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To study the status of vitamin b12 deficiency in pregnancy and its impact on the maternal and fetal outcome

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Abstract
The study includes 100 ANC patients between 28 to 40 weeks of gestational period, who have attended the ANC OPD and IPD in .Sri Aurobindo Medical College & Post Graduated Institute Indore (M.P.) Data collected prospectively from November 2017 to May 2019. The objective of this study was to evaluate the status of vitamin B-12 deficiency in pregnancy and its impact on the maternal and foetal outcome. Our review, after summarizing existing data of this study, shows a causal relation between low Vitamin B12 level and adverse maternal & neonatal outcome birth. In pregnant women deficiency may cause or be associated with, IUGR, preeclampsia, preterm labour, low birth weight increased rate of LSCSr & Low levels of serum B12 have been documented among pregnant women in India who habitually are vegetarian or mix non vegetarians, taking small proportion of non-vegetarian food.

Keywords: Vitamin B12, IUGR, preeclampsia, preterm labour, low birth weight

Introduction
Vitamin b12 is required for formation of the RBC as well as functioning of nervous system. If left untreated the insufficiency can lead to anaemia, as well as nerve damage which may become irreversible. So women who do not get sufficient level of vitamin B12 may have an increased risk of giving birth to a newborn with potentially disabled or fatal birth defect. Vitamin B12 deficiency is characterized by fatigue, weakness, loss of appetite, lethargy, neurological changes like numbness, tingling in hand can occur. By above symptoms we can detect vitamin B12 deficiency anaemia early and can prevent complications and fatal outcome [2]. Vitamin B12 deficiency is emerging as a public health problem. The Megaloblastic anaemia is caused by deficiency of folic acid or vitamin B12 .Vitamin B12 deficiency during pregnancy is associated with preeclampsia, foetal growth restriction, preterm labour, abruptio placenta neural tube defects, neonatal megaloblastic anaemia and neonatal neurological symptoms [3]. In the developed world megaloblastic anaemia occurs in only 3-4 % of the women with anaemia during pregnancy while 25% in developing world. Despite improvement in socioeconomic status and general well being of the population, megaloblastic anaemia continue to be one of the major health problem in developing country. Improper dietary habit, multiparty, high incidence of enteric worm infestation, haemolytic disorder coupled with poor intake of nutrient resulting from over cooking of food are considered to be important causative factor [4] Vitamin B12 or "cobalamin" is a water soluble vitamin that is present in foods of animal origin such as meat, dairy products, fish and eggs. In supplements and fortified foods the synthetic form of vitamin B12, known as cyanocobalamin is used. Cobalamin plays a main role in DNA-synthesis. Cobalamin is included as a coenzyme in two enzymatic reactions in the first main enzymatic reaction, methionine synthetase enzyme produces methionine from homocysteine in the cytosol. In the second enzymatic reaction adenosylcobalamin is act as a coenzyme in the formation of methylmalonylcoenzym-A (methylmalonyl-CoA) to succinyl-CoA in the mitochondrion. A vitamin B12 deficiency results in increase concentrations of methylmalonic acid homocystein acid in serum [9].
Cobalamin is included as a coenzyme in two enzymatic reactions In the first main enzymatic reaction, methionine synthetase enzyme produces methionine from homocysteine in the cytosol. In the second enzymatic reaction adenosylcobalamin is act as a coenzyme in the formation of methylmalonylcoenzym-A (methylmalonyl-CoA) to succinyl-CoA in the mitochondrion.

A vitamin B12 deficiency results in increase concentrations of methylmalonic acid homocystein acid in serum [9]. Role of Vitamin B12 In Pregnancy ● It is required for brain, neural tube formation, and spine development. Vitamin B12 together with Folate (B9), attempts to produce DNA synthesis in cells. ● It is required in development and working of brain, nerves and blood cells ● It additionaly improve state of mind and stress levels by supporting the metabolization of fats, sugars, and proteins. It maintain the normal central nervous system and neurological functions by regulating the synthesis of myelin and fatty acids. For reproductive age group women B12 insufficiencies are uncommon, but if it happen it increases the risk of your baby developing an NTD (Neural Tube Defect). This is like issues that may result from low B9 (folate) serious birth defects can include: ● Anencephaly – the spinal cord and brain do not form properly ● Encephalocele – parts of the brain begins to push out ● Spina bifida – spine does not form correctly If any of these birth defects run in the family a triple screen test will be essential. Neural damage can occur in severe deficiency conditions. In a randomized trial of vitamin B-12 supplementation in Bangalore, India, 51% of pregnant women were vitamin B-12 deficient (vitamin B-12: 0.26 μmol/L) at their first prenatal visit (11) Pregnancy is a continuum of different stages, from the preconceptional to the postpartum period. During each phase several malformations and disorders can occur. The periconceptional period which contains the following stages Preconception Conception, implantation, placentation and organogenesis, is critical for the development of the fetus. Preconceptional nutrition alter the health of women and their fertility. The onset and early stages of pregnancy and the maternal health and fetus development during pregnancy can also be influenced [12].

Materials and Method

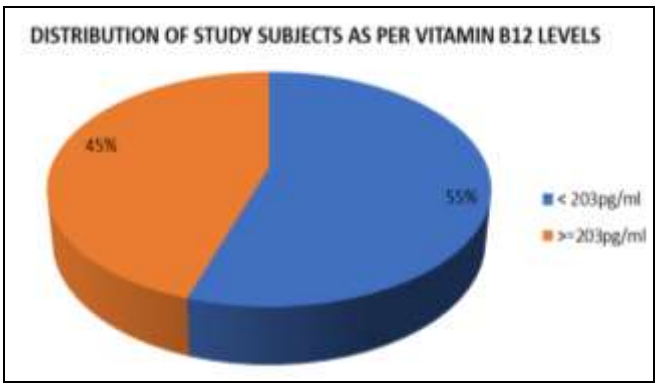
The design of present research study is "Observational study". The study is conducted in the Department of obstetrics &gynaecology, Sri Aurobindo Medical College and Post Graduate Institute, Indore. The study includes 100 ANC patients between 28 to 40 weeks of gestational period, who have attended the ANC OPD and IPD in. Sri Aurobindo Medical College & Post Graduated Institute Indore (M.P.) The duration of present study was one and half year; November 2018 to May 2019. However, Data collected prospectively from november 2017 to May 2019. INCLUSION CRITERIA: 1 All ANC Patients between age 20 to 35 yrs 2. All pregnant patient attending ANC OPD/IPD in last trimester of pregnancy without any antenatal co morbidities Exclusion criteria 1. Patient not willing to participate. 2. AGE 35 years 3. Multiple Pregnancy 4. patient on preconceptional supplementation of vitamin B12. Detailed history was taken. 100 ANC cases will be included in this study. Detailed history will be taken. Details of past medical and surgical treatment taken Clinical examination will be done. Management of the patient will be done according to the investigation findings Mode of delivery will be will be planned according to obstrestric indication all patients will be followed till discharge from hospital. Investigation Detail All patients will be subjected to detailed history and thorough clinical examination and following investigations will be done CBC, Blood group, Serology (HIV, HBSAG, VDRL), TSH,RBS, Obstetrics USG in last trimester Ps for anaemia typing in all cases. Special investigation- serum Vitamin B12 level Data collection and methods special designed pre structured proforma will be used for collecting the data Statistical Analysis Plan Sample size of the study will be 100. Descriptive statistics will be used to show the features and characteristics of the collected data. Chi- square test will be applied on the categorical data to point out the association between the two variables. ● Student 't' test will be applied on quantitative data. If data found to be normal $p< 0.05$ will be considered statistically significant.

Observation and Result

Table 1: Distribution of Study Subjects as Per Vitamin B12 Levels

Vitamin B12 Levels	Number N=100	Percent %
< 203pg/ml	55	55%
>=203	45	45%
Total	100	100%

Table 1 and graph 1 shows that, 100 patients participated in the study out which 55% patients were found deficient in vitamin B12 and 45 % patients had normal serum vitamin B12 levels



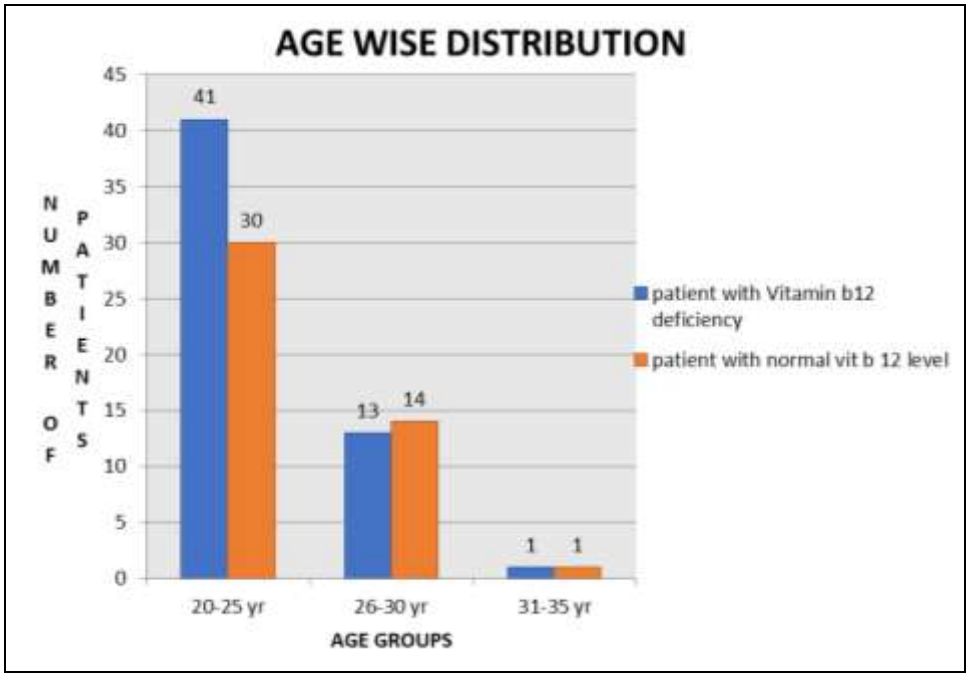
Graph 1: Distribution of study subject as per Vitamin B12 levels

Table 2: Age Group Wise Distribution of Patients

Age Groups(Year)	Patient Withvitamin B12 Deficiency N =55		Patient With Normal Vitamin B12 Level N=45		Total N=100	
	Number	Percentage	Number	Percentage	Number	Percentage
20-25 YRS	41	74.54%	30	66.66%	71	71%
26-30 YRS	13	23.63%	14	31.11%	27	27%
31-35YRS	01	1.81%	01	2.22%	02	2%
TOTAL	55	100%	45	100%	100	100%

Chi square=0.0026, P value=0.959

Table 2 and graph 2 shows that, Maximum number of patients (74.54%) belonged to age group of 20-25 years, 23.63% of cases were in the age group 26- 30years and 1.8 % of cases were in the age group of 31-35 years and they were found to have vitamin B12 deficiency. However the difference was not found to be not significant.



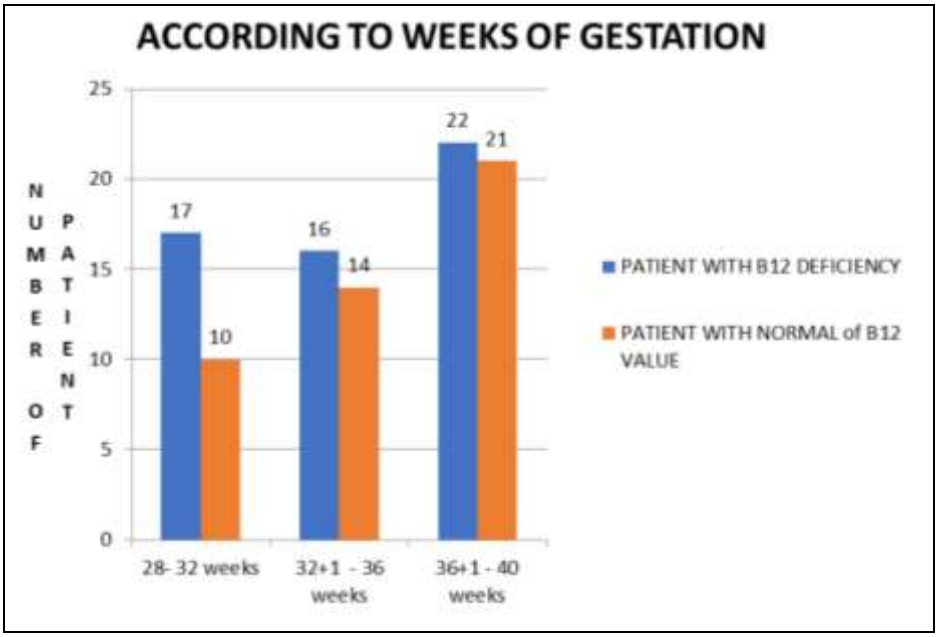
Graph 2: Age wise distribution of patients in our study

Table 3: Distribution of Study Subjects According To Weeks of Gestation

Weeks Of Gestation	Patient Withvitamin B12 Deficiency N =55		Patient With Normal Vitamin B12 Level N=45		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
28 - 32 weeks	17	30.91%	10	22.22%	27(27%)	27%
32+1 - 36weeks	16	29.09%	14	31.11%	30(30%)	30%
36+1 - 40 weeks	22	40%	21	46.66%	43(43%)	43%
TOTAL	55	100%	45	100%	100	100%

Chi square=0.98, P value =0.612

Table 3 and graph 3 shows 30.91 % patients were between gestational age 28-32 weeks. 29.09 % patients were between gestational age 32+1 - 36 weeks, and 40% patient were between 36+1 -40 weeks in Vitamin B12 deficient patients and the difference was not found to be significant.



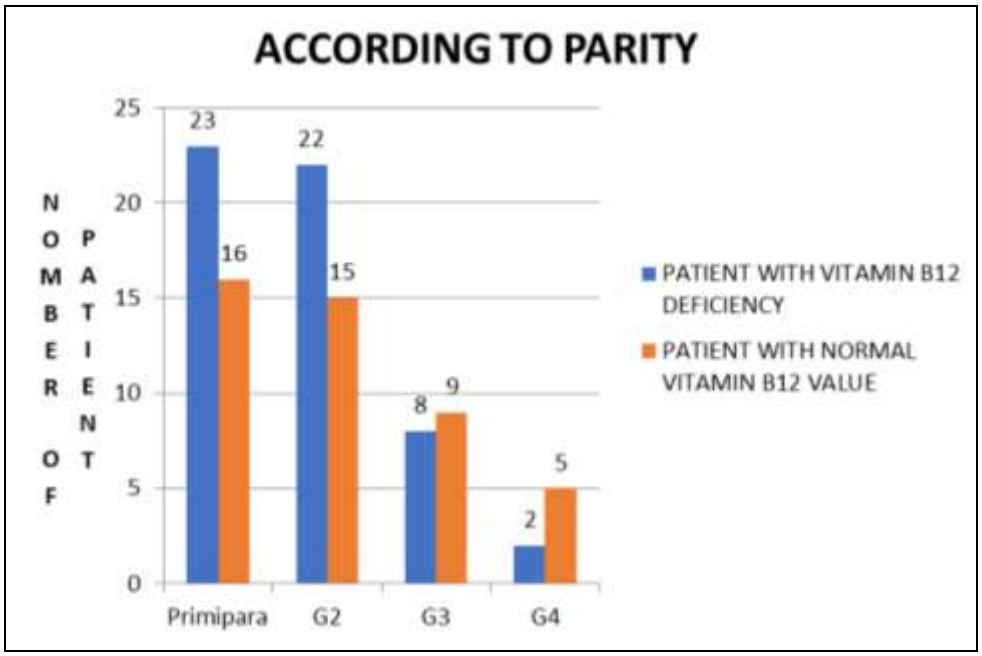
Graph 3: Distribution of patients according to weeks of gestation in our study

Table 4: Distribution of Study Subjects According To Parity

Parity	Patient With vitamin B12 Deficiency N =55		Patient With Normal Vitamin B12 Level N=45		Total N = 100
	Number	Percentage	Number	Percentage	Number
Primipara	23	41.81%	16	33.55%	39
G2	22	40.3%	15	33.33%	37
G3	08	14.54%	09	20%	17
G4	02	3.63%	05	11.11%	07

Chi Square Value = 0.1.81, P Value = 0.39

Table 4 and graph 4 shows that in Vitamin deficient group 41.81% primipara, 40.3% were second gravida, 14.54% were third gravida and 3.63% were forth gravid and difference was found to be not significant.



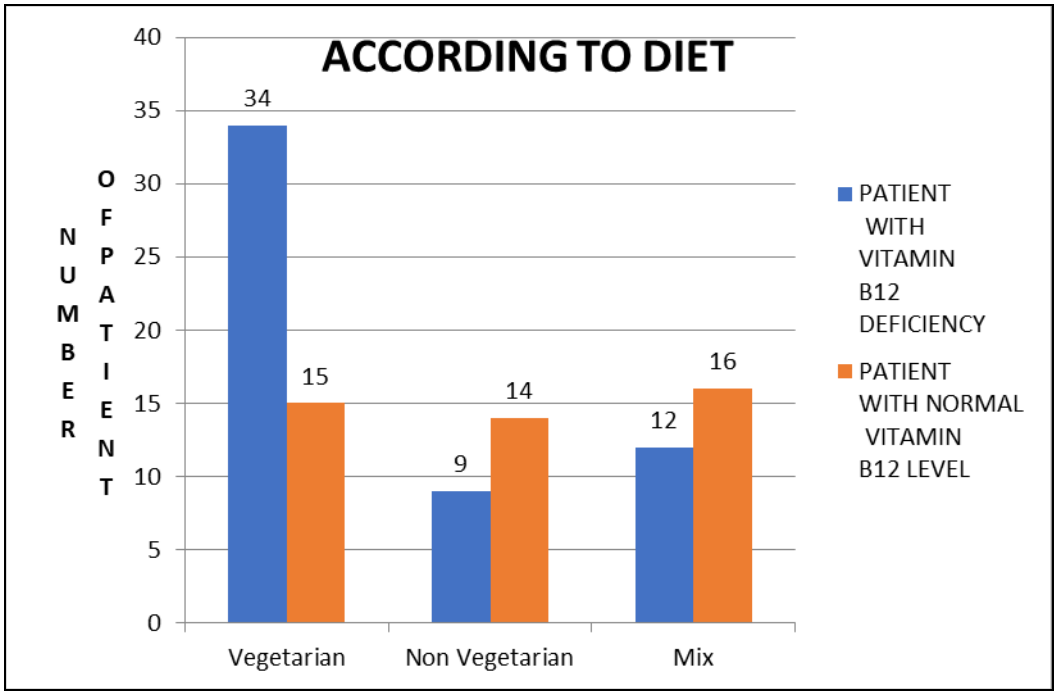
Graph 4: Distribution of patients according to parity in our study

Table 5: Associations with Food Habits

Food Habits	Patient With vitamin B12 Deficiency N =55		Patient With Normal Vitamin B12 Level N=45		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Vegetarian	34	61.81 %	15	27.27%	49	49 %
Non-Vegetarian	09	16.36 %	14	25.45%	23	23 %
Mix	12	21.81 %	16	29.09%	28	28 %
Total	55	100%	45	100%	100	100 %

Chi Square = 8.106,P Value = 0.0174

Table 5 and graph 5 shows that in vitamin B12 deficient patients majority (61.81%) of them were vegetarian. In above table significant association was found between vitamin B12 deficiency and diet of the patient.



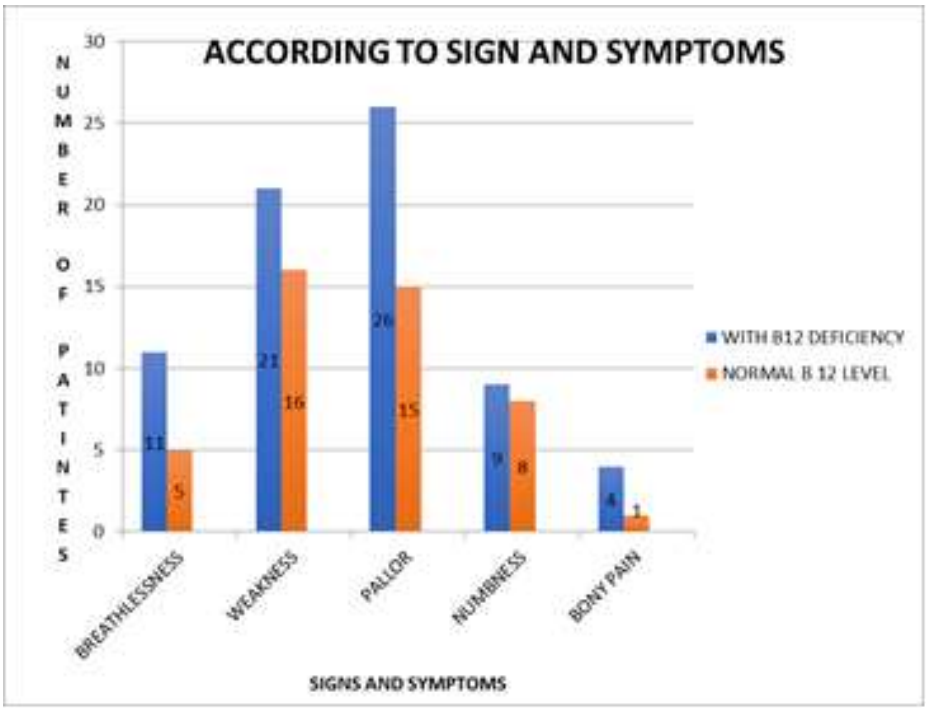
Graph 5: Distribution of patients according to diet in our study

Table 6: Symptoms and Signs in Patients

Symptom	Patient With vitamin B12 Deficiency N =55		Patient With Normal Vitamin B12 Level N=45		Total N=100	
	Number	Percentage	Number	Percentage	Number	Percentage
Breathlessness	11	20%	05	9.09%	16	16%
Weakness	21	38.18%	16	29.09%	37	37%
Pallor	26	47.27%	15	27.27%	41	41%
Numbness	09	16.36%	08	14.54%	17	17%
Bonypain	04	7.27%	01	1.81%	05	5%

Chi square = 2.00, P=0.73 Not significant

Table 6 and graph 6shows that total 47.27% patients had pallor, 38.18% had weakness, 16.36% had numbness, 20% had breathlessness and 7.27 % had Bony pain in vitamin B12 deficient patients however the difference was not found to be significant.



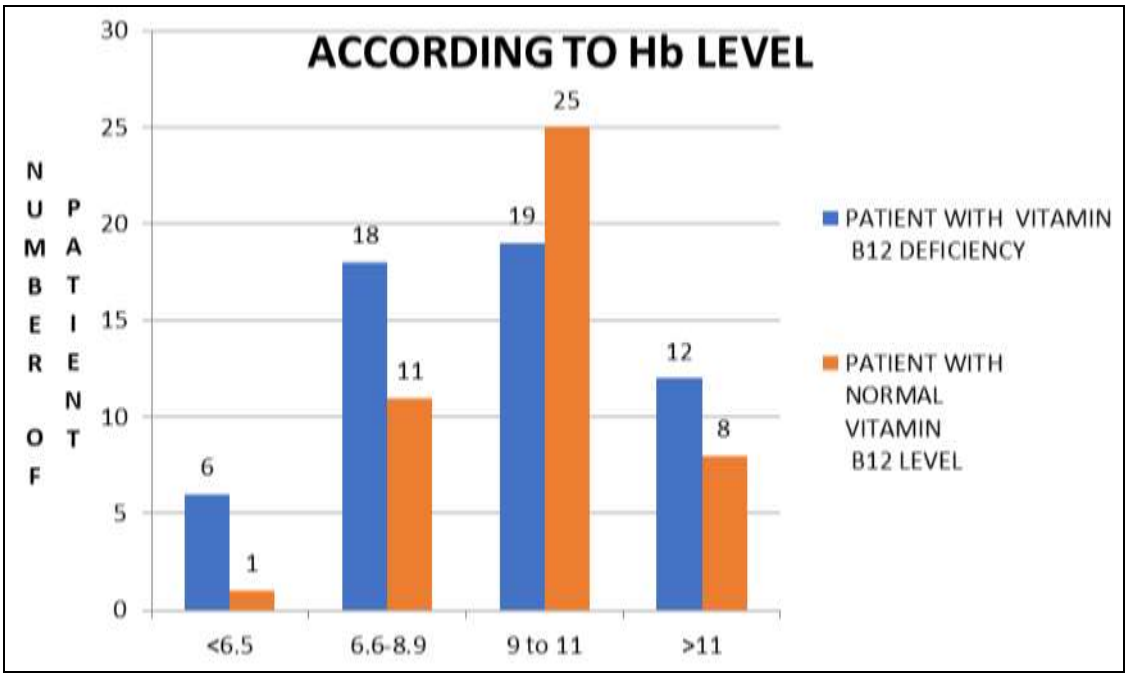
Graph 6: Distribution of patients according to Sign and symptoms in our study

Table 7: Relations with Haemoglobin Level

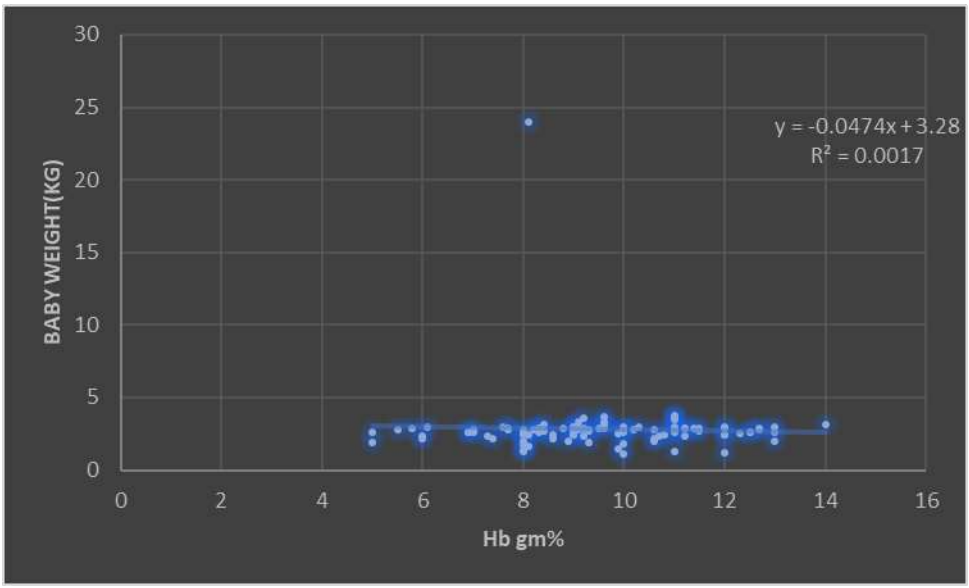
Hb Level Mg/Dl	Patient With vitamin B12 Deficiency N =55		Patient With Normal Vitamin B12 Level N=45		Total N=100	
	Number	Percentage	Number	Percentage	Number	Percentage
<6.5	06	10%	01	2.22 %	07	7%
6.6-8.9	18	32.72 %	11	24.44 %	29	29%
9 – 11	19	34.54 %	25	55.55%	44	44%
>11	12	21.81 %	08	17.77 %	20	20%

Chi square=5.93, p value =0.11

Table 7 and graph 7 showed that in vitamin B12 deficient patient 21.81% cases with Hb level more 11 mg/dl. 34-54% case have Hb between 9 to 11 mg /dl, 32.72 % have Hb between 6.6-8.9 mg/dl and 10% patient have Hb <6.5mg/dl however the relation of b12 with level the not significant.



Graph 7: Distribution of patients according to Hb levels in our study



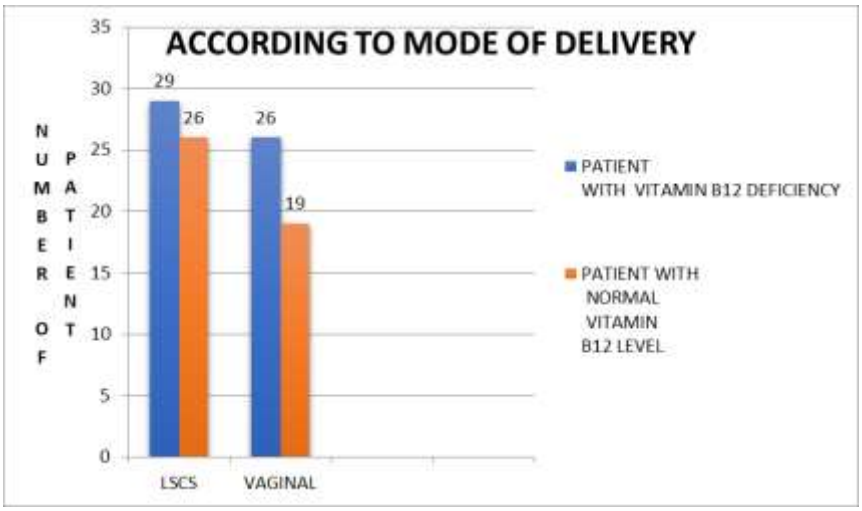
Graph 8: Negative Correlation Seen In Between Hb Levels & Birth Weight Levels Which Was Non-Significant Correlation (*P*>0.01)

Table 8: Association with Mode of Delivery

Mode Of Delivery	Patient With vitamin B12 Deficiency N =55		Patient With Normal Vitamin B12 Level N=45		Total N=100	
	Number	Percentage	Number	Percentage	Number	Percentage
Lscs	29	52.27%	26	57.77%	55	55%
Vaginal	26	47.72%	19	42.22%	45	45%
Total	55	100%	45	100%	100	100%

Chi Square 0.255, p-value is.613

Table 8 and graph 9 show that 52.27% patient underwent in LSCS and 47.72 % underwent in vaginal delivery in Vitamin B12 deficient patients and this was not found to be significant



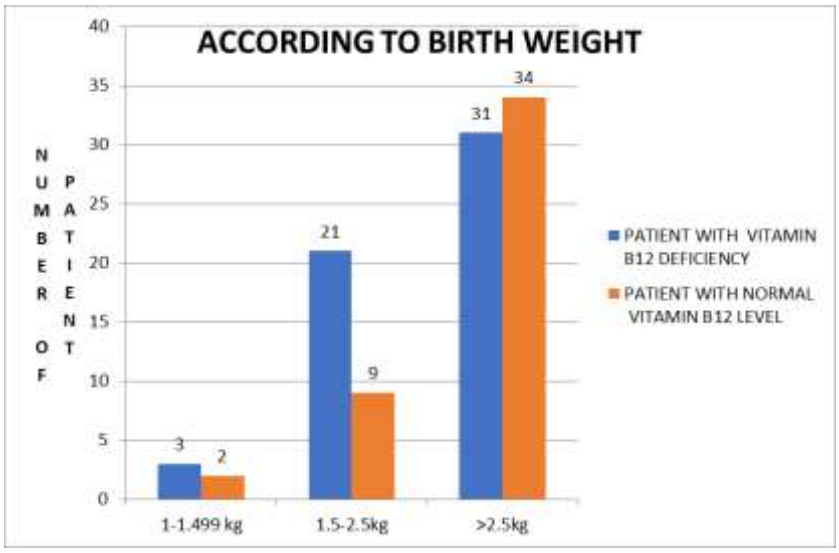
Graph 9: Distribution of patients according vitamin B12 levels and mode of delivery in our study

Table 9: Correlation with Baby Birth Weight

Birth Weight	Patient With vitamin B12 Deficiency N =55		Patient With Normal Vitamin B12 Level N=45		Total	
	Number	Percentage	No	Percentage	Number	Percentage
1-1.499 Kg	03	5.54%	02	4.44%	05	5%
1.5-2.5kg	21	38.18%	09	20%	30	30%
>2.5kg	31	56.36%	34	75.55%	65	65%
Total	55	55%	45	45%	100	100%
Mean ± S.D	2.48 ± 0.536					

Chi-square value = 20.389 p value =0 .0003

Table 9 and graph10 represent 56.36% babies were having birth weight more than >2.5kg and 43.72 % having birth weight less than 2.5kg in the vitamin B12 deficiency which was lower than 75.55 % more than 2.5 kg weight in the normal vitamin B12 group and difference was found to be significant.



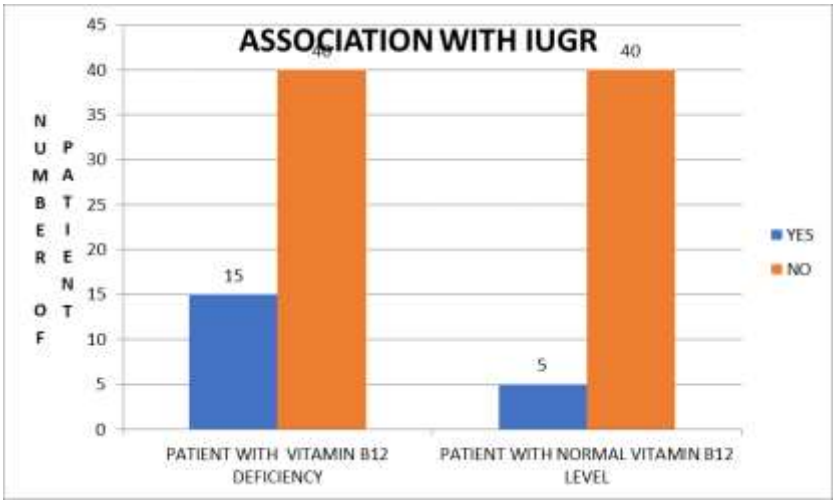
Graph 10: Distribution of patients according to vitamin B12 levels and the birth of baby in our study

Table 10: Association with Iugr

Category	IUGR				Total	
	Yes		No			
	Number	Percentage	Number	Percentage	Number	Percentage
Patient Withvitamin B12 Deficiency N =55	15	27.27%	40	72.72%	55	55%
Patient With Normal Vitamin B12 Level N=45	05	2.2%	40	88.88%	45	45%
Total	20	20%	80	80%	100	100%

Chi square test = 4.040, p = 0.0444

Table 10 and graph 11 shows that in Vitamin B12 deficient patients 27.27% were having IUGR. There was significant association between vitamin B12 deficiency in pregnancy and IUGR.



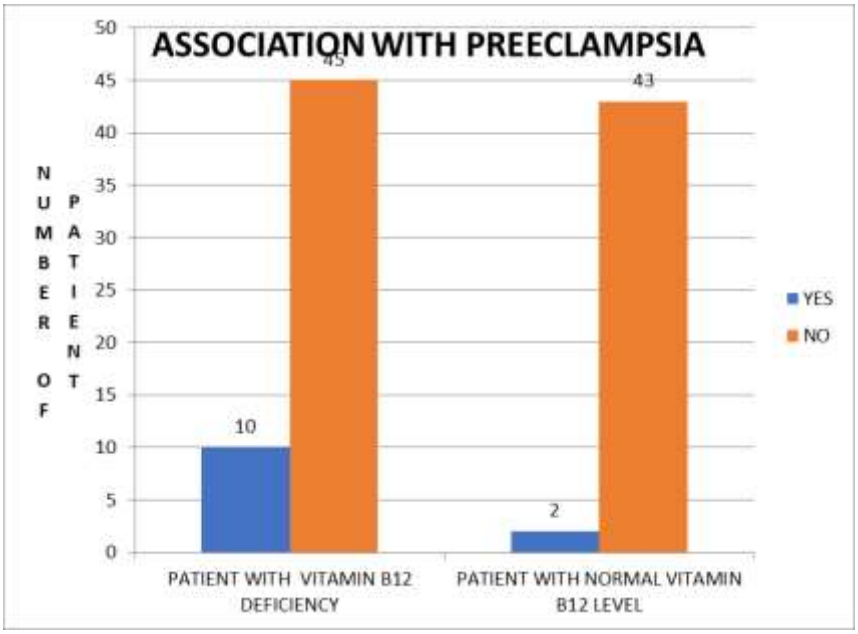
Graph 11: Distribution of patient vitamin B12 level and IUGR in our study

Table 11: Association with pre-Eclamspsia Parameter-Preeclampsia

Category	Preeclampsia				Total	
	Yes		No			
	Number	Percentage	Number	Percentage	Number	Percentage
Patient Withvitamin B12 Deficiency N =55	10	18.18%	45	81.81%	55	100%
Patient With Normal Vitamin B12 Level N=45	02	4.4%	43	95.55%	45	100%
Total	12	12%	88	88%	100	100%

Chi square test -3.217P value -0.03517

Table 11 and graph 12 shows that in vitamin b12 deficiency 18.18 % patient had preeclampsia where as only 4.4 % of patients in normal vitamin b12 had preeclampsia and difference was found to be significant



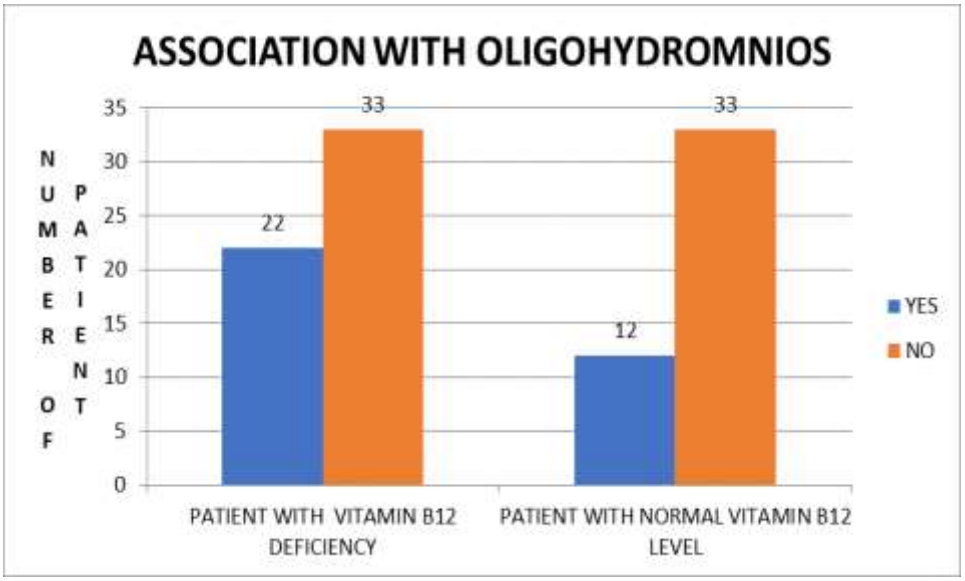
Graph 12: Distribution of patients according vitamin B12 levels and occurrence of preeclampsia in our study

Table 12: Association with Oligohydramnios Parameter Oligohydroamnios

Category	Oligohydroamnios				Total	
	Yes		No			
	Number	Percentage	Number	Percentage	Number	Percentage
Patient Withvitamin B12 Deficiency N =55	22	40%	33	60%	55	55%
Patient With Normal Vitamin B12 Level N=45	12	26.66%	33	73.33%	45	45%
Total	34	34%	66	66%	100	100%

Chi square test =1.96, P value = 0.161

Table 12 and graph 13 shows that in vitamin b12 deficient 40% patient are oligohydromnios as compared to 26.66% in normal B12 group and difference was not found to be significant.



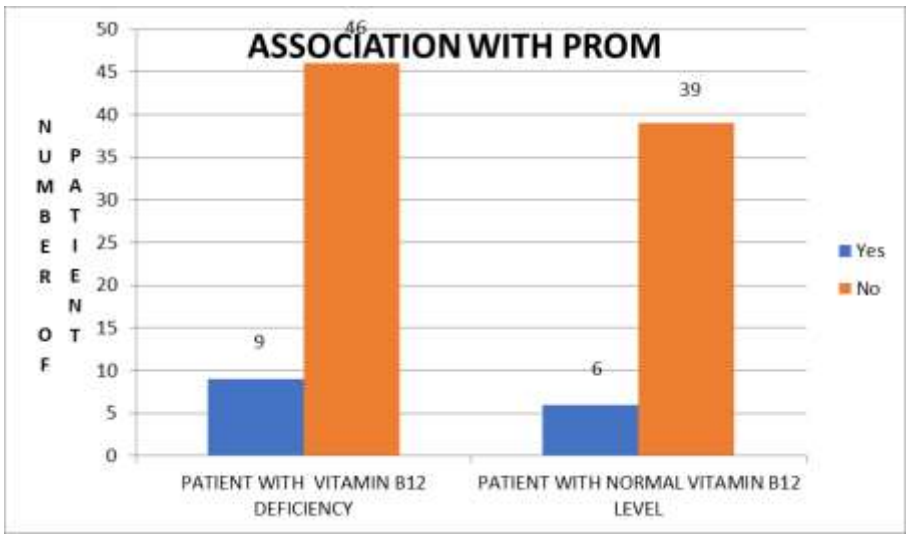
Graph 13: Distribution of patients according vitamin B12 levels and occurrence of oligohydromnios in our study

Table 13: Association with Prom Parameterprom

Category	PROM				Total	
	Yes		No			
	Number	Percentage	Number	Percentage	Number	Percentage
Patient Withvitamin B12 Deficiency N =55	09	16.36%	46	83.63%	55	100%
Patient With Normal Vitamin B12 Level N=45	06	13.33%	39	86.66%	45	100%
Total	15	15%	85	85%	100	100%

Cui square test = 0.178, Pvalue = 0.672

Table 13 and graph 14shows in Vitamin B12 deficient 16.36 % have PROM where as 13.33% in normal vitamin B12 group had PROM and difference was found to be not significant.



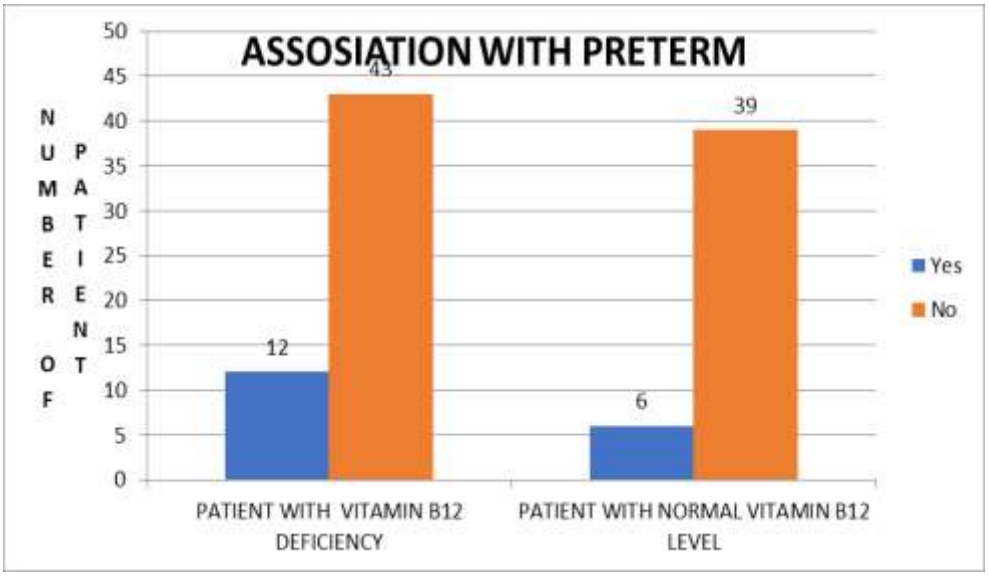
Graph 14: Distribution of patients according vitamin B12 levels and association with PROM in our study

Table 14: Association with Pre-Term Parameter Preterm

Category	Preterm				Total	
	Yes		No			
	Number	Percentage	Number	Percentage	Number	Percentage
Patient Withvitamin B12 Deficiency N =55	12	12.81%	43	78.18%	55	55%
Patient With Normal Vitamin B12 Level N=45	06	13.34%	39	86.66%	45	45%
Total	18	18%	82	82%	100	100%

Chi square test = 1.20, P value =.271

Table 14 and graph 15 showed that in vitamin b12 deficiency 12.8% had preterm birth where has 1.34% in normal vitamin B12 group had preterm birth and difference was found to be not significant.



Graph 15: Distribution of patients according vitamin B12 levels and association with preeclampsia in our study

Discussion

The present study entitled "To Study the status of vitamin B-12 deficiency in pregnancy and its impact on the maternal and foetal outcome" has been carried outin the department of obstetrics and gynaecology, Sri Aurobindo Institute Of Medical science medical college Indore, during the period of 1st October2017 to 31st May 2019. The study includes 100 ANC patients between 28 to 40 weeks of gestational period, who have attended the ANC OPD and IPD of Sri Aurobindo Institute of Medical science medical college Indore.

Most studies of anaemia during pregnancy describe large population and deal with nutritional anaemia. Anaemia affects more than 2 billion people globally accounting for over 30% of world's population, making it the most common public health problem especially in low income countries. Anaemia is the most common medical disorder during pregnancy with varied prevalence, aetiology and degree of severity in different population. Iron deficiency anaemia is the commonest nutritional deficiency in pregnancy followed by folate deficiency anaemia. Deficiency of vitamin B12 which was thought to be less common in the past is being recognized more often now.

In the present study, 55% ofpatients were found to be vitamin B12 deficient. Dave A *et al.* [30] and Yajnik CS *et al.* [21] reported 41.8% and 66% of patients to be vitamin B12 deficient in their studies respectively. Similar study done by Nithya *et al.* [50] showed the pooled estimates of vitamin B-12 insufficiency to be 29% in thethird trimester. A similar study done by Garima *et al.* [51] showed a high prevalence (67%) of vitamin B12 deficiency in anaemic pregnant females.A study done by Pathak *et al.* [52] showed that 74.1% of the pregnant women had poor vitamin B12 stores.

In present study, 77.54% cases belong to20-25yr of age group. The mean age in study group was23.4 years. Similar study done by Garima *et al.* [51] showed that (48.6%) belonged to the age group 20-25 years. Mean age of the samples was 26.33 years. Similar study done by Muthayya [37] *et al.* in 2006 showed that the mean age of the study participants was 24.67 years.

The present study showed that 40% patients from 36+1week - 40 week of gestation, who were vitamin B12 deficient. 29.09 % patient from 32+1week - 36 weeks of gestation. Somean gestational age for vitamin B12 deficient patientsis 34+6week.

In present study 41.81% were primigravida patients suffering from B12 deficiency. Similar study done by Dave *et al.* [30] and Garima *et al.* [51] showed 69.5% and 64.8 % patients were primigravida, respectively.

Vitamin B12 is found naturally in a wide variety of animal-based diet and is added to some fortified foods. Vegetarian/vegan dietary habits have no vitamin B12 unless they are fortified. The present study shows61.81%patients who are vegetarian and were Vitamin B12 deficient. Similar study done by Garima *et al.* [51] regarding dietary pattern showed that around 74% of patients were vegetarian and 26% were non-vegetarian, although no statistically significant association was found between vitamin B12 level and type of diet in their study.

Similar study done by Pawlak *et al.* [53] showed that 62%vegetarian patients were Vitamin B12 deficient. Similar study done by Dave *et al.*, [30] in which 52.17%Vegetarians showed vitamin B12 deficiency. It clearly shows that vegetarian population have an increase drisk of developing vitamin B12 deficiency in pregnancy.

Lower maternal serum vitamin B-12 concentrations have been associated with increased risk of adverse pregnancy outcomes

such as spontaneous abortion, recurrent pregnancy loss, small-for- gestational age (SGA), low birth weight (LBW), intrauterine growth restriction (IUGR), and neural tube defects (NTDs).

The present study shows that in vitamin B12deficient patients, 43.63%babies had birth weigh less 2.5 kg. Similar study done by Muthayya *et al.* [37] where the mean birth weight of all new-born s was 2.85 ±0.45kg and that of IUGR babies was 2.40 ±0.34kg [54] Similar study conducted by Dave *et al.* which showed fifty babies born with the weight of less than 2.5kg. Out of these fifty babies 36 had deficiency of vitamin B12 [30] a study done by Julia *et al.* [10] which also shows Vitamin B12 deficiency and its association with low birth weight.

A compromised maternal nutritional status is a major determinant of IUGR in developing countries. Our study shows 27.27% occurrence of IUGR in vitamin B12 deficient patients. Thus, this study shows that vitamin B12 is significantly associated with IUGR.

Similar study done by S Muthayya, *et al.* [37], which was a cohort study (n=486), showed that women in the lowest tertile of serum vitamin B12 concentration during each of the three trimesters of pregnancy had a significantly higher risk of IUGR. The prevalence rate of IUG Rin this cohort study was 28.6%.[51] Similar study done by a Dave *et al.* [30] in which21 new-born were found to have IUGR out of 110 patients. And among those 21 patients, 12 patients had vitamin B12 deficiency. A similar study by Julia *et al.* [10] which showed Vitamin B12 deficiency and its associated with IUGR.

Preeclampsia, a serious metabolic disturbance of pregnancy that occurs most often following the twentieth week of pregnancy is one of the leading causes of feto-maternal morbidity and mortality. Vascular damage in the maternal uteroplacental and foetal umbilical-placental circulation deterioration is the centre of the reason of preeclampsia. Our study showed 18.18% patients developed pre eclampsia in vitamin B12 deficient group. Similar study done by Arpita P *et al.* [9]Ahmedabad showed a similar association between both preeclampsia and vitamin B12 levels. Studies reported by Julia at el which also predicted association of Vitamin B12 deficiency with preeclampsia [10]

In present study of100 patients40% patients developed oligohydromnios amongst vitamin B12 deficienct group. Similar study done by Dave *et al.*, 21out of 110patients had oligohydroamnios in which 12 out of 46patients had vitamin B12deficiency. [30]

Preterm delivery was defined as delivery before 37 weeks of gestation. This study shows that out of 100 patient 12.81% patients went in preterm labour and amongst vitamin B12 deficient group. Similar study done by Ronnerberg *et al.* which also showed the risk of preterm birth was 60% lower amongst women with normal vitamin B-12 levels than in women deficient in it [55] Similar study done by S Muthayya, *et al.* [37] in which, incidence of preterm births was 7.9% Additional studies have noted association between other vitamin B12 biomarker and gestational age at delivery, although findings are conflicting. Maternal vitamin B-12 deficiency is associated with increased risk of common pregnancy complications such as small-for-gestational age (SGA), low birth weight (LBW), intrauterine growth restriction (IUGR), and neural tube defects (NTDs). Infants born to vitamin B-12-deficient women are at increased risk of developmental abnormalities, growth failure, and anaemia.

This study has highlighted the importance of considering Vitamin B12 deficiency anaemia in pregnancy as an indicator of adverse pregnancy outcome. Therefore, to reduce the burden of this problem and related morbidity, measures needed are to be implemented at community level, which can present and treat anaemia in women.

Conclusion

The objective of this study was to evaluate the status of vitamin B-12 deficiency in pregnancy and its impact on the maternal and fetal outcome. Very little research has been published on this topic till date; therefore, a goal of this study was to inform and encourage an increase of experimental research in this field.

A recent RCT in India showed that vitamin B12 supplementation improved maternal serum B12 concentrations which in turn improved breast milk and infant status. However, this study took place in India where deficiency is common. Results of our study between maternal serum vitamin B12 showed that even in predominantly vitamin B12 replete population associations are still present. In our study maternal vitamin B-12 deficiency is associated with increased risk of common pregnancy complications like small-for-gestational age (SGA), low birth weight (LBW), intrauterine growth restriction (IUGR), preeclampsia. Infants born to vitamin B-12 deficient women are at increased risk of developmental abnormalities, growth failure, and anaemia.

Our review, after summarizing existing data of this study, shows a causal relation between low Vitamin B12 level and adverse maternal & neonatal outcome birth. In pregnant women deficiency may cause or be associated with, IUGR, preeclampsia, preterm labour, low birth weight, increased rate of LSCS and low levels of serum B12 have also been documented among pregnant women in India who habitually are vegetarian or mix non-vegetarian, taking small proportion of non-vegetarian food.

The sefindings have important implications for the antenatal vitaminB12 supplementation policy in India. This study adds to the knowledge needed for inclusion of vitamin B12 in antenatal supplementation of pregnant women along with iron and folate.

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