

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(اَقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ (1) خَلَقَ الْإِنْسَانَ مِنْ عَلَقٍ (2) اَقْرَأْ وَرَبُّكَ
الْأَكْرَمُ) 3 (الَّذِي عَلَّمَ بِالْقَلَمِ (4) عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمْ (5)
صدق الله العظيم

ACKNOWLEDGMENT

First I thank God who has blessed and guided me to accomplish this thesis.

I would like to express my deep gratitude's and appreciation to my supervisor,

Dr. Babiker Abd Elwahab Awad Alla for his great offered for helping me to finish thesis and for his close supervision and for giving valuable times, guidance, criticism and corrections to this thesis from the beginning up to the end.

Dr. Bader Eldeen Abu Naib for his helping me and giving advice of finishing the thesis.

Prof. Dr.Elsafi Ahmed Bala, the Previous Dean of the College of Medical Radiological Sciences, Sudan University of Sciences and Technology, for great helping to successes the program and Prof. Dr Mohamed Mohamed Omer to finish the program.

I would like to express my gratitude to Sudanese embassy in UAE that help us to complete this program on its Consulate house in Dubai and support us to finish it.

I would like to express my grate thanks to Dr. Ali Abdurrahman Our Dean before, And Our lovely Prof Caroline Edwards for their effort and support this program to hold on UAE.

I would like to express my sincere thanks to my lovely group of friends, same my classmate for their assistant me to continue and finish this study.

Finally, most of my activities related to this study affected my duties in house, I am deeply appreciate and thankful my husband Ahmed Mohamed El Hassan for his encouragement and support during this process.

DEDICATION

I dedicate this thesis to my husband who support me to finish this effort

To my Mama she is blessing me by her continuous prayers

To my Children for nursing me with affections and love and their

dedicated partnership for success in my life.

To my friends whom enlightened me throughout my journey in this study

help me to continue

I dedicate this work to them

ملخص الدراسة

هذه الدراسة علمية وعملية وأجريت خلال أبريل 2014م إلى أبريل 2015م طبقت بدولة الإمارات العربية المتحدة (قسم الموجات فوق الصوتية بمركز الرعاية الصحية فى مدينة محمد بن زايد) أبوظبي.

ناقشت الدراسة تقييم دقة المسح بالموجات فوق الصوتية فى تشخيص متلازمة داون بقياس سمك الشفافية القفوية خلال الاسبوع العاشر الى الثالث عشر وستة أيام من عمر الجنين مقارنة مع الفحوصات البيوكيميائية .

هنالك (200) امرأة حامل (160 عينة تجريبية و40 عينة الضبط) تتراوح أعمارهم بين (20 الى 45 سنة) فى الاسبوع العاشر الى الأربعة عشر من الحمل اختيروا عشوائيا .

أى امرأة لديها حمل كاذب أو حمل عنابى، مرض م {كد فى القلب، ورم أو مرض فى الكبد والذين لديهم ارتفاع طبيعى فى الألفا فيتو بروتين سواء كان عند الجنين أو الحامل (بعض الأشخاص طبيعيا" لديهم ارتفاع فى الألفا فيتو بروتين) أستبعدوا من هذه الدراسة.

كل هؤلاء المرضى فحصوا بالموجات فوق الصوتية باستخدام مساحات جنرال اليكتريك فولسون 730 و بطاقة مقدارها 3.5 ميغا هرتز. تم اجراء المسح بالموجات فوق الصوتية لكل المرضى وقياس الشفافية القفوية.

اجري المسح عن طريق البطن لكل المرضى وتم قياس سمك الشفافية القفوية.

الباحث استخدم المسح بالموجات فوق الصوتية فى هذه الدراسة لقياس سمك الشفافية القفوية الناتج عن وتم فيه إعطاء كل ملمح فى الأبعاد ، الحجم ، شكل ومظهر البروستاتا درجة محددة وتم جمع المعدل لكل مريض لديه سرطان البروستاتا لمعرفة اقل معدل يمكن أن يوجد عند أي مريض لديه سرطان البروستاتا . أيضا لتحليل النتائج استخدم الباحث برنامج س ب س س ، اختبارات علمية مثل اختبار تى والتحليل الخطي. وأيضا" العلاقات بين المتغيرات وانتشار سمك الشفافية القفوية، العلاقات بين العمر،الوزن، عوامل الخطورة وانتشار سمك الشفافية القفوية.

هذه الدراسة وجدت أن سمك الشفافية القفوية الطبيعى هو دائما" بين 2 -2.5 ملم و يمكن أن يكون هناك خطأ لعلامة موجبة، ولكن اذا كان قياس الشفافية القفوية أكبر من 3 ملم، فهذا يعنى أن هنالك علامة لحالة غير طبيعية تحتاج الى مزيد من الفحوصات.

الدراسة أوجدت أن هرمون الألفا فيتو بروتين لوحده غير موثوق فيه وغير دقيق فى تشخيص متلازمة داونز; والفحص بالموجات فوق الصوتية لقياس سمك الشفافية القفوية أدق منه فى تشخيص الاختلالات الكروموسومية مثل متلازمة داون.

بالإضافة إلى ذلك الدراسة عرضت إن الاختلافات العرقية ليس لها تأثير فى قياسات الشفافية القفوية .

هذه الدراسة أوصت بأن قياسات الشفافية القفوية يجب أن تجرى لكل جنين عمره بين 10 أسابيع الى 13 اسبوع وستة أيام دوريا لاستخلاص وجود متلازمة داون أو أى اختلالات كروموسومية لأن الموجات فوق الصوتية رخيصة ، آمنة وموثوقة أكثر من الفحوصات المعملية.(ألفا فيتو بروتين،بروتين أ المصاحب لبلازما الحامل ,هرمون المشيمي للغدد التناسلية).

ABSTRACT:

This is a retrospective study which is scientific and practical study which was done during January -2015 to April- 2015 and was carried out in Arab United States (In ultrasound department – Madinat Mohammed bin Zayed Health care center - Abu Dhabi).

The study discusses evaluation of U/S Scanning accuracy in diagnosing of Down syndrome by measurement of Nuchal Translucency at 10–13weeks 6 days of fetus gestation versus biochemical serum.

A total of “200” pregnant women (160 experimental sample & 40 control sample) aged between (20to45 years old) with 10th to 14th week of gestation age were selected randomly. Any pregnant woman has an ectopic or molar pregnancies, confirm cardiac pulsation ,a tumor or liver disease and a normally elevated AFP in the fetus or woman (some people naturally have very high AFP). Was excluded from this study.

All patients were subjected to be examined by U/S scanning using GE Voluson 730 with 3,5MHz probe. In Trans abdominal scanning were performed for all patients and measured the Nuchal Translucency(NT) thickness.

The author use Ultrasound scanning for measuring the Nuchal Translucency thickness. Also for data analysis the author using SPSS, significant tests like T test, frequencies and regression .and also the correlation between variables and prevalence of NT thickness, correlations between, age , gender, weight, risk factors and prevalence of NT.

This study found that; The normal thickness of NT is usually between 2-2.5mm and there may be false positive sign, but if the NT measurement is more than 3 mm, this is means that there is sign of abnormality needs more investigations.

Study revealed that the Alfa fetoprotein alone is not reliable and accurate in diagnosis of Down syndrome; U/S scanning for measuring NT thickness is more accurate in diagnosis of chromosomal abnormalities like Down syndrome.

In addition to that the study shows that, The ethnic difference is not significant in interpretation of NT measurements.

This study recommended that Nuchal Translucency measurements must be done for every fetus aged between 10 weeks to 13 weeks 6 days routinely to exclude presence of Down syndrome or any chromosomal abnormalities, because ultrasound scans is cheap, safety, and reliable than lab investigations(Alfa fetoprotein, PAPP –A , free Beta-hCG).

Table of Contents

NO	Subject	Page
	الاية	1
	Acknowledgement	2
	Dedication	3
	Abstract (Arabic)	4
	Abstract (English)	5
	Table of contents	6
	List of tables	9
	List of graphs	10
	List of figures	11
	List of Abbreviations	13
	Chapter One	

1.1	Introduction	1
1.2	Problem of The Study	5
1.3	Objectives of the study	5
1.3.2	Specific objectives	5
1.4	Significance of the study	5
1.5	Previous Studies	6
	Chapter Tow	
2.1	Anatomy Nuchal Translucency	9
2.2	Pathophysiology	11
2.2.1	Down syndrome	11
2.2.2	Incidence Rate of Down's syndrome	12
2.2.3	Phenotype of Down's syndrome	13
2.2.4	Cytogenetic of Down's Syndrome	15
2.3	Maternal Age and Gestation	16
2.4	NT and other Chromosomal Defects	18
2.5	Diagnostic Methods	19
2.5.1	Maternal Serum AFP (MSAFP) Technique.	19
2.5.2	Human Chorionic Gonadotropin (hCG)	21
2.5.3	Other studied serum markers	22
2.5.4	Nuchal Translucency Screening	23
2.6	Factors affecting nuchal translucency measurement	29
2.6.1	Gestational Age	29
2.6.2	Ethnicity	31
2.6.3	Fetal Gender	32
2.6.4	Gravity and parity	33
2.6.5	Mode of conception	33
2.7	Relationship of Crown Rump length (CRL) and gestational age	34
2.8	Use of Ultrasound in Diagnosis of Chromosomal Disorders	35
2.8.1	Trisomy 21 (Down Syndrome)	35
2.8.2	Trisomy 18 (Edwards Syndrome)	35

2.8.3	Trisomy 13 (Patau's Syndrome)	35
	Chapter Three	
3.1	Type of the Study	36
3.2	Area of the Study	36
3.3	Duration of the Study	36
3.4	Subject	36
3.5	Data Collection	37
3.6	Data Analysis	37
3.7	Ethical Consideration	37
3.8	Maternal serum AFP (MSAFP) Technique	37
3.8.1	Packaging & Delivery	37
3.8.2	Specification	37
3.8.3	Specimen Collection	38
3.8.4	Test Procedure	38
3.8.5	Interpretation OF Results	38
3.8.6	Storage And Stability	39
3.9	The NT Technique	40
3.9.1	Technique of doing NT Screening	40
	Chapter Four	
4	Results	47
4.1	Tables and Graphs	47
	Chapter Five	
5.1	Discussion	53
5.2	Conclusion	56
5.3	Recommendations	60
5.4	References	61
	Apendixies	

List of Tables

Table no	Table contents	Page
Table 4.1	Age Distribution of experimental group.	47
Table 4.2	Age Distribution of control group.	48
Table 4.3	Types of Trisomy	49
Table: 4.4	Outcome of pregnancies with respect to the NT thickness.	50
Table: 4.5	Clinical findings in liveborn infants with respect to the NT thickness.	51
Table: 4.6	Clinical findings in liveborn infants with respect to the NT thickness.	52

List of Figures

No of figure	Figure repression	Page
Figure (1-1)	Represent three imaging modalities that identify early fetal development	4
Figure (2.1)	Images of fetus during first trimester from 10 weeks to 14 weeks	10
Figure (2.2)	Down's syndrome is one of the most common genetic conditions. Numbers.	13
Figure (2.3)	Phenotype of Down's syndrome	14
Figure (2.4)	The mechanism of non-disjunction in Trisomy 21	15

Figure (2.5)	NT MOMs in unaffected pregnancies and those with Trisomy 21 (Down syndrome).	17
Figure (2.6)	Same appearance of Trisomy 21 investigation.	18
Figure (2.7)	hCG MOMs in unaffected pregnancies and those with Trisomy 21 (Down syndrome).	19
Figure (2.8)	Standardized measurement Technique	27
Figure (2.9)	Estimated risks of fetal trisomies at 10-14 weeks gestation on the basis of maternal age (background) alone and age plus nuchal fold thickness of 3mm, 4mm and >4mm.	30
Figure(2.10)	Monitoring of NT versus crown-rump length measurements from a sample cohort – recommended increment is 15-25% per week. This data set shows a 17.3% increase in median NT per week.	31
Figure (2.11)	Down syndrome chromosome appearance	34
Figure (3.1)	AFP serum rapid card.	39
Figure (3.2)	GE Voluson 730 Ultrasound System	41
Figure (3.3)	Preparations during the Procedure of NT scanning.	43
Figure (3.4)	Protocol for measurement of Nuchal Translucency	44
Figure (3.5)	Down syndrome patient	46
Figure (4.1)	Age Distribution of experimental group	47
Figure (4.2)	Age Distribution of control group	48
Figure (4.3)	Types of Trisomy	49
Figure (4.4)	Outcomes of pregnancies with respect to the NT thickness	50
Figure (4.5)	Clinical findings in liveborn infants with respect to the NT thickness	51
Figure (4.6)	Clinical findings in live born infants with respect to the NT thickness	52

List of Abbreviations

AFP	Alpha-fetoprotein
CHD	Congenital Heart Disease
CI	Confidence Interval
CI	Confidence Interval
CRL	Crown Rump Length
CUB	combined ultrasound and biochemical
DR	Detection Rate
DR	Detection Rate

DS	Down Syndrome
DV	Ductus Venosus
FMF	Fetal Medicine Foundation
FPR	False Positive Rate
Hhcg	Hyperglycosylated Hcg
IVF	In Vitro Fertilization
MSAFP	Maternal Serum Alpha PhetoProtein
Mom	Multiple Of Median
Mu/L	Milliunits Per Litre
MW	Molecular Weight
Ng/MI	Nanograms Per Millilitre
NSC	National Screening Committee
NT	Nuchal Translucency
NTD	Neural Tube Defect
PAPP-A	Pregnancy Associated Plasma Protein-A
PPV	Positive Predictive Value
SD	standard deviation
Ue3	Unconjugated Estriol
UK	United Kingdom
B-Hcg Free	Beta Human Chorionic Gonadotropin