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Maternal Risk Factors Associated with Neonatal Low Birth Weight in AL Nasiriyah city

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Aim of the study
Because of high mortality [NMR]and the serious medical complications and bad prognosis among the neonates whom born with LBW [specially the extremely LBW][1] and the costs to the family and society in keeping LBW infants alive [2], so we conduct this study to determine some of maternal risk factors that associated with neonatal low birth weight in order to reduce LBW morbidity rate in our locality.

Abstract
Objective: To determine the association of maternal medical, obstetric and social risk factors with neonatal LBW.

Design: A descriptive study.
Place and time of study: This study was carried out in the department of neonatology in Al- Habboby teaching hospital during the period between January and May 2021.

Patients and methods: One hundred low birth weight (less than 2500mg) live born babies were taken randomly to enrolled cases in this study our parameter is just the neonatal body weight, regarding maternal medical, obstetric and social history taken from mothers.

Results: [66%] of cases were males and [34%] were females in ratio of Male to Female: 1.9:1.
Fifty-two percent [52%] were preterm (premature) and forty-eight [48%] were term [small for date (IUGR) or [SGA]. Also, the study found that forty-seven percent [47%] were delivered by cesarean section while fifty-three [53%] were by normal vaginal delivery.
The factors like maternal urinary and genital tract infection [88%], anemia [82%], exposure to cigarette smoking [46%], low education [45%], bad psychological mode [35%], poor prenatal care [35%], hypertension [20%], previous cesarian section [18%], poverty [13%] and diabetes mellitus [12%] have been considered as a risk factor in causing neonatal LBW.

Conclusion
Common maternal risk factors for LBW neonates in AL Nasiriyah city include, GTI, anemia, cigarette smoking exposure, worker pregnant, low education level, poor antenatal care, hypertension, DM and poverty.

Introduction

Low birth weight (LBW), regardless of gestational age, is a multifaceted public health problem with significant individual and societal impact worldwide, especially in developing countries.[2] Globally, an estimated 20 million LBW infants are born each year, with over 18 million of these in developing countries.[1]

LBW neonates are at a disproportionately higher risk of mortality, morbidity, poor growth, and impaired psychomotor and cognitive development.[2]

These LBW neonates are also disadvantaged when they become adults as they are more susceptible to type 2 diabetes, hypertension, and coronary heart diseases [3]. Infant mortality rate is six-fold higher in LBW neonates and 100-fold higher in with neonates very low birth weight (VLBW < 1500 g) compared with normal birth weight neonates.[3]

Low birth weight The W.H.O. has defined the term low birth weight as "the birth weight of a new born infants less than 2500 grams /8 ounces /5 pounds irrespective of gestational age. [1]. According to the definition, babies with the birth weight of less than 2500 gm are classified as Low birth weight babies.

There are some other categories also –

1. **Very low birth weight infants**- The baby whose birth weight is less than 1500 gm /3 pounds is termed very low birth weight infant.[5]
2. **Extremely low birth weight Infants** who has birth weight of less than 1000gms/2 pounds.[5]

Low birth weight is a major public health problem, particularly prevalent in developing countries. It is as high as 30% in many developing countries.[1]

Low birth weight is either the result of:

A. **Preterm births [premature**] **LBW** as child birth occurring earlier than 37 complete weeks of pregnancy.[5]

B. **Term birth [mature] LBW [**37-42 weeks**] also called [Fetal growth restriction] or [intrauterine growth retardation (IUGR**)] **or [SGA]** these babies are called growth restricted or small for gestational age. These may be full term but they are under weight, may be small and have low birth weight because of slow growth in uterus.[6]

-Small for gestation [SGA] **[small for date]: -** The body weight less than the 10^{th} percentile for that age [5]

- Large for gestation [LGA] or [large for date]:- the body weight more than the 90^{th} percentile [infant of diabetic mother] [5]

C. Post mature [post term] The fetus who remains in uterus after 42week of gestation.[5]

Complications of low birth weight: -

Low birth weight is a multi-factorial problem with a wide spectrum of health-related problems from its origin to later in life. It is one of the important causes of high infant's mortality and morbidity rate in developing countries. The rate of low birth weight continues to increase; putting more children at risk of health-related consequences, because it has an independent effect on child health. [2]

A. Medical Complications

1. hypothermia
2. respiratory distress syndrome [RDS]
3. apnoea,
4. intraventricular hemorrhage
5. patent ductus arteriosus
6. jundice and kernicterus
7. anemia
8. tendency to hemorrhage
9. infections
10. hypocalcemia
11. hypoglycemia and brain damage.
12. tendency for rickets

13. retinopathy
14. cerebral palsy and Mental retardation. [5]

B. Neonatal hospital costs: -

New modes of ventilation, exogenous surfactants are high and it remains high after hospital discharge. as children grow older costs continues to be high. [7]

Also, Reduction in LBW mortality have greatly contribute to the reduction in overall neonatal mortality**. [1]**

Maternal risk factors Associated With low birth weight

Women with these following factors are at increased risk of premature delivery and having low birth weight infants;

1. History factors-including previous history of preterm/LBW/IUGR, maternal age, birth interval, inadequate weight gain in pregnancy, infections and improper nutrition. [8]
2. Environmental Factors-It includes stress, smoking and antenatal care.[8]
3. Maternal health: Women exposed to drugs, alcohol, and cigarettes during pregnancy is more likely to have LBW or VLBW babies. Mothers of lower socioeconomic status are also more likely to have poorer pregnancy nutrition, inadequate prenatal care, and complications of pregnancy.[9]
4. Multiple birth babies are at increased risk of being VLBW because they often are Premature, more than 50% of twins and other multiple gestations are VLBW.[10]
5. Age: Teen mothers (especially if <15 years old) have a much higher risk of having VLBW infant.[2]
6. Social factors-life style, socio-economic status.[10]
7. Anemia; Hemoglobin levels of less than 11 g/dL at any time during pregnancy are considered abnormal. [11]
8. Infections- Maternal genital tract is infected with acidophilic lactobacilli, staphylococci and streptococci. Vaginal infection act as a starting point in the cascade of ascending infection, membrane rupture, infection of amniotic sac and subsequent pre term labor.[9]

Patients and methods

During the period between January and May 2021 at neonatal unit of Al habboby teaching hospital at Nasiriyah city, one hundred low birth weight [less than 2.5 kg) live born babies were taken randomly to enrolled cases in this study.

The criteria of including patients are:

1- the neonatal body weight which is less than 2.5 kg.
2- both sexes are included.
3- below one month age
4- admited once.
5- regarding maternal medical, obstetric and social history taken from mothers.

A questioner has been used as a guide line to get the data that needed in the study,

Regarding many variables related to both neonates and their mothers were taken in consideration.

The variables that related to neonates were: body weight, sex, gestational age, and presenting illness [5], while those related to mothers have been divided to four categories:

First-physical like: age, body weight and height.[11]
Second -obstetric history like: antenatal care, vaccination, multiparity, mode of delivery, history of stillbirth and any complication during pregnancy.[8]
Third- medical and surgical history like hypertensin, diabetes millets, anemia, psychological state during, the period of pregnancy and any previous cesarian section [10].
Fourth – socioeconomic state of mothers and their families like: rural or urban, salary and family income, cigarette smoking and others.[11]

Results

A total of hundred LBW newborn at the neonatal unit of Al- Habboby teaching hospital during the period of the study.

The LBW neonates comprised sixty- sex percent males and thirty -four percent of cases were females giving a Male: Female ratio of 1.9:1. [table 3]
fifty-two percent [52%] were preterm (premature) and forty-eight [48%] were term small for gestational age [SGA]. [table 3].
Also, we found that forty-seven percent were delivered by cesarean section while fifty-three were by normal vaginal delivery [table2]
The factors like maternal genital tract infection, anemia, bad psychological mode of pregnant mothers, poverty, poor antenatal care, exposure to cigarette smoking, previous cesarian section, hypertension and diabetes mellitus have been considered as a risk factor in causing low birth weight (LBW). [table1]
Other factors were statically not so
interesting.

Maternal risk factors [top ten]

GTI is 88%, Anemia is 82%, contact to cigarette smoking is 46%, low educational level 45%, bad psychological mode during pregnancy 35%, poor prenatal care 35%, working pregnant 33%, hypertension 20%, previous cesarian section 18%, low family income 13% and diabetes millets 12%. [table1]

Maternal factors in details for the study with 100 women how give birth for neonates with low birth weight

The age for 11 women were between (15-19) year, 39 women with age between (20-25) year, 30 with (26-30) year, 15 with (31-35) year and 5 with (36-40) year. [table 2]
The height for 36 women were (140-159) cm, for 62 were (160-179) cm and for 2 were (180-199) cm.
The weight for 5 women were (40-49) kg, for 19 were (50-59) kg, for 22 were (60-69) kg, 32 were (70-79) kg and 22 were cases above 80 kg.
The education level were 18 women for bachelor, 16 women for diploma, 20 for primary, 21 for secondary and 25 for untaught women.
Social state was 21 from rural and 79 for urban
For Occupation we found that 27of the women were worker, 67 housewife and 6 students
Family income 13 women were very poor, 49 in middle and 38 in good.
57 of them visit the perinatal care regularly, 8 of them intermittent and 35 didn't.
53 of them had a normal vaginal delivery and 47 a cesarean section.
In Iraq it's hard for women to be honest about a habit such us smoking so we found only two women smoking cigarette but 6 of them had a smoking family member and 41 of them had a smoking husband.
76 of the women got Ferrofolic and folic acid to manage anemia and 3 got blood transfusion.
5 got diabetes millets during pregnancy and 7 had diabetes millets before getting pregnant.
7 of the mange diabetes millets with insulin injection and 5 with hypoglycemic drugs.
4 of them had a known hypertension case and 16 got it during pregnancy.
53 of them had a known UTI case and 35 women got it during pregnancy.
For other medication 47 women taking drugs to prevent miscarriages.
For family members count 13 women lived in a family with (1-3) members, 42 with (4-6) members, 40 with (7-12) members and 12 of them with above 12 members at the same house.
One of the women had 8 live child and 82 had (1-3) live child and 17 had (4-6) live child.
We found only 3 of them were twins while 97 were single fetus.
32 of them had 1 multi parity, 24 had 2 multi parity, 16 had 3 multi parity, 11 had 4 multi parity and 17 above 4.
18 had one stillbirth and 6 had 2 stillbirths.

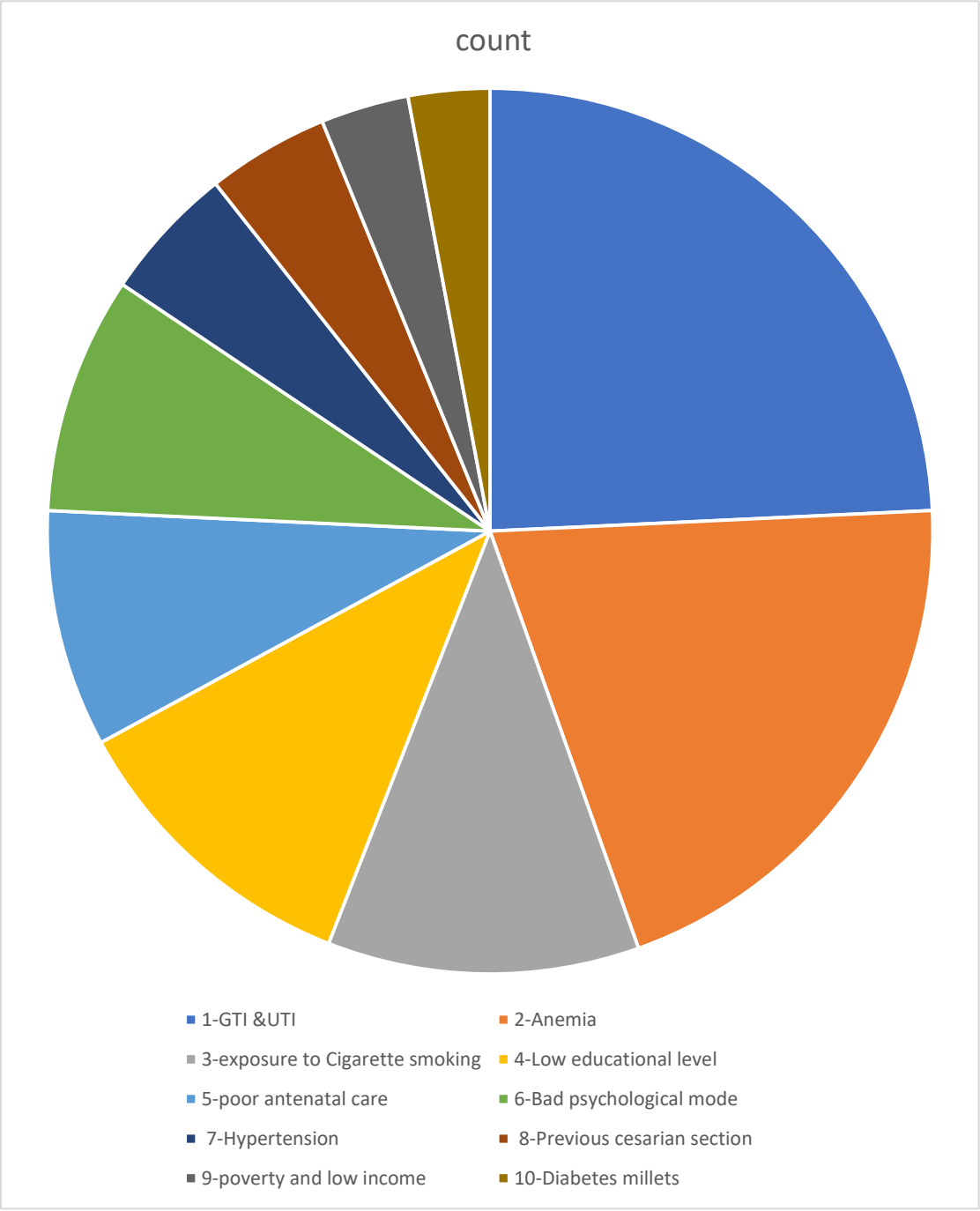
Neonatal factors in details

The gestational age were[52] below 37 weeks,[40] were between 37- 41 weeks and [8] were above 41 weeks. [table3]

66 of them were a male and 34 were a female. [table3]
Also, the study found that forty-seven percent were delivered by cesarean section [Table3]
Their weight was below 1.5 kg for 15 of them, (1.5 – 2) kg for 33 of them and above 2 kg for 52 neonates.
59 of them with jaundice and 41 with respiratory problems.
50 got a breast feeding, 30 got bottle feeding and 20 got a mixed feeding

[table 1] Top ten

1 Maternal High-Risk Factors	%
1-GTI &UTI	88
2-Anemia	82
3-exposure to Cigarette smoking	46
4-Low educational level	45
5-poor prenatal care	35
6-Bad psychological mode	35
7-Hypertension	20
8-Previous cesarian section	18
9-poverty and low income	13
10-Diabetes millets	12


count
1-GTI &UTI
2-Anemia
3-exposure to Cigarette smoking
4-Low educational level
5-poor antenatal care
6-Bad psychological mode
7-Hypertension
8-Previous cesarian section
9-poverty and low income
10-Diabetes millets

[table 2]

Mothers medical, obstetric and socio-demographic characteristics	count
age	**100**
(15-19) year	11
(20-25) year	39
(26-30) year	30
(31-35) year	15
(36-40) year	5
height	**100**
(140-159) cm	36
(160- 179) cm	62
(180 - 199) cm	2
weight	**100**
(40 -49) kg	5
(50 - 59) kg	19
(60- 69) kg	22
(70 - 79) kg	32
above 80	22
education level	**100**
bachelor	18
diploma	16
primary	20
secondary	21
untaught	25
residence	**100**
rural	21
urban	79
occupation	**100**
Worker	27
housewife	67
student	6
Income [salary]	**100**
Bad [poor family]	13
middle	49
very good	38
Prenatal care	**100**
regular	57
intermittent	8
nil	35
Mode of delivery	**100**
normal vaginal delivery	53

cesarean section	47
Cigarette smoking contact	**46**
smoking family member	6
smoking father	38
smoking mother	2
Anemia management	**82**
blood transfusion	6
Ferro folic, folic acid	76
Diabetes millets	**12**
known case	7
during pregnancy	5
Diabetes millets management	**12**
insulin injection	7
Metformin	5
hypertension	**20**
known case	4
during pregnancy	16
UTI and genital tract infection	**88**
Known case	53
during pregnancy	35
Other medication	**47**
drugs to prevent miscarriages	47
family members count	**100**
(1-3)	13
(4-6)	42
(7-12)	40
Above 12	5
0ffspring	**100**
(1- 3)	82
(4- 6)	17
(7- 10)	1
Multiparity	**100**
single	97
twin	3
Stillbirth	**17**
1	10
2	4
3	2
4	1

[table 3]

Neonatal characteristics	count
gestational period	**100**
Below 37 weeks	52
(37-41) weeks	40
Above 41 weeks	8
sex	**100**
female	34
male	66
age	**100**
(1-7) DAY	43
(8- 14) DAY	42
(15-21) DAY	15
weight	**100**
Below 1.5kg	15
1.5- 2 kg	33
Below 2.5 kg	52
Presenting illness	**100**
jaundice	59
Respiratory problems	41
feeding type	**100**
bottle feeding	30
breast feeding	50
mixed	20
Mode of delivery	**100**
normal vaginal delivery	53
cesarean section	47

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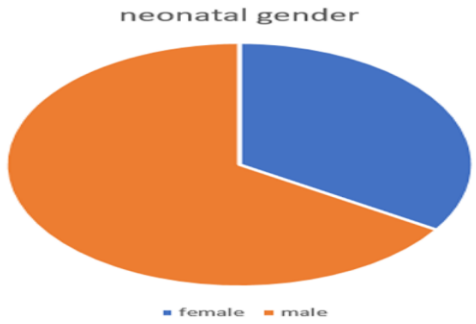

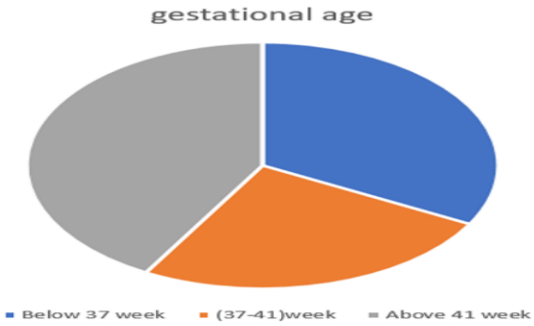

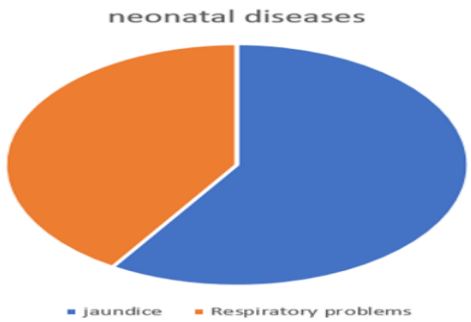

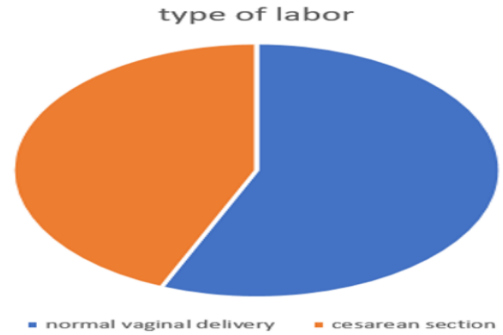

Discussion

Neonatal LBW still present a big problem in pediatric practice, large number of mortalities can be prevented by decreasing the predisposing factors.[12]

The LBW neonates comprised sixty- sex percent males and thirty -four percent of cases were females giving a Male: Female ratio of 1.9:1 while same study was done in Nigeria and the result was 1:1.3 [13], Also, same finding in another study in USA, [Boys were less likely to be LBW infants than girls [14]] So, male predominance in this study needs another research to prove it.

fifty-two percent [52%] of neonates with LBW that enrolled in this study were preterm (premature) and forty-eight [48%] were term small for date (IUGR) or [SGA] while in Nigeria study was 43% and 57% respectively.

The predominance of premature number may be due high percentage of caesarian section as, we found that that {47%} had been delivered by CS [table 2,3], also this point needs more studding.

A group of maternal medical obstetric and social factors as in table below have strong association with LBW GTI is 98%, Anemia is 82%, cigarette smoking is 46%, low educational level 45%, bad mental state during pregnancy 35%, poor perinatal care 35%, working pregnant 33%, hypertension 20%, previous surgical operation 18%, bad living state 13%, diabetes millets 12%, [table 1] poverty and low family income lead to malnourishments among pregnant besides anemia and that may causes the delivery of LBW neonates .

compering to same study [13] the most common risk factors were APH, HIV, Hypertension in pregnancy and primigravida.

While in Thailand, the maternal obstetrical risk factors for LBW included: vaginal bleeding during early pregnancy, maternal hypertension, convulsion during pregnancy, no prenatal care or less than 4 visits, maternal drug addiction, cigarette smoking, coffee or tea drinking during pregnancy, and repeated induced abortions [15]. And in India, LBW infants were significantly more likely to be born to mothers of very low socioeconomic status (unadjusted relative risk, aged less than 20, pregnant for the first time, whose last pregnancy interval was shorter than 6 months, whose nonpregnant weight was less than 40 kg, whose height was less than 145 cm, whose hemoglobin was less than 9 g/dl, who bled during the third trimester and who delivered the infant prematurely,[2]

To decrease these problems, more attention is required to strengthen the mother and child health care services in our community

Conclusion

High percentage of neonates with LBW [47%] had been delivered by cesarean section and high percent of them [48%] were IUGR.

A group of maternal medical, obstetric and social factors have strong association with LBW newborns include, genital tract infection, anemia, cigarette smoking exposure, worker pregnant, low education level, previous surgical operation, poor antenatal care, hypertension, DM and bad standard living.

Early identifying these risk factors and appropriate interventions may lead to reduce the incidence of neonatal LBW and as consequence this will result in the reduction of NMR in our locality.

Recommendation

Early identifying these risk factors and appropriate intervention like good management of UTI and genital tract infection, anemia, hypertension and DM among the young women, programing to educate all pregnant women about the hazard of exposure to cigarette smoking and the importance of getting antenatal care beside the solving of poverty problem may lead to reduce the incidence of neonatal LBW and as consequence this will result in the reduction of NMR in our city.

Also, we recommend to do a perfect study in Nasiriyah city to ensure if these numbers of cesarean sections are indicated or not!

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Abbreviation

CS	cesarean section
DM	diabetes mellites
IUGR	intrauterine growth retardation
LBW	low birth weight
LGA	large for gestational age
NICU	neonatal intensive care unit
NMR	neonatal mortality rate
SGA	small gestational age
UTI	urinary tract infection
GTI	genital tract infection
APH	antepartum hemorrhage

العلاقة بين عوامل الخطورة عند الحوامل والولادات منخفضة الوزن

دراسة استبيانيه أجريت في وحدة الخدج وحديثي الولادة في مستشفى الحبوبي التعليمي لمعرفة العوامل الاجتماعية والصحية والنفسية ومشاكل الحمل والولادة عند الحوامل والتي تسبب ضعف الوزن عند الأطفال حديثي الولادة في مدينة الناصرية وتبين من الدراسة ما يلي: -

أولا – تم دراسة مائة حالة راقدة في وحدة الخدج من الأطفال ذوي الوزن المنخفض أي بحدود 2500 غرام او دون ذلك وقد تم اختيار النماذج بشكل عشوائي في الفترة من 2021\01\01 ولغاية 2021\03\31 كما تم اخذ المعلومات المطلوبة من طبلات المرضى والاستفسار عن المعلومات الأخرى من الأمهات

ثانيا – تبين ان 66 %من الحالات هم من جنس الذكور و34 %اناث

ثالثا – ان 47% من هؤلاء قد تم توليدهم بواسطة العملية القيصرية وهذه كما نعتقد انها نسبة عالية وتحتاج الى دراسة ادق لمعرفة أسباب هذا العدد المرتفع من العمليات القيصرية وهل له ما يبرره

رابعا – وجدنا ان 52 %من الحالات هم من الخدج أي لم يتموا فترة 37 أسبوع في الارحام كما وجدنا ان 48 %منهم هم من النوع ضعف النمو داخل الرحم وهذه أيضا نسبة مرتفعة ومن المحتمل ان تكون بسبب العمليات القيصرية

خامسا : بعد الدراسة والتحليل تبين وجود مجموعة من العوامل الطبية والنفسية والاجتماعية عند الأمهات في مدينة الناصرية ربما لها علاقة وثيقة في التسبب بولادات صغيرة الوزن ومن هذه العوامل هي التهابات المجاري البولية والتناسلية عند الحوامل وفقر الدم والتعرض لدخان السكائر والاجهاد في العمل كما تبين ان نسبة عالية من الأمهات هن ذوات مستوي تعليمي متدني ولم يتلقين العناية الطبية اللازمة في مرحلة الحمل وقبل الولادة كما وجدنا ان ارتفاع ضغط الدم والسكري عند الأمهات لهما تأثير مباشر في حين ان الفقر والحالة النفسية المتدنية قد لعبا دورا واضحا في موضوع انجاب أطفال منخفضي الوزن

المقترحات:

أولا: -نقترح القيام بدراسة تفصيلية دقيقة عن العمليات القيصرية لبيان أسبابها ومبرراتها

ثانيا: -نوصي تثقيف الأمهات بمراجعة مراكز الرعاية الصحية الأولية عند الحمل

ثالثا: - تثقيف الأمهات على خطر التعرض الى دخان السكائر

رابعا: -إيجاد حلول لمشكلة الفقر المنتشر في هذه المدينة وغيرها من مدن العراق