

# A tertiary care study to assess the effectiveness of 'Supplement adherence kit' on intake of nutritional supplements among pregnant women

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## ABSTRACT

**Background:** An antenatal mother undergoes significant changes throughout pregnancy and most of which occur during the second trimester. Supplements are important for normal growth and development of fetus, Deficiency of supplements during pregnancy leads to anemia and can have a negative impact on perinatal and maternal outcomes. These complications can be prevented by supplementing needed vitamins and minerals. **Method:** A Quasi-experimental study was conducted on 137 subjects visiting gynecology OPD enrolled by total enumerative sampling technique. Hemoglobin level and the adherence of supplements were assessed during the second trimester of antenatal mothers in both the groups. **Results:** Adherence of supplements has increased significantly ( $p$  value = 0.005, 0.004, and 0.040 for iron, folic acid, and calcium, respectively) among subjects in the experimental group. Results of SMAQ shows that there is increase in adherent mothers from 33.3% to 71.2% experimental group. **Conclusion:** Supplement adherence kit was effective in increasing supplement adherence level along with an improvement in hemoglobin levels among antenatal mothers in the Experimental group.

**Keywords:** Anemia, antenatal mother, supplement adherence, supplement adherence kit

## Introduction

Vitamins and minerals are essential for normal function, growth and development and have significant effects on the health of the mother and fetus. Deficiency during pregnancy can lead to a negative impact on maternal and perinatal outcomes.<sup>[1]</sup> Folic

acid, Iron and Calcium are the supplements recommended during pregnancy for the healthy development of developing fetus.<sup>[2]</sup>

Iron deficiency and anemia during pregnancy is a significant health problem in many developing countries.<sup>[3]</sup> Low folate levels at the time of conception are related to increased risk of development of baby having Neural tube defects Pregnant women may have an inadequate diet and have other factors such as malaria, worm (helminthic) infestations, poor sanitation and drinking water which contribute to the increased risk of anemia.<sup>[4]</sup> Low hemoglobin levels, can lead to a low-birth-weight baby. Iron

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deficiency and anemia in newborn infants can impair the infant's cognitive and intellectual development and physical growth.<sup>[5]</sup>

Adequate nutrition in pregnancy is essential for maternal health and positive birth outcomes. However, traditional diets in many low-income countries are suboptimal, and additional individual and socio-cultural factors such as food aversions and eating less food in pregnancy can further reduce the intake in pregnancy. Nutritional supplements can help fill this dietary gap and may improve pregnancy outcomes.<sup>[6]</sup>

WHO (World Health Organization) recommends daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron and 400 µg (0.4 mg) folic acid is recommended for 100 days to pregnant women to prevent anemia, puerperal sepsis, low birth weight and preterm birth. Daily calcium supplementation (1.5 g–2.0 g oral elemental calcium) is recommended for pregnant women to meet the Calcium requirement during pregnancy. Despite the prescription and free distribution of Iron and Folic acid tablets, a large number of pregnant women are anemic<sup>[7]</sup> Anemia may be due to non-adherence to prescribed supplements. Hence measuring compliance and adherence to supplementation and developing strategies to improve adherence is essential.<sup>[8]</sup>

## Methods

The study was conducted in Antenatal Clinic, at a tertiary care hospital of northern India. Total enumeration sampling technique was used and 137 antenatal mothers visiting antenatal clinic from July to December 2019 were enrolled. An interview schedule comprising of Socio-demographic profile, Clinical and obstetric profile, SMAQ (Simplified Medication Adherence Questionnaire) and Pill count. SMAQ is available in the open domain for the use of the researcher. It comprises of 6 questions to assess the adherence and reason of non-adherence. Pill count method was used to assess the supplement adherence and supplement. Adherence rate is calculated by formulae Adherence rate = (no. of pills consumed/no. of pills prescribed) × 100.

### Research instrument

Tools were prepared based on an extensive review of relevant literature and validated by experts in fields of Nursing, Obstetrics and Gynecology, Dietetics Department. A tryout was conducted to check the feasibility of study. Written permission was taken from Institute Ethics Committee, and Trial was registered in CTRI (Clinical trial registration no CTRI/2019/07/020298).

### Data Collection

Study data was collected from July to February 2020. Antenatal women were approached during their clinical visit at the antenatal clinic. Antenatal mothers were informed about the purpose of study, and written consent was taken from them. The Mothers were interviewed in the nursing room of Gynecology OPD. A structured interview schedule was used to gather information from both

groups. Supplement adherence kit was given to the experimental group and the control group got routine care. Simplified medication adherence questionnaire (SMAQ) and Pill Count method were used to assess the adherence level of the participants at the time of enrollment and for 3 months at the interval of 1 month.

## Result

Table 1 depicts statistically significant difference of post intervention Hb levels between experimental group and control group (P-value of 0.004). This shows that the supplement adherence kit was effective in improving Hb levels among study subjects Table 2 indicates that post intervention adherence of nutritional supplements intake (iron, calcium and folic acid) have increased among antenatal mothers. Table 3 depicts the adherence of medication among study subjects as per pill count among study subjects. Mann Whitney U test is applied to compare the median values of pre and post intervention pill count of nutritional supplements (Iron, calcium and Folic acid). Results show that post intervention the adherence to nutritional supplements (iron calcium and folic acid) intake has increased significantly.

The mean age of the control group was 27.89 and of the experimental group was 27.45. One antenatal mother in control group was separated rest all were living with their partners. Education level of participants were 28.8% of the antenatal mothers in experimental and 25.4% in the control group were graduate. Furthermore, most antenatal mother in both groups were a housewife (75.8% in the experimental group and 84.5% in the control group) More than half of antenatal mothers in the experimental group (51.5%) and control group (63.4%) lives in the rural area.

Half of the mothers (50%) in the experimental groups were primigravida and 50% were multigravida whereas the control group had more multigravida mothers (59.2%) and primigravida were 40.8%. Most of the antenatal mothers had the duration of menstruation for 3–4 days, have an average amount of blood flow and had a regular menstrual pattern Both the groups were comparable and homogeneous.

The majority of the antenatal mothers in both groups were vegetarian (69.7% in the experimental group and 56.3% in the control group). The mothers had meals thrice a day (48.5% in the experimental group and 49.3% in the control group). Majority of antenatal women in the experimental (74.2%) and the control group (80.3%) do not skip any meals. Nearly 34.8% of antenatal mothers in the experimental group and 38.0% in the control group consume one glass/day of milk. Fruits and vegetables

**Table 1: Pre intervention and post intervention Hb level among study subjects (n=137)**

Hemoglobin	Control (n=71) mean (SD)	Experimental (n=66) mean (SD)	t, df, *P
Pre intervention	10.94 (1.182)	10.923 (1.2241)	0.122, 133.4, 0.333
Post intervention	10.874 (0.873)	11.357 (1.02)	-2.963, 128.3, 0.004

\*P<0.05

Table 2: Pretest and post-test scores of study subjects on Simplified Medications (n=137)

ITEMS	Responses	Pretest		Posttest 1		Posttest 2		Posttest 3	
		Control group n (f%)	Experimental group n (f%)	Control group n (f%)	Experimental group n (f%)	Control group n (f%)	Experimental group n (f%)	Control group n (f%)	Experimental group n (f%)
Ever forget to take medications	Yes	65 (91.5)	61 (92.4)	64 (90.1)	21 (31.8)	65 (91.5)	4 (6.1)	62 (87.3)	4 (6.1)
Careless at times about taking medications	Yes	40 (56.3)	34 (51.5)	42 (59.2)	6 (9.1)	43 (60.6)	0 (0.0)	38 (53.5)	0 (0.0)
At time feel worse, and stop taking medications	Yes	36 (50.7)	34 (51.5)	35 (49.3)	9 (13.6)	27 (38.0)	4 (6.1)	30 (42.3)	4 (6.1)
Since last week, often have not taken medicine	Never	7 (9.9)	6 (9.1)	13 (18.3)	45 (68.2)	9 (12.7)	60 (90.9)	11 (15.5)	59 (89.4)
	1-2 times	44 (62.0)	40 (60.6)	39 (54.9)	21 (31.8)	53 (74.6)	6 (9.1)	49 (69.0)	7 (10.6)
	3-5 times	20 (28.2)	20 (30.3)	19 (26.8)	0 (0.0)	9 (12.7)	0 (0.0)	11 (15.5)	0 (0.0)
Not taken medicine since last week-end.	Yes	23 (32.4)	21 (31.8)	48 (67.6)	18 (27.3)	51 (71.8)	1 (1.5)	48 (67.6)	4 (6.1)
Days in past 3 months not taken any medicine	<=2	25 (35.2)	22 (33.3)	18 (25.4)	20 (30.3)	15 (21.1)	30 (45.5)	14 (19.7)	47 (71.2)
at all.	>2	46 (64.8)	44 (66.7)	53 (74.6)	46 (69.7)	56 (78.9)	36 (54.5%)	57 (80.3)	199 (28.8)

were consumed daily by most of the antenatal mothers (86.4% in the experimental group and 74.6% in the control group) and had a single serving of fruit daily (69.7% in the experimental group and 46.5% in the control group). Nearly 50% of antenatal mothers do not consume junk food in both groups. Only 37.9% of antenatal mother in experimental and 31.0% in control group take 2 liters of water daily.

Both the groups were homogenous and comparable in terms of dietary habits, Fasting, fasting duration, number of meals, meals skipped, milk consumption, tea consumption, milk intake time, vegetable intake, non-veg intake, outside meals, junk food intake, and water intake.

BMI (Body Mass Index) of study subjects according to WHO Classification. Depicts that majority of antenatal mothers in both the groups were of normal weight (18.8–24.9).

### Discussion

Supplements are the micronutrients that are required to meet the increased demand for micronutrients during pregnancy such as Iron, folic acid, and calcium. Major physical changes a woman experiences during pregnancy occur mostly during the second trimester. The second trimester requires essential nutrients to support the growth of a developing fetus.<sup>[9]</sup> The dietary habit of the antenatal women alone is not sufficient to meet the micronutrient requirement of the antenatal mother and developing fetus. So, supplements play a vital role to prevent micronutrient deficiency.<sup>[10]</sup>

The government of India is providing free distribution of Iron, Calcium, and Folic acid for 100 days at government health centers during pregnancy. Despite all these efforts by the government antenatal mothers are still facing micronutrient deficiencies. Antenatal mother often suffers anemia during pregnancy because of non-adherence to nutritional supplements.<sup>[3]</sup> Hence it is important to assess the adherence to nutritional supplements among pregnant women SMAQ (simplified medication adherence questionnaire) is a tool used to assess the adherence level. It is a 6-item questionnaire that is used to assess the adherence and the reason for non-adherence.<sup>[11]</sup>

Getachew MA *et al.* researched validation of SMAQ and concluded that the Questionnaire provides a good level of validity and inter-observer agreement. In the study researcher also used Morisky-Green scale to compare the results of SMAQ. SMAQ provides higher sensitivity and lower specificity than Morisky-Green scale. Higher sensitivity is advantageous in a tool as it provides greater power of detection of non-complaint subjects and thus leads to better clinical follow-up. Moreover, SMAQ is free of cost scale in contrast to Morisky. So SMAQ scale is chosen for this research study for assessing the adherence of antenatal mothers.<sup>[12]</sup>

In the current study, we have assessed the adherence level by a Simplified medication adherence questionnaire (SMAQ).<sup>[13]</sup>

**Table 3: Adherence of nutritional supplements (Iron, Calcium, Folic acid) among study subjects (n=137)**

	Iron		Folic acid		Calcium	
	Control (n=71)	Experimental (n=66)	Control (n=71)	Experimental (n=66)	Control (n=71)	Experimental (n=66)
Median (IQR)	88.57 (5.71)	100 (3.58)	88.57 (8.54)	100 (3.58)	88.57 (7.14)	100 (1.58)
U		1696.0		1670.0		2248.0
*P		0.005*		0.004*		0.040*

\*P&lt;0.05

The scores based on SMAQ (Simplified Medication Adherence Questionnaire) shows that 64.8% of women were non-adherent to supplements and forgetfulness of medication is the major reason of the antenatal mothers for non-adherent to medication. Similarly, a study conducted by Taye B *et al.* (2015) on compliance of iron and folate among pregnant women. It is a community-based cross-sectional study on 628 pregnant women. The result of the study shows that 20.4% of participants were compliant with iron folate supplementation which. This indicates that the proportion of women taking iron and folic acid supplementation is much lower.<sup>[11]</sup> In similar lines, Clermont *et al.*<sup>[5]</sup> (2018) in their study concluded that despite a stated high level of acceptance and enthusiasm for the supplements among pregnant women and their household members, it is clear that certain fears and side effects impacted utilization. In the current study we have found that nearly half of women are non-adherent due to worse feeling associated with medication. They feel acidity, nausea after taking an iron tablet. The adherence is increased from enrollment till third follow up 71% were adherent.

In our study, we had used an information booklet mentioning the role of Iron, Calcium, and folic acid during pregnancy and it is observed that the compliance to medicine is increased and a positive correlation between the supplement adherence and the Hb level is observed. This positive correlation indicates that with an increase in supplement adherence, there is also an increase in Hb level among antenatal mothers. Getachew *et al.*<sup>[12]</sup> (2018) supports the results and concluded in a study that Proper counseling and health promotion about Iron-Folic Acid tablet intake, promoting the benefits of early and frequent Antenatal Clinic visit, health promotion on anemia prevention and health benefits of the importance of iron-folic acid supplements are recommended to increase adherence with iron-folic acid supplementation.

Nutrition is a vital part of pregnancy. Well, a balanced diet is recommended for pregnant women that are rich in vitamins, minerals, carbohydrates, protein, and micronutrients.

Good dietary practices help in meeting the nutrient requirement of the mother and the developing fetus. So, it is an important aspect that cannot be neglected during pregnancy. Hence in the present study dietary practices of antenatal mothers were assessed. It is recommended to have small frequent meals and not to keep fast during pregnancy. It was good to note that in the present study most of the mothers were taking three meals a day but still few mothers (15%) were skipping their breakfast and lunch due to feeling nauseated with the aroma of food and few of them were fasting during pregnancy because they have strong

spiritual belief related to fasting whereas some mothers said that they cannot skip some important fasting days as it is their family practice. It is good to know that there were few women (17%) who were following the dietary recommendations and having small and frequent meals i.e., 5–6 times a day. Milk is a good source of calcium, vitamins and is an important component of the diet of pregnant women.

In the present study one-third of mothers were not including milk in their diet and told that they do not like having milk and were not taking it even before the pregnancy. But in the meantime, few mothers were taking up to 3 glasses of milk. It is good to note that in the present study majority of mothers were including fruits and vegetables daily in their diet but still there was a small number of antenatal mothers (4%) who were not including vegetables in the diet because they were not liking the taste and feel nausea. Milk and tea interfere with the body's ability to absorb iron from food supplements. So, these products must be avoided to be taken with meals. In the present study, we have noted that some women are taking milk and tea along with meals which are considered as wrong dietary practices.

## Conclusion

It is concluded that the supplements are essential during pregnancy and adherence to supplements is a major challenge faced. Iron deficiency anemia can be minimized during the pregnancy by improving adherence to the supplements to reduce anemia-related complications.

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## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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