The National Ribat University
Faculty of Graduate Studies and Scientific Research

Pattern of Congenital Heart Disease among Children in Ahmed Gasem Teaching Hospital
(January - October 2015)
A retrospective Echocardiography Study

Research Submitted for partial fulfillment required for Msc in Human and Clinical Anatomy

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Professor: Taher Osman Ali
Dedication

I dedicate my dissertation work to my family and many friends for their support. Special feeling of gratitude to my loving parents whose words of encouragement and push for tenacity ring in my ears.

My sister has never left my side I also dedicate this work to my wife and son who have supported me throughout the process.

I will always appreciate all they have done especially Shahd Taj Elsir who has been my best cheerleader and was a great source of support and countenance. To everyone who taught me a letter to everyone who helped me to be better.
Acknowledgment

I would like to thank my faculty for giving us this great opportunity and learning us how to seek for knowledge emphasizing the major role that researches and evidence based data play.

I would also like to thank my supervisor Prof: Tahir Osman Ali for his help and time. Thanks to everyone who helped me in finalizing this research.
Abstract

**Objectives:** Congenital heart disease (CHD) is the most common congenital anomaly in newborns. The aim of this descriptive retrospective hospital-based study was to assess age, gender distribution and relative frequency of congenital heart disease (CHD) in Sudanese children under 16 years old who attended echocardiography clinic prior to cardiac surgery.

**Methods:** Review of 285 pediatric patients diagnosed with CHD, documents and records were reviewed by summary check list Patients were from different age, sex and tribe and different anomalies in Ahmed Gasim tertiary hospital. The study was between January and October 2015.

**Results:** Wide spectrum of congenital heart diseases was found including isolated ventricular septal defect (23.5%), Tetralogy of Fallot (15.9%), Atrio-ventricular cushion defect (5.3%), isolated atrial septal defect (5.3%), Arterial duct cases (11.2%), common arterial trunk (.6%) isolated stenosis of the pulmonary artery (2.6%), Coarctation of the aorta (2.9%), congenital mitral valve regurgitation (6.5%), Atresia of the tricuspid valve (.6%), double-outlet right ventricle (1.2%), Anomalous pulmonary venous return (.6%) Situs ambiguus (.6%).

**Conclusion:** The present data showed wide spectrum of congenital heart diseases in Sudanese children, isolated ventricular septal defect was the most prevalent pathology, And Galiaa tribe was the most affected tribe. Despite successful diagnosis early intervention and patient follow up remained a significant challenge.
ملخص الرسالة

دراسة عن أمراض القلب الخلقية بين الأطفال السودانيين في مستشفى أحمد قاسم في الفترة بين يناير وأكتوبر 2015

الأهداف:
أعراض القلب الخلقية هي التشوهات الأكثر شيوعا في الأطفال حديثي الولادة. وكان الهدف من هذه الدراسة الوصفية أن يراجع في المستشفى هو تقييم العمر والتوتر في التعزز بين الجنسين والتردد النسبي لأمراض القلب الخلقية في الأطفال السودانيين. دون سن السادسة عشر، عامة الذين حضروا عيادة تخطيط صدى القلب قبل جراحة القلب.

الطرق:
استعراض وثائق وسجلات 285 من الأطفال المرضى بأمراض قلب خلقية واستخلاص المعلومات عن طريق قائمة اختيارية موجبة من قبل. كان المرضى من مختلف الأعمار والجنس والقبيلة والتشوهات المختلفة في مستشفى أحمد قاسم التعليمي بين يناير وأكتوبر 2015.

النتائج:
如果没有给出具体数据，无法提供完整的答案。

الخلاصة:
أظهرت البيانات الحالية طيف واسع من أمراض القلب الخلقية عند الأطفال السودانيين. كان معزول عيب حاجز البطين الأكثر انتشارا وكانت قبيلة الجعلين الأكثر تضرراً ومع ذلك على الرغم من نجاح التشخيص مازال التنسيق الجراحى المبكر والمتابعة يشكلان تحدياً كبيراً.
# Table of Contents

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedication:</td>
<td>II</td>
</tr>
<tr>
<td>Acknowledgment</td>
<td>III</td>
</tr>
<tr>
<td>Abstract</td>
<td>IV</td>
</tr>
<tr>
<td>Arabic Abstract:</td>
<td>V</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>VI</td>
</tr>
<tr>
<td>List of tables</td>
<td>VII</td>
</tr>
<tr>
<td>List of figures</td>
<td>VIII</td>
</tr>
<tr>
<td>List of abbreviations</td>
<td>IX</td>
</tr>
<tr>
<td>Chapter one - Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Background</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Statement of the problem</td>
<td>2</td>
</tr>
<tr>
<td>1.3 Justification</td>
<td>3</td>
</tr>
<tr>
<td>1.4 Objectives</td>
<td>3</td>
</tr>
<tr>
<td>chapter two - Literature review</td>
<td>4</td>
</tr>
<tr>
<td>2.1 Introduction</td>
<td>4</td>
</tr>
<tr>
<td>2.2 Similar studies</td>
<td>5</td>
</tr>
<tr>
<td>Chapter three - Material and methods</td>
<td>7</td>
</tr>
<tr>
<td>3.1 Study design</td>
<td>7</td>
</tr>
<tr>
<td>3.2 Study area</td>
<td>7</td>
</tr>
<tr>
<td>3.3 Study population</td>
<td>7</td>
</tr>
<tr>
<td>3.4 Data collection and study instrument</td>
<td>7</td>
</tr>
<tr>
<td>3.5 Study Variables</td>
<td>8</td>
</tr>
<tr>
<td>3.6 Sample size</td>
<td>8</td>
</tr>
<tr>
<td>3.7 Data management and analysis plan</td>
<td>8</td>
</tr>
<tr>
<td>3.8 Ethical consideration</td>
<td>8</td>
</tr>
<tr>
<td>3.9 Limitation of study</td>
<td>8</td>
</tr>
<tr>
<td>Chapter four - Results</td>
<td>9</td>
</tr>
<tr>
<td>Chapter five - Discussion</td>
<td>23</td>
</tr>
<tr>
<td>Chapter six -</td>
<td>25</td>
</tr>
<tr>
<td>6.1 Conclusion</td>
<td>25</td>
</tr>
<tr>
<td>6.2 Recommendation</td>
<td>26</td>
</tr>
<tr>
<td>Chapter seven - References</td>
<td>27</td>
</tr>
<tr>
<td>Annexes</td>
<td>28</td>
</tr>
</tbody>
</table>
# List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page no</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4.1)</td>
<td>Illustrates the mean age of CHD patients at Ahmed Gasem hospital between Jan to Oct 2015</td>
<td>12</td>
</tr>
<tr>
<td>(4.2)</td>
<td>Illustrate the mean age of diagnosing CHD patients at Ahmed Gasem between Jan to Oct 2015 at in 2015</td>
<td>12</td>
</tr>
<tr>
<td>(3.3)</td>
<td>Shows Frequency of CHD in Sudanese Children at Ahmed Gasem between Jan to Oct 2015 at in 2015</td>
<td>13</td>
</tr>
</tbody>
</table>
# List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page no</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Shows Gender distribution among CHD patients at Ahmed Gasem between jan to oct 2015</td>
<td>11</td>
</tr>
<tr>
<td>4.2</td>
<td>Shows Frequency of CHD in Sudanese Children at Ahmed Gasem between jan to oct 2015</td>
<td>14</td>
</tr>
<tr>
<td>4.3</td>
<td>Shows percentage of CHD patients at Ahmed Gasem hospital between jan to oct 2015 at in 2015 according to geographical area</td>
<td>15</td>
</tr>
<tr>
<td>4.4</td>
<td>Shows frequency of CHD patients at Ahmed Gasem hospital between jan to oct 2015 at in 2015 according to Ethnic group</td>
<td>16</td>
</tr>
<tr>
<td>4.5</td>
<td>Illustrates percentage of CHD symptoms among children at Ahmed Gasem hospital between jan to oct 2015 at in 2015 according to ethnic group</td>
<td>17</td>
</tr>
<tr>
<td>4.6</td>
<td>Illustrates percentage of socioeconomic class among children at Ahmed Gasem hospital between jan to oct 2015 at in 2015</td>
<td>18</td>
</tr>
<tr>
<td>4.7</td>
<td>Association between type of CHD and child gender at Ahmed Gasem hospital between jan to oct 2015 at in 2015</td>
<td>19</td>
</tr>
<tr>
<td>4.8</td>
<td>Association between age and symptoms of CHD among CHD patient at Ahmed Gasem hospital between jan to oct 2015 at in 2015</td>
<td>20</td>
</tr>
<tr>
<td>4.9</td>
<td>Association between type of CHD and symptoms among CHD children at Ahmed Gasem hospital between jan to oct 2015 at in 2015</td>
<td>21</td>
</tr>
<tr>
<td>4.10</td>
<td>Association between occurrence of CHD and ethnicity of children at Ahmed Gasem hospital between jan to oct 2015 at in 2015</td>
<td>22</td>
</tr>
<tr>
<td>4.11</td>
<td>Association between CHD and Age at clinical intervention among children at Ahmed Gasem hospital between jan to oct 2015</td>
<td>23</td>
</tr>
<tr>
<td>4.12</td>
<td>Association between different socioeconomic status and age at clinical intervention between children patient of CHD at Ahmed Gasem hospital between jan to oct 2015 at in 2015.</td>
<td>24</td>
</tr>
</tbody>
</table>
List of abbreviations

(CHD): Congenital heart disease

(TOF): Tetralogy of Fallot

(TA): Truncus arteriosus

(TGA): Transposition of the great arteries

(VSD): Ventricular septal defect

(AVSD): Atrioventricular septal defect

(PDA): Patent ductus arteriosus

(ASD): Atrial septal defect

(PS): Pulmonary stenosis

(CoA): Coarctation of the aorta

(PHP): Pulmonary hypertension

(RV): Right Ventricle

(PVR): Pulmonary vascular resistance

(MVR): Mitral valve regurgitation

(T.P.O): Total anomalous pulmonary venous connection

(AS): Aortic stenosis

(PS): Pulmonary stenosis
Chapter- one

Introduction
1. Introduction

1.1. Background

Congenital heart disease (CHD) is defined as an abnormality in the cardio-circulatory structure or function, which is either present at birth or appears much later in life. The prevalence and pattern of this group of disorders vary both within and between regions and countries [1].

The etiology of the majority of congenital heart diseases is still unexplained, with the progress in molecular and developmental biology our understanding of the factors that influence cardiac development is likely to increase. Cardiac development is regulated by complex mechanisms involving interaction between genetic and environmental factors. About 30% of all congenital heart disease cases are associated with extracardiac malformations, The presence of facial dysmorphic features and associated extracardiac malformations should alert the pediatricians to an underlying syndrome diagnosis [2].

CHD is often divided into two groups, cyanotic heart disease such as tetralogy of Fallot (TOF), truncus arteriosus (TA), transposition of the great arteries (TGA); and Acyanotic heart disease including especially ventricular septal defect (VSD), atrioventricular septal defect (AVSD), patent ductus arteriosus (PDA), atrial septal defect (ASD), pulmonary stenosis (PS), and coarctation of the aorta (CoA).

The CHDs are classified as multifactorial defects but the majority of congenital heart malformations do not segregate in Mendelian ratios, although they show familial aggregation, which suggests that genetic factors may play a role in their development. Most of the known causes of CHDs are sporadic genetic variations, point mutations, deletion or duplication [3].
Malformations of the cardiovascular system are also associated with significant medical morbidity, which requires use of costly medical facilities. Determining the prevalence and pattern of CHD is necessary to recommend valuable changes in health policies. Several previous reports suggest changing in pattern and incidence of congenital heart disease in various geographic locations according to racial and ethnic factors\(^{(4)}\). Knowledge of the epidemiology of congenital heart is the basis on which investigative efforts will emerge to identify the causes of cardiac dysmorpho-genesis and afford opportunities to prevent them\(^{(4)}\).

**1.2. Statement of the problem:**

Congenital heart disease (CHD) is a problem of heart structure and function that is present at birth. It describes a number of different anomalies affecting the heart. It is the most common type of birth defect. Population-based studies on the prevalence of CHD worldwide was found to range between 1.0-150 per 1000 live births\[^3\].

Congenital heart disease is the most common of the major congenital malformations with an incidence of about 8 per 1000 live births. In 1987, an estimated 38,950 babies would have been born with congenital cardiac malformation\[^5\].

Congenital heart malformations constitute a common cause of birth defects with the prevalence of confirmed defects ranging from 5 to 10 per 1000 live birth. The prevalence of CHD in 1998 at the school age in Alexandria, Egypt, was 10.01 per 1000 school children\[^2\].

In the majority of developing nations, and especially in most countries in the African continent, only a small and insignificant portion of the population can afford the cost of diagnosis, medical treatment and/or surgical correction of congenital heart diseases. The situation is even worse for those living in rural areas where access to basic healthcare is already a serious issue, despite their wealth in natural resources. Rural areas in developing countries is usually the poorest regions in terms of financial resources. These regions depend entirely on the availability of public health funding to finance and support their healthcare. Most of the time these funds do not reach them or are simply not provided\[^1\].
(55%) of the patients with congenital heart disease had ventricular septal defects compared to the recognized frequency of (25-30%) worldwide\textsuperscript{[1]} The probable reason was that of natural selection where most of the neonates with life-threatening duct-dependent congenital heart lesions were not recognized, or if recognized had no treatment, leading to early death. The other finding was that many of the patients with congenital heart disease were still waiting for surgery beyond the recommended age, for example up to teens for Fallot's tetralogy\textsuperscript{[5]}. 

1.3. Justification:

Congenital Heart Disease not only contributes to a significant morbidity and mortality but also causes a tremendous psychological stress and economical burden to the whole family. However if the problems are recognized at early age the chance of long term complications are less and the outcome is better, Thus there is a need for increase awareness among general population. This study is undertaken to find out the pattern and clinical profile of congenital heart disease among the Outpatient children in Ahmed Gasem teaching hospital.

1.4. Objectives:

1.4.1. General objective:
To find out age, gender distribution and relative frequency of various congenital Heart Diseases in Sudanese Pediatrics Patients referred to a Ahmed Gasim Teaching Hospital between January and October 2015.

1.4.2. Specific objectives: To study the
- Association of socioeconomic status and age at clinical intervention.
- Association of congenital heart anomalies with patient’s tribe.
- Association of type congenital heart anomalies with patient gender.
- Association of symptom of congenital heart anomalies with patient age.
- Association of congenital heart anomalies with clinical presentation.
- Association of residence and age at clinical intervention.
- To estimate the age at Clinical intervention and the age at diagnosis
Chapter- two

Literature review
2. Literature review

2.1. Introduction

Congenital heart disease (CHD) is a problem of heart’s structure and function that is present at birth. It can describe a number of different anomalies affecting the heart. It is the most common type of birth defect. Population based studies on the prevalence of CHD worldwide was found to range between (1.0- 150) per 1000 live births \[1\].

CHD is often divided into two groups, cyanotic heart disease such as tetralogy of Fallot (TOF), truncus arteriosus(TA), transposition of the great arteries (TGA); and acyanotic heart disease including ventricular septal defect (VSD), atrioventricular septal defect (AVSD), patent ductus arteriosus (PDA), atrial septal defect (ASD), pulmonary stenosis (PS), and coarctation of the aorta (CoA)\[9\] . The CHDs are classified as multifactorial defects but the overwhelming majority of congenital heart malformations do not segregate in Mendelian ratios, although they show familial aggregation, which suggests that genetic factors may play a role in their development \[3\] .

Most known causes of CHDs are sporadic genetic variations, point mutations, deletion or duplication \[4\] . Moreover, a large spectrum of chromosomal abnormalities such as Trisomies 21, 13, and 18 are associated with CHD in (5-8%) of cases, In addition a small proportion of chromosomal abnormalities are also frequently related to CHD and the most common chromosomal abnormality found in this group is the 22q11 micro deletion causing DiGeorge syndrome \[7\] .

Almost 30% of major cardiac malformations are associated with additional developmental abnormalities and result from a recognized chromosomal abnormality syndrome or occur as part of a genetic syndrome. However, up to now few data on CHD associated with genetic defects have been reported in African populations .In addition only one study done in Rwanda in 2007 showed some cases of Down syndrome associated with CHD and the VSD was the most common \(9\).

2.2 Similar studies:

A study carried out in Malaysia, by Hung et al.\(^5\), aimed to determine pattern of congenital heart disease in pediatrics showed that the cumulative proportions of infants registered under 1 week, 1 month and 3 months of age were \((5\%),(8\%)\) and \((24\%)\) respectively. This proportion was significantly lower than the rate in other countries.\((83.2\%)\). A study conducted by Hung et al.\(^5\) aimed to determine the patterns of congenital heart disease in pediatrics. The study showed that the cumulative proportions of infants registered under 1 week, 1 month and 3 months of age were \((5\%),(8\%)\) and \((24\%)\) respectively. This proportion was significantly lower than the rate in other countries.\((83.2\%)\). The study found that the cumulative proportions of infants registered under 1 week, 1 month and 3 months of age were \((5\%),(8\%)\) and \((24\%)\) respectively. This proportion was significantly lower than the rate in other countries.\((83.2\%)\).

The study of Nikyar et al.\(^4\) in Northern Iran (2007-2008) aimed to assess prevalence and pattern of congenital heart disease among Neonates in Gorgan. This study showed that the prevalence of CHD among live births in Gorgan is lower than reported in the studies for Middle East and European countries. ASD was the commonest lesion (2.64 per 1000), followed by VSD+ASD (1.28 per 1000) and PDA (1.28 per 1000). The rate of ASD in male and female was (3.02 and 2.26) per 1000 respectively. Parents of 40 (39.6%) babies were related. 39 (38.6%) couples were first cousins\(^4\).

The study done by Settin, et al.\(^2\) in Egypt to assess dysmorphic features, consanguinity and cytogenetic pattern of congenital heart diseases showed that Egyptian children affected with CHD were significantly associated with positive family history of CHD, prenatal history of maternal diseases or drug intake during pregnancy and positive parental consanguinity risk of CHD increased with positive family history and consanguinity\(^2\).

In other study done by Zahid et al.\(^7\), to assess Spectrum of congenital heart disease in children admitted for cardiac surgery at Pakistan this study showed that male to female ratio of 1.3:1. Sixty five (52.8%) of the total cases had a cyanotic heart defects. cyanotic heart defects were seen in 58 patients (47.1%). Ventricular septal Defect (VSD) followed by Patent ductus arteriosus (PDA) and atrial septal defect (ASD), were the commonest cyanotic heart lesions, 33.8%, 23.0% and 16.9% respectively; Tetralogy of fallot (TOF) was the commonest cyanotic lesion.\(^7\).
In a study conducted by Sani, et al. (8) in tropical environment, showed that (VSD) was the most common echocardiographic diagnosis at high occurred in 56 (45.9%) of the patients, followed by TOF 32 (26.2%), Atrial septal defect (ASD) 15 (12.3%) and then endocardial cushion defect 10 (8.2%). There were 56 cases of VSD, 49 (87.5%) were membranous, two (3.6%) were in the muscular interventricular septum and five (8.9%) were of the Maladie de Rogers type. There were 15 patients with ASD out of which 12 (80%) were of the secundum type, two (13.3%) were primum type, and one (6.67%) was a sinus venosus defect (8).

In a previous study carried out by Teteli elate (13) aimed to determined pattern of congenital heart disease in pediatric showed that The ranged between two weeks and 15 years and four months. Symptoms started in infancy in (89%) of 94 symptomatic patients. The commonest symptoms were breathlessness, failure to thrive, repeated chest infections and cyanosis. Almost all types of defects were represented the commonest being ventricular septal defect (VSD), Fallot's tetralogy, pulmonary stenosis, patent ductus arteriosus, Atrioventricular septal defect and secondum atrial septal defect. Five patients with VSD were preterm. (91%) of patients with (VSD) were symptomatic (9).
Chapter-three

Material and methods
3. Material and methods

3.1. Study design:

This is a retrospective descriptive study on all patients with confirmed diagnosis of congenital heart disease referred for echocardiography and cardiology clinic in Ahmed Grasim teaching hospital over a period of ten month from January 2015 till October 2015. Patients from day one of life till 15 years were included.

3.2. Study area:

Ahmed Gaseim Teaching hospital, located in Khartoum bahry, Khartoum state Sudan. Opened in 1998 as tertiary hospital for cardiology, nephrology, pediatrics, medicine and surgery. Total of 100 bed, 11 cardiologist and one cardiac surgeon.

3.3. Study population:

3.3.1 Inclusion Criteria

Sudanese children with confirmed diagnosis of congenital heart disease referred for echocardiography and cardiology clinic in Ahmed Gaseim teaching hospital from day one of life till 15 years were included.

3.3.2 Exclusion Criteria

- Patients with acquired heart diseases as rheumatic heart disease
- Patients Above 15 Years
- Premature babies
- Foreigners

3.4. Data collection and study instrument:

Review of documents and Records of patients by summary check list for pediatrics, Sudanese patients from different age, sex and tribe and different congenital heart anomalies.
3.5. Study Variables:
Demographic data: Age, Gender and tribe.

Clinical information: Type of CHD, Age at clinical diagnosis, Age at clinical intervention, CHD Symptoms

3.6. Sample size:
Total coverage of out Patients list of Ahmed Gasem teaching hospital referred clinics with confirmed diagnosis of congenital heart disease trans echocardiography. They were 285 patients.

3.7 Data management and analysis plan:
The data will be analyzed by SPSS version 20 computer program. All data were coded and then they were imported for SPSS (Statistical Package for the Social Sciences) Version (20) for windows in order to perform proper analysis. Descriptive statistics were used to analyze direct questions and demographic data obtained from the research (i.e. frequency distribution, percentile, mean, and standard deviation). Chi square test and fisher’s test were used to measure possible associations. Results were presented in form of tables and figures.

3.8. Ethical consideration:
1-This study will be reviewed and approved by the Ethical Committee, National Ribat University, Sudan.

2-Verbal consent will be taken from parents of children that meet the congenital heart disease CHD case definition also Will be informed about the study and consent will be taken prior to study enrolment.

3-Confidentiality of data collected will be preserved.

3.9. Limitation of study
The main obstacles were the time, poor recording and financial support.
Chapter- four
Results
4. Results

A retrospective analysis of data was done for 285 patients between one month and 15 years with confirmed diagnosis of congenital heart disease. There were 84 males (49.41%) and 52 females (50.59%) as shown in figure (4.1), with male to female ratio 1:1.2.

Figure (4.1) shows gender distribution among 285 CHD patients at Ahmed Gasem between (Jan to Oct 2015).

Patients age of this study between one month and 15 years, the mean age at clinical diagnosis was 1 year and 9 months (22 months), and the mean age at clinical intervention was five years and 3 months, the details shown in Table (4.1) and (4.2) respectively.
Table (4.1) illustrates the mean Age of CHD Patients (patients were from 2 months to 15 years the mean age was 5 years and 3 months)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
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<tr>
<td>age</td>
<td>170</td>
<td>0.2(year)</td>
<td>15.00(years)</td>
<td>5.4365</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>170</td>
<td></td>
<td></td>
<td></td>
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</table>

Table (4.2) illustrates the mean Age of diagnosing CHD Patients (patients were from 1 month to 15 years the mean age was 1 year and 9 months)

<table>
<thead>
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<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
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<tr>
<td>age at clinical presentation</td>
<td>112</td>
<td>1.00 Month</td>
<td>180.00 Months</td>
<td>21.8393</td>
</tr>
<tr>
<td>Valid N (list wise)</td>
<td>112</td>
<td></td>
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</table>
Isolated ventricular septal defect was the most prevalent pathology. 40 cases (23.5%), followed by tetralogy of Fallot 27 cases (15.9%), detailed description is shown in table (4:3).

Table(4:3) shows Frequency of CHD among 285CHD patients at Ahmed Gasem between (Jan to Oct 2015).

<table>
<thead>
<tr>
<th>CHD</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
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<td>40</td>
<td>23.5</td>
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<tr>
<td>TOF</td>
<td>27</td>
<td>15.9</td>
</tr>
<tr>
<td>PDA</td>
<td>19</td>
<td>11.2</td>
</tr>
<tr>
<td>Atroventricular cushion defect</td>
<td>9</td>
<td>5.3</td>
</tr>
<tr>
<td>ASD</td>
<td>9</td>
<td>5.3</td>
</tr>
<tr>
<td>Double outlet RV</td>
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<td>1.2</td>
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<tr>
<td>Atresia of tricuspid valve</td>
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<td>.6</td>
</tr>
<tr>
<td>PVR</td>
<td>3</td>
<td>1.8</td>
</tr>
<tr>
<td>Common arterial trunk</td>
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<td>.6</td>
</tr>
<tr>
<td>MVR</td>
<td>8</td>
<td>4.7</td>
</tr>
<tr>
<td>Coarctation of the aorta</td>
<td>5</td>
<td>2.9</td>
</tr>
<tr>
<td>Stenosis of pulmonary artery</td>
<td>11</td>
<td>6.5</td>
</tr>
<tr>
<td>PDA+AS</td>
<td>3</td>
<td>1.8</td>
</tr>
<tr>
<td>VSD+PH+PDA</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>PDA+VSD</td>
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<td>1.2</td>
</tr>
<tr>
<td>PS+ASD</td>
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<td>2.9</td>
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<tr>
<td>VSD+PH</td>
<td>9</td>
<td>5.3</td>
</tr>
<tr>
<td>AS</td>
<td>4</td>
<td>2.4</td>
</tr>
<tr>
<td>VSD+Ps</td>
<td>5</td>
<td>2.9</td>
</tr>
<tr>
<td>PDA+ASD</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>ASD+PH</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>T.P.O</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>Situs ambiguous</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>TGA</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>Total</td>
<td>170</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Figure (4.2) shows Frequency of CHD in Sudanese Children at Ahmed Gasem hospital between (Jan to Oct 2015).

(The commonest CHD was VSD 40 patients from 170)
Most of the patients were from Khartoum state 88 patients (51.47%) while patients from port sudan were the least (1.18%); the details of geographical distribution of the patients shown in figure (4.3).

Figure (4.3) shows percentage of CHD patients at Ahmed Gasem hospital between (Jan to Oct 2015) according to geographical area.
Regarding the Ethnic groups, most of the patients were Gaalia tribe 88 patients (16.4%) followed by Kawahla tribe 11 patients (6.5%). The detailed frequency of CHD according to Ethnic group shown in figure (4.4).

Figure (4.4) shows frequency of CHD patients at Ahmed Gasim hospital between (Jan to Oct 2015) according to Ethnic group.
Shortness of breath was the main symptom found in 43 patients (36.1%) , edema alone was the only presenting complain in 1 patient (.84% ) , the details of the symptoms at presentation shown in figure (4.5).

Figure (4.5) illustrates percentage of CHD symptoms among children at Ahmed Gasem hospital (The Most common symptom was shortness of breath (36.1%).)
The majority of the cases were from middle income class (n=79) (44.3%) the details of socioeconomic class among children shown in figure (4.6).

Figure (4.6) illustrates percentage of socioeconomic classes among children in Ahmed Gasem hospital between (Jan to Oct 2015).
In the majority of cases there were no association between types of CHD and child gender (p value = .7) There is no association (p value > 0.05). more detailed showed in (figure 4.7)

Figure (4.7) association between types of CHD and child gender in Ahmed Gasem hospital between (Jan to Oct 2015).

(p = .7) There is no association (p value < 0.05).
All The patient age groups were cross tabbed with symptoms at clinical presentation. There were association between age and symptoms of CHD among patients (P=.027 There is association (p value <0.05).) more detailed showed in (figure 4.8).

Figure (4.8) association between age and symptoms of CHD among CHD patient at Ahmed Gasem hospital between (jan to oct 2015).

(P=.027 There is association (p value >0.05).)
All The CHD types were cross tabbed with symptoms at clinical presentation. There were no association between type of CHD and symptoms among CHD children (P = .9, there is no association, p value > 0.05). More detailed showed in (figure 4.9).

Figure (4.9) association between type of CHD and symptoms among CHD children at Ahmed Gasem hospital between (Jan to Oct 2015).

( P = .9, There is no association, p value < 0.05)
There were no association between types of CHD and ethnicity of children (P = .046). There is association p value <0.05) more detailed showed in (figure 4.10).

Figure (4.10) association between CHD and ethnicity of children at Ahmed Gasem hospital between (Jan to Oct 2015).

(P = .046 There is association p value <0.05)
There were no association between residence of CHD patients and Age at clinical intervention in rural and urban area (P= .4 There is no association p value >0.05) more detailed showed in (figure 4.11)

Figure (4.11) association between CHD and Age at clinical intervention between children in Ahmed Gasim hospital between (Jan to Oct 2015) (P= .4 There is no association p value >0.05)
Also there is no association between different socioeconomic status and age at clinical intervention between patient of CHD (P= .62 There is no association p value >0.05) more detailed showed in (figure 4.10)

Figure (4.12) association between different socioeconomic status and age at clinical intervention between children patient of CHD at Ahmed Gasem hospital between (Jan to Oct 2015).

(P=.62 There is no association p value >0.05)
Chapter five

Discussion:
5. Discussion

The purpose of this study is to assess age, gender distribution and relative frequency of congenital heart disease (CHD) in Sudanese children under 16 years of age. The patients attended echocardiography clinic prior to palliative or corrective cardiac surgery at Ahmed Gasim tertiary hospital in the interval from January to October 2015.

A total of 285 cases were followed retrospectively, 170 children were included and 95 were excluded due to acquired heart disease and being non Sudanese or above 16 years old. The data from these patients were evaluated regarding sex distribution, age and relative frequency of different congenital heart defects. There were 84 males (49.41%) and 52 females (50.59%), with male to female ratio 1:1.2.

The age spectrum of this study between one month and 15 years, the mean age at clinical diagnosis was 22month and the mean age at clinical intervention was five year, comparing the two group there is delay in the clinical intervention and these results were similar to those of Tantchou tchouml, who founded very high incidence of late presentations (68.2%) recorded in Bannerman’s study in Zimbabwe, late presentation to practitioners was observed in (79.3%) of cases. This can be because developing countries are usually the poorest regions in terms of finance, only a small and insignificant number of the population can afford the cost of diagnosis, medical treatment and/or surgical correction of congenital heart diseases. Most of our patients were middle socioeconomic status. The situation is even worse for those living in rural area who have less than five cardiac center in Sudan situated in Khartoum and Madany which are difficult to access; The result is similar to that of study done in Zimbabwe which (41%) percent of the patient were from nearby places the majority of these patients could not afford treatment as evidence of the difficulty in accessing healthcare. Numerous late presentations to practitioners were registered, also few number of cardiologist, and the weak referral health system, and this explained that( 51% ) were from Khartoum state.
Forty patients (23.5%) of the total cases had ventricular septal defect (VSD) followed by Fallot’s tetralogy (15.9%) followed by (PDA) 19 patients (11.25%) followed by stenosis of pulmonary artery (6.5%) followed by (AVSD) and (ASD) and combination of VSD with PH (5.3%). There was one case of combination (PDA with ASD) and one case of (ASD with PH) and one case of situs ambiguous and (TBO), CHD gender distribution didn’t differ (>.05). VSD was the commonest CHD anomaly in different age groups. Result is similar to that of study conducted by Sani et al. (8) in tropical environment at 2007 they showed that VSD was the most common echocardiography diagnosis which occurred in 56 (45.9%) of the patients (8) and another study conducted in Sudan in 1994 by Elhag (6) aimed to determine pattern of congenital heart disease in pediatrics showed almost all types of defects were represented, The commonest being ventricular septal defect (VSD), Fallot’s tetralogy, pulmonary stenosis, patent ductus arteriosus, atrioventricular septal defect and secondum atrial septal defect. Five patients with VSD were preterms (91%) of patients with VSD were symptomatic (10) so no change in pattern of congenital heart disease since 1994.

The majority of the study populations were from (Galiaa) tribe, The present study found that congenital heart diseases were predominant in the Gallia tribe However this could be due to the fact that the majority of Galia tribe residence in Khartoum coming from river Nile state regions, which is closest to Khartoum state. Galliae tribe are known to marry close relatives and therefore it could hypothesized that genetic background could be linked to the predominance of congenital heart diseases found in this tribe. However testing the hypothesis showed that there is association between tribe and CHD (p value was =.046 <.05) the present results were similar to the results of study done by Settin, etal (2) in Egypt in (2008) which showed highly significant association with positive family history of similar conditions and also of positive consanguinity particularly for first cousin parental consanguinity and ethnicity and cytogenetic background (2).

Shortness of breath was the common symptom, followed by recurrent infection (25.2%) and the least one was edema (.8%) as complicated heart failure and there is association between the age at clinical diagnosis and symptoms (p>.05). And this is similar to a study conducted in Sudan In 1994 by Alhaj that showed the commonest symptoms were breathlessness, failure to thrive, repeated chest infections and cyanosis (10).
Chapter -six

Conclusion and Recommendation
6.1. Conclusion

- The data showed that a wide spectrum of congenital heart diseases among Sudanese children were represented in the cardiac centre of Ahmed Gasim tertiary hospital in Khartoum bahry.

- Isolated ventricular septal defect was the most prevalent pathology.

- Early intervention and patient follow up is significant challenge despite successful diagnosis.

- Congenital heart diseases were predominant in the Gallia tribe.
6.2. Recommendation

- People should be educated about congenital heart disease and the risk factors like consanguinity marriage.
- Parents should know the importance of early health seeking.
- Increase the quality of antenatal and postnatal care and early screening programs and school health program.
- Doctors should be advised about the proper referral health system and the importance of early intervention to safe life.
- Redistribution of health centers and increase the quality and quantity of heart centers in different state in Sudan to ease the access to the health system.
Chapter -seven

References
7. References


Annexes
Annexes

THE NATIONAL RIBAT UNIVERSITY

Faculty of Graduate Studies/Clinical Anatomy Msc program

DATA COLLECTION SHEET

Pattern of Congenital Heart Disease among Children in Ahmed Grasim Teaching Hospital between Jan and OCT 2015

- Index: ______________________________
- Telephone no _________________
- Age (at clinical intervention): ______________________________
- Sex: 1. male 2. female
- Tribe ______________________________
- Degree of Consanguinity ________________
- Residence: ______________________________
- Diagnosis: ______________________________
- age at Clinical diagnosis ______________________________
- symptom at presentation ______________________________
- Socioeconomic status: 1/ low 2/ middle 3/ high