IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 1 Ser.7 (January. 2021), PP 01-07
www.iosrjournals.org

Assessment of Fetal Biophysical Profile using Ultrasonography among Pregnant Sudanese's Women

Anwar Adam[1], Mohamed Yousef[1,2], M. E. M. Gar-alnabi[1], Hanady Elyas Osman[3,4], Awadalla Wagealla[5]

[1](*Sudan University of Science and Technology, College of Medical Radiological Sciences, Khartoum-Sudan)*
[2](*Radiologic Sciences Program, Batterjee Medical College, Jeddah, Saudi Arabia)*
[3](*Al-Ghad International Colleges for Applied Medical Sciences, Jeddah, Saudi Arabia)*
[4](*National Ribat University, College of Medical science and Nuclear medicine-Khartoum-Sudan)*
[5](*Radilogical Sciences Department, Al-Ghad International College for Applied Medical Science, Abha, Saudi Arabia)*
Corresponding author: Dr. Hanady Elyas Osman.

Abstract: *The main objective of the study was to assess the fetal biophysical profile using ultrasound (U/S) among Pregnant Sudanese Women. A retrospective and descriptive study was conducted at Radiology department in Ad-Damazin Hospital , Ad-Damazin specialized Center– Ad-Damazin and Aldamazin specialized Ultrasound Clinic. Blue Nile state –Sudan, in the period from October 2015 to December 2020. . The study was conducted with 401 pregnant women using abdominal U/S. The study included 401 participants (168 males fetuses represent 41.9% and 233 females fetuses represent 58.1%) with gestational age ranged from 22 and 40 weeks. The study revealed that the 269 fetuses represent 67.1% had score 2 fetal body movement and 132 fetuses represent 32.9% had score 0.for fetal breathing 358 of fetuses represent 89.3% had score 2 and 43 represent 10.7% had score 0, 276 of fetuses represent 68.8 %had score 2 fetal tone and 125 fetuses represent 31.2% had score 0. For liquor volume 290 of pregnancies represent 72.3% had score 2 of and 111 pregnancies represent 27.7% had score 0, 213 of pregnancies represent 53.1% had score 2 of placenta grading and 188 pregnancies represent 46.9% had score 0. The study found that 188 fetuses had a score 8 represent 44.1%, 86 fetuses had a score 6 represent 21.4%, 85 fetuses had score 4 represent 21.2%, 49 fetuses had score 2 represent 12.2%, two fetuses had score 2 represent 0.5% and also two fetuses had score 7 and represent 0.5%. .this concluded that a biophysical profile is a noninvasive test that uses real-time ultrasound evaluation of multiple fetal biophysical variables to identify the fetus at risk for intrauterine injury or death and to facilitate the management of the high-risk pregnancy.*

Keywords: *Fetal Biophysical Profile, pregnancy, U/S, fetus, Fetal Breathing Movements, fetal tone, placenta grading.*

Date of Submission: 01-01-2021 Date of Acceptance: 13-01-2021

I. Introduction

The Fetal Biophysical Profile (BPP) is a method of fetus assessment that uses real-time ultrasound evaluation of multiple fetal biophysical variables to identify the fetus at risk for intrauterine injury or death and to facilitate the management of the high-risk pregnancy. Fetal Biophysical Scoring (BPS) is an analogous score performed to determine the general health and vital signs of the fetus in the uterus. The cumulative data indicate that fetal biophysical profile scoring is sensitive for identifying both normal and compromised fetuses[1].

A biophysical profile is a noninvasive test that doesn't pose any physical risks to you or your baby. However, it's not always clear that the test improves pregnancy outcomes. Find out what a biophysical profile involves and whether this prenatal test might benefit your baby. BPP is used to evaluate and monitor a baby's health. The goal of a biophysical profile test is to prevent pregnancy loss (apportion) and detect a low oxygen supply in the baby (fetal hypoxia) early enough so that the baby can be delivered and not sustain permanent tissue damage or brain damage[1, 2].

Severely compromised fetuses exhibit prolonged periods of inactivity during pregnancy weeks which is easier to interpret than the short-term absence of a specific biophysical activity since the normal biophysical fetal activity is characterized by periodicity influenced by regular fetal sleep-wake cycles[2].

The mean duration of a term pregnancy is 40weeks based on menstrual dating, including the first day of the last menstrual period (LMP) of the women. Closer to birth, your baby sleeps 85 to 90 % of the time the same as a newborn. We just need to stimulate and touché the fetus to wake up and start their normal activity so

the biophysical profile is done at normal fetal activity, at this time observation of parameters spent 4 minutes. In some cases, the fetus in deep sleep BPP spent more than 26.5 minutes to assess the parameters. The fetal biophysical profile is five fetal parameters to be assessed (Fetal body movement, fetal breathing movement, fetal tone, placental grading, and Amniotic fluid (liquor) volume) [3].

Usually, BPP performed after 20 weeks at end of the second and third trimester at this time the amniotic fluid starts decreasing and fetal size starts increasing so fetal movement starts decreasing and the mother feeling less fetus movement. Although the primary goal of fetal BPS is the detection of sick fetuses with life-threatening asphyxia, unsuspected detection of major fetal anomalies which may have a significant impact on obstetric health care is an additional benefit over other fetal assessment techniques and is an integral part of the fetal biophysical examination. Fetal malpresentation and significant abnormalities of the placenta and cord can be diagnosed immediately by BPP and the pregnancy managed appropriately[1, 3].

Routine prenatal ultrasound (US) scanning is an integral part of the follow-up of pregnant women in many countries. However, expert views on its use remain controversial with the main aspects of contention being benefits, cost, and ethical considerations. Over the years ultrasound scans have become more and more available in developing countries with increasing accessibility and sensitivity, enhancing their routine use in the follow-up of pregnancies by healthcare providers. The pregnant woman is an important stakeholder regarding prenatal ultrasonography. Her acceptance of the procedure and willingness to pay for it as is often the case in some developing countries where health insurance policies are quasi-inexistent for the majority of the population are factors that can contribute to its success as a method in the pregnancy assessment tool[4].

The fetal BPP test performed by a sonographer is most commonly done when there's an increased risk of problems that could lead to complications or pregnancy loss. Your health care provider will determine the necessity and timing of a biophysical profile based on whether your baby could survive if delivered early or the severity of your condition and the risk of pregnancy loss. Your health care provider might initially recommend a modified biophysical profile - a simplified version of the test, non-invasive that includes a non-stress test and assesses amniotic fluid through ultrasonography. He or she will use the results to determine whether you need a full biophysical profile, which also measures a baby's breathing, fetal movements and muscle tone, or other tests[5].

The purpose of this study was to assess the fetal biophysical profile using ultrasound (U/S) among Pregnant Sudanese Women.

II. Materials and Methods

2.1Material

2.1.1Area and duration

A retrospective and descriptive study was conducted at Radiology department in Ad-Damazin Hospital , Ad-Damazin specialized Center– Ad-Damazin and Aldamazin specialized Ultrasound Clinic. Blue Nile state – Sudan, in the period from October 2015 to December 2020.

2.1.2 Sample study

The study was conducted on 401 pregnant women in the second and third trimester sent for Anti-Natal Care ultrasonography in the area of the study, selection of pregnant women through simple random sampling, and then the data was collected from the women.

Inclusion criteria: pregnant women in the second and third trimester of pregnancy.

Exclusion criteria: non-pregnant women.

2-2 Methods

2-2-1 Technique used

By using A 3.5 to 5 MHz curved linear array, an electronically focused transducer was the best available for Obstetrical ultrasonography.

The original fetal BioPhysical profile Scoring (BPS) consisted of five ultrasound-based variables Test (maximum BPS 10/10). and the Non-Stress The protocol Replaced by Cardiotocography (CTG) which done by Gynecologist. All parameters were observed maximum at 4 minutes.

Below are a list and description of the five original biophysical variables. Each normal variable is given a score of 2. Each abnormal variable is given a score of 0. Thus, each variable is weighted equally:

2-2-1-1 Fetal Breathing Movements:

It means the fetal diaphragm moving. One episode lasting more than 60sec. the score is 2 at least one episode of fetal breathing lasting in the 60s. The score is 0 when fetal breathing is absent or lasting less than 30s

2-2-1-2 Fetal body Movements:
It means all fetal body moving (trunk and limb) score is 2 when two or more discrete body/limb movements (limb+spine+neck) in a maximum 4 minute observation period. The score is 0 when absent fetal movement.

2-2-1-3 Fetal Tone :
Its different from fetal body movement this depends on the motion of a limb from a position of flexion to extension and a rapid return to flexion. Opening and closing of hand considered normal tone. the score is 2 when one episode of extension and flexion of extremities and also one episode of extension and flexion of the spine. the score is 0 when a slow extension of extremities and not followed by a return to flexion or absent fetal tone.

2-2-1-4 Amniotic fluid volume:
Its mean measure the largest pocket of fluid in vertical diameter. the score is 2 when fluid throughout the uterine cavity, the largest pocket measuring 2cm or more in vertical diameter. The score is 0 when fluid throughout the uterine cavity, the largest pocket measuring less than 2cm in vertical diameter or absent.

2-2-1-5 Placental grading:
It depends on the maturity and potion of the placenta. Score is 2 when the placenta is grade 0*1*2. Score is 0 when the placenta is grade 3 or posterior difficult to evaluate.

2.2.2 Statistical analyses
By using the SPSS program version16 all data and variables are analyzed. Descriptive statistics, including frequency and percentages, were calculated. An ANOVA test was applied to test the significance. Data are presented as percentages and frequencies The complex tables were used in the analysis and was carried out the relationship between different variables and the important statistical indicators was drawn from the study. The covariates for the multivariable regression analysis were chosen as potential confounding factors based on their significance in univariate analysis. The *p*-value of less than 0.005 was considered to be statistically significant.

III. Results

All collected data analyzed and tabulated in tables and graphs as follows:

Table no (1) show Age distribution among a sample of the study

Age \years	Frequency	Percent
15-23 years	115	28.7%
24-32 years	126	31.4%
33- 41 years	109	27.2%
42- 50 years	51	12.7%
Total	401	100%

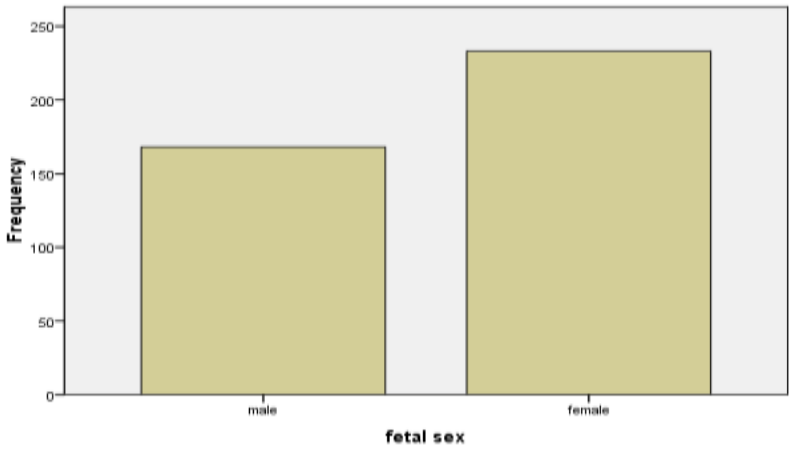

Figure (1): chart display Frequency distribution of fetal gender.

Table (2) show the Frequency distribution of Presentation

Presentation	Frequency	Percent
Cephalic	297	74.1%
Breech	89	22.2%
Transverse	15	3.7%
Total	401	100%

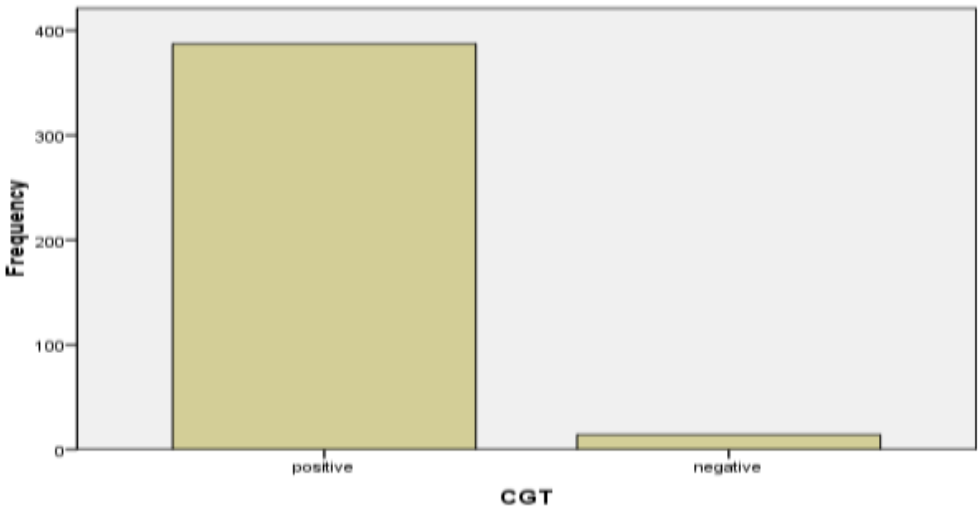

Figure (2): chart Shows the Frequency distribution of CTG**.**

Table (3): Shows Frequency distribution of fetal body movement

Fetal body movement	Frequency	Percent
Score 2	269	67.1%
Score 0	132	32.9%
Total	401	100%

Table (4): Shows Frequency distribution of fetal breathing movement

Fetal breathing movement	Frequency	Percent
Score 2	358	89.3%
Score 0	43	10.7%
Total	401	100%

Table (5): Shows Frequency distribution of fetal tone:

Fetal tone	Frequency	Percent
Score 2	276	68.8%
Score 0	125	31.2%
Total	401	100%

Table no (6): Shows Frequency distribution of liquor volume:

Liquor volume	Frequency	Percent
Score 2	290	72.3%
Score 0	111	27.7%
Total	401	100%

Table no (7): Shows Frequency distribution of placental grading:

Placental grading	Frequency	Percent
score 2	213	53.1
score 0	188	46.9
Total	401	100.0

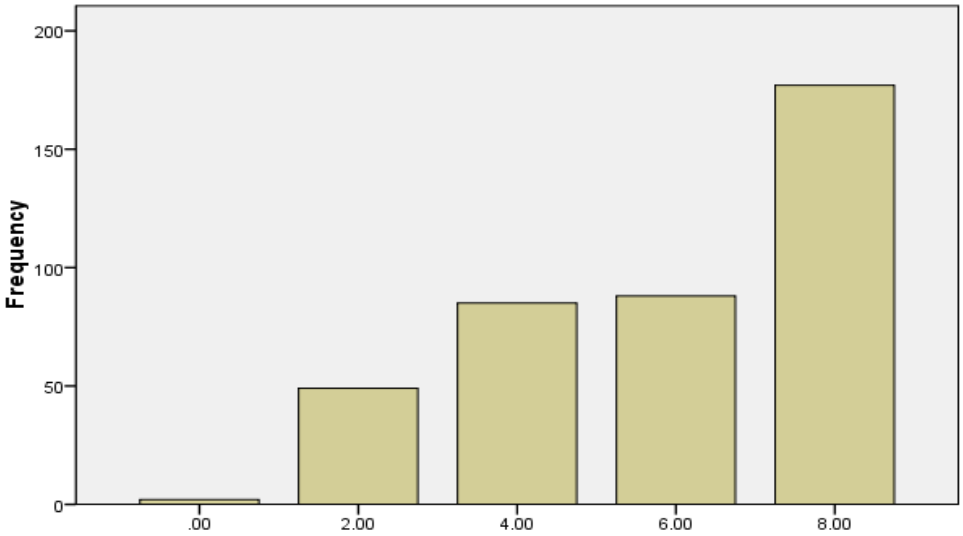

Figure no 3: chart Shows Frequency distribution of score.

IV. Discussion

The sample of this research consisted of 401 pregnant women, the study carried out in Blue Nile State in the Radiology department of Aldamazin Hospital, Aldamazin specialized Center– Aldamazin and Aldamazin specialized Ultrasound Clinic in the period from October 2015 to December 2020. and aimed to assess the fetal biophysical profile by using ultrasound.

Table (1) shows most of the study sample in the age group 24-32 years (31.4%) followed by 15-23 years (28.7%), 33- 41 years (27.2%), and 42- 50 years(12.7%) which was the less group of pregnant women age.

Figure (1) shows that display Frequency distribution of fetal gender about 168 were males sex gender represent 41.9% and 233 of the study were females sex gender represent 58.1% that means girl sex gender was more than boys one.

Table (2) shows the Frequency distribution of Presentation, about 297 fetuses had cephalic presentation represent 74.1%, 89 fetuses had breach presentation represent 22.2% and 15 fetuses had transverse presentation represent 3.7% which is lower presentation.

Figure(2) represent Frequency distribution of CTG which was Cardiotocography tests from all sample size about 387 had positive CTG represent 41.9% and 14 had negative CTG represent 3.5%.

When the biophysical profile is complete, your health care provider will likely discuss the results with you right away. Each area that's evaluated during a biophysical profile is given a score of 0 or 2 points, depending on whether specific criteria were met. A score can be given immediately during the examination. A biophysical profile (BPP) test measures the health of your baby (fetus) during pregnancy. The results are scores on five measurements in a 30-minute observation period. Each measurement has a score of 2 points if normal and 0 points if not normal. Some BPPs do not include all the measurements. When all five measurements are

taken, a score of 8 or 10 points means that your baby is healthy. A score of 6 or 8 points means that you may need to be retested in 12 to 24 hours. A score of 4 or less may mean the baby is having problems. Further testing will be recommended.

Table (3) discuss the Frequency distribution of fetal body movement in score either to be 2 0r 0. In this study we found that the 269 fetuses represent 67.1% had score 2 fetal body movement and 132 fetuses represent 32.9% had score 0, that means 67.1 % were normal fetus and had normal fetus body movement.

Table (4) represent the Frequency distribution of fetal breathing movement, about 358 of the total pregnant women her/his fetus has normal fetal breathing movement with score 2 represent 89.3%, and 43 of the fetus had score 0 with 10.7 % fetal breathing movement. According to all previous studies mentioned that if your baby moves his or her body or limbs three times or more within 30 minutes, 2 points or score will be given. If your baby's movements don't meet the criteria, 0 points/ score will be given. [6]

If your baby moves a limb from a bent position to an extended position and quickly back to a bent position, 2 score will be given. If your baby's muscle tone doesn't meet the criteria, 0 score will be given. In the table (5) which Shows the Frequency distribution of fetal tone, score 2 in fetal muscle tone was 68.8% by 276 of the total while score 0 was 31.2% representing 125 of all total pregnant women.

Table (6) Shows the Frequency distribution of liquor volume of pregnant women, in 290 women had score 2 present 72.3% while score 0 present 27.7%. Actual amniotic fluid volume (AFV) estimation is feasible in early pregnancies however it is impractical to perform in advanced pregnancies due to the limited field of view of the ultrasound image and the time required to collect multiple serial images needed to accurately derive a volume estimate. The advent of three-dimensional equipment with the capability of rapid image acquisition and image reconstruction has the potential in the future of offering accurate AFV (liquor volume) estimation. The two most popular ultrasound measurement protocols for the semi-quantitative determination of AFV are the Chamberlain and Phelan methods. For either method, the pregnant patient should be supine and "vertical" is defined as perpendicular to the transducer head; brief appearances of cord or an extremity are ignored, but an aggregation of either one, to the exclusion of fluid, is not considered part of a fluid pocket. [7]

Table (7) Shows the Frequency distribution of placental grading, 53.1% score 2 and score 0 was 46.9%.

Sonographically, macroscopic areas of placental calcifications appear as hyperechoic (white) echo densities in different areas of the placenta, with larger areas of calcification exhibiting shadowing.[4]

More than 50% of placentas show some sonographic features of calcification after 33 weeks' gestation however about 20% of normal term placentas have no macroscopic or sonographic evidence of calcification. Previously, investigators found it useful to assign placentas a numerical grade (0 to 3) based on the degree of calcification however such grading schemes have proven to be of limited value in clinical practice in predicting fetal maturity, fetal well being, or perinatal and pregnancy outcome.[6]

Figure 3 represent Frequency distribution of score, The study found that 188 fetuses had a score 8 represent 44.1%, 86 fetuses had a score 6 represent 21.4%, 85 fetuses had a score 4 represent 21.2%, 49 fetuses had a score 2 represent 12.2%, two fetuses had score 2 represent 0.5% and also two fetuses had score 7 and represent 0.5%. some previous studies discuss that The individual scores are then added together for a total score. Typically, a score of 8 to 10 is reassuring. If you receive a score of 6, your health care provider will likely repeat the test within 24 hours or, if your pregnancy is near term, delivery might be recommended. A score of 4 or lower means that further testing is needed or that you might need to deliver the baby early or immediately. Also, if your health care provider finds that you have a low amount of amniotic fluid, you'll need further testing and might need to deliver your baby early - regardless of your overall score.[7] a similar study done by Dr. Serdar Aydin, et al, 1993 concluded that about 104 pregnant patients, 84 (80.7%) had normal FBP score (>8); 17 had an equivocal fetal biophysical score (-6). whereas 3 patients (2.9%) had an abnormal score (<4).[8,9]

Certain factors can affect the results of the BPP test, including the recent use of corticosteroids medication to speed your baby's lung maturity. Taking certain medications, such as morphine, also can affect the test score. Be sure to discuss the results of your biophysical profile with your health care provider to fully understand what they might mean for pregnant women.[10]

V. Conclusion

The results of this research were as expected The study demonstrates that the 269 fetuses represent 67.1% had a score 2 fetal body movement and 132 fetuses represent 32.9% had a score 0, 358 fetuses represent 89.3% had a score 2 fetal breathing, and 43 represent 10.7% had score 0, 276 of fetuses represent 68.8 %had score 2 fetal tone and 125 fetuses represent 31.2% had score 0. 290 of pregnancies represent 72.3% had score 2 of liquor volume and 111 pregnancies represent 27.7% had score 0, 213 of pregnancies represent 53.1% had score 2 of placenta grading and 188 pregnancies represent 46.9% had score 0. The study found that 188 fetuses had a score 8 represent 44.1%, 86 fetuses had a score 6 represent 21.4%, 85 fetuses had a score 4 represent

21.2%, 49 fetuses had a score 2 represent 12.2%, two fetuses had a score 2 represent 0.5% and also two fetuses had score 7 and represent 0.5%.

Sonographic examination in the second trimester of pregnancy should include evaluation of the situation, presentation, and cardiac activity of the fetus; placental localization assessment of the amniotic fluid; fetal biometrics; and assessment of fetal anatomical structures and fetal movements. The sonographer might also recommend a biophysical profile if you're between 40 and 42 weeks pregnant according to special pregnancy condition, health care provider might recommend that some pregnant women should have a biophysical profile once a week or twice a week, depending on pregnant health condition - until she delivers.

A biophysical profile is a noninvasive test that doesn't pose any physical risks to the pregnant woman or her fetus. so the test improves pregnancy outcomes. BPP is an integral part of the fetal biophysical examination, it can detect fetal malpresentation, significant abnormalities of the placenta and cord can be diagnosed and the pregnancy managed appropriately.

Acknowledgments

We sincerely thank the participants without whom the study would not have been feasible. ultrasound departments of Radiology department of Aldamazin Hospital, Aldamazin specialized Center, Aldamazin specialized Ultrasound Clinic., Sudan University of Science and Technology, College of Medical Radiological Sciences, Radiological Science Department Batterjee Medical College in Jeddah, Al-Ghad International Colleges for Applied Medical Sciences in Jeddah, and National Ribat University, College of Medical science and Nuclear medicine-Khartoum-Sudan, are thankfully acknowledged.

References

[1]. Trish Chudleigh, Basky Thilaganathan, Obstetric Ultrasound, How, Why and When third edition, London new york oxford Philadelphia St Louis Sydney Toronto 2004 (p182)
[2]. Kuldeep Singh, Narendra Malhotra, Step by Step, Ultrasound in Obstetrics, Jaypee brothers medical publishers (P) LTD, New Delhi, India, First Edition: 2004
[3]. Enid Gilbert-Barness, Diane Debich-Spicer, Embryo, and Fetal Pathology, color atlas with ultrasound correlation, Cambridge University Press, New York, 2004 p .84
[4]. Asim Kurjak, Frank A Chervenak, Donald School Textbook of Ultrasound in Obstetrics and Gynecology, Jaypee brothers, medical publishers (P) LTD. New Delhi, First Edition 2003
[5]. Randy E. Moore A primer of Basic Obstetrics Images/ at http://www.ultrasonix.com/application/musculoskeletal.
[6]. Kakoli Ghosh Dastidar Manual of Ultrasound in Obstetrics and Gynaecology, 2nd Edition,2009 p88
[7]. Sweitzer Ln, Suite, Laurel. AIUM Practice Guideline for the Performance of Obstetric ultrasound examination.The American Institute of Ultrasound in Medicine; USA: 2012.P. 2-3
[8]. Dr.Serdar AYDIN, Dr.M.Bülent TIRAŞ, Doç.Dr.Kemal, ZTEKİN, Prof.Dr.Refik ıAPANOĞLU, The Fetal Biophysical Profile and Its Predictive Value in Antenatal Fetal Assessment, *T Klin Jinekol Obst 1993,3*
[9]. Mike Bradley, Paul O'Donnell. Atlas of Obstetrics ultrasound anatomy.1st edition. New York; Cambridge University: 2002. P. 30-42.
[10]. Devin Dean. ultrasonography of the Obstetrics and Gynecology. Module two. The burwin institute of diagnostic medical ultrasound; Lunenburg, Canada: 2005. P. 17,18, 20

Anwar Adam, et. al. "Assessment of Fetal Biophysical Profile using Ultrasonography among Pregnant Sudanese's Women." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(01), 2021, pp. 01-07.