ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
SCHOOL OF MEDICINE
DEPARTMENT OF ANATOMY

PLACENTA IN PREECLAMPTIC AND GESTATIONAL DIABETES MELLITUS MOTHERS: A macroarchitectural study at Gandhi memorial and Black Lion hospitals, Addis Ababa, Ethiopia

A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, SCHOOL OF MEDICINE, DEPARTMENT OF ANATOMY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN ANATOMY.

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ADDIS ABABA, ETHIOPIA

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Declaration

This is to certify that the thesis by Yibeltal Wubale, Entitled: "Placenta in preeclamptic and gestational diabetes mellitus mothers: A macroarchitectural study at Gandhi and Black Lion Hospitals, Addis Ababa, Ethiopia" on year 2016 and submitted in partial fulfillment of the requirements for the degree of Master of science in Anatomy complies to originality and quality. The thesis has passed with_____remark.

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Chairman	Signature	Date

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Abstract

Globally, preeclampsia and gestational diabetes mellitus are known to have an average prevalence of 6% and 4% respectively. Both clinical conditions are thought to impact on morphophysiology of placenta. Placenta is a dual sourceorgan that structurally and functionally connects the developing fetus to the uterine wall during pregnancy. This fetomaternal organallowsuptake of nutrients,elimination of wastes and exchange of gases. Pregnancy is usually complicated by preeclampsia and gestational diabetes mellitus, which in turn will alter the macroarchitecture and functions of the placenta as well as health of the pregnant mothers. Hence, this study was conducted to assess the macroarchitectural changes of placenta in preeclampsia and gestational diabetes mellitus mothers as compared to uncomplicated mothers who gave birth at Gandhi Memorial and Black Lion Specialized Hospitals, Addis Ababa, Ethiopia. It was an observational comparative cross-sectional studycarried outat Gandhi and Black Lion Hospitals, from June, 2016- August, 2016. A total of 125 fresh placentas from uncomplicated, preeclampsia and gestational diabetes mellitus mothers were implemented. Themacroarchitecture of placenta were examined by inspection and measuring. The data were analyzed by independent- samples t-test and chi square. Accordingly, the finding shows that the shapes of placentas were circular in 80% of uncomplicated, 72% of preeclamptic and 76% of gestational diabetes mellitus, while oval in 14% of uncomplicated, 20% of preeclamptic and 8% of gestational diabetes mellitus. In addition, it was irregular in 6% of uncomplicated, 8% of preeclamptic and 16 % of gestational diabetes mellitus. The weight of placenta in uncomplicated, preeclamptic and gestational diabetes mellitus mothers respectively were 499.4, 456.20 and 583.68 gram. The numbers of cotyledon were 18.66 in uncomplicated, 17.24 in preeclamptic and 22.56 in gestational diabetes mellitus mothers. The diameter was19.4, 17.66 and 23.50 centimeter in order of uncomplicated, preeclamptic andgestational diabetes mellitus mothers. The thicknesses were1.96centimeter inuncomplicated, 1.72centimeterin preeclamptic and 2.34 centimeterin gestational diabetes mellitus mothers. According to the present study most of macroarchitecture (diameter, thickness, weight and number of cotyledon) of placenta were significantly decreased in preeclamptic and increased in gestational diabetes mellitus mothers.

Abbreviationsand Acronyms

AAU - Addis Ababa University

ADA – American Diabetic Association

CHS - College of health science

C/S - Cesarean section

DM - Diabetes mellitus

GA - Gestational age

GDM - Gestational diabetes mellitus

HTN – Hypertension

IRB - Institutional Review Board

IUGR – Intrauterine growth retardation

UC – Uncomplicated

NGDM - Non gestational diabetes mellitus

NHBPE - National High Blood Pressure Education program

PE – Preeclampsia

PIH - Pregnancy induced hypertension

RVI - Retro viral infection

SVD - Spontaneous vaginal delivery

U/S – Ultrasonography

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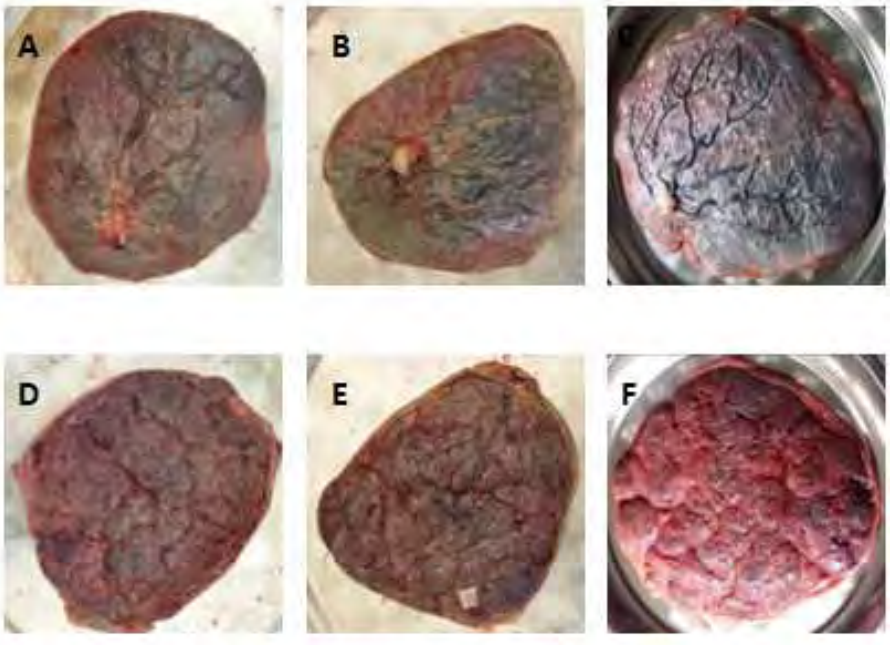
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Upper channel shows fetal surface and lower channel shows maternal surface.
Image A&Dwere from uncomplicated, B&E from preeclamptic andC&F from gestational diabetes mellitus mothers.

A term placenta is dark reddish-blue and discoid organ,15- 25 cm in diameter, 400- 600gm in weight and 2- 3 cm in thickness. At term the weight of the placenta is 1/6 of the fetus and occupies about 15 - 30% of uterine wall(Yetter, 1998). Its functional connectivity allows nutrient uptake, waste elimination and gas exchange through the mother's blood supply. It additional has roles of producing hormones(Ambedkar et al., 2014).Under normal conditions, the growth and survival of the fetus depends on the proper developments of placenta. During its development throughout gestation, placenta continuously undergoes different changes in morphophysiology (Teasdale, 1980).When pregnancy is complicated by gestational hypertension, PE and GDM, its morphophysiology will be altered, which in turn will impact maternal health as well as the fetus(Rahman et al., 2006).

Hypertension is one of the common complicationsthat occur during pregnancy. It is diagnosed if maternal blood pressure is more than 140/90 mm Hg on at least two different occasions six hours apart with the patient at rest in bed(Agarwal et al., 2015).

According to the American College of Obstetricians and Gynecologists (ACOG) Committee on Terminology in 1972, which is further modified by the National High Blood Pressure Education Program Working Group in 2000, there are four major categories of hypertension in pregnancy. These are gestational hypertension, chronic hypertension, preeclampsia or eclampsia, and preeclampsia superimposed on chronic hypertension(NHBPE, 2000).

Chronic Hypertensionisa type ofhypertension that develops before pregnancy or diagnosed before the 20^{th} week of gestation. Hypertension diagnosed for the first time during pregnancy and that does not resolve postpartum is also classified as chronic hypertension(Emery, 2005).

Gestational Hypertensionisan elevation of blood pressure after 20 weeks of gestation or in the 1^{st} 24 hours postpartum without proteinuria in normotensive pregnant woman before the prescribed gestational week. Blood pressure will become in normal range during the postpartum period, usually within 10 days(Landesmon, Douglas, and Holze, 1984).

Preeclampsiaispregnancy-specific syndrome which usually occurs after 20 weeks of gestation (or earlier with trophoblastic diseases). It is characterized by increased blood pressure (≥140/90 mmHg) with either proteinuria (≥300mg/24hr or ≥+1 dipstick) or, in the absence of proteinuria, new onset of any of the following systemic findings: thrombocytopenia, renal insufficiency, abnormal liver

function, pulmonary edema or cerebral/visual symptoms in a women normotensive before 20 week(Steegers et al., 2013).

Preeclampsia further divided into mild and severe. Mild preeclampsia is classified as a blood pressure of ≥140/90 mm Hg and<160/110 mm Hg with proteinuria of ≥0.3 gm/day but < 5 gm/day and in the absence of any systemic findings listed in preeclampsia. When a pregnant mother develops a blood pressure ≥160/110 mm Hg, either proteinuria of ≥5 gm/day or one/more of the systemic finding listed in preeclampsia the clinical condition is known as sever preeclampsia(Peter, Laura and James, 2013).

Eclampsia is a convulsive(not attributable to other causes) phase of disorder occur in pregnant mother post 20 weeks of gestation usually proceeded by sever preeclampsia (Templeton and Campbell, 2014).

Preeclampsia Superimposed upon Chronic Hypertensionis development of preeclampsia in a woman with chronic hypertension(NHBPE, 2000).

The etiology of preeclampsia is unknown.As many authors stated that failure of endometrial spiral artery remodeling,maternal endothelial dysfunction and vasospasm, immune maladaptation and genetics are the hypothesize etiologies of preeclampsia(Emery, 2005). In normal pregnancies, the wall of the spiral arteries is invaded by trophoblastic cells (first and second wave). This enables the spiral arteries to have wide caliber, tortuous channels that carry a large amount of blood to the intervillous space and are resistant to the effects of endogenous vasomotor agents (trophoblast-mediated vascular remodeling). In preeclampsia, there isa failure of a second wave of endovascular trophoblast migration(Robertson, Brosens, and Dixon, 1967).This results in persistence of muscular tissues in the tunica media of spiral arteries. As a result, the vessels fail to dilate and remain responsive to endogenous vasomotor influences that lead to high resistance. This results in a decrease in uteroplacenta blood flow(Kishwara et al., 2009).

Gestational diabetes mellitus (GDM) is any degree of glucose intolerance with first onset or diagnose during pregnancy. As gestation advances,anti-insulin signals(i.e. Human placental lactogen) produce by placenta increases. This leads to decrease in insulin sensitivity. Gestational diabetes mellitus is a treatable condition if a woman modifies diet and does moderate exercise (Khaskhelli et al., 2013,ADA, 2009).

1.2 Statement of the problem

Hypertensive disorder during pregnancy is one of the deadly triad along with hemorrhage and infection; that results in large number of maternal and fetal death. Worldwide hypertensive disorders are responsible for 5-10 % of all maternal deaths (Romero et al., 2008). A study done at Black Lion Hospital of Addis Ababa showed that out of 3424 deliveries 183 (5.3%) mothers were found to have one form of hypertensive disorders of pregnancy. About 85.2% were cases of pregnancy induced hypertension (PIH), and majorities (78.2%) of them were severe preeclampsia and eclampsia. The remaining 14.8% had chronic hypertension (Teklu and Gaym, 2006).

Worldwide,preeclampsia complicates 2 - 10% of pregnancies and directly associated with 10 to 15% of maternal death(Shenhav et al., 2002).

The risk of preeclampsia is 2 to 5-fold higher in pregnant women with a maternal history of this disorder.The incidence of preeclampsia ranges from 3 to 7% in nulliparas and 1 to 3% in multiparas(Zhang et al., 1997).According to Ethiopian National Emergency Obstetric and Newborn Care report, preeclampsia complicates approximately 1% of all deliveries and 5% of all pregnancies. In addition to this it is responsible for 16% of direct maternal mortality and 10% of all maternal mortality (direct and indirect) (Gaym et al., 2011).Preeclampsia may cause chronic hypertension, ischemic heart disease, and stroke on the mother side and increase a risk of stroke, coronary heart disease, and metabolic syndrome in adult life on child(Meads, Cnossen and Meher, 2008, Barker et al., 1993).

Worldwide from all pregnancies complicated by DM nearly 90% is contributed by GDM(ADA, 2010). Gestational diabetes mellitus affects nearly 2-5% of all pregnancies. It increases a risk of spontaneous abortion, fetal macrosomia, IUGR and fetal hypoglycemia.In majority of GDM cases, glucose levels return to normal after delivery. The risk of recurrence in future pregnancies is at least 50% (Crowther et al., 2005).In Europe the prevalence of GDM is 2–6% of pregnancies(Buckley et al., 2012). A community based survey of gestational diabetes in 18 rural villages of the eastern zone of Tigray administrative region, northern Ethiopia showed that the prevalence rate of gestational diabetes mellitus was 3.7%(Seyoum et al., 1999).

In spite of the fact that placental examination is crucial to save the life of the mother and her fetus, it is mostly neglected by health professionals and researchers in Ethiopia. To this end, this study is set to assess the presence of anymacroarchitectural changes of placenta in preeclampticand gestational diabetes mellitus mothers in comparisonwith uncomplicated ones in two hospitals in Addis Ababa.

1.3 Significance of the study

The importance of this study ismultiple, which may include:

I. It helps the clinicians to givean immediate or later management forpreeclamptic mothers; this enables to prevent maternal or fetal adverse outcomes.

II. Opening doors for further studies to be carried out on macroarchitectural changes in other disease /or microarchitecture studies in the same conditions taking this as a baseline.

2. LITREATURE REVIEW

Available evidence shows that preeclampsia and gestational diabetes mellitus are the main causes of complicated pregnancies worldwide. Yet, to date, less information is still available regarding the effect of preeclampsia and gestational diabetes mellitus on macroarchitecture of placenta.Macroarchitecture of human placenta is characterized by its shape, diameter, thickness, weight, lobes or cotyledons, etc.

2.1Shape

Shape of placenta is determined by the persistent patch of villi finally left on chorionic sac.Abnormal shape of placenta will encountered if the mother have preeclampsia or GDM. There are different abnormalities of shape of placenta like bi-discoidal shape of placenta is when it consists of two disc, placenta bilobata (Lobed) is formed when it is divided in to two lobes, placenta membranacea or diffuse is when chorionic villi persist all-round the chorionic sac and it is thin, placentasuccenturiata is formed when small part of the placenta isseparated from the rest of it.Fenestrated placentapresents with hole in the disc. When the chorionic plateon the fetal side of the placenta is smaller than the basalplate and if the fetal surface of such a placenta has acentral depression surrounded by a thickened whitish ring, it is called a circumvallate placenta(Sudha, Sivakumar, and Christilda, 2012).

A cross-sectional study done in Era's Lucknow Medical Collegeshowed that 73.33% of preeclampsia and 83.33% of uncomplicatedmothers' placenta were discoid in shape. Other observed placental shapes were irregular (16.67% in preeclampsia group and 10% in non-complicated group) and bidiscoid, lobed and diffused (3.33% each) in both preeclampsia and uncomplicated group. The difference was not significant (Navbir, 2012).

A research done in Rajasthan, Indiashowed that 60% of the uncomplicated group placenta was oval shape and 40% was circular.On the other hand in PIH 80% was oval and 20% was circular. The difference was not significant(Agarwal et al., 2015)

A study done in India on 100 placentas from uncomplicated, 100 placentas from mild PE and 100 from sever PE mothers showed that 90.2% of placentasin both preeclampsia and uncomplicated cases were circular in shape. In severe and mild PE the occurrence was 81 (81.0%) and 91 (91.0%) respectively. Oval shape placenta distribution in severe PE, mild PEand uncomplicated motherswas 19 (19.0%), 9 (9.0%), 9.8 (9.8%) respectively. The finding showed that significantly ($P < 0.001$) higher number of oval placenta was recorded in preeclampsia than uncomplicated(Vijayalakshmi and Kittali, 2015).

A research done inEgmore, Chennai showed that 16 (80%), 4(20%)placentas from uncomplicated mothers were circular and oval in shape respectively but altered shape was not observed. On the other hand in complicated pregnancy apart from circular and oval the following altered shapes were observed: in Preeclampsia: kidney shape 8 (40%) and triangle shape 8 (40%); in gestational diabetes mellitus: placenta succenturiata 10(50%) and placenta biparita 2(10%) was found. Thus significantly there was many altered placentashape recorded in complicated cases than uncomplicated groups (Sudha, Sivakumar, and Christilda, 2012).

A study done in Pakistan in 50 gestational diabetes mellitus mothers showed that all placentas had discoid in shape. The difference was not significant(Memon, Goswami, and Lata, 2015).

2.4 Diameter and thickness: - A normal term placenta has 15-25 cm and 2-3 cm diameter and thickness respectively (Yetter, 1998).

A study done in India showed that the average diameter and thickness of placenta in PIH was 15.91±2.11cm, 2.39±0.54cm respectively and in uncomplicated group placental diameter was 18.40±1.42 cm and 2.77±0.51 cm thickness. Placental diameter and thickness were significantly decreased in PIH as compared to uncomplicated group (Singh and Gugapriya, 2014).

A study done in India showed that in uncomplicated mothers the mean placental thickness and diameter was 1.67 cm and 15.4 cm respectively. In GDM the mean placental thickness was 3.15 cm and mean placental diameter was 16.66 cm. Placental diameter and thickness were significantly decreased in uncomplicated as compared to GDM mothers (Saha et al., 2014).

A study done in India showed that placental diameter was 18.7±1.55 cm Vs 17.2±1.7 cm, placental thickness was 2.3±0.43 cm Vs 1.8±0.49 cm in uncomplicated and preeclamptic mothers respectively. Placenta in preeclamptic mothers was significantly smaller and thinner than in uncomplicated mothers(Shevade et al., 2015).

A research done in Rajasthan, India showed that the mean placental thickness in uncomplicated mothers was 1.96 ± 0.23 cm and 1.82 ± 0.22 cm in PIH mothers. The mean placental diameter in uncomplicated groups was 15.40 ± 1.34 cm and 14.46 ± 1.81 cm in PIH groups. Placental diameter and thickness was significantly ($p<0.01$) smaller and thinner respectively in PIH as compared to uncomplicated (Agarwal et al., 2015).

A study done in India in 25 uncomplicated and 25 PIH mothers showed that the mean placental diameter in uncomplicated was 18.02±2.40 cm and 18.09±2.50 cm in PIH. The differences in diameter of placenta was not significant(Durgesh et al., 2015).

A report from Pakistan showed that diameter and thickness of placenta in gestational diabetes mellitus mothers was 20-30 cm and 2.4-3 cm respectively. Gestational diabetes mellitus placenta was significantly larger and thicker (Memon, Goswami, and Lata, 2015).

A study conducted in India (2015) showed that placental diameter (21.1 ± 3.0 cm vs. 17.4 ± 1.4 cm; p=0.0001) and thickness (2.3 ± 0.3 cm vs. 1.9 ± 0.2 cm; p=0.0001) in gestational diabetes mellitus and uncomplicated mothers respectively. Placenta from Gestational diabetes mellitus was significantly larger and thicker than uncomplicated (Jeelani, Jabeen, and Qureshi, 2015).

2.3 Weight

Theweight of placenta is functionally significant as it is related to villous surface area and fetalmetabolism.A normal term placenta weighs 400gm- 600gm(Shevade et al., 2015).

A study done in India with a sample of 50 placenta from PIH and 50 from uncomplicated showed that the mean placental weight was 376.41±17.198gm in mild PE, 330.72±2.90gm in severe PE and 435 .92±14.18 gm in uncomplicated groups. The result showed that placental weight was significantly decreased in preeclamptic as compared to uncomplicated mothers (Singh and Gugapriya, 2014).

A studydone on 75 placentas from PIH and 25 from non complicated in India showed that the mean placental weight was 495 grams inuncomplicated group, 435.63 grams in mild preeclampsiaand 371.43 grams in severe preeclampsia. The result showed that placental weight was significantlydecreased inpreeclampsia as compared to that of the uncomplicated (Udainia, 2001).

A study done in Era's Lucknow Medical Collegeshowed that placenta weighing ≤ 400 gm in sever preeclampsia,mild preeclampsia and uncomplicated groups was 60%, 50% and 36.67% respectively. The weight of placenta was significantly decreased in preeclampsia(Navbir, 2012).

A study done in Pakistanshowed that the mean weight of placenta in uncomplicated group was 499.0 gm and 967.5 gm in gestational diabetic mothers. The study showed that placenta ofgestational diabetes mellitus was significantly heavier than nondiabetic(Khaskhelli et al., 2013).

A research done in India showed thatthe mean placental weight was 504.42 gm (range 345-570 gm) in uncomplicated groups and 565.75 gm (range 510-665 gm) in GDM. Placenta fromgestational diabetic mothers was significantly heavierthan that of uncomplicated mothers (Saha et al., 2014).

A cross sectional study done in Indiawith a sample of 50 placenta from preeclampsia and 50 from uncomplicated mothers showed thatthe mean weight of placenta was 502.26gm in normotensive and 430.38gm in preeclampsia. Placental was significant decreased in preeclamptic mothersas compared to uncomplicated(Shevade et al., 2015).

A study conducted in Rajasthan, India showed that the mean placental weight in uncomplicated mothers was 397.5±42.29 gm and376.25±39.2 gm in PIH. Placental weight was significantly decreased in PIH(Agarwal et al., 2015).

Also a study donein Karnataka, Indiashowed that the placenta weight was 399.1±79.11gm, 371.31±85.31 gm and 478.8±292.21 gram in mild PE, sever PE and uncomplicated mothers respectively. Placental weight was significantly decreased in preeclamptic group(Vijayalakshmi and Kittali, 2015).

A research done in 98 GDM mothersin Srinagar Kashmir, India showed that placenta from the GDM mothers wasweighing significantly higher as compared to NGDM (589.3 ± 66.5 gm(GDM) vs. 511.0 ± 36.5gm (NGDM); p=0.0001)(Jeelani, Jabeen, and Qureshi, 2015).

A study done by Teasdale on diabetic and uncomplicated mothers showed that placental weight showed only a tendency to be heavier in diabetic than the gestationally matched non diabetic, though the difference was not statistically significant(Teasdale, 1981).

A research done in Pakistan in 50 gestational diabetic mothers showed that the weight of placenta was 700-1000 gm. Placenta from gestational diabetes mellitusmothers was significantly heavier than uncomplicated(Memon, Goswami, and Lata, 2015).

2.2 Number of cotyledon

As the placenta become mature the short, thick early stem villi branch repeatedly, forming progressively finer subdivided and greater numbers of branched villi. Each cotyledon contains two or more stem villi and its ramification. The total number of cotyledons remains the same throughout gestation, but individual cotyledons continue to grow until term, although less actively in the final weeks(Hanley et al., 2002). A normal term placenta has 15-20 cotyledons (Ashfaq, Janjua, and Channa, 2005).

A study done in Pakistan on gestational diabetic and non diabetic mothers showed that placental number of cotyledons was significantly increased in gestational diabetic mothers (24.46) as compared to that of the non diabetic 16.13 (Khaskhelli et al., 2013).

A cross-sectional study done in India on 100 placentas(50 from uncomplicated and 50 from preeclampsia) showed that placental number of cotyledons in preeclampsia and uncomplicated group was 10.02±4.13 and 16.26±4.14 respectively. Placental number of cotyledons were significantly decreased in preeclampticmothers (Singh and Gugapriya, 2014).

A work done in India showed that mean placental number of cotyledon was 18.9 and 16 in uncomplicated and preeclampsia respectively. Placenta number of cotyledons in preeclampsia was significantly decreased(Shevade et al., 2015).

About 37% of severe preeclampsia placenta had 10-15 cotyledons compared to 25% of mild PE and 11% of uncomplicated was recorded in a study done in Karnataka, India. This study showed that placental number of cotyledon was significantly decreased in preeclampsia as compared to uncomplicated (Vijayalakshmi and Kittali, 2015).

A cross sectional study done in Rajasthan, India showed that the mean placental number of cotyledons in uncomplicated groups was 16.93±2.49 and 14.78±2.28 in PIH groups. Which was significantly decreased in PIH as compared to uncomplicated (Agarwal et al., 2015).

On another cross sectional study conducted in Pakistan in 50 GDM term mothers showed that placental number of cotyledon was 25-35. Placental number of cotyledons were increased in GDM as compared to uncomplicated mothers(Memon, Gosawmi, and Lata, 2015).

As we have seen on the above literature there is a variation in macroarchitecture of placenta in preeclampsia Vs. uncomplicated and GDM Vs. uncomplicated mothers. From the above literature we can also understand most of literatureshowed that macroarchitecture of placenta including diameter, thickness, weight and number of cotyledons were decreased in preeclamptic mothers and increased in gestational diabetes mellitus mothers as compared to uncomplicated mothers. But according to majority of literature listed on the above placental shape wasn't showing a significant change in preeclamptic and gestational diabetes mellitus mothers. This study assesses macroarchitecture of placenta in preeclamptic and gestational diabetes mellitus mothers as compared to uncomplicated mothers.

3. OBJECTIVE

3.1 GENERAL OBJECTIVE

Generally, this study aims to assessmacroarchitectural change of placenta inpreeclampticand gestational diabetes mellitus mothers as compared to uncomplicatedmothers.

3.2 SPECIFIC OBJECTIVES

Specifically, this study aims:

1. To identifychanges in shape of placentain preeclamptic and GDM mothers as compared to un complicated mothers
2. To comparediameter and thickness of placenta in preeclamptic and gestational diabetes mellitus mothers with uncomplicated mothers
3. To compare placental weight and number of cotyledon in preeclamptic and gestational diabetes mellitus mothers with uncomplicated mothers

4. METHODS AND MATERIALS

4.1 Study type and study period

Anobservational comparative cross-sectional study typewas conducted from June, 2016 – August,2016.To conduct this study weight scale, flat tray, bucket, measuring cylinder, gloves, towels, sponge, blade holder and blade, non stretched scale graduated in cm, needle, wood block, digital camera, normal saline and formalin solution were used.

4.2 Study area

The study was conducted at Gandhi Memorial and Black Lion Specialized Hospitals, Addis Ababa, Ethiopia.

4.3 Source of population

The source of population was all term pregnant mothersin Addis Ababa.

4.4 Study population

The study population was all term pregnant mothers who fulfill the inclusion criteria and attend their delivery at Gandhi Memorial and Black Lion Specialized Hospitals during data collection time.

4.5 Eligibility criteria

4.5.1 Inclusion criteria

Uncomplicated, gestational diabeticand preeclamptic mothers had gestational age 37-42 weekswere included.

4.5.2 Exclusion criteria

Pregnant mothers who did experience any complication during pregnancy like gestational hypertension, chronic hypertension, pre-existing diabetes mellitus,intrauterine fetal death, chronic intrauterine infection, fetal hydrops, RVI,anemia, multiple pregnancies,placenta eccereta, placenta percreta, placenta previa, abruption placenta, incomplete delivery of placenta,pre and post term pregnanciesand malnutrition was excluded from this study.Moreover, pregnant mother who did experience both preeclampsia and gestational diabetes mellitus simultaneously was not included.

4.6 Sample size and sampling method

The desired sample was calculated using difference of means formula.

$n1\ O \quad 2 = (\frac{r+1}{r})(\frac{(Z_{\alpha_2} + Z_{\beta})^2 (\sigma_1^2 + \sigma_2^2)}{(x-y)^2})$ where,

$n1$ o $2 =$ Sample size in the uncomplicated group respect to PE & GDM respectively

$r =$ Ratio of uncomplicated to preeclamptic = 1:1(Singh and Gugapriya, 2014)or ratio of uncomplicated to gestational diabetes mellitus=2:1

$Z_\beta =$ 0.84 for 80% power

Z α/2 = 1.96 for 95% confidence level

$x - y =$ Difference of means of weight of placenta of preeclamptic Vs uncomplicatedmothers and gestational diabetes mellitus Vs uncomplicated mothers

$o_1^2 a \quad o_2^2 =$ VarianceofweightofplacentaofpreeclampticVs.uncomplicatedmothersfrom recent report (Vijayalakshmi and Kittali, 2015) and gestational diabetes mellitus Vs. uncomplicated mothers(Fahima, Ferdousi, and Sultan, 2011)

Therefore, $n1 = (\frac{1/1+1}{1/1}) \frac{(1.9 + 0.8)^2(8.2^2 + 2 .1^2)}{(3 .4 - 4 .8)^2}$

$n1 = 165.54 = 166$ (By using uncomplicated to preeclamptic ratio)

Bytaking$o_1 = (97.32) a \quad o_2 = (112.62)$, x=417 gm and y=361.68

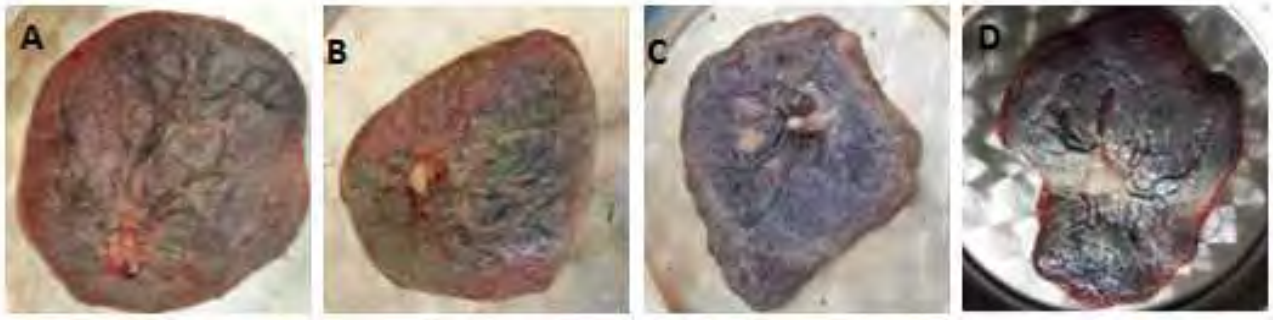
n2= 170 (By using uncomplicated to gestational diabetes mellitus ratio)

Nf- average of n1(By using preeclampsia)& n2 (By using gestational diabetes mellitus)

Nf= (n1+n2)/2= (166+170)/2=168

Because of cost and shortage of preeclampsia and GDM cases for the calculated sample size were too much, I used purposive sample size of 50 uncomplicated, 50 preeclampsia and 25 GDM cases(Singh and Gugapriya, 2014).

A total of 620 uncomplicated mothers were delivered at Gandhi Memorial Hospital from June, 2015 – August, 2015. The uncomplicated cases were selected by systematic random sampling techniques. The study units initially identified as after taking delivery statistics report from previous year of the same month from book of registration**.** Then in order to calculate the sampling interval the total delivery statistics (620) was dividing to the total sample size (50), and found to be 12. Every 12 delivered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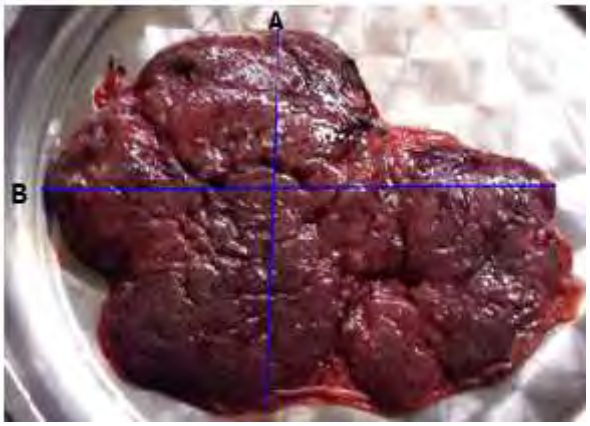
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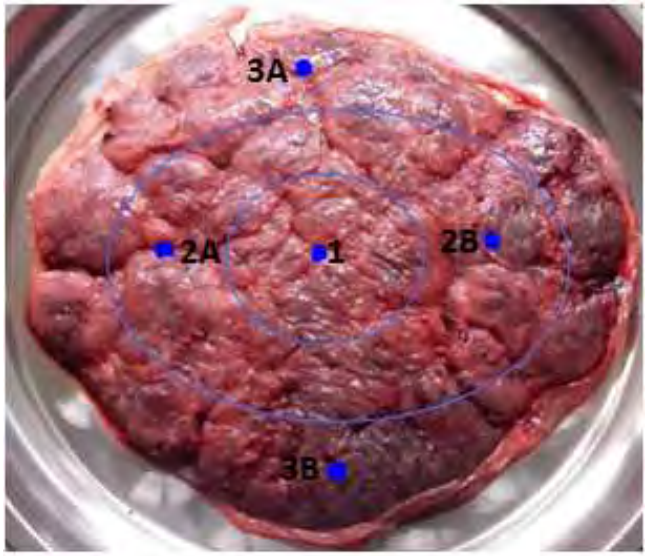
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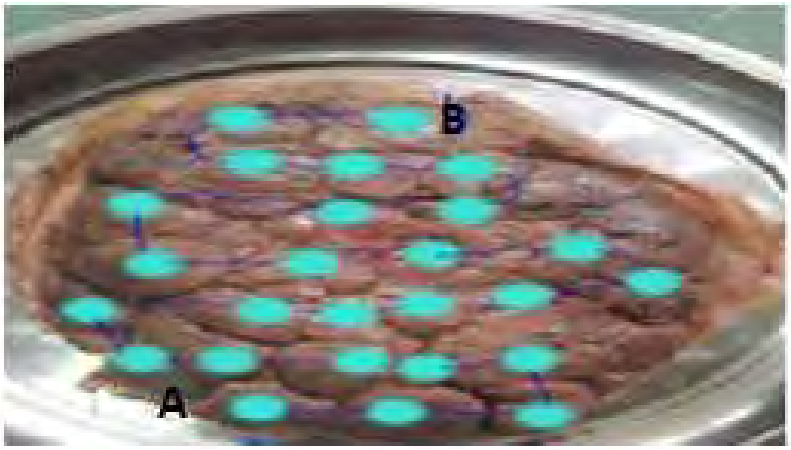
B
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4.10 Operational definitions

Irregular shape of placenta:allshape of placentaexcept circular and oval.

Preeclamptic mother: Pregnant women were diagnosed by the physician for preeclampsia on her follow up card before or during delivery.

Gestational diabetes mellitus mother: Pregnant women were diagnosed for gestational diabetes mellitus by the physician on her follow up card before or during delivery.

Uncomplicated mother: Pregnant women were diagnosed by the physician as non-complicatedon her card before or during delivery.

Gestational age: The period of time between conception and birth which was written by the physician on mother's card during delivery.

Mode of delivery: A mechanism by which a mother gave a birth written by the physician on mother's card after delivery.

Spontaneous vaginal delivery: A mode of delivery which include vaginal delivery with or without instrument.

4.11 Data processing and analysis

The collected data wascoded and entered into EPI INFO version 16 then data was exported to SPSS version 20. Comparisons of macroarchitecture of placenta in preeclampticVs. uncomplicated and gestational diabetes mellitus Vs. uncomplicated mothers were analyzed using independent sample t-test and chi- square test.Differences $p<0.05$ was considered statistically significant.

4.12 Ethical considerations

Ethical clearance was obtained from Institutional Review Board of CHS, AAU. Each study participant was adequately informed about the objective of the study and anticipates benefit and risk of the study. Formal consent was obtained from study participants for protecting autonomy and ensuring confidentiality. Respondents were also informed the right not to give their placentaif they don't want to participate.

4.13 Dissemination and Utilization of results

The findings of the study will bepresented to the department of Anatomy,School of Medicine, College of Health Science, Addis Ababa University. Thestudy result will also submit to Gandhi Memorial and

Black Lion Specialized Hospitals, Addis Ababa, Ethiopia. Effort will be made to present the result in locally orinternationally held seminars, workshops, conferences and meetings.For the publication purpose,the abstract of this thesis will be submitted to national or international peer reviewed publishers.

4.14 Limitation of the study

The scope of the present study is limited on macroarchitectural study; nonetheless, I shouldn't be able to proceed with microarchitectural and biochemical studies due to cost and time. The relatively low sample size was also attributed to the shortage of preeclampsia and gestational diabetes mellitus cases during data collection period. This will impact the generalization of the present study to a wider population.There is variation of incidence rate of preeclampsia in Ethiopia and worldwide these may be due to poor documentation and use of different diagnostic criteria.

5. Result

This study finding showed thatthe mean age of participants were 26.46 ± 2.95year in uncomplicated, 25.56 ± 2.84 year in preeclamptic and 28.04 ± 2.15 yearin gestational diabetes mellitus. Majority of the uncomplicated(60 %), preeclamptic (48%) and gestational diabetes mellitus(68%) motherswere in the age group 25-29 year(**Table1**).

Table 1: - Age categories among uncomplicated, preeclamptic and gestational diabetes mellitus mothers

Age(year)	UC (%)	PE(%)	GDM (%)
20-24	26	38	4
25-29	60	48	68
30-34	14	14	28

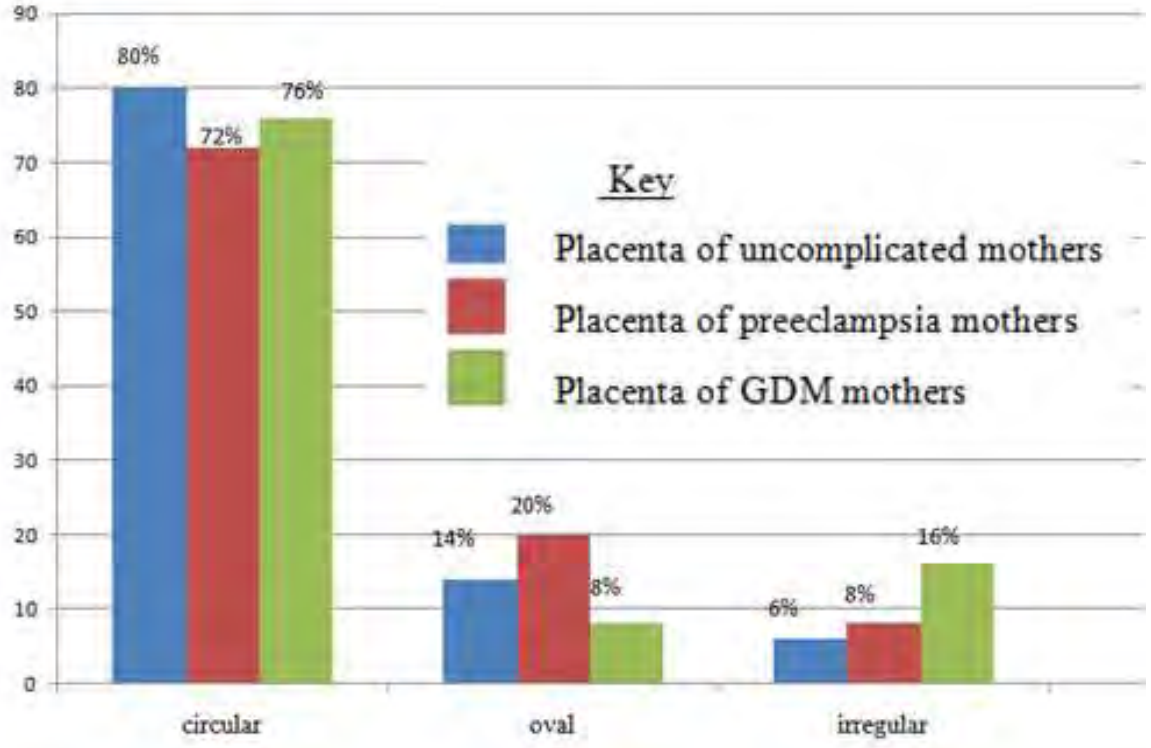
The present study result showed that from the total participants 44%ofuncomplicated and 40%of gestational diabetes mellitus were para-1. In preeclampsia group majority of them were para-0(58%) followed by para-1(22%) as shown on **table2**.

Table 2: - Parity distribution inuncomplicated, preeclamptic and gestational diabetes mellitus mothers

Parity	UC (%)	PE (%)	GDM (%)
Para-0	30	58	24
Para-1	44	22	40
Para-2	22	18	24
Para≥3	4	2	12

The present finding showed that most of uncomplicated and gestational diabetes mellitus mothers' gestational age was 40 weeks (34% Vs. 32%) followed by 38 weeks (30% Vs. 28%) respectively. Majority of preeclamptic mothers' gestational age was 38 weeks (50%) followed by 39 weeks (24%).

From all participants 23.2% (4% uncomplicated, 11.2% preeclampsia and 8% gestational diabetes mellitus) were delivered by C/S and the remaining 76.8% (36 % uncomplicated, 28.8% preeclampsia and 12% gestational diabetes mellitus) were by SVD.Respective of the sample size 40% of gestational diabetes mellitus, 28% of preeclamptic and 4% of uncomplicated mothers were delivered by C/S.


90
80
70
60
50
40
30
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10
0
80%
72%
76%
14%
20%
8%
6%
8%
16%
Key
Placenta of uncomplicated mothers
Placenta of preeclampsia mothers
Placenta of GDM mothers
circular
oval
irregular

The mean placental weight in uncomplicated group was 499.40 ± 11.89 gram.It was lesser in preeclampsia group (456.20 ± 19.13 gram) as compared to uncomplicated mothers.But placenta of gestational diabetes mellitusparticipants (583.68 ±21.80 gram)was significantly weighing more than placenta of uncomplicated mothers (**Table3**).

The mean placental number of cotyledons in uncomplicated group was 18.66 ± 1.21; where as it was 17.24 ± 1.06 and 22.56 ± 1.58 in preeclampsia and gestational diabetes mellitus participants respectively (**Table3**). Placental number of cotyledon was significantly ($p<0.001$) decreased in preeclamptic and increased in gestational diabetes mellitus mothers than uncomplicated.

The mean placentalthickness was 1.96 ± 0.20 cmin uncomplicated, 1.72 ± 0.11 cm in preeclampticand 2.34 ± 0.17 cm in gestational diabetes mellitus mothers (**Table3**).Placental thickness in uncomplicated mothers was significantly ($p<0.001$) thicker than preeclamptic but thinner than gestational diabetes mellitus mothers.

The mean placental diameter was 19.4 ± 0.85 cm, 17.66 ± 1.07cm and 23.50 ± 0.88 cm in uncomplicated, preeclamptic and gestational diabetes mellitus mothersrespectively (**Table3**). It was significantly ($p<0.001$) larger in gestational diabetes mellitus and smaller in preeclamptic than in uncomplicated mothers.

Table 3:- Gross morphological characteristics of placental in uncomplicated, preeclamptic and gestational diabetes mellitus mothers

Placenta parameter	**UC (mean ± SD)**	**PE (mean ± SD)**	**GDM (mean ± SD)**
Weight (gm)	499.4±11.89	456.20±19.13	583.68±21.80
Cotyledon	18.66±1.21	17.24±1.06	22.56±1.58
Diameter (cm)	19.40±0.85	17.66±1.07	23.50±0.88
Thickness (cm)	1.96±0.20	1.72±0.11	2.34±0.17

6. Discussion

6.1 Macroarchitecture of placenta inpreeclampticVs. uncomplicated mothers

The weight of placenta is functionally a significant parameter as it relates to villous area and fetal metabolism(Shevade et al. 2015). The present finding showed that the mean placental weight in preeclampsia group was 456.20±19.13 gmand 499.4±11.89 gmin uncomplicated mothers. Placental weight was significantly ($p<0.001$)decreased in preeclamptic mothers as compared to uncomplicated mothers. The present study was in line with the studiesdone in India which was 495gm (normotensive) Vs 435.63 gm (mild PE) and 371.43 gm (sever PE)(Udainia, 2001), Era's Lucknow Medical College (Navbir, 2012), India 478.80±91.10 gm (normotensive) Vs 399.10±79.11 gm (mild PE) and 371.31±85.31 gm (sever PE) (Vijayalakshmi and Kittali, 2015), India435.92±14.18 gm (normotensive) Vs 376.41±17.12 gm (mild PE) and 330.72± 2.90 gm (sever PE) (Singh and Gugapriya, 2014) and India 502.26 gm (normotensive) Vs 430.38 gm (preeclampsia) (Shevade et al. 2015).But the above reported results showed that placental weight in preeclamptic were more decreased as compared to the present study, which might be is attributed to due to severe placental insufficiency caused by earlier onset of preeclampsia and low health quality service given for mothers during follow up in preeclamptic cases included in the above studies . In addition to this may be due to environmental and genetic differences.

According to thepresent study placental number of cotyledon was 17.24±1.06 in preeclamptic and 18.66±1.21 in uncomplicated mothers. Number of cotyledons of placenta was significantly ($p<0.001$) decreased in preeclamptic mothers as compared to uncomplicated mothers. This study was in line with a study reported from India; whichshowed that number of cotyledon was 10.02±4.13(PE) and 16.26±4.14 (normotensive) (Singh and Gugapriya, 2014), India (Shevade et al., 2015) and in Karnataka, India showed that about 37% of severe preeclampsia group had 10-15 cotyledons compared to mild PE 25% and uncomplicated 11% (Vijayalakshmi and Kittali, 2015). Number of cotyledons of placenta in preeclamptic mothers in the above studies was more decreased as compared to the present study. This may be due to early onset of preeclampsia and/or a poor control of preeclampsia result much degeneration of placental cotyledon in preeclampsia samples.

The present finding showed that placental diameter was 19.40±0.85 cm (uncomplicated) Vs 17.66±1.07 cm (preeclampsia) and placental thickness was 1.96±0.20 cm (uncomplicated) Vs 1.72±0.11 cm (preeclampsia). Placental diameter and thickness in preeclampsia were significantly

($p<0.001$) smaller and thinner respectively. This study was in line with the study done bySingh and Gugapriya, Shevade et al.(Singh and Gugapriya, 2014)(Shevade et al. 2015). But a study doneby Durgesh et al. (Durgesh et al, 2015)showed that there was no significant change of placental thickness and diameter in PE and uncomplicated mothers which contrast with the present study. This difference maybe due to preeclamptic mothers included in Durgesh et al. study were late onset preeclampsia cases and/or get better health service during pregnancy as compared to preeclamptic mothers included in the present study.

Placenta is a mirror which reflects the perinatal period history (Langley and Fox, 1973). Placenta of preeclamptic mothers shows macro/microarchitectural maldevelopment (Prakash et al, 2014). According to this study most of the placentas 80% in uncomplicated and 72% in preeclampsia were circular in shape. In addition, 14% Vs. 20% oval and 6% Vs. 8% irregular placental shapes were observed in uncomplicated and preeclamptic mothers respectively. These findings though it is not statistically significant, there was more oval and irregular placental shape observed in preeclampsia. This difference may be due to apoptosis and compensatory hyperplasia of the parenchyma run side by side causing loss and fibrosis of parenchyma tissue.These changes influence the shapes which deviate from normal. The present study was in line with a study conducted in Era's Lucknow Medical College (Navbir, 2012). But according to studies conducted in India (Sudha, Sivakumar, and Christilda, 2012, Vijayalakshmi and Kittali 2015) there was more altered shape in preeclampsia; the difference was statistically significant. This difference may be due to a low quality health service given and/or early onset of preeclampsia in the above two study cases.

6.2 Macroarchitecture of placenta in gestational diabetes mellitusVs. uncomplicated mothers

According to the present study the weight of placenta in gestational diabetes mellitus was 583.68±21.80 gm. It was significantly ($p<0.001$) heavier than uncomplicated (499.40±11.89 gm) mothers. This may be due to compensatory hyperplasia of placenta to support macrosomic baby, which in turn results from reactionary hyperglycemia in fetuses of gestational diabetic mothers. The present study wasin agreement with a study done in Pakistanshowed that the mean weight of placenta in uncomplicated group was 499.0 gm and 967.5 gm in gestational diabetic mothers(Khaskhelli et al., 2013), Pakistan which was 700-1000gm in gestational diabetes mellitus (Memon, Gowsami, and Lata, 2015),Srinagar Kashmir, India showed that 589.3 ± 66.5 gm (GDM) vs. 511.0 ± 36.5 gm (NGDM); p=0.001)(Jeelani, Jabeen, and Qureshi, 2015). The present study was in contrast to a study done by Teasdale(Teasdale, 1981)which showed that placental weight was slightly heavier in GDM than uncomplicated but not statistically significant. This difference may bedue to quality of health services for mothers' during pregnancy in cases that included in Teasdalestudy was better than cases included in the present study.

This study showed that the mean placental number of cotyledon in gestational diabetes mellitus was 22.56±1.58 and 18.66±1.21 in uncomplicated mothers. Placental number of cotyledon wassignificantly ($p<0.0001$) increased in gestational diabetes mellitus mothersas compared to uncomplicated mothers. This difference may be due to a long term phenomenon of compensatory mechanism to support macrosomic babyresult increase number of cotyledon number of placenta. This study was corroboratedwith the study done in Pakistan (Khaskhelli et al., 2013, Memon, Gowasmi, and Lata, 2015).

The currentstudy showed that placental diameter vs. thickness in gestational diabetes mellitus and uncomplicated mothers was 23.50 ± 0.88 cm Vs. 19.40 ± 0.85 cm, 2.34±0.17 cm vs. 1.96±0.20 cm respectively. Placental diameter and thickness was significantly increased in gestational diabetes mellitus mothers as compared touncomplicatedmothers. This findings was in line with a study done in India (Saha et al., 2014, Jeelani, Jabeen, and Qureshi, 2015)and in Pakistan (Memon, Gowsami, and Lata, 2015).

Gestational diabetes mellitus is associated with many placental abnormalities such as placentomegaly, infarcts, thickening of basement membrane and abnormalities of placental villi such as fibrosis(Aerts, Holemans, and Van Assche, 1990).The present finding indicated that 80% circular, 14% oval and 6%

irregular shape of placentas were observed in uncomplicated mothers. On the other hand, in gestational diabetes mellitus, 76% circular, 8% oval and 16% irregular placental shapes were recorded. Even though, it was not statistically significant the placenta in gestational diabetes mellitus mothers was more irregular in shape as compared to uncomplicated mothers. This findings was supported by a study done in Pakistan (Memon, Goswami, and Lata, 2015). But a study conducted in India (Sudha, Sivakumar, and Christilda, 2012) in gestational diabetes mellitus showed that significantly more altered placental shape was observed. This difference may be due to poor control of glucose level in gestational diabetes mellitus mothers included in the study conducted in India as compared to the present GDM cases. Environmental and genetic differences may also have own impacts.

Finally, this study result showed that an increment in placental weight, number of cotyledon, diameter and thickness in GDM mothers. This may be due to a long term compensatory hyperplasia in order to support macrosomic baby this may result from poor control of sugar level during pregnancy. But the same parameters were reduced in preeclamptic mothers. This may be due to apoptosis of placental parenchyma/placental insufficiency secondary to hypo perfusion.

7. Conclusion

The following conclusions weredrawn from the present study conducted in macroarchitectural changes of placenta in preeclamptic and gestational diabetes mellitus mothers.

i. A significant decrement in weight, diameter, thickness and number of cotyledonof placenta in the preeclamptic mothers as compared to uncomplicated mothers.

ii. A significant increment in weight, diameter, thickness and number of cotyledon of placenta in the gestational diabetes mellitus mothers as compared to uncomplicated mothers.

iii. Even though, it was not significant more irregular shape of placenta were observed in preeclamptic and gestational diabetic mothersas compared to uncomplicated mothers.

8. Recommendation

I would like to forward the following recommendations for health professions, pregnant mothers and researchers.

- The clinicians could be able to inspect and measure the macroarchitecture of placenta immediately after delivery for each pregnant mother to treat or prevent any further complications.
- Researchers to use this data as a baseline to carry out further microarchitecture and immunohistochemical studies in the same conditions or other clinical scenarios.

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ANNEX

I. Englishversion information sheet

Name of Investigator: Yibeltal Wubale Adamu

Name of Organization: Department of Human Anatomy, School of Medicine, College of Health Sciences, Addis Ababa University.

Name of Sponsor: Addis Ababa University, College of Health Sciences

Title of the Study

Placenta in preeclamptic and gestational diabetes mellitus mothers: A macroarchitectural study at Gandhi and Black Lion hospitals, Addis Ababa, Ethiopia

Objective of the Study

To assess macroarchitectural change of placenta in preeclamptic and gestational diabetes mellitus mothers who gave birth at Gandhi Memorial and Black Lion Specialized Hospitals, Addis Ababa, Ethiopia.

Introduction

This information sheet and consent form is prepared to explain the study are being asked any question about the study before you agree to join, please listen carefully and ask questions at any time after joining the study.

Procedure: To assess macroarchitectural change of placenta in preeclamptic and gestational diabetes mellitus mother, invite you to participate in this study. You need to understand and sign the agreement form. Then after your permission, your placenta will examined by the Investigator. You do not tell your name to the investigator and all the findings from your placenta will be kept confidential by using coding system whereby no one will have access to the findings

Risk of the study: the study has no any risk for the mother and her child. The study participants will not get any benefits for being participated.

The result will be used as a base line for further studies that can be disseminated to the Hospital and Ministry of Health for designing prevention and control measures.

Confidentiality: The information collected from this study will be kept confidential and information about your placenta that will be collected by this study will be stored in a file, without your name, but a code number assigned to it and it will not be revealed to anyone except the principal investigation.

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3.IRB, Phone: 0118961396

II. Amharic version information sheet

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የምርምርወጭየሚሸፍነው፦የአዲስአበባዩኒቨርሲቲ ህ /ጤ/ሳ /ኮ ሌጅ

የ ጥ ና ቱ ር ዕ ስ ፦

በ ጋ ን ዲ እ ና በ ጥ ቁ ር አ ን በ ሳ ሆ ስ ፒ ታ ሎ ች ከ እ ር ግ ዝ ና ጋ ር የ ተ ያ ያ ዘ የ ደ ም ግ ፊ ት እ ና የ ስ ኳ ር በ ሽ ታ ያ ለ ባ ቸ ው ወ ላ ድ እ ና ቶ ች በ አ ይ ን የ ሚ ታ ዩ የ እ ን ግ ዴ ል ጅ የ ቅ ር ፅ ለ ው ጥ የ ጥ ና ቱ አ ላ ማ ፦ በ ጋ ን ዲ እ ና በ ጥ ቁ ር አ ን በ ሳ ሆ ስ ፒ ታ ሎ ች ከ እ ር ግ ዝ ና ጋ ር የ ተ ያ ያ ዘ የ ደ ም ግ ፊ ት እ ና የ ስ ኳ ር በ ሽ ታ ያ ለ ባ ቸ ው ወ ላ ድ እ ና ቶ ች በ አ ይ ን የ ሚ ታ ዩ የ እ ን ግ ዴ ል ጅ የ ቅ ር ፅ ለ ው ጥ መ ለ የ ት ነ ው ፡ ፡

መ ግ ቢ ያ ፦

ይ ህ የ መ ረ ጃ ና የ ስ ም ምነ ት ቅ ፅ የ ተ ዘ ጋ ጀ ው ፅ ር ስ ዎ ተ ሳ ታ ፊ እ ን ዲ ሆ ኑ ለ ተ ጋ በ ዙ በ ት በ ም ር ም ር ቡ ድ ኑ የ ሚ ካ ሄ ደ ው ን ጥ ና ት በ ተ መ ለ ከ ተ የ ፅ ር ስ ዎ ን ፈ ቃ ደ ኝ ነ ት ለ ማ ወ ቅ ነ ው ፡ ፡

የ ም ር ም ር ፕ ሮ ጀ ክ ቱ ዋ ና አ ላ ማ በ ጋ ን ዲ እ ና በ ጥ ቁ ር አ ን በ ሳ ሆ ስ ፒ ታ ሎ ች ከ እ ር ግ ዝ ና ጋ ር የ ተ ያ ያ ዘ የ ደ ም ግ ፊ ት እ ና የ ስ ኳ ር በ ሽ ታ ያ ለ ባ ቸ ው ወ ላ ድ እ ና ቶ ች በ አ ይ ን የ ሚ ታ ዩ የ እ ን ግ ዴ ል ጅ የ ቅ ር ፅ ለ ው ጥ መ ለ የ ት ነ ው ፡ ፡

የ ጥ ና ቱ ዘ ዴ ፦

ከ እ ር ግ ዝ ና ጋ ር የ ተ ያ ያ ዘ የ ደ ም ግ ፊ ት እ ና የ ስ ኳ ር በ ሽ ታ ያ ለ ባ ቸ ው ወ ላ ድ እ ና ቶ ች በ አ ይ ን የ ሚ ታ ዩ የ እ ን ግ ዴ ል ጅ የ ቅ ር ፅ ለ ው ጥ ለ መ ለ የ ት በ ሚ ደ ረ ገ ው ጥ ና ት ው ስ ጥ እ ን ዲ ሳ ተ ፉ የ ጋ በ ዝ ን ዎ ሲ ሆ ን ፈ ቃ ደ ኛ ከ ሆ ኑ ይ ህ ን ን የ ስ ም ምነ ት ቅ ጽ ይ ፈ ር ማ ሉ ፡ ፡

ከ ዚ ያ በ ኋ ላ መ ረ ጃ ዎ ች ን በ ሚ ሰ በ ስ ቡ የ ጥ ና ት ቡ ድ ን አ ባ ላ ት አ ማ ካ ኝ ነ ት በ እ ን ግ ዴ ል ጁ ላ ይ ም ር ም ር ይ ካ ሄ ዳ ል ፡ ፡ በ ም ር ም ሩ ወ ቅ ት ስ ም ዎ ን መ ና ገ ር አ ያ ስ ፈ ል ግ ም ፡ ፡

ከ ር ስ ዎ የ እ ን ግ ዴ ል ጅ የ ሚ ገ ኘ ው መ ረ ጃ ም በ ሚ ስ ጠ ር የ ሚ ያ ዝ ሲ ሆ ን በ ተ ጨ ማ ሪ ም ማ ን ም ሰ ው ወ ደ መ ረ ጃ ው እ ን ዲ ቀ ር ብ አ ይ ደ ረ ግ ም ፡ ፡

የ ጥ ና ቱ ጉ ዳ ት ፦

ተ ሳ ታ ፊ ው ብ ዚ ህ ጥ ና ት ው ስ ጥ በ መ ሳ ተ ፋ ቸ ው የ ሚ ደ ር ስ ባ ቸ ው ም ን ም አ ይ ነ ት ጉ ዳ ት የ ለ ም ፡ ፡

የ ጥ ና ቱ ጥ ቅ ም ፦ ተ ሳ ታ ፊ ው ብ ጥ ና ቱ ተ ሳ ታ ፊ በ መ ሆ ና ቸ ው ብ ቀ ጥ ታ የ ሚ ገ ኙ ት ጥ ቅ ም የ ለ ም ፡ ፡

ከ ዚ ህ ጥ ና ት የ ሚ ገ ኘ ው ው ጤ ት በ ሆ ስ ፒ ታ ሉ እ ና ሌ ሎ ች መ ሰ ል ሆ ስ ፒ ታ ሎ ች ለ ሚ ካ ሄ ዱ ተ መ ሳ ሳ ይ ጥ ና ቶ ች እ ነ ደ መ ነ ሻ ግ ብ ዐ ት ያ ገ ለ ግ ላ ል ፡ ፡

የ ጥና ቱ ውጤት ለ ጤና ጥበ ቃ ሚኒ ስ ትር ፤

ለ አ ዲስ አ በ ባ ዩ ኒ ቨ ር ሲ ቲ ህ ክ ምና ና ጤና ሳ ይን ስ ኮ ሌጅ እ ና ጥና ቱ ለ ተ ካ ሄ ደ በ ት ሆስ ፒ ታ ለ ይ ፋ ስ ለ ሚደ ረ ግ ጉ ዳ ቱ ን ለ መ ከ ላ ከ ል ና ለ መ ቆ ጣ ጠር የ ሚያ ስ ች ሉ መ ፍ ት ሄ ዎ ች ን ለ መ ን ደ ፍ ይ ጠ ቅ ማ ል ፡ ፡

ሚ ስ ጥ ራ ዊ ነ ቱ ፡-

በ ዚ ህ ጥ ና ት የ ሚ ሰ በ ሰ በ ው መ ረ ጃ ሚ ስ ጠ ራ ዊ ነ ቱ የ ተ ጠ በ ቀ ሲ ሆ ን መ ረ ጃ ው ም በ ፋ ይ ል ተ ደ ር ጎ ሚ ስ ጠ ራ ዊ ኮ ድ ተ ሰ ጥ ቶ ት ሥ ም ዎ ን ሳ ይ ጨ ም ር ተ ቆ ል ፍ ይ ቀ መ ጣ ል ፡ ፡

በ ተ ጨ ማ ሪ ም መ ረ ጃ ው ከ ዋ ና ው አ ጥ ኝ በ ስ ተ ቀ ር ለ ማ ን ም ግ ል ፅ አ ይ ደ ረ ግ ም ፡ ፡

የ መ ቃ ወ ም ና የ ማ ቋ ረ ጥ መ ብ ት ፡-

በ ዚ ህ ጥ ና ት ላ ይ የ መ ሳ ተ ፍ ም ሆ ነ ያ ለ መ ሳ ተ ፍ መ ሉ መ ብ ት ዎ የ ተ ጠ በ ቀ ነ ው ፡ ፡

በ መ ሳ ተ ፍ ላ ይ እ ያ ሉ ም ሆ ነ በ ማ ን ኛ ው ም ሰ ዓ ት ማ ቋ ረ ጥ ይ ቻ ላ ሉ ፡ ፡

ለ ተ ጨ ማ ሪ መ ረ ጃ ፡-

1. ይ በ ል ጣ ል ው ባ ለ

ስ ል ክ ፡ +251-910-18-92-45

E-mail: yibeltaw7@gmail.com

2. ዶ /ር አ መ ኑ ቶ ሌ ራ

ስ ል ክ ፡ +251-911-62-33-44

Email:**amannut2002@yahoo.com**

III. English version consent form

Department of Human Anatomy, School of Medicine, College of Health Sciences, Addis Ababa University

Title of the study: Placenta in preeclamptic and gestational diabetes mellitus mothers: A macroarchitectural study at Gandhi and Black Lion hospitals, Addis Ababa, Ethiopia.

Written Consent Form

Dear study participant, I am----------. I am doing research for partial fulfillment of the requirement for the degree of master in Human Anatomy at Addis Ababa University. I would like to ask your permission to give your placenta to conduct a study on a change of placental shape, placental weight, placental number of cotyledon, placental thickness and diameter in preeclampsia and gestational diabetes mellitus. Your permission is important in order to do research on your placenta and will help policy makers to design strategies to prevent and control maternal and child morbidity and mortality secondary to PE and GDM. Your name will not be written in this form and will never be used in connection with your placenta. All findings from your placenta will be kept strictly confidential. You are not obligate to give permission without your interest. If you feel discomfort to give permission, please feel free to dropout at any time you want. Could I have your permission to continue?

1. Yes, signature----------

2. No, skip to the next subject.

Informed consent certified by investigator

Name---------- Signature----------

Date of permission given---------- time----------

IV. Amharic version consent form

አዲስ አበባ ዮኒቨርሲቲ
የህክምና ጤና ሳይንስ ኮሌጅ
ይህ መጠይቅ በጋንዲአና በጥቁር አንበሳ ሆስፒታሎች ከእርግዝና ጋር በተያያዘ የደምግፊትእና የስኳር በሽታየ አለባቸውላ ድእናቶችንየእንግዴልጅየ ቅርፅ ፣ የክብደት ፣ የውፍረት ፣ ዲያሜትርእናየ ኮቲለደን መጠን ለውጥለ ማጥናትየ ተዘጋጀነው ። ።

የፈቃደኝነ ትቅፅ

ጤና ይስጥልኝ ። ። ----------

እባላለሁ ። ። እዚህየተገኘሁትይህንንጥናትበአዲስ አበባዩኒቨርሲቲበአናቶሚትምህርትለሁለተኛዲግሪ ማሙያ ጥናትለማካሄድነው ። ። በዚህሆስፒታልበወለድሽወየ እንግዴልጅላይየ ሚታየ ውጓየ ቅርፅ ፣ የክብደት ፣ የውፍረት ፣ ዲያሜትርእናየ ኮቲለደንቁጥርለውጥለ መረዳትእንፈልጋለን ። ። በመሆኑ ምጥናቱንእንድናካሄድፈቃድወንእጠይቃለን ። ። ፈቃዱን ከሰጡን ጥናቱከተካሄደከእርግዝና ጋርተያይዞበሚከሰተወየ ደምግፊትእናየስኳርበሽታየ ተነሳየ ሚታየ ውጓየ እንግዴልጅየ መጠንለውጥበመለየ ትበእናቶችእናህፃናትላይየ ሚከሰተውን የህመም፤ የሞትእናየ ጤናችግርለመቅረፍየ ሚያስችሉፖሊሲዎችንለመቅረፅየ ሚያስችልመረጃወችንለመስጠትያስችላል ። ። ከእርስዎየ ተወለደውጓ የእንግዴልጅየ ሚገኘውን መረጃበሚስጥርእንጠብቃለን ። ።

ከዚህጥናትጋርበተያያዘበማንኛውምበታናጊዜስምዎእንደማይመዘገብናእንደማይጠቀስልንገልፅልዎእንወዳለን ። ። ጥናቱንየ ምናካሂደውየ ርስዎን መሉፈቃደኝነ ትስናገኝብቻነው ። ። ፈቃደኝነ ተዎንለመስጠትምሆነ ላለመስጠትውሳኔ ወየ ዕርስዎብቻነው ። ። በወለዱትየ እንግዴልጅላይጥናቱንእንድናካሂድፈቃደኛነ ዎት?

1. አዎ ። ---------- ፊርማ---------- 2. አይደለም

የጠያቂውሥም----------ፊርማ----------

መጠይቁየ ተሞላበትቀን ---------- ሰዓት ----------

ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES (IRB)
አዲስ አበባ ዩኒቨርስቲ ጤና ሳይንስ ኮሌጅ
Institutional Review Board

ANNEX 3
Form AAUMF 03-008

IRB's Decision

Meeting No: 005/16 Date: May 25, 2016

Protocol number: 019/16/Anato Assigned No.

Protocol Title: Assessment of macroscopic morphological changes of placenta in pre-eclamptic and gestational diabetes mellitus mothers at Ghandi Memorial Hospital, Addis Ababa, Ethiopia		
Principal Investigators:	Yibeltal Wubale	
Institute:	School of Medicine-College of Health Sciences, AAU	
Elements Reviewed (AAUMF 01-008)	☑ Attached	☐ Not attached
Review of Revised Application ☐ Yes ☐ No	Date of Previous review:	
Decision of the meeting:	☑ Approved ☐ Approved with Recommendation ☐ Resubmission ☐ Disapproved	

I. Elements approved:
1. Protocol Version No:
2. Protocol Version Date:
3. Informed consent Version No.
4. Informed Consent Version Date

II. Obligations of the PI-
1. Should comply with the standard international & national scientific and ethical guidelines
2. All amendments and changes made in protocol and consent form needs IRB approval
3. The PI should report SAE within 10 days of the event
4. End of the study, including manuscripts and thesis works should be reported to the IRB

III. TO NERC ☐

Institution Review Board (IRB) Approval: Period from 26 May 2016 to 25 May 2017
Follow up report expected in
3 Months ___ 6 months ___ 9 months ✓ one year ___

Chairperson, IRB
Dr. Yimtubezinash Woldeamanuel
Signature
Date: 25/5/16

ADDIS ABABA UNIVERSITY

DEPARTMENT OF ANATOMY
SCHOOL OF MEDICINE
ADDIS ABABA UNIVERSITY
P.O. Box 9086
Addis Ababa, Ethiopia

አናቶሚ ት/ክፍል
ሕክምና ፋኩልቲ
አዲስ አበባ ዩኒቨርሲቲ
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Fax: 251-115-513099

Anat/ሀ/008
01 July, 2016

To: Black Lion Hospital,
Addis Ababa, Ethiopia

Subject: - **Cooperation for M.Sc. thesis research**

Yibeltal Wuhale ADAMU, is a final year postgraduate student in our department for an M.Sc. degree in Anatomy and with a background of Health Officer .He is working in thesis project entitled "Assessment of macroscopic morphological change of placenta in preclamptic and gestational diabetes mellitus(GDM) mothers' under the supervision of Dr. Amenu Tolera WIRTU.

His research proposal was recently approved by institutional review board of College of Health Science, in Black Lion Hospital in May, 2016.

Yibeltal is a graduate of Health Officer (B.Sc.) with a very good discipline capacity of doing a research work in an ethical manner. I, therefore, kindly request your usual cooperation in order to allow him to collect the relevant data regarding his research project.

Sincerely,

Mekbeb Afework, PhD
Head,
Department of Anatomy,
School of Medicine, Addis Ababa University, Ethiopia

DEPARTMENT OF ANATOMY
SCHOOL OF MEDICINE
ADDIS ABABA UNIVERSITY

P.O. Box 9086
Addis Ababa, Ethiopia

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አዲስ አበባ ዩኒቨርሲቲ

Tel: 251-115-537967
Fax: 251-115-513099

Anat 109/008
09 June, 2016

To: **Gandhi Memorial Hospital.**
Addis Ababa, Ethiopia

Subject: - Cooperation for M.Sc. thesis research

Yibeltal Wubale ADAMU, is a final year postgraduate student in our department for an M.Sc. degree in Anatomy and with a background of Health Officer .He is working in thesis project entitled 'Assessment of macroscopic morphological change of placenta in preclamptic and gestational diabetes mellitus(GDM) mothers' under the supervision of Dr. Amenu Tolera WIRTU.

His research proposal was recently approved by institutional review board of College of Health Science, in Black Lion Hospital in May, 2016.

Yibeltal is a graduate of Health Officer (B.Sc.) with a very good discipline capable of doing a research work in an ethical manner. I, therefore, kindly request your usual cooperation in order to allow him to collect the relevant data regarding his research project.

Sincerely,

Mekbeb Afework, PhD
Head,
Department of Anatomy,
School of Medicine, Addis Ababa University, Ethiopia

V: Checklist

Table 4:- Checklist for data collection

S/no	Age	Parity	GA	BP	Mode of delivery (SVD/ C/S)	Placental shape	Placental weight (gm)	Placental number of cotyledon	Placental thickness (cm)	Placental diameter (cm)	GDM	PE	UC	BMI
1														
2														
3														
125														

- Placental shape categorized as circular (0), oval (1) and irregular (2).