

## **Maternal supplementation and demographic features association with developing fetus.**

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### **Abstract**

**Background:** In Pakistan, most of the low socio-economic setup and under nutrition mothers deliver the babies having multiple congenital anomalies. These abnormalities make infant physically disable and sometimes mentally retarded too. Nutritional status of mother effects on various pregnancy pregnancy. **Objectives:** To find out the impact of supplementation and demographic features of mother on her fetus through scan.

**Methodology:** The study was conducted to investigate the association of nutritional status and demographic features on pregnancy scan in Pakistani women. This data was collected from different areas of Pakistan, during January 2015 to June 2015, through proforma. The proforma was designed by literature review and expert opinion, consisting of eight questions, filled by researcher in formal interview with pregnant woman of 2nd trimester. The sample size of the study was two fifty two. Data was analyzed by using SPSS16.

**Results:** Results of this study show that 46% mothers were using no nutritional supplement during pregnancy and out of 46%, 36.5% women were bearing their first pregnancy, 93.7% women showed normal scan. 31.7% women got normal BMI, while significant association was found among scan, pregnancy number and BMI of mother.

**Conclusion:** The results showed that BMI value and number of pregnancy are the factors which have profound effect on the fetus scan. Supplementation and Hb level have negative correlation with scan. Other demographic factors have clinically significant effects on the pregnancy outcomes.

**Keywords:** Nutritional deficiency, Pregnant women, Fetus abnormalities, BMI, Haemoglobin.

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### **Introduction**

Around the globe, Pakistan has third heaviest burden of maternal, fetal, and child mortality. An adequate accessibility of nutrients throughout gestation is most likely the single most important environmental aspect influencing pregnancy result [1]. Though physiological adjustments in nutrient utilization and metabolism are geared to improve the consumption of dietary nutrients throughout pregnancy, these changes may be not enough to meet the load for pregnancy and lactation if the woman is in poor nutrient status at the time of conception. An inadequate supply will cause a situation of biological contest between the mother and fetus in which the safety of both is at

serious risk. The consequences of this unwanted situation on the fetus are well identified while the results of under nutrition on the mother are less well known. Like the under nutrition, overweight also have numerous effects on fetus during pregnancy [2]. Overweight and fatness lead to perilous metabolic effects on cholesterol, blood pressure, triglycerides and insulin resistance. Risks of ischemic stroke, coronary heart disease and type 2 diabetes mellitus enhance progressively with increasing body mass index (BMI). In the environment possible factors that encourage overconsumption of energy, include the easy accessibility of a wide variety of energy-dense foods and the serving of these foods in large portions. Other environmental factors lean to reduce total energy outflow by

reducing physical activity [3]. Pre-existing maternal conditions have implications on the growth and development of the fetus, and neonatal survival and on the mother's health during the pregnancy. Compromised fetal growth is a major determinant of the risk of chronic diseases, in adulthood yet in clinically healthy infants [4,5]. Fetal development is most susceptible to maternal diet which is lack in nutrients (e.g., protein and micronutrients) during the peri-implantation stage and the period of swift placental growth [6,7]. During gestation maternal under nutrition condition reduces placental and fetal development of both domestic animals and humans [8,9].

Growing the number of women who are turning to natural supplements and functional foods products during pregnancy. Nutraceuticals and functional food ingredients that are advantageous to health may represent useful compounds that are able to cure the overall health issues. "Nutraceuticals" is "a food (or part of a food) that provides medical or health benefits, including the prevention and/or treatment of a disease". Nutraceuticals include Minerals, vitamins and other dietary supplements, Herbal products like garlic (allicin), ginger, echinacea, ginseng, liquorice, onion, senna, turmeric (curcumin), dietary enzymes for instance bromelain, papain dietary fiber, hydrolyzed proteins, phytonutrients like resveratrol, carotenoids, lycopene, prebiotics and probiotics. These Nutraceuticals have been used from many years for good health and in treatment of health issues [10].

Nutraceuticals reduce dyslipidemia problem. This action is important when considering patients who are intolerant to statins, although suffering from severe lipid disorders or whose statin treatment is not able to attain good results. Nutraceuticals could be safely use in these individuals to prevent dyslipidemia development [11].

Studies that investigated the association between maternal nutrition and baby's birth size are inadequate, and available studies are incompatible [12].

This study reflects some core issues with maternal health in the region. This relationship of under nutrition and overweight during pregnancy is affected by many socioeconomic and biological aspects, which differ widely in various populations. Education and socioeconomic status are most prominent features of all which relate with other factors contributing under and overweight of pregnant woman.

## Materials and Methods

Using simple convenient sampling technique, a cross sectional survey was conducted during January 2015 to June 2015, to find out the supplementation and demographic association with pregnancy scan in Pakistani women. Sample size (281) was calculated through online calculator [13] on the basis of 2.97% anomaly prevalence [14] among population of 1000, taking 98% confidence level and 2% confidence interval. Out of 281 only 252 patients cooperated during formal interview. Response rate was 89.67%.

A questionnaire was designed through expert opinion and literature review. Questionnaire was comprise of medical history, bio-data and other questions regarding education, supplementation, age, weight height to calculate BMI., settlement and occupation to estimate monthly income.

Hb was reported by patient's clinical reports and ultra sound scan was done by radiologist. Questionnaire was filled by the researcher in formal interview and also collected reports of the patient in different hospitals. Pregnant women of 2<sup>nd</sup> trimester belong to different urban and rural areas of Karachi, Lahore and Faisalabad were included in the study.

## Results

Association of BMI and number of pregnancy were found significant in our results with scan showing p- values <0.005.

While the other demographic features such as education, occupation and settlement showed non-significant relationship with scan. Clinical parameter such as Hb and supplementation were found non significantly related with scan of pregnant women of 2<sup>nd</sup> trimester. These results indicate that level of BMI and pregnancy number had effects on the result of scan (Tables 1-3).

**Table 1.** Basic and clinical feature of subjects (n=252).

		Frequency	Percent
Living Area	Urban	204	81
	Semi Urban	40	15.9
	Rural	8	3.2
Occupation	Business	36	14.3
	Professional	12	4.8
	Employment	96	38.1
	Labor	108	42.9
Education	Graduation	96	38.1
	Intermediate	24	9.5
	Matriculation	76	30.2
	Uneducated	56	22.2
Body mass index	Under weight	4	1.6
	Normal	80	31.7
	Overweight	112	44.4
	Obese	56	22.2
Pregnancy	First	92	36.5
	2nd	44	17.5
	3rd	56	22.2
	More than 3	60	23.8
Supplementation	No	116	46
	Folic Acid	100	39.7

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	More than 1	36	14.3
Scan	Normal	236	93.7
	Abnormal	16	6.3
Hb	<12	192	76.2
	Dec-16	56	22.2
	>16	4	1.6

Correlation and multiple regression analysis were conducted to examine the relationship between scan and various potential predictors.

Table 4 summarizes the descriptive statistics and analysis results. As can be seen four variables are positively and significantly correlated with the criterion, indicating that these factors have profound effect on scan. Supplementation and Hb level is negatively correlated.

The multiple regression model with all predictors produced R2=0.197, F=10.04 and p<0.001.

**Table 2.** Comparison of Clinical characteristics (Ultrasound scan and Hb level) in relation to supplementations.

		Supplementations			p-value
		No	Folic Acid	More than 1	
Scan	Normal	100	100	36	0.082
	Abnormal	16	0	0	
Hb	<12	100	72	20	0.246
	12-16	16	24	16	
	>16	0	4	0	

**Table 3.** Comparison of Ultrasound scan with living area BMI, Pregnancy, Hb, education and occupation.

		Scan		p-value
		Normal	Abnormal	
Living Area	Urban	196	84wdx	0.151
	Semi Urban	32	8	
	Rural	8	0	
BMI	Under weight	0	4	< 0.001
	Normal weight	80	0	
	Overweight	100	12	
	Obese	56	0	
Pregnancy	First	92	0	0.003
	2nd	44	0	
	3rd	56	0	
	More than 3	44	16	
Hb	<12	180	12	0.959

	12-16	52	4	
	>16	4	0	
Education	Graduation	92	4	0.548
	Intermediate	24	0	
	Matriculation	72	4	
	Uneducated	48	8	
Occupation	Business	36	0	0.565
	Professional	12	0	
	Employment	92	4	
	Labor	96	12	

As can be seen pregnancy, settlement, occupation, education had significant positive regression weight indicating that these parameters if taken up to the mark it will lead to normal scan after controlling for other variables in model.

**Table 4.** Summary statistics, correlations and results from the regression analysis.

Variable	Mean	Std	Correlation with scan	Multiple regression analysis	
				β	b
Scan	1.0635	0.24433			
Supplementation	2.1111	1.65668	-0.175**	-0.013	-0.086
Hb	1.7937	0.44305	-0.126	-0.063	-0.114
Pregnancy	2.3333	1.19761	0.363***	0.076***	0.374
Settlement	1.2222	0.48711	0.149**	0.070*	0.140
Occupation	3.0952	1.02112	0.167**	0.024	0.098
Education	2.3651	1.20161	0.138*	0.008	0.041

\*p<0.05 \*\* p<0.01 \*\*\*p<0.001

**Discussion**

Results of this study show that chances of abnormal fetal scans are higher in those mothers who have high BMI. Similar results were found in the study conducted in Finland [15], findings suggest improved nutrition in thin women increase the fat and ultimately increase BMI, which seems to amplify the risk of coronary heart disease in the next generation. Mother's height is unrelated to coronary heart disease in the fetus. However, it was strongly correlated to the mother's body mass index in pregnancy [16]. Another study conducted in India, which shows the correlation of maternal BMI and baby's weight at the time of birth. The mothers were light in weight, short in height and younger in age and had a lower mean body mass index (BMI) than Southampton mothers. They gave birth to babies light in weight. The Indian babies were small in all body measurements when compared to Southampton babies [17].

In our study increasing number of pregnancies shows significant correlation with abnormal scan (P value 0.003).

Depletion of maternal nutrition might be another reason because pregnancy consumes maternal stores of necessary minerals, amino acids and vitamins. Decline in maternal nutritional rank at time of conception is due to reduction in maternal energy and protein. Changed outcomes of pregnancy resulting from short inter pregnancy intervals or early pregnancies [18]. In addition to that, lack of economic resources prevents them from taking vitamin and iron supplementation during pregnancy. Pregnancy outcome is not associated with the concentration of most nutrients all the time. High hemoglobin and retinol concentrations, not in early but in late pregnancy were strongly and independently related with smaller placental size and lower birth weight at time of birth [19].

Our study shows that women, who is not taking supplements having less than 12 Hb and abnormal ultrasound but the relationship found insignificant, these difference of results may be due to change of environment, culture and race. In another study review of 20 randomized, controlled trials that showed that routine supplementation (with folic acid and iron) has no noticeable effect on any substantive measures of either fetal or maternal outcome, particularly on low birth weight, stillbirths, preterm delivery or neonatal morbidity [19]. High frequency of anemia in all socio-economic groups in all trimester's points to serious lack of health education regarding nutrition, high frequency of anemia (60%) was present in our study population. This frequency can vary considerably in different parts of country because of differences in socio-economic conditions, life styles and health seeking behaviors. Moreover, the prevalence of anemia is higher in fertile years, due to menstrual losses, repeated pregnancies and inadequate intake of iron, folic acid and unhealthy diets [20]. Reduced placental flow related with not only high hemoglobin concentrations but also maternal vascular dysfunction may be implicated to control fetal development [21].

Husband's income and education serve as indicators to evaluate socioeconomic setup of women. For approaching antenatal care, income of household was found to be a significant factor after multivariate logistic regression analysis, which is constant with the findings of other studies [22].

The grown person literacy rate in Pakistan for males is 56.5% and for female is 32.6%. When compared internationally, these rates are rather low. Education is extensively related with deployment of maternal health services, 22% of mothers with no education get antenatal care while 85% of mothers with at least secondary education do so. It was reported in a review of studies that utilization of antenatal care is positively related with education of women [23].

Obstetric ultrasonography has been recognized as fundamental component of antenatal care and is accessible for every pregnancy in many countries. Primarily the main reasons for performing the scan were estimation of gestational period, detection of multiple pregnancies and to locate right position of placenta [24]. Association of LBW with increased incidence of anomalies was found in our study and was in accordance with results of others [25].

## Conclusion and Recommendations

In general health services are underprivileged in Pakistan, but predominantly they are scarce for maternal health, leading to undesirable outcomes for both mother and infant. On univariate analysis, no maternal characteristic was found to be considerably related with neonatal death when compared characteristics of mothers whose infants died within the 28 days following delivery with those, whose infants survived. Deficiency of a significant relationship in this population is confirmed by regression analysis [26]. Rate of literacy among females in Pakistan, is one of the lowest in the world that is 28%, that keeps these women unaware regarding their reproductive rights and health facilities [27]. The lesser life expectancy of females than males (51 yr compared to 52 for males) is the outcome of inferior position of female in our social system plus superadded factor like toxemia, anemia, septicemia, malnutrition, infection, and hemorrhage. With this poor accessibility and availability of health services the load of short interpregnancy intervals poses a most important threat to the life of women.

It is needed to keep away from barrier of poverty and high cost of care as well as socio-economic setup of community requires to be improved. To discourage rise in maternal mortality Nutritional status of reproductive age group should be improved. Repeated and closely spaced pregnancies should be dejected on community forums. Without increasing literacy rate among females as well as in males we cannot achieve the goal of healthy nation with alive mother and newborn.

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