation for males (59.40486) and females (10.70628) and the average standard error for males (8.01015) and females (1.59600), meaning exposed female disease sinusitis (S) more than males

### Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
s	Equal variances assumed	35.536	.000	-3.414	98	.001	-30.65798	8.98029	-48.47908	-12.83688
	Equal variances not assumed			-3.754	58.260	.000	-30.65798	8.16760	-47.00566	-14.31030

Given the table, we find that the value of (F) = 35.536 and the significance level = 0.000 which is statistically significant.

Authorized no statistically significant differences between males and females in the disease sinusitis.

### Group Statistics

	sex	N	Mean	Std. Deviation	Std. Error Mean
R	m	55	48.5891	47.54586	6.41108
	f	45	120.8356	53.50057	7.97539

Given the table, we find that the arithmetic average for males (48.5891) and females (120.8356) and standard deviation for males (47.54586) and females (53.50057) and the average standard error for males (6.41108) and females (7.97539) which means exposure for female inflammatory disease rhinitis (R) more than males

### Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
R	Equal variances assumed	2.426	.123	-7.145	98	.000	-72.24646	10.11202	-92.31344	-52.17949
	Equal variances not assumed			-7.060	88.967	.000	-72.24646	10.23274	-92.57879	-51.91413

Given the table, we find that the arithmetic average for males (48.5891) and females (120.8356) and standard deviation for males (47.54586) and females (53.50057) and the average standard error for males (6.41108) and females (7.97539) which means exposure for female inflammatory disease rhinitis.



### Group Statistics

	sex	N	Mean	Std. Deviation	Std. Error Mean
RS	m	55	.4545	.78924	.10642
	f	45	16.0667	39.15166	5.83639

Given the table, we find that the arithmetic average for males (0.4545) and females (16.0667) and standard deviation for males (0.78924) and females (39.15166) and the average standard error for males (0.10642) and females (5.83639), meaning exposed female disease rhinitis and sinusitis (RS) more than males

### Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
RS Equal variances assumed	21.182	.000	-2.960	98	.004	-15.61212	5.27454	-26.07926	-5.14498
Equal variances not assumed			-2.675	44.029	.010	-15.61212	5.83736	-27.37632	-3.84793

Given the table, we find that the value of  $(F) = 21.182$  and the significance level = 0.000 which is statistically significant.

Authorized no statistically significant differences between males and females in the disease, rhinitis and sinusitis

### Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
PS	M	55	111.1091	63.54895	8.56894
	F	45	129.5556	48.21303	7.18717

Given the table, we find that the arithmetic average for males (.111.1091) and females (129.5556) and standard deviation for males (.63.54895) and females (48.21303) and the average standard error for males (.8.56894) and females (7.18717), meaning exposed female disease polyps and sinusitis (PS) more male

### Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
PS :qual ariances ssumed	6.493	.012	-1.605-	98	.112	-18.44646-	11.49252	-41.25299-	4.36007
:qual ariances ot ssumed			-1.649-	97.489	.102	-18.44646-	11.18401	-40.64223-	3.74930

Given the table, we find that the value of (F) = 6.493 and the significance level = 0.012 which is statistically significant.

Authorized no statistically significant differences between males and females in the disease polyps and sinusitis



### Group Statistics

	sex	N	Mean	Std. Deviation	Std. Error Mean
C	m	55	47.5273	27.12171	3.65709
	f	45	63.8444	30.11592	4.48942

Given the table, we find that the arithmetic average for males (.47.5273) and females (63.8444) and standard deviation for males (27.12171) and females (30.11592) and the average standard error for males (3.65709) and females (4.48942), meaning exposed female disease more than male(c ) cancer.

### Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	6.262	.014	-2.848	98	.005	-16.3171	5.72972	-27.68761	-4.94673
Equal variances not assumed			-2.818	89.616	.006	-16.3171	5.79044	-27.82156	-4.81278

Given the table, we find that the value of (F) = 6.262 and the significance level = 0.014 which is statistically significant.

Authorized no statistically significant differences between males and females in cancer

### Group Statistics

Sex	N	Mean	Std. Deviation	Std. Error Mean
RSP m	55	4.1145	13.92273	1.87734
f	45	155.5432	221.17273	32.97048

Given the table, we find that the arithmetic average for males (.4.1145) and females (155.5432) and standard deviation for males (13.92273) and females (221.17273) and the average standard error for males (1.87734) and females (32.97048) which means exposure of female disease Rhino sinusitis, and polyps (RSP)mor than male.

### Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	57.140	.000	-5.071	98	.000	-151.42869	29.86144	-210.68775	92.16963
Equal variances not assumed			-4.585	44.285	.000	-151.42869	33.02389	-217.97185	84.88553

Given the table, we find that the value of (F) = 57.140 and the significance level = 0.000 which is statistically significant.

Authorized no statistically significant differences between males and females in the rhinosinusitis& polyps.

**Final Diagnoses-Association Between Disease And Patient Age:  
Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Age	1.5400	100	.65782	.06578
	P	71.0700	100	70.51484	7.05148

Given the table, we find that the arithmetic average for Reconstruction (1.5400) and the arithmetic mean of the disease products (71.0700) and standard deviation for Reconstruction (13.92273) and standard deviation of the Diet (70.51484) and the average standard error for Reconstruction (0.06578) and average square standard error of diet (7.05148)

**Paired Samples Test**

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1	-69.53000	70.50989	7.05099	-83.52069	-55.53931	-9.861	9	.000

Given the table, we find that the value of (T) = -9.861- and the level of significance = 0.000 which is statistically significant.

Authorized no statistically significant differences between age and polyps disease

### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Age	1.5400	100	.65782	.06578
	S	43.9070	100	47.01912	4.70191

Given the table, we find that the arithmetic average for Reconstruction (1.5400) and the arithmetic mean of the disease sinus (43.9070) and standard deviation for Reconstruction (0.65782) and standard deviation of sinus (47.01912) and the average standard error for Reconstruction (.06578) and the mean square error standard sinus (4.70191 )

### Paired Samples Test

	Paired Differences	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
					Pair 1	age - sinus			

Given the table, we find that the value of (T) = --9.004 and the level of significance = 0.000 which is statistically significant.

Authorized no statistically significant differences between age and sinusitis disease

### Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 age	1.5400	100	.65782	.06578
R	81.1000	100	61.72589	6.17259

Given the table, we find that the arithmetic average for Reconstruction (1.5400) and the arithmetic mean of the disease, bronchial (81.1000) and standard deviation for Reconstruction (.65782) and standard deviation of the disease bronchi (61.72589) and the average standard error of the reconstruction (... 06 578) and the average standard error of the disease square bronchi (6.17259)

### Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 age - R	-79.5600	61.80194	6.18019	-91.82285	-67.29715	-12.873	99	.000

Given the table, we find that the value of (T) = -12.873- and the level of significance = 0.000 which is statistically significant.

Authorized no statistically significant differences between age and the rhinitis disease.

### Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 age	1.5400	100	.65782	.06578
RS	7.4800	100	27.24963	2.72496

Given the table, we find that the arithmetic average for Reconstruction (1.5400) and the arithmetic mean of the disease, bronchitis and sinusitis (7.4800) and standard deviation for Reconstruction (0.65782) and the standard deviation of the disease bronchi (61.72589) and the average standard error for Reconstruction (... 06 578) and the average the standard error of the disease, rhinosinusitis(2.72496)

### Paired Samples Test

	Paired Differences					t	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 age - RS	-5.9400	27.30689	2.73069	-11.35828	-.52172	-2.175	99	.032

Given the table, we find that the value of (T) = -2.175- - and the level of significance =. 0.032 which is statistically significant.

Authorized no statistically significant differences between age and rhinitis and sinusitis disease.



### Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Age	1.5400	100	.65782	.06578
PS	119.4100	100	57.62793	5.76279

Given the table, we find that the arithmetic average for Reconstruction (1.5400) and the arithmetic mean of the disease, polyps and sinusitis (119.4100) and standard deviation for Reconstruction (.65782) and standard deviation for the disease to disease, polyps and sinusitis (57.62793 and the average standard error of the reconstruction (... 06 578) and the average the standard error of the disease to disease polyps and sinusitis) square

### Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair age 1 - PS	-117.8700	57.72056	5.77206	-129.32301	-106.41699	-20.421	99	.000

Given the table, we find that the value of (T) = -20.421 and the level of significance = 0.000 which is statistically significant.

Authorized no statistically significant differences between age and disease polyps and sinusitis

### Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Age	1.5400	100	.65782	.06578
	C	54.8700	100	29.51083	2.95108

Given the table, we find that the arithmetic average for Reconstruction (1.5400) and the arithmetic mean for cancer (54.8700) and standard deviation for Reconstruction (.65782) and standard deviation for the disease to cancer (29.51083 and the average standard error for Reconstruction (... 06 578) and the average standard error of the disease to disease square Cancer (2.95108(

### Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair age 1 - C	-53.3300	29.62858	2.96286	-59.20895	-47.45105	-18.000	99	.000

Given the table, we find that the value of (T) = -18.000- and the level of significance = 0.000 which is statistically significant.

Authorized no statistically significant differences between age and mass.

### Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 age	1.5400	100	.65782	.06578
RSP	72.2574	100	166.07062	16.60706

Given the table, we find that the arithmetic average for Reconstruction (1.5400) and the arithmetic mean of the disease, polyps and cancer and sinuses (72.2574) and standard deviation for Reconstruction (0.65782) and the standard deviation of the disease polyps and cancer and sinuses (166.07062 and the average standard error for Reconstruction (0.06578) and average standard error of the rhinosinusitis& polyps disease, ( 16.60706)

### Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 age - RSP	-70.717	166.14670	16.61467	-103.68451	37.75029	-4.256	99	.000

Given the table, we find that the value of (T) = -4.256- and the level of significance = 0.000 which is statistically significant.

Authorized no statistically significant differences between age and rhinosinusitis&polyps.

## Chapter Five

### Discussion, Conclusion & Recommendations

#### 5.1 Discussion

Table & figure (4-1) shows the study group was 100 cases. 55% male & 45% female.

Table & figure (4-2) shows that out of 100 cases sinus pathology 19% polyps, 17% sinusitis, 10% rhinitis, 4% mass, 28% rhinosinusitis, 4% rhinosinusitis & polyps which demonstrate rhino sinusitis is most range of sinus pathology.

Table & figure (4-3) demonstrate the age distribution were the PT age from 20-77 years, the PT age from (20-30) percent 24 %, (31-40) 30%, (41-50) 26% (51-60) 13% (61-77) 7%.

The most age affected with paranasal sinuses disease prospectively (31-40), (41\_50) & (20-30).

Table & figure (4-4) demonstrate sinus pathology in male group which show polyps and rhino sinusitis has same percentage 25% sinusitis 16% rhinitis 13% rhino sinusitis & polyps 6% mass 7% polyps & sinusitis 9%.

Table & figure (4-5) demonstrate sinus pathology in female group which show rhino sinusitis large range percentage 31%, polyps & sinusitis 24%, sinusitis 20%, polyps 11% ,rhinitis 8% ,mass 4%, rhino sinusitis & polyps 2%.

From Table & figure (4-4) & Table & figure (4-5) rhino sinusitis has a large percentage in two groups.

Table & figure (4-6) show distribution of sinus pathology with age were large range distribution of sinusitis age from (20-30), polyps (20-30), rhinitis (31-40), rhino sinusitis (51-60), polyps & sinusitis (51-60), rhino sinusitis & polyps (41-50), mass (41-50).

The most age affected with Para nasal sinuses disease from (41-60).

Final diagnoses which shows that there was no statistically a significant association between Para nasal sinuses disease and patient sex, which is not similar to study done by (Regeetal 2012) Studied occurrence of maxillary C T in a symptomatic patients and result that abnormalities were diagnosed in 68.2% of cases. There was a significant difference between genders ( P= 0.001)

Also there was no statically a significant association between paranasal sinuses disease and age group which is similar to study done by (Regeetal 2012) Studied occurrence of maxillary C T in a symptomatic patients and result that abnormalities were diagnosed in 68.2% of cases. there was no difference in age groups.

## **Conclusion & Recommendations:**

**5.2. Conclusion:** The computed Tomography CT best modality in diagnoses of Para nasal sinuses disease CT is the image modality of choice two planes (axial , coronal) to evaluate the p.n.s and excellent detail is a available regarding to the anatomy , pathology and early diagnosis of p.n.s very important factor in the disease management. Coronal section used ideally for full evaluation of p.n.s diseases. Axial view also necessary to determines posterior and anterior extension of the disease.

### **5.3.Recommendations:**

Two images planes (axial – coronal) should be perform together for patients complain of p.n.s problem.

Go to hospital and doctor early with any small problem to avoid spread well trained radiologist and technologist are important for well medical service management.

Further researches should be encouraged to identify the causes of missed or wrongly diagnosed cases.

Further researches is recommended to compare between clinical history and ct finding

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### **Website:**

- ([http://199.116.233.101/index.php/generations\\_of\\_ct\\_scanners](http://199.116.233.101/index.php/generations_of_ct_scanners))
- [http://199.116.233.101/index.php/generations\\_of\\_ct\\_scanners](http://199.116.233.101/index.php/generations_of_ct_scanners)
- website:[http.\(www.slideshare.net\)](http://www.slideshare.net)
- Wikibooks.Human physiology. 2013.
- [Http ll jap .physiology.org](http://jap.physiology.org) content

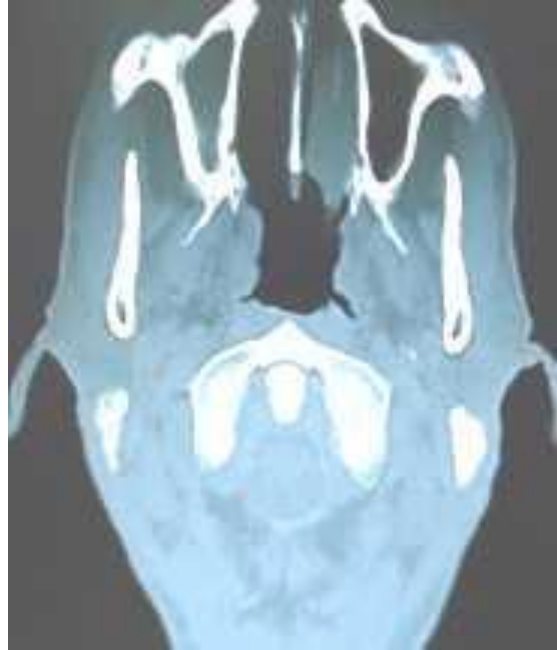


## APPENDIX

### APPENDIX (A):



CORONAL VIEW



AXIAL VIEW

Ct image (Axial and coronal) view in 36 years male demonstrate mucosal thickening of the right maxillary antrum (chronic sinusitis):



CRONAL VIEW



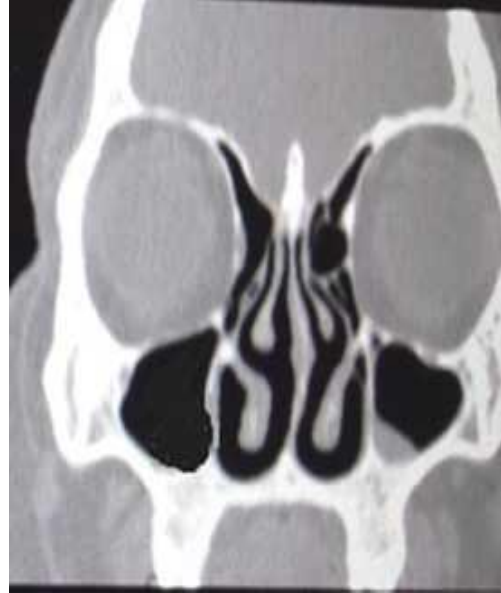
AXIAL VIEW

17 Ct image (Axial and coronal) views years male demonstrates mass in the Right side(osteoma)

:



AXIAL VIEW



CORONAL VIEW

Ct image (Axial and coronal) views 45years oldfemale demonstrate mucosal thickening in the left maxillary sinus(acute sinusitis)

## APPENDIX (B)

Serial no: \_\_\_\_\_ .

### **A. General information:**

I. Initials: \_\_\_\_\_ .

II. Sex:            Male    (    )                      Female    (    ).

III. Age. ( ----- ) years

CT Findding:

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. -----  
. -----