MAR Gynecology and Urology (2025) 8:4

Research Article

Maternal and Fetal Outcome of preterm birth at Saad Abu Ella Teaching Hospital (July – December 2020).

Dr. Asma Ali Rizig Omer *

*Correspondence to: Dr. Asma Ali Rizig Omer, Sudan.

Received: 16 May 2025

Published: 27 May 2025

DOI: https://doi.org/10.5281/zenodo.15523392

Abstract:

Background: *Preterm birth, also known as premature birth, is the birth of baby at less than 37 weeks` gestational age. These babies are known as preemies or premise. In past 10 years' preterm rate have risen in United States from 10.6%in 1990 to 11.6% in 2000.*

Objective: *To study the preterm birth at Saad AbuElla Teaching Hospital (July – December 2020)*

Methodology: *This is prospective descriptive hospital based study was conducted in Saad Abu Ella teaching Hospital, the study sample was total coverage, Data was tabulated and analyzed using the Statistical Package for Social Sciences (SPSS).*

Results: *This study involved 184 ladies with preterm labor, most frequent age groups are between 20 – 40 years, most of the ladies in my study were multigravida, the prevalence of regular ANC (according to WHO classification) is 58%, the most frequent GA is 36 weeks by about 42%, hypertension is the most frequent associated maternal disease.*

Incidence of NICU admission is about 78%, correlation between regularity of ANC of the mother and Admission to NICU and between gestational age of the mother and NICU outcomes, are significant, but the Correlation between Admission to NICU and Fetal Outcomes, shown to be negative.

Conclusion: *The prevalence of regular ANC is 58%, the most frequent GA is 36 weeks by about 42%. 44% of birth weight between 2-2.5 Kg, there is a significant correlation between regularity of ANC of the mother and Admission to NICU and between gestational age of the mother and NICU outcomes.*

Key words: *Preterm labor / Cesarean section / Anti natal care/ Gestation Age.*

List of Abbreviations

APH	Anti-partum hemorrhage
BMI	Body-mass index
CTG	Cardio topography
DIC	Disseminated intravascular coagulation
FGR	Fetal growth restriction

ICP	Intrahepatic cholestasis of pregnancy
IVF	In Vitro fertilization
NEC	Necrotizing enterocolitis
NICU	Nursery intensive care unite

1. Introduction

1.1. Background:

Preterm birth, also known as premature birth, is the birth of baby at less than 37 weeks` gestational age. These babies are known as preemies or premise [1]. more focus of study for past two decades by health care providers in several displace, it remains more prevalent in United States than in many developed countries and continues to be prime reason for infant mortality and morbidity. [2]

In past 10 years' preterm rate have risen in United States from 10.6%in 1990 to 11.6%in2000 [3] Symptoms of preterm labor include uterine contractions which occur more often than every ten minutes or the leaking of fluid from the vagina [4]. Premature infants are at greater risk for cerebral palsy, delays in development, hearing problems. These risks are greater the earlier a baby is born [1] resulted in 0.81 million deaths in 2015 down from 1.57million in 1990 [5]. The chance of survival at 2 weeks is about 6%, while at 23 weeks is 26%, 24 weeks 55% and 25 weeks about 72%. The chance of survival without any long-term difficulties is lower [6].

The exact cause of preterm birth is difficult to determine and it maybe multi-factorial. The cause of 50% of preterm births is never determined [7]. Four different pathways have been identified that can result in preterm birth and have considerable evidence: precocious fetal endocrine activation, uterine over distension (placentalabrobion, deciual bleeding and intra uterine infection [8].

The lungs are one of the last organs to mature in the womb; because of this, many premature babies spend the first days and weeks of their lives on ventilators. Therefore, a significant overlap exists between preterm birth and prematurity. Generally, preterm babies are premature and babies are mature. Preterm babies born near 37 weeks often have no problems relating to prematurity if their lungs have developed adequate surfactant, which allows the lungs to remain expanded between breaths. Sequelae of prematurity can be reduced to small extent by using drugs to accelerate maturation of the fetus and to a greater extent by preventing preterm birth. Than one baby, being either obese or underweight, a number of vaginal infections, tobacco smoking and psychological stress, among others [3]. It is recommended that labor should not be medically induced before 39 weeks unless required for other medical reasons. The same recommendation applies to cesarean section

[2].

Medical reasons for early delivery include preeclampsia [8] in those at risk, the hormone progesterone, if taken during pregnancy, may prevent preterm birth. [5] To some degree those individuals may have underlying conditions (i.e. uterine malformation, hypertension, diabetes) that persist. Women with celiac disease have an increased risk of the development of preterm birth. [8]

The specific cause of premature birth isn`t clear. However, there are known risk factors of premature delivery, including:

Having a previous preterm birth, Pregnancy with twins, triplets or other multiples, an interval of less than six months between pregnancies, Conceiving through in vitro fertilization, Problems with the uterus, cervix or placenta

Smoking cigarettes or using illicit drugs, some infections, particularly of the amniotic fluid and lower genital tract, some chronic conditions, such as high blood pressure and diabetes, being underweight or overweight before pregnancy, Stressful life events, such as the death of a loved one or domestic violence,

Multiple miscarriages or abortions and Physical injury or trauma. [1]

For unknown reasons, black women are more likely to experience preterm birth than are women of other races. But preterm birth can happen to anyone. In fact, many women who have a preterm birth have no known risk factors. [1]

While not all premature babies experience complications, being born too early can cause short-term and long-term health problems. Generally, the earlier a baby is born, the higher the risk of complications. Birth weight plays an important role. [1]

Short-term complications, In the first weeks, the complications of premature birth may include, breathing problems. A premature baby may have trouble breathing due to an immature respiratory system. If the baby`s lungs lack surfactant- a substance that allows the lungs to expand dumbly he or she may develop respiratory distress syndrome because the lungs can`t expand and contract normally.

In addition, some preterm babies may experience prolonged pauses in their breathing, known as apnea.

The most common heart problem premature babies experience is patent ductus arteriosus (PDA) and low blood pressure (hypotension). PDA is a persistent opening between the aorta and pulmonary artery. While this heart defect often closes on its own, left untreated it can lead to a heart murmur, heart failure as well as other complications. Low blood pressure may require adjustments in intravenous fluids, medicines and sometimes blood transfusions. The earlier a baby is born, the greater the risk of bleeding in the brain, known as an

intraventricular hemorrhage. hemorrhages are mild and resolve with little short-term impact. But some babies may have larger brain bleeding that causes permanent brain injury [2].

Premature babies can lose body heat rapidly. They don`t have the stored body fat of a full-term infant, and they can`t generate enough heat to counteract what`s lose through the surface of their bodies. If body temperature dips too low, an abnormally low core body temperature. (hypothermia) can result.

Hypothermia in a premature baby can lead to breathing problems and low blood sugar level. In addition, a premature infant may use up all of the energy gained from feedings just to stay warm. That`s why smaller premature infants require additional heat from a warmer or an incubator until they`re larger and able to maintain body temperature without assistance.

Premature infants are more likely to have immature gastrointestinal system, resulting in complications such as necrotizing enter colitis (NEC).

Premature babies are at risk of blood problems such as anemia and newborn jaundice. Anemia is a common condition in which the body doesn`t have enough red blood cells. While all newborns experience a slow drop in red blood cell count during the first months of life, the decrease may be greater in premature babies.

Metabolic problems. Premature babies often have problems with their metabolism. Some premature babies may develop an abnormally low level of blood sugar (hypoglycemia).

In the long term, premature birth may lead to the following complications' Cerebral palsy. Is a disorder of movement, muscle tone or posture that can be caused by infection, inadequate blood flow or injury to a newborn`s developing brain either early during pregnancy or while the baby is still young and immature.

Impaired learning. Premature babies are more likely to lag behind their full-term counterparts on various developmental milestone. Upon school age, a child who was born prematurely might be more likely to have learning disabilities.

Vision problem. Premature infants may develop retinopathy of prematurity, a disease that occurs when blood vessels swell and overgrow in the light-sensitive layer of nerves at the back of the eyes (retina). Sometimes the abnormal retinal vessels gradually scar the retina, pulling it out of position. When the retina is pulled away from the back of the eye, it`s called retinal detachment, a condition that, if undetected, can impair vision and cause blindness.

Hearing problems. Premature babies are at increased risk of some degree of hearing loss. All babies will have their hearing checked before going home [2].

Dental problems. Premature infants who have been critically ill are at increased risk of developing dental problems, such as delayed tooth eruption, tooth discoloration and improperly aligned teeth.

Behavioral and psychological problems. Children who experienced premature birth may be more likely than full term infants to have certain behavioral or psychological problems, as well as developmental delays.

Chronic health issues. Premature babies are more likely to have chronic health issues- some of which may require hospital care – than are full-term infants. Infections, asthma and feeding problems are more likely to develop or persist.

Premature infants are also at increased risk of sudden infant death syndrome (SIDS).

Although the exact cause of preterm birth is often unknown, there are some things that can be done to help women- especially those who have an increased risk – reduce their risk of preterm birth, including:

Progesterone supplements. Women who have a history of preterm birth, a short cervix or both factors may be able to reduce the risk of preterm birth with progesterone supplementation.

Cervical cerclage this is a surgical procedure performed during pregnancy in women with short cervix, or a history of cervical shortening that resulted in a preterm birth [2]

WHO has developed new guidelines with recommendations for improving outcomes of preterm birth. The guide lines include interventions provided to the mother (e.g.: steroid injection before birth, antibiotics when her water breaks before the onset of labor and magnesium sulfate to prevent future neurological impairment of the child) as well as intervention for newborn baby (e.g. thermal care feeding, kangaroo mother care, safe oxygen use and other treatment to help baby's breath more easily) (3).

1-2 Problem statement:

Despite of increase in medical technology the preterm birth is still a medical mastery.

A comprehensive list of risk factors and outcome of preterm birth has not been definitively established. This creates an additional challenge to clinicians in designing effective and parsimonious interventions to reduce the number of outcome of preterm births.

So the question is: what is the rate of Preterm birth? And what is the outcomes of NICU? How does this relate to ANC of the mother.

1-3 Justification:

According to the best knowledge of the researcher, there is little available of published research work that to measure the risk factors and the outcome of preterm birth among Sudanese neonates within the previous few years.

Within this perspective, the need for study may help to offer valuable rationalized information for variety of beneficiaries such as the patients themselves and their families.

Moreover, it is of important for obstetrician, neonatologists and relevant medical staff; in order to be more critical in investigation to be more precise in overall management outcome for the nulliparous women under active management in Sudan.

This study aims to improve outcome of preterm birth by identification risk factor, diagnosis and good management of preterm birth.

1-4 Objectives:

1-4-1 General Objective:

To assess the preterm birth at Saad AbuElla Teaching Hospital (July – December 2020)

1-4-2 Specific Objectives:

1. To identify the rate of preterm birth.
2. To determine fetal outcome of preterm birth with regard to admission to NICU hospital stay.
3. To determine maternal outcome associated with preterm birth.
4. To identify Etiological risk factor for preterm birth.

2. Methodology

2.1 Study design:

This is a hospital based descriptive study.

2.2 Study area:

The study conducted in **Saad Abu Ella teaching Hospital**, which is the university hospital specialized maternity hospital in Sudan. It was established in 2013 mainly to provide delivering services to women from the greater Khartoum area and the surrounding villages. It is a national training center in obstetrics for medical students, house officers, registrars and specialists. It also provides maternity healthcare services to women from different states of the country. To cope with the demands of its' clients, the hospital has to expand and has established many medical activities including the following: special care baby unit provides round the clock care for premature baby with all the necessary equipment's include(incubator, monitor of the baby vital sings, feeding tube, virtue, bilirubin light, and medication) and staff; I.C.U: caring for the critically ill and high risk patients; Laparoscopic surgical and diagnostic unit; Feto-maternal unit; Antenatal Clinic receiving patients from all over the country and has an effective health awareness unit, HIV/ AIDS. Reproductive health including family planning clinics, vaccination, Central Blood Bank theatre with three room and Laboratory; Statistic unit with a modern set-up The department of obstetrics is divided into 5 units covered by senior

consultants, junior consultant, registrars, house officers and the number of midwives about nine. The cover for the labor ward is twenty-four hours, 2150 vaginal deliveries, 1988 caesarian sections were inducted in 6 months (duration of this study) The activities of these obstetric and gynecological units involve casualties, labor room, major and minor theaters, referred clinics and academic activities.

2.3 Study duration

The study was conducted during the period from (July 2020 to December 2020).

2.4 Study population

The study population was all patients presented with pre-term labor who delivered at **Saad Abu Ella Hospital** during the study period.

2.4.1 Inclusion criteria

All patients presented with pre-term labor to study area during the study period and have excellent date and have ultrasound done at (7-13) weeks, no recent use of contraception and has no early vaginal bleeding.

2.4.2 Exclusion criteria

Refusal to participate in the study, have not early ultrasound scan, woman was on contraception, have early vaginal bleeding and triple pregnancy.

2.5 Sample size and sampling technique

The study sample was **total coverage** of all patients presented with pre-term labor to study area during the study period and fulfilled the inclusion criteria of the study.

2.6 Data collection tools:

The data was collected by pre-designed questionnaire (attached), by the researcher herself assisted by house-officer, registrars who was available in the labor room and medical records.

Procedure of data collection:

All participants that fulfilled the selection criteria were enrolled in the study. All participants and their close relatives was explained about the outcome of preterm labor, They also explained about the risk of preterm labor.

A written informed consent was obtained at the time of enrolment in the study. The participants were asked to come for regular antenatal checkups in next pregnancy.

2.7 Statistical analysis:

Data was tabulated and analyzed using the Statistical Package for Social Sciences (SPSS). Chi squire test used

and significance differences (P value) is adjusted with confidence interval (CI) 95% (P < 0.05 significant, P > 0.05 not significant).

Results were analyzed, discussed and recommendations suggested

2.8 Ethical considerations

• Ethical clearance from the ethical committee of the Sudan Medical Specialization Board, Council of Obstetrics and Gynecology was obtained.

- Ethical clearance from the ethical committee of EDC was obtained.
- Official agreement from the pediatrics department of **saad Abu Ella Hospital** for permission.

• Written consent which stated the purpose of the study, was taken from all participants in this study.

3. Results

The total number of live birth during the study periods was 4138 of whom 184 were preterm birth so that preterm of the neanate was (184/4138)*100= 4.4%

Our study found that 81(44%) of preterm births were delivered through spontaneous virginal delivery and 103(55.9%) by C\S More than half of vaginal deliveries 63(77%) were spontaneous while only 37(45%) were induced. The majority of caesarian sections 66(.35.9%) were Em C\S while only 37(20%) were ELC\S. the majority of preterm births 176(95.6%) were alive while only 8(4.3%) were dead more than two thirds of preterm birth 143(77.7%) were admitted for NICU with the following indications of admission:

The study reported that only 5(3.4%) of preterm births were admitted due to meconium aspiration, more than half of NICU admissions 129(90.2%) due to RDS and 9(6.2%) due to TTN.

The study also reported one case of maternal complication (postpartum psychosis).

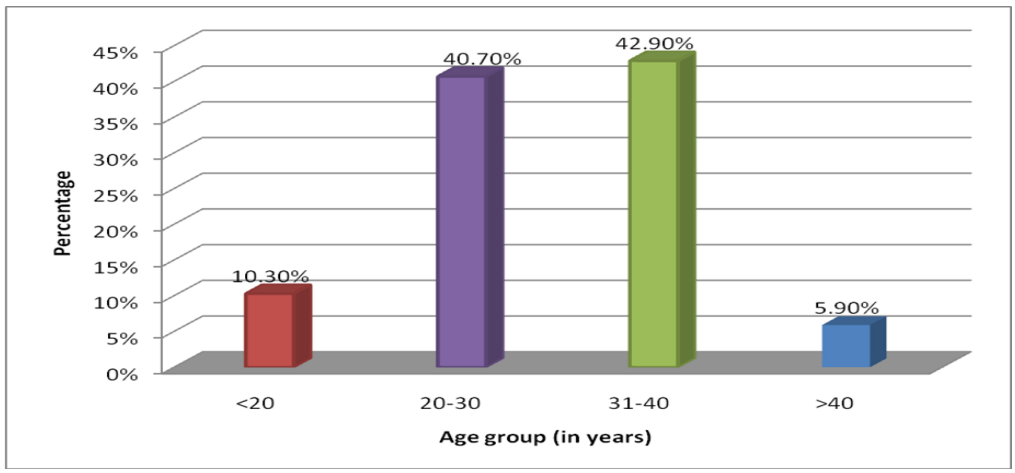

Figure (3.1) The Age distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

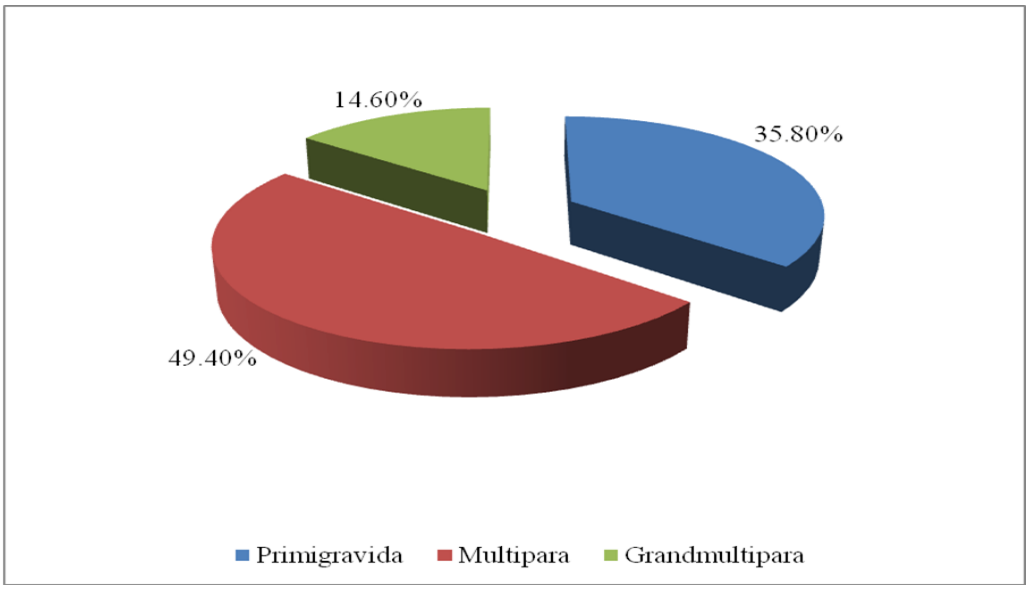

Figure (3.2) The Parity distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

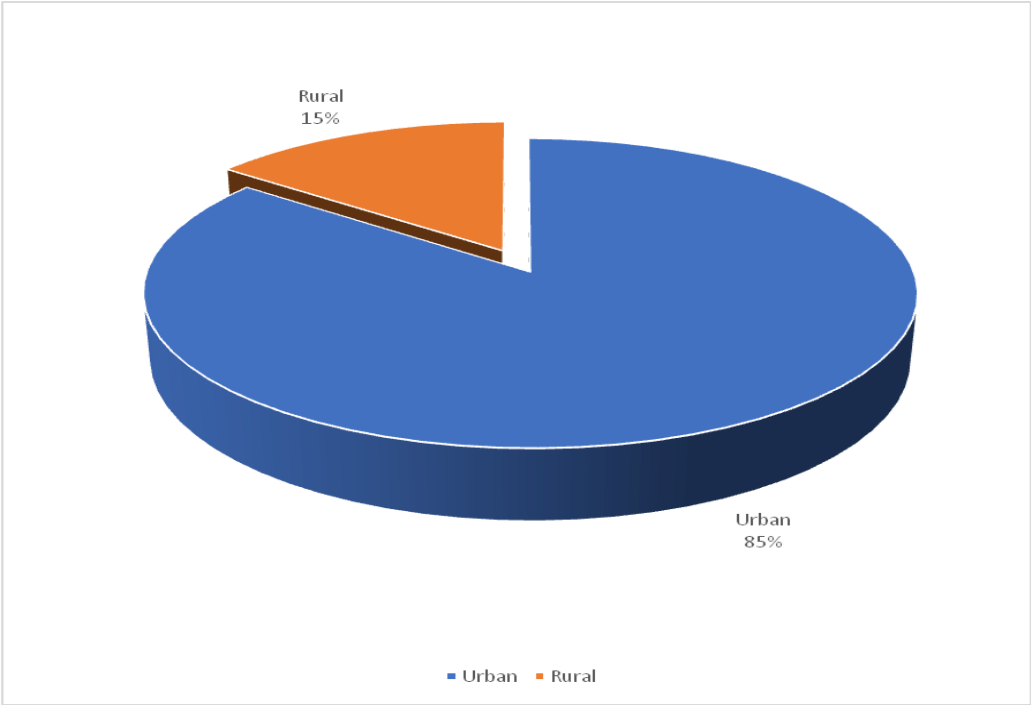

Figure (3.3) The Residence distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

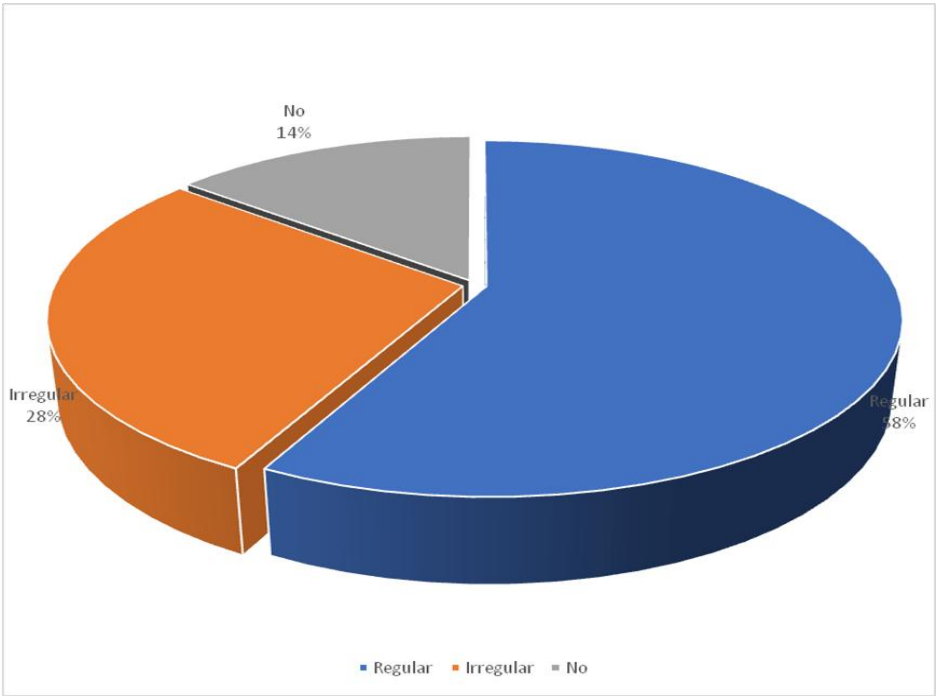

Figure (3.4) Attendance of antenatal care distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

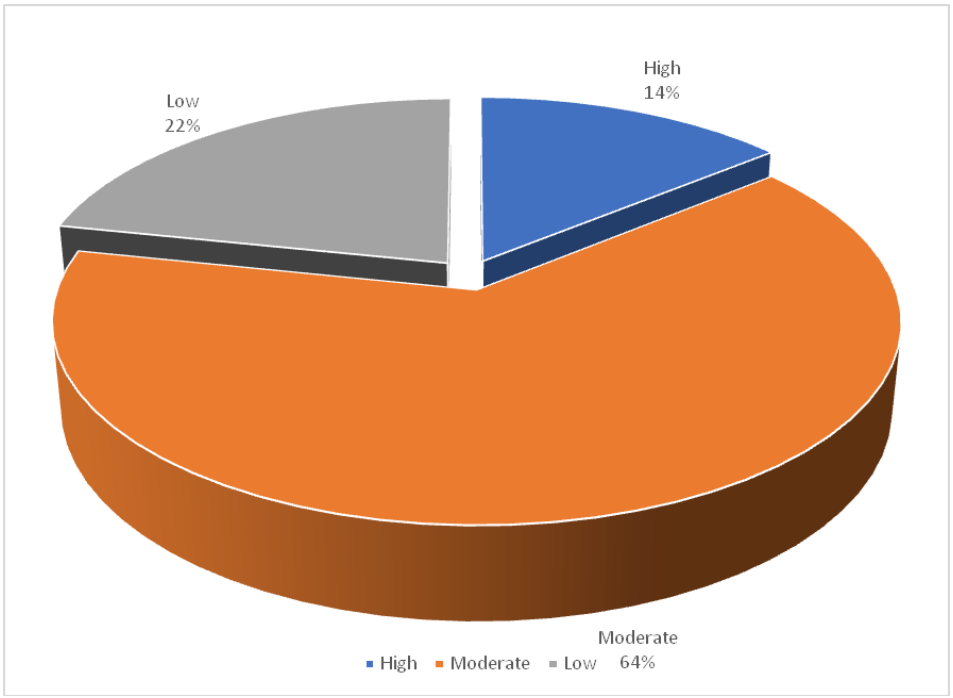

Figure (3.5) socioeconomic status distribution among woman presenting with preterm labor to Saad Abu Ella Hospital according to WHO classification.

Table (3.1) shows the Distribution of Gestational age per week among woman presenting with preterm labor to Saad Abu Ella Hospital

GA	FREQUENCY (N)	PERCENT (%)
24	1	.5
26	4	2.2
27	3	1.6
28	7	3.8
30	9	4.9
31	7	3.8
32	12	6.5
33	9	4.9
34	17	9.2
35	38	20.7
36	77	41.8
Total	184	100.0

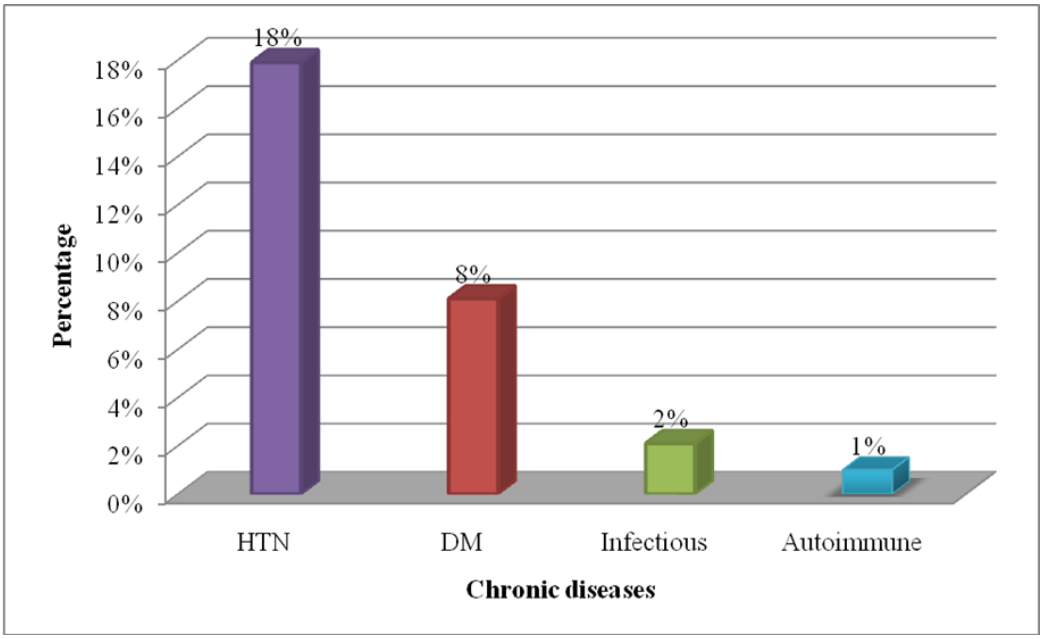

Figure (3.6) The Chronic disease distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

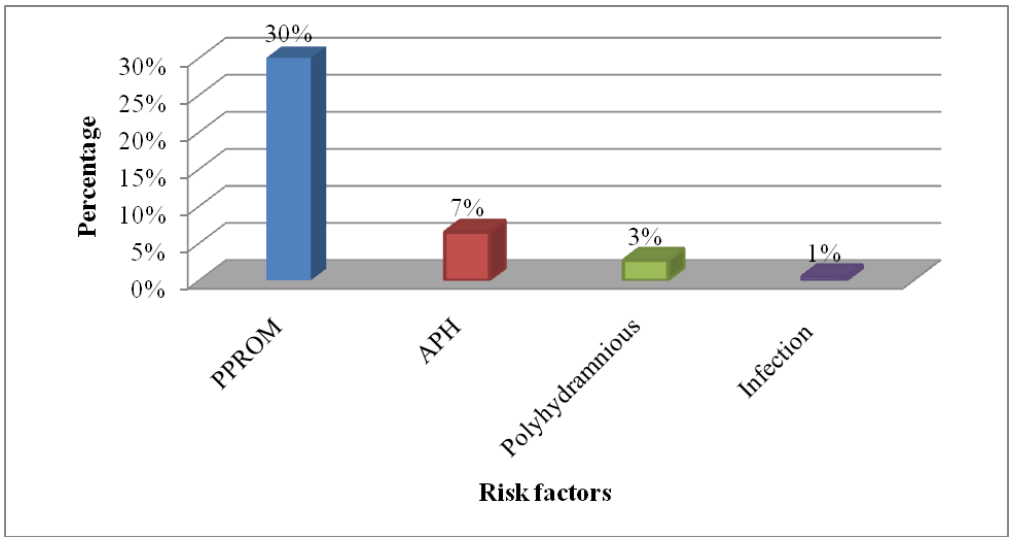

Figure (3.7) risk factor distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

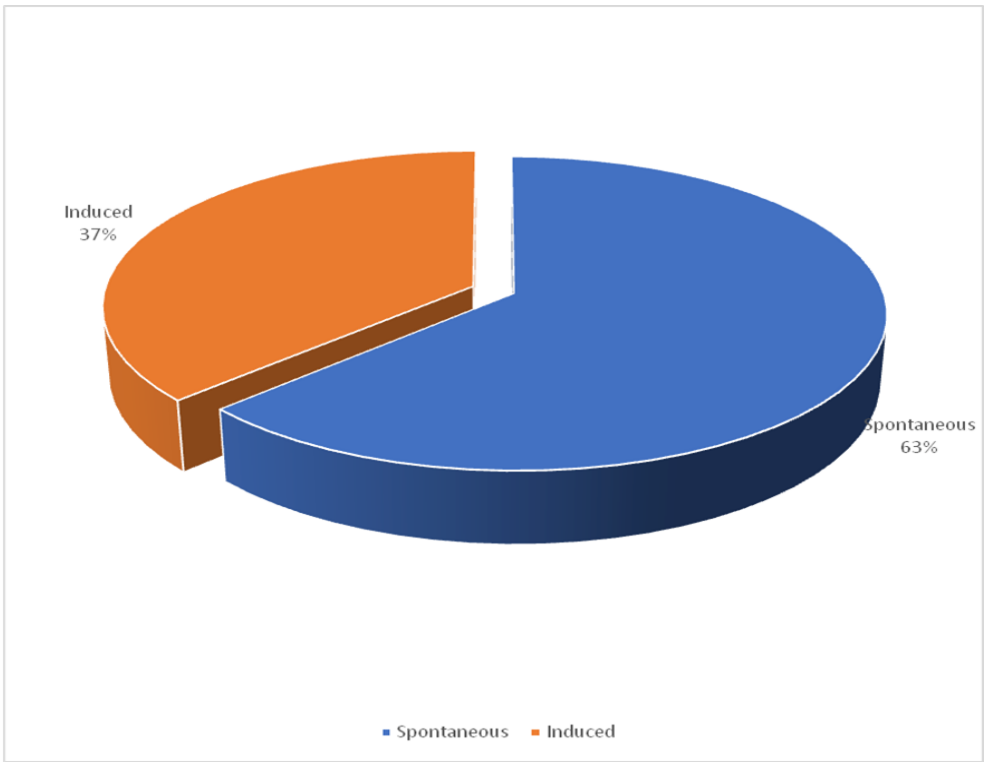

Figure (3.8) The onset of labor distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

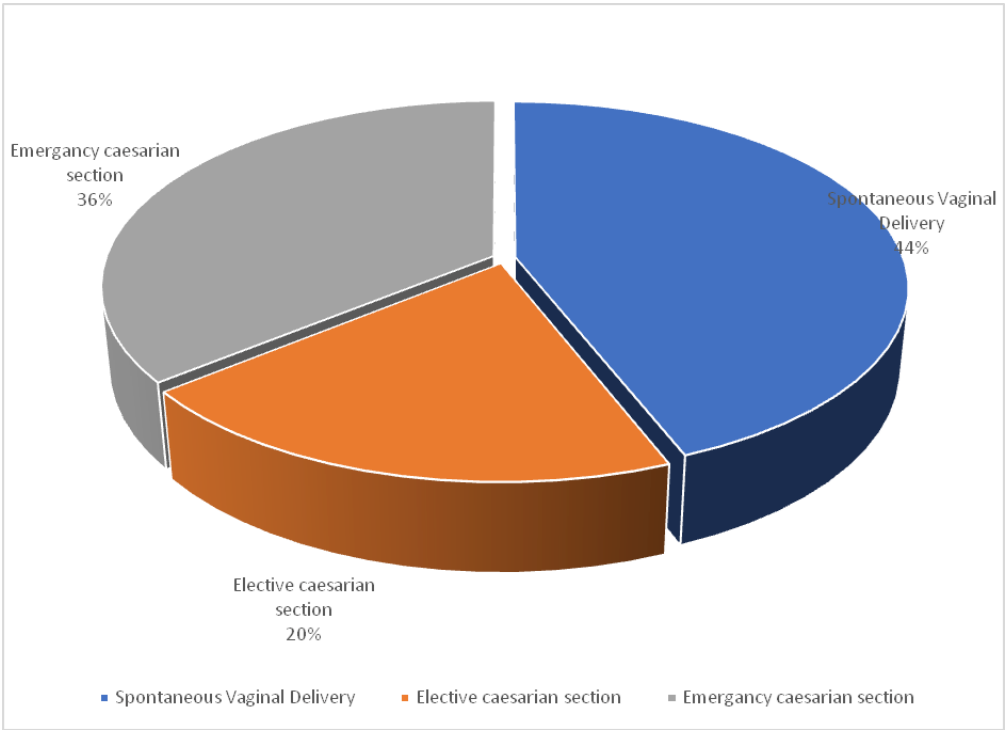

Figure (3.9) The Mode of delivery distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

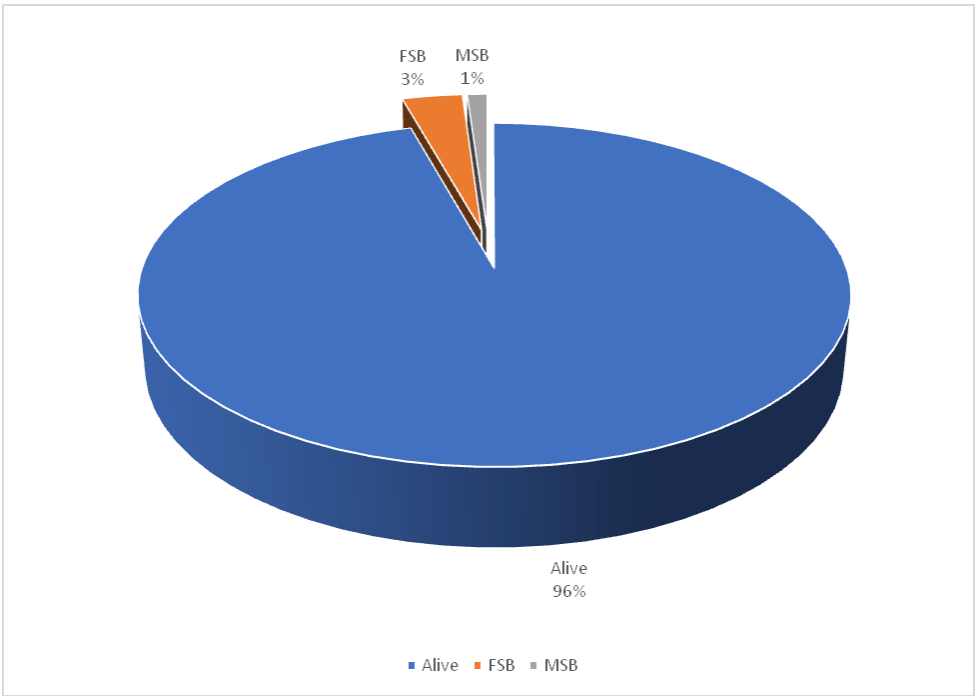

Figure (3.10) The Fetal outcomes distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

Table (3.2) shows the APGAR score for the neonates of study population in (1 min, 5min, and 10 min) (n = 183).

	APGAR1	APGAR5	APGAR10
0	1	1	1
1	0	1	0
4	1	0	0
5	1	0	0
6	19	7	4
7	29	22	10
8	88	39	21
9	44	111	142
10	1	3	6
Total	184	184	184

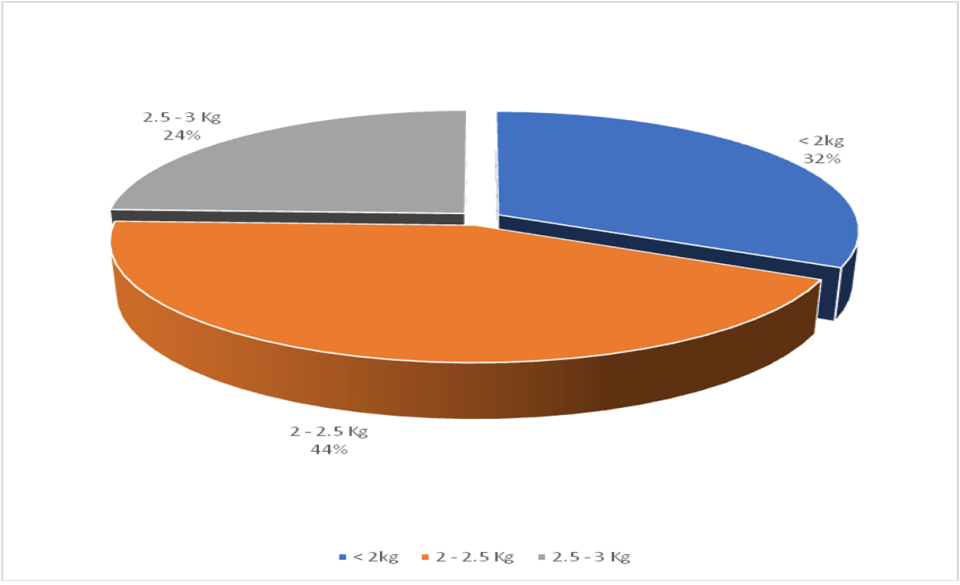

Figure (3.11) The birth weight distribution among woman presenting with preterm labor to Saad Abu Ella Hospital.

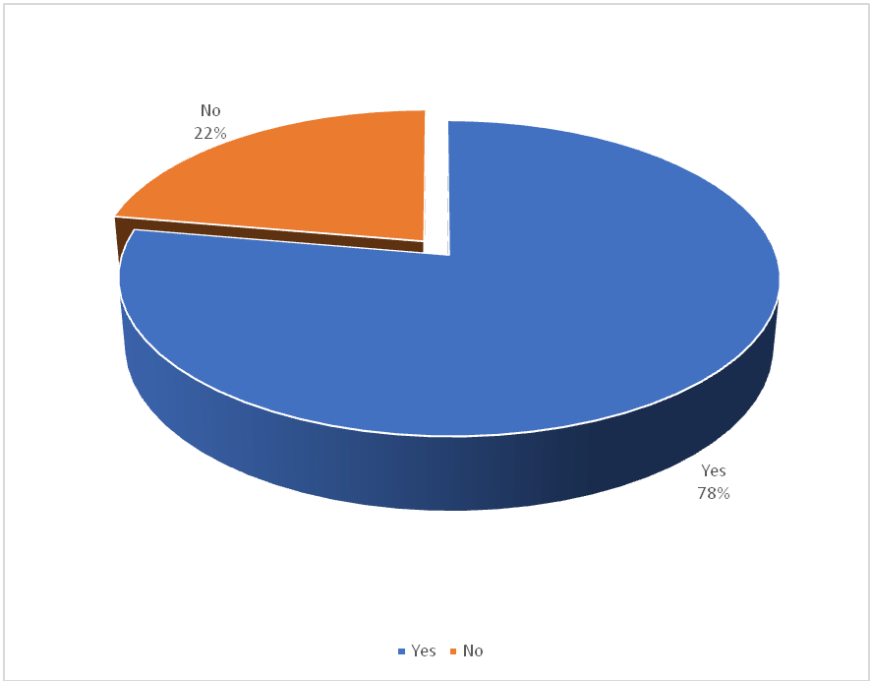

Figure (4.12) Admission to NICU among woman presenting with preterm labor to Saad Abu Ella Hospital.

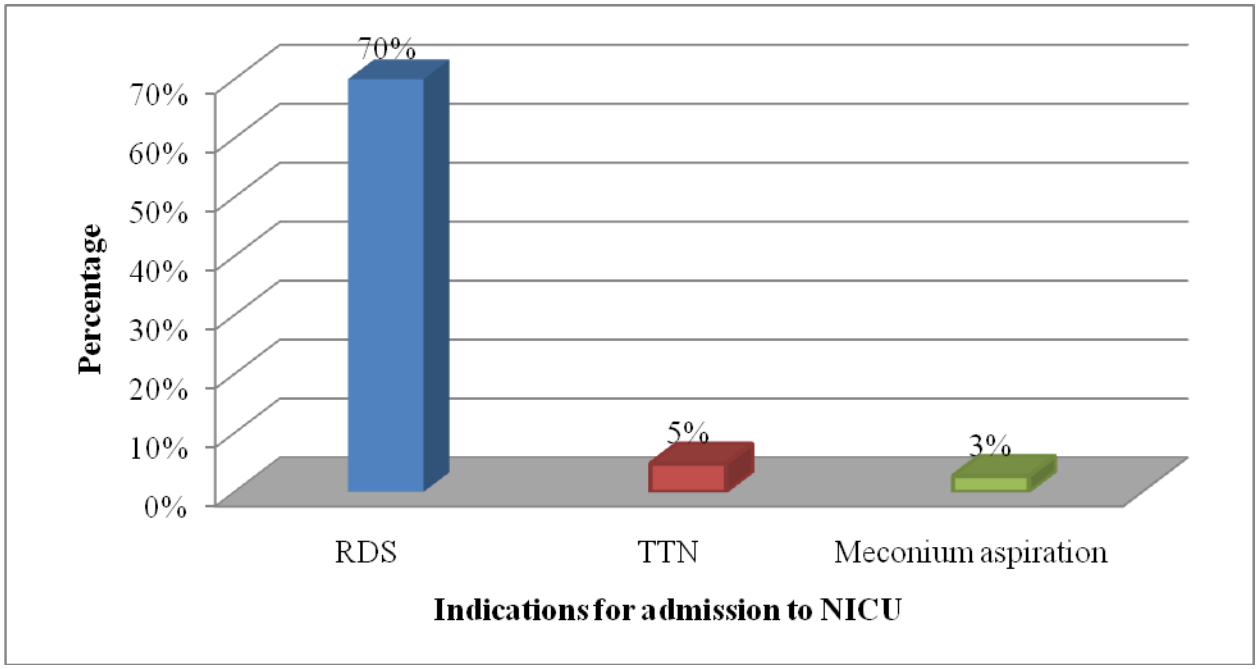

Figure (3.13) The Frequencies of indications for admission to NICU.

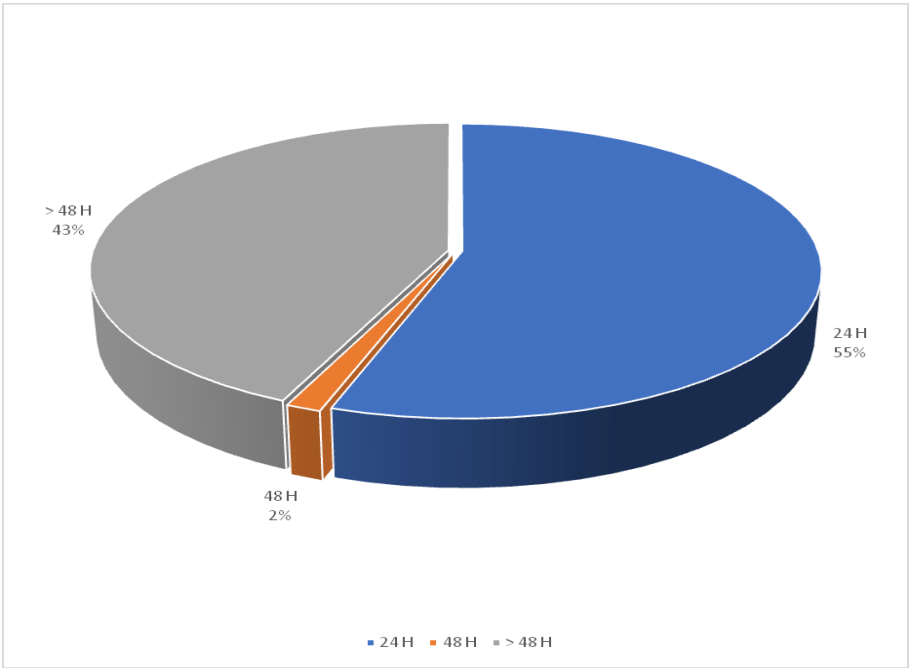

Figure (3.14) duration for NICU admission among woman presenting with preterm labor to Saad Abu Ella Hospital.

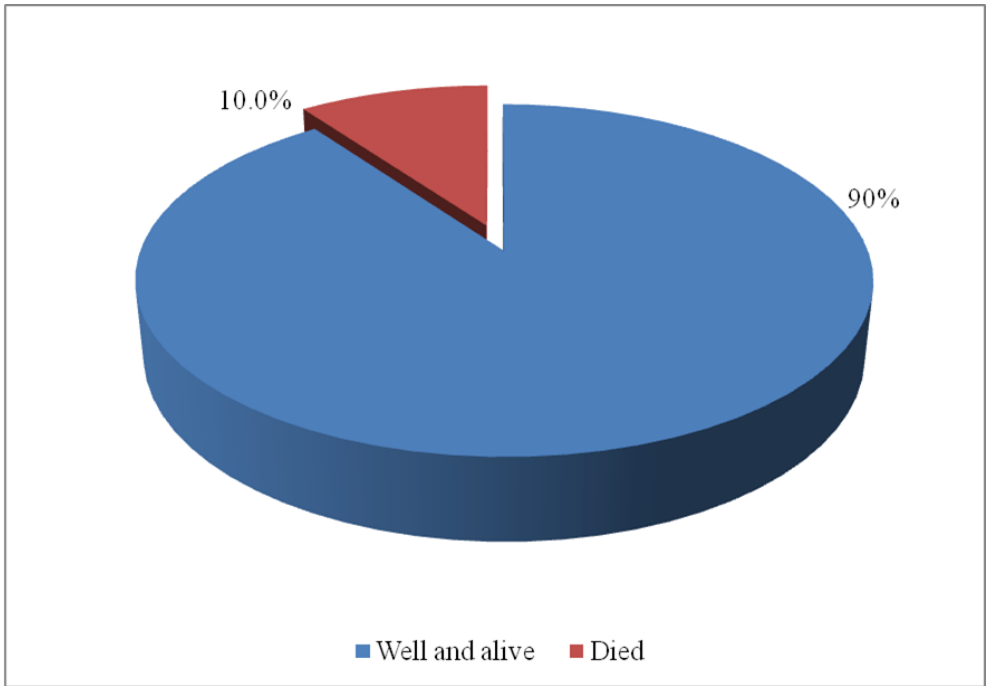

Figure (3.15) The outcomes of NICU admission among woman presenting with preterm labor to Saad Abu Ella Hospital.

Table (3.3) shows the Correlation between ANC of the mother and Admission to NICU, the P value of .009 (< 0.05) significant correlation.

		NICU		Total
		Yes	No	
ANC	Regular	89	17	106
	Irregular	38	14	52
	No	16	10	26
Total		143	41	184

Table (3.4) shows the Correlation between GA of the mother and NICU outcomes, the P value of .0001 (< 0.05) significant correlation.

		NICU_Outcome		Total
		Well	Death	
GA	24	0	1	1
	26	1	3	4
	27	0	3	3
	28	3	4	7
	30	7	1	8
	31	5	1	6
	32	10	0	10
	33	8	0	9
	34	17	0	17
	35	32	1	33
	36	46	0	45
Total		129	14	143

Table (3.5) shows the Correlation between Admission to NICU and Fetal Outcomes, the P value of .661 (> 0.05) non-significant correlation.

		Fetal Outcome			Total
		Alive	END/FSB	MSB	
NICU	Yes	138	5	0	143
	No	38	1	2	41
Total		176	6	2	184

Discussion, Conclusion and Recommendations

4-1 Discussion

Preterm birth, also known as premature birth, is the birth of baby at less than 37 weeks` gestational age, this is a prospective descriptive study aimed to study the preterm birth at Saad AbuElla Teaching Hospital, it involved 184 cases.

My study shows that the most frequent age groups among the study population is between 20 – 40 years of age, and this is the normal age group for pregnancy and delivery.

Most of the ladies in my study were multigravida, and hence this study was conducted at the center of Khartoum state; the majority was resident in urban areas. More important, Figure (4.4) show the status of Anti natal care among study population, 58% of them are having a regular ANC, 28% irregular ANC and 14% do not have ANC at all, so the prevalence of regular ANC is 58% according to my study, which is not a higher percentage but still higher than the study of Dr. Inaam Aloshary [28], which reports that the regularity of ANC is about 35,9%. This may be presumed by cultural and social habits in Sudan, or because of the lower socioeconomic status and lower rate of awareness about ANC between Sudanese.

Regarding the gestational Age; my study show that the most frequent GA is 36 weeks by about 42% of the study population, only about 54 individual have a chronic disease mainly Hypertension, 73 have a risk factor for preterm labor mainly the PPROM. The latter 2 findings agree with the study of Dr. Inaam Aloshary [28]. Similarly, in Sudan, by Alhaj Am et al. showed that those women who had history of infection such as periodontal were at higher risk for preterm birth [29]. Moreover, in Jordan Nadin M. et al. reported that hypertension, and diabetes were significantly associated with an increased risk of preterm delivery [20].

When I investigated for the Mode of delivery among study population, 44% Spontaneous vaginal Delivery, 36% Emergency CS and 20% Elective CS.

Frequencies of indications for CS among individuals that underwent CS from study population show that the most frequent indication is previous scar (35%) which is similar with Inam [27] she reported that the previous scar involve about 27% of study population, followed by fetal distress (10%).

The percentage of neonatal outcome about 96% are alive and the rest 4% between FSB, MSBand early neonatal death.

The Frequency of birth weight among neonates of study population shows that the most frequent by about 44% are between 2-2.5 Kg, followed by < 2 Kg and the least one is 2.5 – 3 Kg.

My study shows that the incidence of NICU admission is about 78% admitted to the mainly for RDS and Asphyxia, and this can be explained by the fact that the lungs develop very lately during the fetal live. this is very close to the finding of Inam [27] she reported that the prevalence is about 69.9% mainly for TTN and meconium Aspiration.

Frequencies of duration for NICU, 55% of the admitted persist for 24 hours, 43% stay for more than 48 hours and only 2% stay for 48 hours.

Frequencies of Presence of Fetal congenital malformation among neonates of study population represent only 1% but Inam [27] reported that 13.1% of preterm births had congenital malformation. Similarly, in Jordan, Nadin M. etal reported that congenital anomalies were the causes of 84% of preterm neonatal deaths [30]. Numerous studies have shown an association between congenital anomalies of any part of the body and preterm birth or low birthweight.

the Frequencies of outcomes of NICU, fortunately about 90% are alive 10% when I correlated between regularity of ANC of the mother and Admission to NICU, the P value of .009 (< 0.05) significant correlation and the Correlation between gestational age of the mother and NICU outcomes, the P value of .0001 (< 0.05) significant correlation, which indicated that the bigger the gestational age the better the outcomes. The Correlation between Admission to NICU and Fetal Outcomes, the P value of .661 (> 0.05) non-significant correlation. Which indicate there is no relation between them.

4-2 Conclusion

- The study shows that the rate of preterm was 4.4% birth
- The major risk factors were PPROM; APH and polyhdramniosis some are reversible and others are permanent.
- The study showed that more than two thirds of preterm birth admitted to nursery 143(77.7%) and mortality rates was 8 (4.3%).
- The study showed that there was one maternal complication (postpartum psychosis).

4-3 Recommendations

● Awareness of such risk factors is essential in planning public education programs

● Upgrading of the neonatal intensive units so as to decrease the high mortality rate.

● Administration of dexamethasone for any mother that enter to preterm labor or has risk to preterm labor from (24_34) week as it proved to reduce ARDS, NEC and IVH so it improves the outcome in preterm babies.

● Administration of magnesium sulfate to any woman enter preterm labor and GA (24_29) week

● More researches on preterm birth so as to improve outcome.

● Support group for mothers that were lost her babies.

● Clear program for inutero transfer.

References

1. Preterm labor at birth: An overview. National institute of child health and human Development.3November 2014.Archived ftomorginal on 2015.

2. Hay WW, et al., eds.The newborn infant. In; Current Diagnosis & Treatment 3.Word health organization{November 2014}preterm birth fact sheet N363WHO int. Archived from the orginal on 7 march2018

4. What are the symptom of preterm laborN.I.H.11June2013Archevid from orginal on 2April 2015

5.What are thetreatment are usedto prevent preterm labor and birth N.I.H 3 November 2014

6. GBD 2013 morttality and cause of death collaboraters{8 Octtober2016}

7. Exteremepreamiesface long term disabilities Archived from the original on 2December2010

8. Jarjour, IT(February2015)"Neurodevelopmental outcome After Extreme prematurtity:AReview of Literature" Pediatric Neurolgy.2014

9.Behrman, RichaedE,Butler,Adrienne Stithoutcome,Institute of Medicine(US)Committee on Understanding premature birth and Assuring Health(2007).Biological Pathways Leading to Premature

10. Flood K, Malone FD: Prevention of preterm birth. Seminars Fetal Neonat Med 2012; 17; 58e63.

11. Cochrane search “prevention and preterm labour” http://summaries. cochrane.org/search/site?f[32] =im_field_terms_cochrane_library %3A51374&f[1]=im_field_stage%3A3&f[2]=im_field_terms_coc hrane_library%3A51378. Last accessed on 26 Februrary 2013

12. Bitzer E, Schneider A, Wenzlaff P, Hoyme UB, SiegmundSchultze E: Self-testing of vaginal pH to prevent preterm delivery: A controlled trial. Dtsch Arztebl Int 2011; 108(6): 81–6.

13. Crane JM, Hutchens D: Transvaginal sonographic measurement of cervical length to predict preterm birth in asymptomatic women at increased risk: a systematic review. Ultrasound Obstet Gynecol 2008; 31: 579–87.

14. Berghella V, Rafael T, Szychowski JM, Rust OA, Owen J: Cer - clage for short cervix on ultrasonography in women with singleton gestations and previous preterm birth. Obstet Gynecol 2011; 117: 663–71.

15. Dodd JM, Flenady V, Cincotta R, Crowther CA: Prenatal administration of progesterone for preventing preterm birth. Cochrane Database of Systematic Reviews 2006, Issue 1. Art. No.: CD004947. DOI: 10.1002/14651858.CD004947.pub2

16. Romero R, Nicolaides K, Conde-Agudelo A, et al.: Vaginal progesterone in women with an asymptomatic sonographic short cervix in the midtrimester decreases preterm delivery and neo - natal morbidity: a systematic review and meta-analysis of individual patient data. Am J Obstet Gynecol 2012; 206: 124.e1–19.

17.Anotayanonth S, Subhedar NV, Garner P, Neilson JP, Harigopal S: Betamimetics for inhibiting preterm labour. The Cochrane Database of Systematic Reviews 2010; 2: CD004352. DOI: 10.1002/14651858.CD004352.pub2 18. Schleussner E, Möller A, Groß W, et al.: Maternal and fetal side effects of tocolysis using transdermal nitroglycerin or intravenous fenoterol combined with magnesium sulfate. Eur J Obstet Gynecol Reprod Biol 2003; 106: 14–9.

19. de Heus R, Mol BW, Erwich JJ, et al.: Adverse drug reactions to tocolytic treatment for preterm labour: prospective cohort study. BMJ 2009; 338: b744.

20. RCOG Green-top Guideline No. 1b, February 2011, Tocolysis for women in preterm labour. www.rcog.org.uk/files/rcog-corp/ GTG1b26072011.pdf

21. Spätling L, Fallenstein F, Schneider H, Dancis J: Bolus tocolysis: treatment of preterm labor with pulsatile administration of a beta-adrenergic agonist. Am J Obstet Gynecol 1989:160: 713–7.

22. Papatsonis D, Flenady V, Cole S, Liley H: Oxytocin receptor antagonists for inhibiting preterm labour. Cochrane Database of Systematic Reviews 2005; 3: CD004452. DOI: 10.1002/14651858.CD004452.pub2

23. The Worldwide Atosiban Versus Beta-agonists Study group:
Effectiveness and safety of the oxytocin antagonist atosiban versus beta-adrenergic agonists in the treatment of preterm labour. Br J Obstet Gynaecol 2001; 108: 133–42.

24. King JF, Flenady V, Papatsonis D, Dekker G, Carbonne B: Calcium channel blockers for inhibiting preterm labour. Cochrane Database of Systematic Reviews 2003, Issue 1. Art. No.: CD002255. DOI: 10.1002/14651858.CD002255.

25. Min J, Miskatul M, Dan L, Xianghua Y, A case control study of risk factors and neonatal outcomes of preterm birth; 2018; Taiwanese Journal of Obstetrics & Gynecology 57 (2018) 814e818

26. Fernando A, Janet L, Luz G, Mabel B, Shivaprasad S, Elwyn C, Richard J,Archana P, Sarah S, Omrana P, Fabian E, Ana G, Adverse maternal and perinatal outcomes in adolescent pregnancies: The Global Network's Maternal Newborn Health Registry study, Althabe et al. Reproductive Health 2015, 12(Suppl 2):S8

27. Huang J, Qian Y, Gao M, Ding H, Zhang L, Jia R. Analysis of factors related to preterm birth: a retrospective study at Nanjing Maternity and Child Health Care Hospital in China. Medicine 2020;99:28(e21172).

28. Inaam A, Outcome of preterm birth at Omdurman Maternity Hospital December 2018 – July2019) ; SMSB Council of Obstetrics and Gynecology 2019 29. Alhaj AM, Radi EA, Adam I. Epidemiology of preterm birth in Omdurman Maternity hospital, Sudan. J Matern Fetal Neonatal Med. 2010;23(2):131–134.

30. Nadien AT, Cherie A, Belihu TM, Tasisa GG. Factors associated with spontaneous preterm birth in Addis Ababa public hospitals, Ethiopia: cross sectional study. BMC Pregnancy Childbirth. 2018;18(1):332.

31. al-Eissa YA, Ba'Aqeel HS. Risk factors for spontaneous preterm birth in a Saudi population. Eur J Obstet Gynecol Reprod Biol. 1994 Oct;57(1):19-24

32. Quinn JA, Munoz FM, Gonik B, et al. Preterm birth: Case definition & guidelines for data collection, analysis, and presentation of immunisation safety data. Vaccine. 2016;34(49):6047–6056.