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## The effect of maternal lifestyle factors on pregnancy complications and perinatal outcome

Sulu Susan Rajan

[vijiadi2006@yahoo.com](mailto:vijiadi2006@yahoo.com)

All India Institute of Medical  
Sciences, Rishikesh, Uttarakhand

Vijayalakshmi R

[vijiravikl@gmail.com](mailto:vijiravikl@gmail.com)

Adyar Cancer Institute, Chennai,  
Tamil Nadu

Dr. Kanchana S

[kanchana\\_khan@yahoo.co.in](mailto:kanchana_khan@yahoo.co.in)

Omayal Achi College of Nursing,  
Tiruvallur, Tamil Nadu

### ABSTRACT

*A meta-analysis was done to assess the effect of maternal lifestyle factors on pregnancy complication and perinatal outcome based on 14 primary studies. The statistical data was collected and condensed depending on the factors identified from the meta-synthesis. The data was analyzed using the forest plot method. The findings of the study revealed that maternal lifestyle factor like pre-pregnancy BMI >25kg/m<sup>2</sup> had a statistical and clinical significance with the RR>1. The other factors identified by meta-synthesis were poor dietary factors and lack of physical activity. The adverse outcome of pregnancy complications like GDM, PIH, Anemia was prolonged labor, premature delivery, maternal mortality, IUD, IUGR, low birth weight, low Apgar score<5 with RR>1 and narrow confidence limit. Other maternal and fetal outcomes identified from meta-synthesis are SGA, LGA, birth asphyxia, stillbirth, congenital anomalies, and increased rate of admission to ICU. Thus the study concluded that there was a significant association between maternal lifestyle factors on complications like GDM, PIH, and anemia and had a significant relation in causing the adverse perinatal outcome.*

**Keywords:** Maternal lifestyle factors, Pregnancy complications, Perinatal outcomes.

### 1. WHAT IS ALREADY KNOWN ON THIS SUBJECT?

Maternal mortality is unacceptably high, about 800 women die from pregnancy or childbirth related complications around the world every day. In 2013, 2,89,000 women died during and following pregnancy and childbirth. Almost all of these deaths occurred in low resource settings, and most could have been prevented. The maternal mortality ratio in the developed countries in 2013 is 230 per 1,00,000 live birth versus 16 per 1,00,000 live births in developed countries.(World Health Organization 2014). Indian scenario of maternal mortality rates is about 200 deaths per 1,00,000 live births in 2010 the state of Tamil Nadu in the South East India shows a maternal mortality rates of 63 deaths per 1,00,000 live births. Anemia is the most common nutritional deficiency disorder in the World.

### 2. WHAT DO THE RESULTS OF THIS STUDY ADD?

There are many independent research studies on individual complications but there is not much evidenced information on all high risk complications which is associated to risk factors. In western countries, nurses have under taken many meta-analytical study to relate life style factors to pregnancy outcome and fetal outcome hence as an initial effort in a small scale the investigator had undertaken the present meta-analytic study on effect of maternal life style factors on pregnancy complication and perinatal outcome.

Hence the investigator developed the research concepts in such a way that the prevention of the pregnancy complication can be done by the health care personnel in reducing the perinatal mortality and morbidity

### **3. WHAT ARE THE IMPLICATIONS OF THESE FINDINGS FOR CLINICAL PRACTICE AND/OR FURTHER RESEARCH?**

The most consistent finding in this review was the recognition of the major risk factor for the pregnancy complications like GDM, PIH and anemia and its maternal and fetal outcome. This study results showed the importance of prevention of occurrence of pregnancy complications and thereby reducing the perinatal mortality and morbidity. Thus the study findings can be utilized in formulating the policies and guidelines for high risk pregnancies towards the safe maternal and fetal outcome at institution, regional health care service system. A comparative study to assess the risk factors of pregnancy complication and its adverse pregnancy outcome can be done. A descriptive study can be done to assess the prevalence and risk factors of pregnancy complication.

### **4. INTRODUCTION**

Pregnancy is a unique, exciting and often joyous time in a woman's life, as it highlights the woman's amazing creative and nurturing powers while providing a bridge to the future.

Lifestyle can affect the health of the future baby, even prior to conception. Because developing baby will entirely depend on their mother's body for nourishment and protection, it is wise to alter a women's lifestyle prior to conception so that she can eliminate any bad habits or risk factors that might compromise her health during pregnancy.

Some women experience health problems during pregnancy. These complications can involve the mother's health, the fetus, or both. Even women who were healthy before getting pregnant can also experience complication. These complications can make the pregnancy a high risk pregnancy. Some common complications of pregnancy include high blood pressure, gestational diabetes, pre eclampsia and preterm labor (National Institute of Child health and Human Development, 2013).

Mutsaers, M.A. (2014) conducted a population based birth cohort study on effects of paternal and maternal life style factors on pregnancy complications and perinatal outcome in Dutch province of Drenthe. The study results shows that of all 2264 women 241 women developed hypertensive pregnancy complication 50 women developed GDM, 79 children were spontaneously delivered pre term and 155 children were small for gestational age. The study concluded that all the paternal and maternal life style factors were positively correlated and the multivariable analysis showed that paternal lifestyle did not have an independent influence on the investigated outcome.

### **5. STATEMENT OF THE PROBLEM**

A meta-analysis study to assess the effect of maternal life style factors on pregnancy complication and perinatal outcome.

### **6. OBJECTIVE**

- To assess the maternal life style factors complicating pregnancy.
- To correlate the maternal life style factors with pregnancy complication and perinatal outcome.

### **7. MATERIALS AND METHODS**

Maternal life style factor: Refers to the set of habits like dietary pattern, physical activity and increased BMI which can cause pregnancy complications.

Pregnancy complication: Refers to the problems that occurs due to some modifiable factors during child bearing period which includes gestational diabetes mellitus, pregnancy induced hypertension and anemia.

Perinatal outcome: Refers to the maternal and fetal consequences caused by the maternal habits and pregnancy complications during labor and one hour after delivery. The maternal consequences includes preterm delivery, prolonged labor and maternal mortality whereas fetal consequences includes small for gestational age, low Apgar score, intra uterine growth retardation, and intra uterine death.

The study was conducted based on the 14 primary studies taken from Google scholar, Pub-Med, Scope-Med, and various other published journals during January 2004 to December 2014 based on the selected criteria. The data was extracted and condensed with its statistical values along with the title of the study, year, nature of the sample and the size with the geographical area in a tabular form. Most often pooling of the Odds ratio or Relative risk ratio and 95% confidence limit is done. These results were summarized using the forest plot method.

#### **Inclusive criteria**

A very comprehensive search was been made on the research question. The studies that met all of the following criteria were included in the present meta-analysis.

- Study conducted and published during the period of January 2004 to December 2014
- Study conducted in any of the following design like randomized control trials, prospective, cohort studies and retrospective studies.

These specific study design was selected because of its purpose and statistical properties. Randomized control trial are often used to test the efficacy or effectiveness of various types of interventions and provide information about adverse effects. The prospective study watches for outcome such as development of diseases during the study period and relates this to the risk factors or other

protective factors. The cohort studies yields true incidence rates and relative risks from a large population. The relative risks are easy to derive and thus the relative risk value is quoted in the prospective studies.

- The study should have included the components of the main study.
- Studies which had full text.

#### Exclusive criteria

- Studies which had incomplete data regarding the components.
- Studies which don't have an odds ratio or relative risk value.

### 8. SEARCH STRATEGIES

#### Database searched

Online databases like Google scholar, Pub med, Scope med, i-search and various other online published journals were searched during the period of November 2014- December 2015 on effect of maternal life style factors on pregnancy complications and perinatal outcomes. Apart from database search efforts were made to search the studies from the university library and college library for unpublished thesis.

#### Keywords

The study title was fragmented into various smaller terms and phrases in order to have a comprehensive and extensive review and analysis. The key words used were risk factors of anemia in pregnancy, gestational diabetes mellitus and pregnancy induced hypertension, maternal and fetal outcome of anemia in pregnancy, gestational diabetes mellitus, pregnancy induced hypertension and life style risk factors of pregnancy complications.

#### Language

Studies which was published in English language was included in the study. The full text studies were selected initially by the researcher and it was verified by the research guide and the statistical information were confirmed by statistician.

### 9. ELIGIBLE PARTICIPANT POPULATION

Samples of all primary studies were taken as samples for the present metaanalysis. Antenatal mothers with anemia, GDM and PIH were taken as the samples in all the studies and were monitored during the time of delivery to assess the maternal and fetal outcome.

### 10. DATA EXTRACTION

The researcher had reviewed all the studies and categorized the studies as studies on risk factors of anemia in pregnancy, gestational diabetes mellitus and pregnancy induced hypertension and studies related to maternal and perinatal outcome of anemia, GDM, PIH. All the studies where assessed for its methodological quality (the extent to which the study has been designed and executed without any systematic error or bias), precision (usually shown as 95% confidence limit).Then the researcher extracted data and condensed the data with its statistical values along with the title of the study, year, nature of the sample and the size with the geographical area in a tabular form.

### 11. DATA SYNTHESIS

Pooling of data was done in this stage by using the statistical methods. Most often pooling of the Odds ratio or Relative risk ratio and 95% confidence limit was done. Summarized these results in the forest plots. Forest plot is the standard format used recently to present the meta analysis results. The point estimate of the Odds ratio (OR) or Relative risk (RR) of individual trials is represented as solid boxes and 95% confidence limit is represented as horizontal lines. The line drawn in the middle of the picture is known as the "line of no effect" and in case of OR and RR, it is associated with the risk ratio of 1.0.

### 12. FINDINGS

#### ANALYSIS OF MATERNAL LIFE STYLE FACTORS ON PREGNANCY COMPLICATION

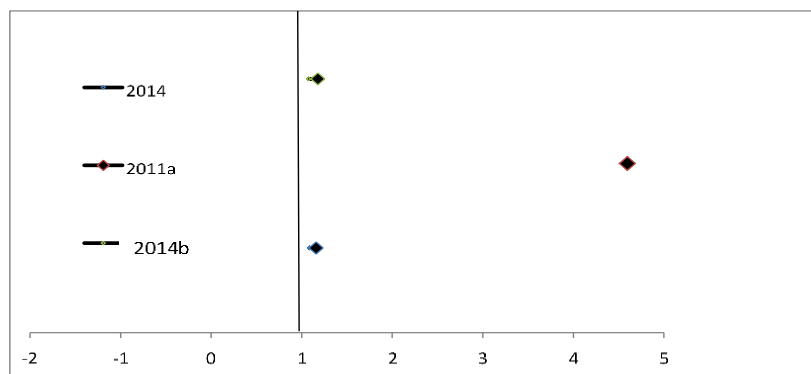


Fig. 1 Forest plot method showing the significance of BMI with maternal complication

**Risk ratio and 95% confidence limits of BMI**

SI no.	Risk factors	Year	Risk ratio	95% confidence limits	
				Lower limit	Upper limit
1.	BMI	2014	1.12	1.09	1.16
2.		2011	4.627	2.16	9.87
3.		2014b	1.13	1.08	1.18

**MATERNAL MORTALITY**

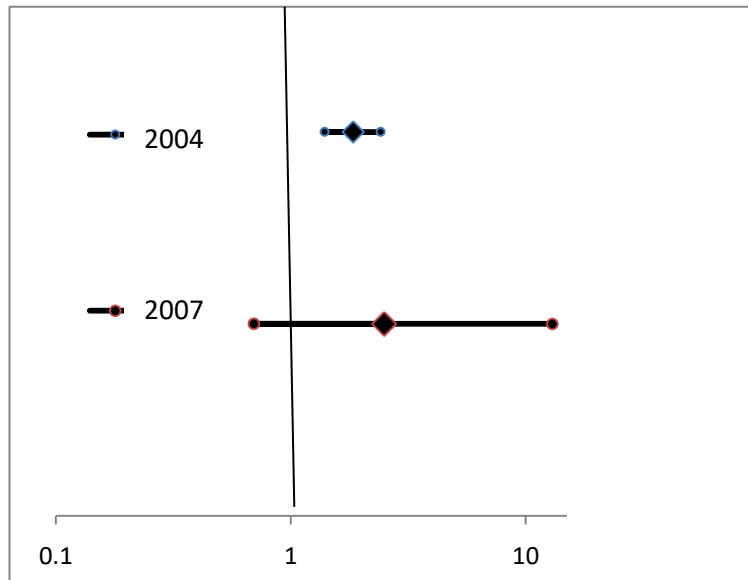


Fig 2 shows the significance of maternal mortality as a perinatal outcome

**Risk ratio and 95% confidence limit of maternal mortality**

Table 2 shows the risk ratio and 95% confidence limit of maternal mortality

Sl.no..	Maternal outcome	Year	Risk factors	95% confidence limit	
				Lower limit	Upper limit
1	Maternal mortality	2004	3.2	0.7	14.6
2		2007	3.5	1.8	10.8

**OTHER MATERNAL OUTCOMES**

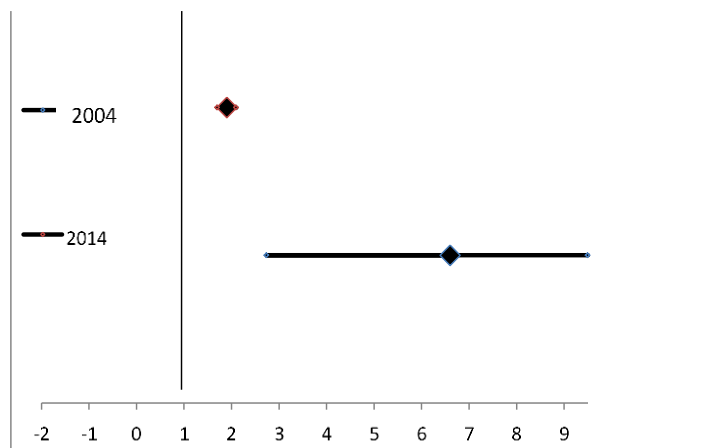


Fig 3 shows the point estimate of maternal outcomes

Risk ratio and 95% confidence limit of maternal outcome

Table 3 gives the risk ratio and the 95% confidence limit of adverse maternal outcome like prolonged labor and premature delivery

Sl. No.	Maternal outcome	Year	Risk ratio	95% confidence limit	
				Lower limit	Upper limit
1	Prolonged labor	2004	6.6	2.74	9.5
2	Premature delivery	2014	1.9	1.7	2.1

APGAR SCORE

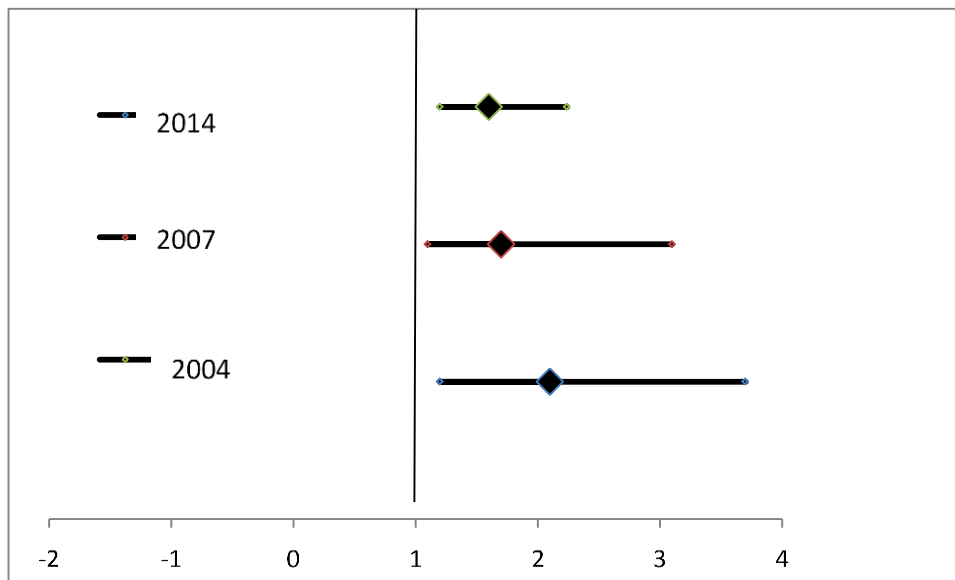


Fig 4 shows the significance of Apgar score as an adverse perinatal outcome

Odds ratio and 95% confidence limit of low Apgar score

Table 4 shows the odds ratio value and the 95% confidence limit value of low Apgar score

				Lower limit	Upper limit
1	Low Apgar score	2004	2.1	1.2	3.7
2		2007	1.7	1.1	3.1
3		2014	1.6	1.2	2.24

INTRA UTERINE GROWTH RESTRICTION (IUGR)

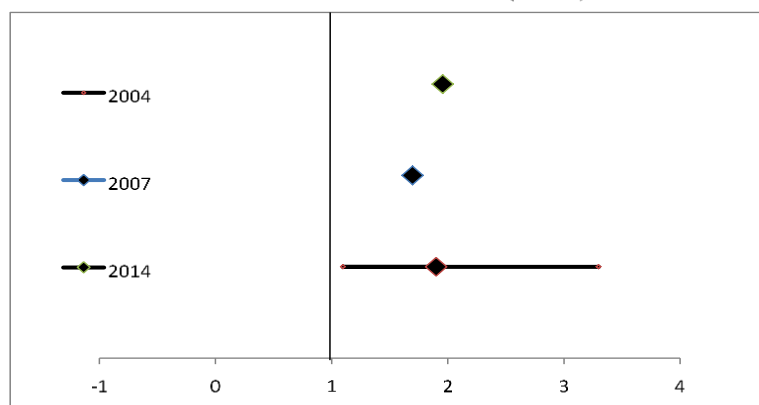


Fig.5 shows the forest plot graph of Significance of IUGR as an adverse outcome

Risk ratio and 95% confidence limit value of IUGR

Table 5 shows the risk ratio and the confidence limit of IUGR

Sl. No.	Perinatal outcome	Year	Risk ratio	95% confidence limits	
				Lower limit	Upper limit
1	IUGR	2004	1.9	1.1	3.3
2		2007	1.7		
3		2014	1.96		

LOW BIRTH WEIGHT (LBW)

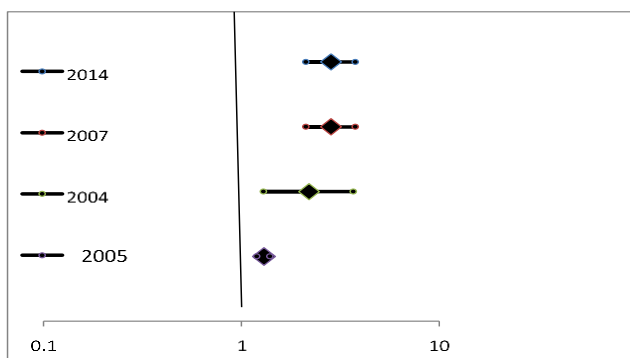


Fig.6 shows the significance of LBW as a perinatal outcome

Risk ratio and 95% confidence limit of low Apgar score

Sl. No.	Perinatal outcome	Year	Risk ratio	95% confidence limit	
				Lower limit	Upper limit
1	Low birth weight	2005	1.7	1.5	2.0
2		2004	2.2	1.3	3.7
3		2007	1.8		
4		2014	2.84	2.13	3.78

Table 6 shows the risk ratio and the 95% confidence limit of low birth weight Fig 4.4.3 infers that LBW is statistically and clinically significant with 95% confidence limit of 1.2- 1.4, 1.3 – 3.7, 2.13 – 3.78 and risk ratio of 1.3, 2.2, 1.8, 2.84. So LBW is a significant fetal outcome.

INTRA UTERINE DEATH

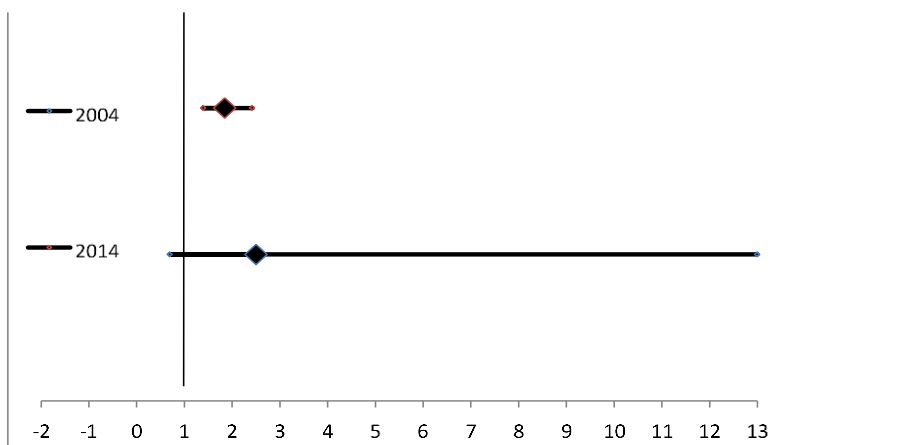


Fig 7 Shows the significance of intra uterine death as fetal outcome

**Risk ratio and 95% confidence limit of intra uterine growth retardation****Table 7 gives the risk ratio and 95% confidence value of IUD**

Sl. No.	Fetal outcome	Year	Risk ratio	95% confidence ratio	
				Lower limit	Upper limit
1	IUD	2004	2.5	0.7	13
2		2014	1.845	1.4	2.427

IUD is statistically significant in both the studies with an odds ratio of 2.5, 1.845 as an adverse fetal outcome in relation with pregnancy complication like GDM, PIH and anemia in pregnancy. In the study which was conducted in the year of 2014 shows the clinical significance with a 95% confidence limit of 1.4 – 2.427 whereas non-significance was elicited with a 95% confidence limit of 0.7 – 13 in another study.

Meta-synthesis results revealed the association between various life style factors for pregnancy complications. The lifestyle factors identified were pre pregnancy BMI>25kg/m<sup>2</sup>, pregnancy weight gain >7 kg (OR: 2.594), poor dietary pattern (caffeine and tea intake and vitamin D intake) and physical activity. The other risk factors for the pregnancy complications apart from life style factors were history of malaria, hematinic compliance, maternal age, parity.

The labor outcome was classified under maternal and fetal outcome. The major maternal outcome identified was preterm delivery, pre mature rupture of membrane, cesarean section, post-partum hemorrhage, and abortion, induction of labor, prolonged labor, instrumental delivery and perinatal mortality. The fetal outcome were small for gestational age, congenital anomalies, low birth weight, large for gestational age >4 kg, still birth, respiratory distress syndrome, preterm babies, intra uterine growth retardation, low Apgar score less than 5 at 1 min and birth asphyxia.

The meta-analysis study identified increased body mass index as a major maternal life style risk factors for pregnancy complications with a relative risk of 1.12, 4.627, 1.13. The maternal outcome identified from the analysis were maternal mortality (RR: 3.2, 3.5), prolonged labor (RR:6.6) and premature delivery (RR: 1.9) in which the maternal mortality was statistically significant but found to be clinically non-significant. The fetal outcome identified was low Apgar score, intra uterine growth retardation, low birth weight and intra uterine death.

### 13. DISCUSSION

There was a significant association between the maternal life style factors for the occurrence of pregnancy complication and had adverse effect on perinatal outcome.

The analysis showed that the body mass index is clinically and statistically significant as a factor for pregnancy complications with the Odds ratio >1.

Vellanki Venkata Sujatha et.al (2011) had conducted a prospective non-randomized descriptive study on high body mass index in pregnancy and its effect on maternal and fetal outcome among 200 samples in KIMS, Narketpally. 100 women with high BMI were compared with 100 women with normal BMI with regard to antenatal complications, maternal morbidity and neonatal outcome. The study results showed that increased BMI is significant factor in the occurrence of pregnancy complications.

The forest plot analysis revealed that the maternal outcomes like maternal mortality, prolonged labor, premature labor and fetal outcome like low birth weight, low Apgar score, IUD and IUGR are statistically and clinically correlated as adverse pregnancy outcome with 95% confidence limit and OR of more than 1.

Vijaya Kancherla et.al (2014) had conducted a retrospective population based cohort study on adverse perinatal outcomes associated with moderate or severe maternal anemia based on parity in Finland. The study results revealed that the prevalence of anemia during pregnancy was 2.5% among nulliparous women and 2.3% among multiparas women. Among multiparous women anemia was associated with preterm delivery, small for gestational age, admission to NICU was found to be statistically and clinically significant.

Anand .V.C., Olga Basso, (2010) conducted a study on impact of pregnancy on stillbirth and neonatal mortality in first and higher order births. The study results revealed that PIH was associated with an increased risk of still birth and neonatal death. The study concluded that a substantial burden of still birth and neonatal mortality is associated with PIH especially among multiparas women.

Radhia Khan et.al (2013) on maternal and fetal outcome of gestational diabetes mellitus among 227 pregnant women at Institute of chemical science, Pakistan. The study results revealed that Women with gestational diabetes were more prone to pregnancy induced hypertension (22.3%), pre-eclampsia (16.5%), premature rupture of membranes (19.4%), preterm labor (25.2%) and cesarean delivery (23.3%) as compared to controls whereas in case of neonatal complications there was increased risk of macrosomia (28.2%), shoulder dystocia or birth trauma (27.2%, p<0.001) and jaundice (29.1%).

### 14. CONCLUSION

The results of the present study shows that body mass index as a maternal life style factor for pregnancy complication and these factors had a significant relationship with the pregnancy complication and perinatal outcome.

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