Abstract

Anemia is a common complication associated with pregnancy which threatens the life of a woman and her unborn baby. Studies have revealed higher incidences of hemorrhages, infections, early labor and reduced birth weight of baby, who are prone to neonatal morbidity and mortality. Therefore, the present study using quasi-experimental time series non-equivalent control group design was conducted at 16 weeks of gestation till first week of delivery on 126 anemic pregnant women in a selected hospital of Kashmir, India, to determine the effectiveness of dietary intervention package on their pregnancy outcome. The study revealed a significant difference in pregnancy outcome of experimental group (66) as compared to control group anemic pregnant women (60).

Keywords: Anemia in pregnancy, Pregnancy outcome, Dietary advices

Introduction

Iron-deficiency anemia (IDA), a common complication associated with pregnancy, causes a major health concern in developing world due to maternal mortality. According to WHO, around 500,000 maternal deaths per year and 20,000,000 morbidity cases per year are attributed to IDA. In India, the prevalence of iron deficiency IDA is perhaps the highest in the world and includes 50% adult women and 80% pregnant women. According to a standard laid down by WHO, anemia in pregnancy is present when the hemoglobin concentration in peripheral blood is 11 g% or less. However, because of hemodilution and socio-economic deprivation in developing countries, the level is brought down to 10 g%. Kalaivani et al. reported that major factors responsible for anemia in India included inadequate dietary iron, folate, low vegetable consumption, low vitamin B₁₂ intake and poor bioavailability of dietary iron from fiber. Indian diets are found responsible for high prevalence of anemia, which causes 40% of maternal deaths. A doubling of low-birth-weight rate and 2–3 fold increase in perinatal mortality rates is seen when hemoglobin is less than 8 g/dL. There is 8-10 fold increase in maternal mortality rate when hemoglobin falls below 5 g/dL. Maternal anemia is also associated with poor intrauterine growth of fetus and increased risk of preterm birth and low-birth-weight rates, which is an independent risk factor for neonatal deaths, because lower the weight at birth, higher the neonatal deaths.

Amin and Imtiyaz and Ali et al. studied correlation of maternal factors like age, literacy, income, type of family, hemoglobin level, and antenatal care on the nutritional status of pregnant women. They revealed that malnourishment increased the risk of premature labor, intra-uterine growth restriction, and low birth weight with increased perinatal, neonatal, and infant morbidity and mortality.

Pregnancy is an especially good time to promote good nutrition, since most expectant women are highly motivated to change their poor eating habits. Dietary advices during pregnancy should focus on improving the quality of woman’s overall dietary intake. The effects of under-nutrition on fetal development should be pointed out to the mother. Much valuable information can be given by providing women with written pamphlets (information). According to National...
Academy of Sciences, good maternal nutrition and the importance of promoting healthful eating practices during pregnancy is utmost important to improve birth weight of baby by improving maternal weight and fetal growth.

Koura et al. conducted a prospective study of 617 anemic pregnant women to determine its effect on birth outcome and infant hemoglobin level during the first 18 months of life in Benin. Prevalence of maternal anemia at delivery was 39.5%, and 61.1% of newborns were anemic at birth. Maternal anemia was not associated with low birth weight [OR=1.2 (0.6–2.2)] or preterm birth [OR=1.3 (0.7–2.4)], whereas the newborn’s anemia was related to maternal anemia [OR=1.8 (1.2–2.5)]. Hediger studied anemia: compilation of data on pregnancy outcome and found that maternal IDA, diagnosed at entry to prenatal care, was associated with low dietary energy and iron, inadequate gestational gain, and twofold or greater increases in the risks of preterm delivery and low birth weight. The relationship between poor diet (with inadequate iron intake) and increased likelihood of preterm delivery persisted during the third trimester.

Jaleel and Khan conducted a cohort study on 51 pregnant women, admitted for delivery and having severe anemia to determine association between severe anemia and maternal and perinatal complications by comparing with 108 non-anemic women of similar demographic features from January 2007 to July 2008. They found that frequency of anemia was 69.9% and that of severe anemia was 4.8%. Post-partum hemorrhage occurred in 9.8% of cases as compared to 0.9% of controls (p=0.013). Frequency of infection of surgical wound was 7.8% in cases and none in controls (p=0.010). Preterm birth was seen in 23.5% cases and 10.2% controls (p=0.026). Of the severely anemic mothers, 29.6% babies were low birth weight (p=0.022) and 27.8% were small for gestational age (p=0.001), as compared to 14.5% and 8.2% of controls, respectively.

Qadir made an analysis from a birth cohort about determinants of infant mortality in Kashmir valley and observed that prematurity caused maximum number of deaths, i.e., 54.5% in the early neonatal period and 24.7% during infancy. Deaths occurred in infants born to mothers with maternal complications like anemia (41.1%), pre-eclampsia (2.2%), eclampsia (6.3%), diabetes mellitus (2.2%), and infections (3.3%).

Mirza  found that poor nutrition and anemia hinders weight gain and causes intra-uterine growth restriction. Kumar stated that about two-thirds of pregnant women (65%) in India receive iron and folic acid tablets but only one-fourths consume them for the recommended period of 90 days; thus there is need to educate and encourage pregnant women for intake of iron and folic acid during pregnancy.

Henrickson conducted a study to determine effect of pregnancy education and nutrition on pregnancy outcome. He found that the adequacy of nutrition was one of the influential factors to affect maternal and fetal health and advocated that if birth weight of baby is to be improved, women need to increase their intake of adequate and balanced diet and adhere to the healthy practices of rest, sleep, relaxation, and self-monitoring.

The investigator felt the need to conduct a study to assess the pregnancy outcome in anemic pregnant women. The objectives of this study were to compare the pregnancy outcome of anemic pregnant women of experimental group with that of control group and to associate pregnancy outcome with their socio-demographic characteristics.

Materials and Methods

A quasi-experimental research approach with time series non-equivalent pre-test-post–test-control group design was used to study 126 pregnant anemic women at antenatal clinic (ANC), labor room and postnatal wards of Sheri-Kashmir Institute of Medical Sciences (SKIMS), Srinagar. Out of 126, 66 subjects were randomly allocated in experimental group and 60 subjects in control group. An interview schedule was used to collect data regarding socio-demographic characteristics, and nutritional status; assessment proforma and observation checklist was used to assess pregnancy outcome and record analysis was done. the researcher to collect data. Intervention package consisted of information about low birth weight/preterm birth (audio-visual supported), antenatal and dietary advices and information booklet. Instruments like weighing machine, fetoscope, and measuring tape were also used while conducting physical and antenatal examination.

Data was collected from September 2011 to August 2012. The initial/baseline assessment was done for both experimental and control groups of study subjects at 16 weeks of gestation. Intervention was administered systematically only on experimental group during 16th week of gestation by providing information about low birth weight and preterm birth (audio-visual supported), giving antenatal and dietary advices, and providing information booklet. Each woman was provided with a Self-Care Activity Compliance Checklist and was advised to fill it up when she performs any activity. Both the experimental and control group subjects were observed for maternal outcome by monthly observation and assessment at 24th, 28th, 32nd and 36th week of gestation, and neonatal outcome during intrapartum period and within 24 hours of delivery.

Results

At the conclusion of the predetermined study, the data revealed the following results.
Section: 1

Findings related to Demographic Characteristics

Table 1. Distribution of Subjects among Experimental Group and Control Group according to Demographic Characteristics

| Demographic Characteristics       | Experimental Group n₁=66 | Control Group n₂=60 | p-value |
|-----------------------------------|--------------------------|---------------------|---------|
| **Age (in years)**                |                          |                     |         |
| (mean±SD)                         | 26.32±4.40               | 27.98±4.81          |         |
| Less than 20                      | 2 (3.03%)                | 3 (5%)              | 0.229   |
| 20–30                             | 38 (57.58%)              | 40 (66.67%)         |         |
| More than 30                      | 26 (39.39%)              | 17 (28.33%)         |         |
| **Socio-economic Status**         |                          |                     |         |
| High                              | 6 (9.09%)                | 4 (6.67%)           | 0.443   |
| Middle                            | 38 (57.58%)              | 37 (61.67%)         |         |
| Low                               | 22 (33.33%)              | 19 (31.67%)         |         |
| **Exposure to Smoke**             |                          |                     |         |
| Mild                              | 15 (22.73%)              | 13 (21.67%)         | 0.242   |
| Moderate                          | 47 (71.21%)              | 45 (75%)            |         |
| Severe                            | 04 (6.06%)               | 02 (3.33%)          |         |
| **Nutritional Status**            |                          |                     |         |
| Good                              | 10 (15.15%)              | 18 (30%)            | 0.175   |
| Average                           | 40 (60.61%)              | 32 (53.33%)         |         |
| Fair                              | 16 (24.24%)              | 10 (16.67%)         |         |
| **No. of Living Children**        |                          |                     |         |
| None                              | 36 (54.54%)              | 35 (58.33%)         | 0.042   |
| One                               | 16 (24.24%)              | 15 (25%)            |         |
| Two                               | 12 (18.18%)              | 04 (6.67%)          |         |
| Three and above                   | 02 (3.03%)               | 06 (9.09%)          |         |
| **Gravidity**                     |                          |                     |         |
| Primigravida                      | 29 (43.94%)              | 32 (53.33%)         | 0.26    |
| Second gravida                    | 20 (30.30%)              | 14 (23.33%)         |         |
| Multigravida                      | 12 (18.18%)              | 10 (16.67%)         |         |
| Grand multigravida                | 05 (7.57%)               | 04 (6.67%)          |         |

Data presented in Table 1 shows that the experimental group and control group were similar in all the demographic characteristics.
Section: 2

Comparison of Physical and Physiological Parameters between Experimental Group and Control Group of Subjects at Various Weeks of Gestation

Table 2. Comparison between Experimental Group and Control Group in Terms of Physical and Physiological Parameters at Various Weeks of Gestation

| Maternal parameters | Experimental Group (n₁=66) Mean±SD | Control Group (n₂=60) Mean±SD | p-value |
|---------------------|----------------------------------|-------------------------------|---------|
| **Body Weight (in kg)** |                                  |                               |         |
| At 16 weeks         | 54.59±8.70                      | 51.63±8.13                    | 0.051   |
| At 24 weeks         | 57.68±8.84                      | 54.22±8.47                    | 0.027*  |
| At 28 weeks         | 59.50±8.93                      | 55.76±8.68                    | 0.019*  |
| At 32 weeks         | 61.25±8.95                      | 57.43±8.87                    | 0.018*  |
| At 36 weeks         | 63.15±9.08                      | 69.13±9.19                    | 0.001** |
| **Hemoglobin g%**   |                                  |                               |         |
| At 16 weeks         | 8.13±1.04                       | 7.73±0.93                     | 0.0251* |
| At 24 weeks         | 8.72±1.00                       | 7.91±0.81                     | 0.001** |
| At 28 weeks         | 9.41±0.89                       | 8.10±0.76                     | 0.001** |
| At 32 weeks         | 9.99±0.91                       | 8.47±0.69                     | 0.001** |
| At 36 weeks         | 10.5±0.91                       | 8.94±0.61                     | 0.001** |
| **Fundal height (in cm)** |                                |                               |         |
| At 16 weeks         | 16.69±0.96                      | 16.68±0.94                    | 0.9531  |
| At 24 weeks         | 23.57±1.62                      | 23.56±1.6                     | 0.9723  |
| At 28 weeks         | 28.36±0.90                      | 28.23±0.98                    | 0.4391  |
| At 32 weeks         | 32.9±0.83                       | 32.76±1.06                    | 0.4085  |
| At 36 weeks         | 35.7±0.45                       | 35.7±0.45                     | 0.384   |
| **Fetal Heart Rate (bpm)** |                                |                               |         |
| At 16 weeks         | 141.88±2.13                     | 142±1.76                      | 0.014*  |
| At 24 weeks         | 142.27±1.64                     | 142.2±1.63                    | 0.8107  |
| At 28 weeks         | 142±1.64                        | 142.03±1.67                   | 0.9192  |
| At 32 weeks         | 141.67±1.80                     | 141.77±1.84                   | 0.7885  |
| At 36 weeks         | 142.58±5.85                     | 149.50±7.9                    | 0.001** |
| **Presence of Fetal Movements** | Yes No | Yes No |         |
| At 24 Weeks         | 66 (100%) 0                     | 60 (100%) 0                   | 1.000   |
| At 28 Weeks         | 66 (100%) 0                     | 60 (100%) 0                   | 1.000   |
| At 32 Weeks         | 66 (100%) 0                     | 58 (96.67%) 2 (3.33%)         | 0.4345  |
| At 36 Weeks         | 66 (100%) 0                     | 60 (100%) 0                   | 1.000   |

**Significant at 0.001 level *Significant at 0.05 level**
Figure 1. Mean Gain in Weight and Hemoglobin among Subjects of Experimental and Control Group at Various Weeks of Gestation

Figure 2. Mean Fundal Height and Fetal Heart Rate among Subjects of Experimental and Control Groups at Various Weeks of Gestation

Table 3. Comparison of Maternal Outcome Variables between Experimental and Control Group of Subjects

| Maternal Outcome Variables | Categories | Experimental Group (n1=66) | Control Group (n2=60) | Odds Ratio (OR) | p-value |
|----------------------------|------------|---------------------------|----------------------|----------------|---------|
| Gain in weight             | Normal     | 59 (89.39%)               | 24 (40%)             | Reference      | 0.001** |
|                            | Average    | 5 (7.57%)                 | 21 (35%)             |                |         |
|                            | Below normal | 2 (3.03%)            | 15 (25%)             |                |         |
| Gain in Hemoglobin         | Normal     | 52 (78.78%)               | 20 (33.33%)          | Reference      | 0.001** |
|                            | Average    | 14 (21.22%)               | 30 (50%)             |                |         |
|                            | Below normal | 0                          | 10 (16.67%)          |                |         |
| Fetal Distress             | Absent     | 59 (89.39%)               | 30 (50%)             | Reference      | 0.001** |
|                            | Mild Distress | 7 (10.61%)              | 28 (46.67%)          |                |         |
|                            | Severe Distress | 0                        | 2 (3.33%)            |                |         |
| Need for Blood Transfusion | No.        | 55 (83.33%)               | 41 (68.33%)          | Reference      | 0.006** |
|                            | 1–2 Transfusions | 8 (12.12%)           | 19 (31.67%)          |                |         |
|                            | >2 Transfusions | 3 (4.55%)               | 0                     |                |         |
| Emergency Hospitalization  | No.        | 55 (83.33%)               | 36 (60%)             | Reference      | 0.004** |
|                            | Once/Twice | 8 (12.12%)                | 22 (36.67%)          |                |         |
|                            | >Twice     | 3 (4.55%)                 | 2 (3.33%)            |                |         |

** p>0.05, highly significant at 0.05 level of significance
Discussion and Conclusion

Socio-demographic characteristics, i.e., age, socio-economic status, exposure to smoke, nutritional status, number of living children, gravidity and number of living children did not reveal any significant difference between the experimental and control group. Mufti and Qadir in their studies obtained similar observations. Present study indicated that high percentage of subjects had average nutritional status. Amin and Imtiyaz studied correlation of maternal factors like age, literacy, income, type of family, Hb level and antenatal care on the nutritional status of pregnant women and found that majority of women had average nutritional status.

The study revealed gain in weight and Hb in study group. Similar results were shown in a study conducted by Spong on pregnancy outcome of 8293 pregnant women including first-time mothers in the US at multiple sites, reported normal weight gain and gain in hemoglobin among 17.5% women who attended counselling sessions during pregnancy.

The mean fundal height of subjects at various weeks of gestation did not show any significant difference between the experimental and control groups. These findings were consistent with the findings of a study conducted by Gardosi and Francis who did a controlled trial of fundal height measurements and studied effectiveness of interventions to improve diet and weight gain among adolescent gravidas.

They reported that pregnancy in adolescents who received diet counselling had better pregnancy period, increase in weight and gain in fundal height.

Amin and Ali reported that anemic women with hemoglobin level <10 g% had comparatively less weight gain than non-anemic women; thus these findings are in conformity with findings of the present study. The present study shows that fetal distress was absent among majority of subjects in experimental group (89.39%, P<0.001). The findings of the study of Maria reported similar results during her study on antenatal evaluation of the fetus by fetal movement monitoring and fetal kick count chart. She reported that incidences of fetal complications were reduced to 88% by recommending self-fetal monitoring.

Experimental group subjects needed 2.99 times less blood transfusions and less emergency hospitalization than control group subjects (P<0.01). Similar findings have been revealed by the study of Gupta et al. who made comparison between experimental group and control group of anemic pregnant women after iron supplementation and dietary counselling and observed that anemic pregnant women in control group needed more admissions in hospital for blood transfusion, due to fetal distress or early rupture of membranes; however, experimental group needed no transfusions.

In the present study, majority of subjects in experimental group (79.87%) delivered babies by normal vaginal delivery

Table 4. Comparison of Neonatal Outcome Variables between Experimental and Control Group of Subjects

| Neonatal Outcome Variables | Categories                | Experimental Group (n=66) | Control Group (n=60) | Odds Ratio (OR) | p-value |
|----------------------------|---------------------------|---------------------------|---------------------|----------------|---------|
| Mode of Delivery           | Normal vaginal            | 54 (81.82%)               | 36 (60%)            | 3              | 0.007** |
|                            | Assisted caesarean        | 0                         | 0                   |                |         |
|                            |                           | 12 (18.18%)               | 24 (40%)            |                |         |
| Birth status Live/dead     | Without distress          | 57 (86.36%)               | 39 (65%)            | 3.41           | 0.005** |
|                            | With distress             | 9 (13.64%)                | 21 (35%)            |                |         |
|                            | Still birth               | 0                         | 0                   |                |         |
| Gestational Age            | Full term                 | 59 (89.39%)               | 46 (76.67%)         | 1.64           | 0.032*  |
|                            | Preterm                   | 7 (10.61%)                | 9 (15%)             | 5 (8.33%)      |         |
|                            | Very preterm              | 0                         | 0                   | Reference      |         |
| Birth Weight               | Normal                    | 55 (83.33%)               | 54 (90%)            | Reference      | 0.55    |
|                            | Moderate LBW              | 11 (16.67%)               | 6 (10%)             | 0.123          |         |
|                            | Very LBW                  | 0                         | 0                   | Reference      |         |
| APGAR Score                | Normal                    | 57 (86.35%)               | 30 (50%)            | Reference      | 5.7     |
|                            | Mild asphyxia             | 7 (10.61%)                | 21 (35%)            | 8.55           |         |
|                            | Severe asphyxia           | 2 (3.03%)                 | 9 (15%)             |                |         |
| Early Neonatal Condition   | Good                      | 63 (95.45%)               | 42 (70%)            | Reference      | 7       |
|                            | Average                   | 3 (4.55%)                 | 14 (23.33%)         | 13.44          |         |
|                            | Poor                      | 0                         | 4 (6.67%)           |                |         |

**p>0.05, highly significant at 0.05 level of significance
as compared to control group (55.63%; p<0.01). Patroci et al., while studying number of antenatal visits and perinatal outcome reported a significant association between the number of antenatal visits and delivery by caesarean section. The more antenatal visits the mother made, the less was the incidence of operative deliveries.

Birth status in the present study indicates that majority of subjects in experimental group (97.31%) delivered live babies without distress as compared to control group (49.29%), whereas majority of subjects in control group delivered live babies with distress (40.14%). Bodole et al., reported birth of premature and distressed babies more in women who had inadequate dietary intake. They also reported increased incidences of caesarean section. Rather et al., while studying pregnancy outcome in severe anemia found that anemic women delivered small babies who were distressed (p<0.05).

The present study reveals that majority of subjects in experimental group (87.25%) and control group (67.71%) delivered full-term babies. The estimated odds ratio (OR=1.85) indicates that experimental group subjects delivered full-term babies only 1.85 times more than the control group subjects. As many as 18.31% and 3.52% subjects in control group delivered both preterm and very-preterm babies respectively as compared to experimental group (12.75%). This indicates the effectiveness of intervention. Similar observations were made by Dodds et al.

The present study reveals that majority of subjects in experimental group (83.22%) delivered normal birth weight babies as compared to control group (66.90%), and as many as 22.54% and 10.56% subjects in control group delivered low-birth-weight and very-low-birth-weight babies, thus showing that intervention was effective. Patroci et al. reported number of antenatal visits and perinatal outcomes reported a significant association between the number of antenatal visits and low birth weight at the level of p<0.001.

This study indicates that majority of subjects in experimental group (83.22%) delivered babies with normal APGAR score (8–10) as compared to control group (47.89%), whereas most of the subjects in control group delivered babies with mild asphyxia (32.39%) or severe asphyxia (19.72%). Thus intervention was effective on experimental subjects. Mani studied the effects of relaxation technique on maternal and neonatal outcome in a selected group of antenatal primipara mothers and reported more number of normal deliveries among experimental group whose babies had higher mean APGAR score at birth as compared to control group.

Thailamlong, who made a systematic review of nursing interventions to prevent preterm birth, found that pregnancy was prolonged among high-risk group of women belonging to intervention group and their neonates had better neonatal period than neonates of non-intervention group.

The study conducted by Villar et al. reported that routine iron supplementation prevented maternal anemia in experimental group and babies were born at term with normal birth weight who had satisfactory outcome as compared to control group.

**Association of Pregnancy Outcome Variables with Socio-Demographic Characteristics**

There was highest association of gain in weight in subjects with good nutritional status (OR=5.48; CI=1.262–23.803) than subjects with fair nutritional status. Least association of gain in weight was observed in subjects with age group of 20–30 years (OR=0.308; CI=0.121–0.783) in comparison to age group of >30 years of subjects (p<0.05). The study indicated no significant association of weight gain with socio-economic status and gravidity of subjects. It is evident that nutritional intake remains a major attribute to influence weight gain, especially in middle socio-economic class. Thus dietary advice during pregnancy is an essential aspect to improve pregnancy outcome. Kousar reported that only maternal age and dietary calorie intake were found to have significant effect on weight gain (p<0.001). It was reported that 26% mothers belonged to <20 years of age and had the lowest weight gain of 7.0±1.85 kg. As the age advanced, the weight gain also increased being 7.83±2.01 kg in the 21–25 years age group and 9.16±2.05 kg in the 26–30 years age group. With regard to socio-economic class, maximum weight gain has been seen in mothers belonging to SES class I, i.e., 10.6±2.6 kg, and the least weight gain in mothers who belonged to SES class IV, i.e., 7.09±0.18 kg.

The study indicated no significant association of need for blood transfusion and emergency hospitalization with age, socio-economic status, nutritional status and gravidity of subjects. The observations made by Singh and Yangzom et al. are similar to the findings of present study. They reported that blood transfusion was needed by women with low hemoglobin irrespective of their age group. Their findings revealed that fetal distress was not associated with age and socio-economic status, though nutritional status and gravidity of mother is found to have some effect to produce fetal distress.

The study indicated significant association of mode of delivery with subjects of high socio-economic status who delivered babies 4.712 times more by caesarean section than low socio-economic subjects (p<0.05), which may be related to their sedentary lifestyle. The present study findings are also endorsed by Qadir and Pushparaj and Maheshwari who have shown significant association of socio-economic status with mode of delivery.
Regarding gestational age, subjects with middle socio-economic status delivered 2.699 times more full-term babies than low socio-economic subjects (p<0.05), which may be probably due to good nutritional status in middle class. Primigravida subjects delivered 2.296 times more full-term babies than multigravida subjects (p<0.05) and second gravida was significantly associated with low birth weight which indicates that high parity leads to delivery of baby who is preterm and has low birth weight. There was highest association of normal birth weight with subjects who were second gravida (p<0.05). Second gravida subjects delivered 2.517 times more babies with normal birth weight than multigravida subjects (p<0.05). The study indicates no significant association of birth weight of baby with age, socio-economic status, and nutritional status of subjects. The present study findings are also endorsed by Qadir and Pushparaj and Maheshwari who have shown significant association of socio-economic status with birth status, gestational age, and birth weight. Anemic mothers with poor dietary intake delivered prematurely as reported by Yangzom et al.

The burden of nutritional anemia in pregnant population is alarmingly high. Severe maternal anemia is associated with preterm birth, low birth weight and small for gestational age infants, as well as low Apgar score and high perinatal mortality. The findings revealed the highest association of gain in weight in subjects with good nutritional status during pregnancy in subjects from middle socio-economic status. Thus dietary advice during pregnancy is an essential aspect to improve pregnancy outcome. Primigravida subjects delivered more full-term babies than multigravida subjects and second gravida was significantly associated with low birth weight, which indicates that high parity leads to delivery of baby who is preterm and has low birth weight. It is found that supplementations alone do not improve the birth outcome but should be supported with verbal information, discussion, and written information. It indicates that nurses are not able to address the problems of high-risk group of women in highly crowded antenatal clinics and cannot counsel them, which may be probably due to posting of one staff nurse in antenatal clinic who remains busy in immunizing and giving iron infusions.

**Conflict of interest:** None

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