

## High risk profile of antenatal mother with special focus on Anemia: A hospital based cross sectional study

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Received: 10<sup>th</sup> September, 2018

Accepted: 31<sup>st</sup> December, 2018

### Abstract

**Aim:** Study aimed to identify prevalence of risk of anemia in pregnancies in institutional antenatal coverage.

**Materials and Methods:** study performed hospital based cross sectional analysis of 8065 antenatal women, who had attended antenatal care programme from Jan 2016-Dec 2016. High Risk factors were identified based on age, multiparity, High blood pressure (SBP>120 mmHg, DBP>80 mmHg), weight of mother at first antenatal visit, lower Hb level (<11 mg/dl) and previous history of pregnancy complications or adverse outcome. Statistical analysis was performed using EPI Info v 7 software. P<0.05 was considered as significance criteria.

**Results:** Out of total 8065 pregnant women attending antenatal care clinic, 2525 women (31.31%, 95% CI 30.3% - 32.34%) were identified to be anemic- a major risk factor in the study. The study population's mean age was 23.5+-3.5 years with majority of adolescent age group. Significant associations were observed between anaemia, literacy level of mother, economic status and location. The prevalence for sickle cell population was 2.43% (95% CI 2.11%-2.8%).

**Conclusion:** This study presented anemia as major risk factor in antenatal women, imposing greater need of targeted clinical attention. It is recommended to promote awareness on iron deficiency and its implications to avert cases of anemia.

**Keywords:** High risk pregnancy, Elderly primigravida, Weight of mother, Previous history of LACS.

### Introduction

Safe motherhood is a universal concern for developing and developed countries.<sup>1</sup> According to UNDP<sup>2</sup> (United National Development Programme), Sustainable Development Goal-3 have been identified with aim of Good Health and Well-being with further elaboration on reducing maternal mortality and child mortality. It is universal fact that Antenatal care (ANC) plays an instrumental role in maternal and child safety.<sup>3</sup> The major risk observed in pregnant women is iron deficiency anemia.<sup>4</sup> According to WHO, global prevalence of anemia is 24.8%.<sup>5</sup> Iron deficiency during Pregnancy is a common phenomenon. Studies have demonstrated association between poor pregnancy outcomes and anemia.<sup>6-8</sup> It is also evident that iron deficiency anemia is reversible with proper nutritional supplements. However, it remains poorly diagnosed, resulting in negative consequences.

Previous studies have evaluated association of various attributing factors to maternal mortality and various models of Antenatal Care in western as well as LMIC population.<sup>9,10</sup> Being factor influencing 2/3 of total pregnant population of LMIC,<sup>11</sup> anemia has been given paramount importance in maternal health. A national level government programme aimed at better pregnancy outcome named *Pradhan Mantri Swastha Matritva Abhiyaan* has delineated anemia as one of the high risk factor in pregnancies.<sup>12</sup> Timely diagnosis and screening of high risk pregnant women including anemic cases has great impact with reduction in number of deaths associated with such pregnancies.<sup>13</sup> Studies have considered clinical data from antenatal clinics as source of information

of such risk prevalence estimation.<sup>14,15</sup> However, very few researchers have addressed rural population from western region of India as target for studies. Moreover, there remains need of corroboration of fact of anemia being factor of high risk.

The present study performed data analysis from registry data of project titled as "Healthy Mother to Healthy Child" which was initiated in 2015 by institute. The present study objective was to study the profile of pregnant women in context to anemia risk in pregnancy amongst women attending tertiary care hospital in district Vadodara, Gujarat.

### Materials and Methods

This study was part of big project title 'Healthy Mother to Healthy Child' of Sumandeep Vidyapeeth, a deemed to be university, Piparia Gujarat. The study was approved by Sumandeep Vidyapeeth Institutional Ethics Committee (SVIEC).

This study was conducted at tertiary care hospital - Dhiraj Hospital, affiliated with Sumandeep Vidyapeeth Piparia, Vadodara Gujarat. For present study the data from 1<sup>st</sup> January to 31<sup>st</sup> December 2016 was analysed. During the year 2016, total 8065 new pregnant women who availed benefit of antenatal care services Dhiraj Hospital. The present study was cross-sectional hospital based study.

A pilot pre-validated questionnaire containing socio-demographic information, previous clinical history, details about history of current pregnancy with medical information, recommended clinical investigations during antenatal period and risk factors that associated with current

pregnancy was filled by resident doctors for every new ANC. The same information was entered in electronic format using HMHC software (Own software developed in house.)

Data of 8065 beneficiaries was retrieved from “Healthy Mother to Healthy Child” project’s software. After two-level data validation by independent research associates, retrospective analysis was performed using Microsoft Excel and EPI info version 7.

For summarized representation of baseline characteristics, descriptive statistics was used. Variables’ association was evaluated using Chi-Square test. P value

less than 0.05 was considered as significance criteria. Outcomes were presented in form of level of significance and Odds ratio/risk ratio as applicable.

## Results

Total 8065 pregnant women between 19-39 years attended antenatal care with their first visit during January 2016 – December 2016. The mean age for the study population was 23.5+3.5 years. The details about demographic analysis are as follows:

**Table 1: Basic information about antenatal women attending hospital**

| Parameter                    | Proportion of Population (N=8065)(no. s) | % (95% CI)             |
|------------------------------|--|------------------------|
| Women with Literacy          | 7059                                     | 87.53% (86.78%-88.24%) |
| Women with Illiterate Status | 1006                                     | 12.47% (11.76%-13.22%) |
| Women from Hindu Religion    | 6409                                     | 79.47% (78.57%-80.34%) |
| Women from Other Religions   | 1656                                     | 20.53% (19.66%-23.41%) |
| Primigravida pregnancies     | 3269                                     | 40.53% (39.46%-41.61%) |
| Multigravida pregnancies     | 4796                                     | 59.47% (58.39%-60.54%) |
| Women from Joint Families    | 6966                                     | 86.37% (85.60%-87.11%) |
| Women from Nuclear Families  | 1099                                     | 13.63% (12.89%-14.40%) |
| Women from Rural Population  | 3322                                     | 41.19% (40.11%-42.27%) |
| Women from Urban Population  | 4743                                     | 58.81% (57.73%-59.89%) |
| Women with BPL card access   | 3928                                     | 48.70% (47.60%-49.80%) |
| Women with APL status        | 4137                                     | 51.30% (50.20%-52.40%) |

It was observed that majority of pregnant women were more than 20 years (n=7606, 94.30% 95% CI 93.78% - 94.8%). Also majority of women were from Joint Family type (n=6966). Religionwise, Hindu Population was predominant (n=6409) as compared to population from other religions (n=1656). More number of women was observed to belong from joint families (n=6966) and from urban settings (n=4743). Out of total 8065 pregnant women, 42.05% women (n=3269) were found to fall in category of

primigravida. 48.70% was found to have access to Below Poverty Line (BPL) economic benefit card, implying to be socio-economically poor population (n=3928).

## Risk in Pregnancies

Out of 8065 antenatal women, total 2525(31.31%; 30.3% - 32.34%) pregnancies with risk of anemia were identified in present study. Another risk factors’ prevalence is as follows:

**Table 2: Distribution of high risk factors in ANC mothers (individual factor’s prevalence)**

| Risk Factor   | No. of patients (%; CI)(N=5831 out of 8065) |
|---|---|
| Age greater than 35 years and Primigravida (First Time Pregnancy) | 5 (0.06%; 0.02% - 0.15%)                    |
| Weight less than 40 kg  | 584(7.24%; 6.69% -7.83%)                    |
| Hypertension  | 86(1.07%; 0.86% - 1.33%)                    |
| Hb less than 11 mg/dl(Anemia)                                     | 2525(31.31%; 30.3% - 32.34%)                |
| Parity>= 4  | 91(1.13%; 0.92% - 1.39%)                    |
| History of previous LSCS  | 164(2.03%; 1.74% - 2.37%)                   |
| Sickle Cell   | 191(2.43%; (2.11% - 2.8%)                   |

**Table 3: Association of anaemia with various socio-demographic characteristics of population**

| Characteristic | Presence of Anemia(Hb<11 mg/dl)N=8065 |           |         |         | Interpretation |
|----------------|---------------------------------------|-----------|---------|---------|----------------|
|                | Yes (2525)                            | No (5540) | Chi-Sq. | P value |                |
| Age            |                                       |           |         |         |                |
| <20            | 178                                   | 323       | 9.56    | 0.002   | Significant*   |
| 20 to 25       | 1805                                  | 3885      |         |         |                |
| >25            | 542                                   | 1332      |         |         |                |

|                                   |      |      |       |        |                      |
|-----------------------------------|------|------|-------|--------|----------------------|
| <i>Education of Mother</i>        |      |      |       |        |                      |
| illiterate                        | 359  | 647  | 10.01 | 0.0016 | Significant*         |
| literate                          | 2166 | 4893 |       |        |                      |
| <i>Education of Father</i>        |      |      |       |        |                      |
| illiterate                        | 215  | 405  | 3.38  | 0.066  | Non-significant      |
| literate                          | 2310 | 5135 |       |        |                      |
| <i>Family Type</i>                |      |      |       |        |                      |
| Joint Family                      | 2160 | 4806 | 2.04  | 0.1532 | Non-significant      |
| Nuclear Family                    | 365  | 734  |       |        |                      |
| <i>Religion</i>                   |      |      |       |        |                      |
| Hindu                             | 2010 | 4399 | 0.03  | 0.8625 | Non-significant      |
| Others                            | 515  | 1141 |       |        |                      |
| <i>Entitlement of BPL benefit</i> |      |      |       |        |                      |
| With BPL                          | 1306 | 2622 | 13.23 | 0.0003 | Significant*         |
| w/O BPL                           | 1219 | 2918 |       |        |                      |
| <i>Parity</i>                     |      |      |       |        |                      |
| Single Parity                     | 1010 | 2259 | 0.4   | 0.5271 | Non-significant      |
| Multi-Parity                      | 1515 | 3281 |       |        |                      |
| <i>Location</i>                   |      |      |       |        |                      |
| Rural                             | 1612 | 2987 | 69.31 | <.0001 | Highly Significant** |
| Urban                             | 913  | 2553 |       |        |                      |

It was found that the literacy level of mother and BPL card access were significantly associated with the presence of anaemia, which in turn indicated poverty as a predictor of anaemia during pregnancy. Moreover, it was observed that age distribution had significant differences in anemic and non-anemic groups. However, the nature of correlation was not possible to be established.

## Discussion

The data of 8065 pregnant women who attended antenatal care was analysed. The study revealed that out of total population, 31.31% women presented manifestations of anemia associated risk in pregnancy. Similar study by Taner CE et al.<sup>16</sup> and Charles, A.M.<sup>17</sup> presented 41.6% and 39.94% prevalence. The difference in results could be because of difference in sample size. It was also observed that LSCS deliveries in previous pregnancy were only 2.3% of total study population. Moreover, hypertension, elderly primigravida, lower prepregnancy weight or grand multiparity did not play major role in manifestation of high risk in pregnancy cohort.

Thus, the high risk was characterized in form of anemia (Hb<11 mg/dl) with 31.31% prevalence in pregnancy population. The fact was also substantiated by World Health Statistics Report 2016<sup>18</sup> by World Health Organization, which presented the prevalence of anemia in pregnant women in 2016 as 50%. Bora, R. et al. reported 89.6% of pregnant women in their study had Hb less than 11 gm/dl.<sup>19</sup> Another study from rural India by Ahankari, A., S., et al. reported 77% of pregnant women were anaemic.<sup>20</sup> The point prevalence of anemia in our study was 31.31% (30.39%-32.22%), whereas Suryanarayana, R., et al., Siddiqui, M.Z., et al. and Agarwal, K.N., et al. found 62.3%,<sup>21</sup> 59%<sup>22</sup> and 57.8%<sup>23</sup> prevalence of anemia in respective manner. This also corresponds to the findings of NFHS-4, which is 55%.<sup>24</sup>

The vast difference in sample size could be the predictor for such outcome discrepancies. However, our study was found to have prevalence of anemia within range stated in published literature (33% to 89%).<sup>25</sup> There was equal distribution of anemia without confounding effect of gender, type of family (joint or nuclear) and religion in study population. However, it was found to have influence due to age, literacy level of mother and entitlement of BPL benefits. Thus, poverty could be considered as strong determinant of anemia especially in under-resourced settings. The reduced level of anemia prevalence could be attributed to counselling during antenatal period and awareness of iron folic supplementation during pregnancy to avoid consequences due to nutrition deficiency.<sup>26</sup> The incidence of sickle cell anemia cases was 2.43%, whereas estimated prevalence range as per Sickle Cell Anemia Control Program for Gujarat by National Health Mission, Gujarat<sup>27</sup> is 0-30%. Similarly, a community based study by Desai, G., et al. in 2017<sup>28</sup> also presented that 1.2% tribal deliveries were sickle cell.

The prevalence of hypertension in pregnancies in present study (1.07%) was comparable to that found in studies by Umesawa, M., et al.<sup>29</sup> and Mehta, B., et al.<sup>30</sup> which was in range of 5% to 8%. This hypertension could be pregnancy induced or because of any other pathological reasons. Unfortunately, due to time and methodology constraints, it was not possible to establish and validate causal relationship and identify potential predictors of hypertension. Present study found lower proportion of elderly primigravida to that presented in other evidence found in NFHS-4 and Sailakshmi, M.,P.,A., et al. (0.06% versus 1.76% and 1.6%).<sup>24,31</sup> Noticeable difference was observed in terms of proportions of women with prepregnancy weight less than 40 kg in current study in their first antenatal visit and the study by Agarwal, G., et al. in

2012. (32)(7.24% versus 26.12%). The difference could be because of nature of the study as well as large difference in sample sizes of both the studies.

Present study showed that 164 women (2.03%) presented previous history of LSCS. Whereas, Balachandran, L., et al.<sup>33</sup> and Sivach, S. et al.<sup>34</sup> reported that 16.5% and 9.43% of total study subjects had history of previous LSCS, respectively. This could be considered as a result of promotion of best practices for safe delivery with skills and help of front line health workers.

Our Study has several limitations: i) Study population: We considered all the women who attended antenatal clinic for ANC care. As hospital study, comparability was not evaluated with real-world antenatal population of area in terms of risk factors prevalence for every characteristic. This could be considered as source of selection bias in our study,<sup>35</sup> with a possible deterrant of study results extrapolation. ii) Risk factor's scope of inclusion: In present study, based on available data, it was possible to focus for high-risk pregnancy screening on few risk factors: 1. Mother's Weight 2. Age 3. Multi-parity 4. Hypertension 5. Anemia and 6. Previous history of LSCS and 7. Sickle cell anemia, which was found to be a small subset of detailed recommended list of risk factors to be assessed as per standard guidelines for *Pradhan Mantri Surakshit Matritva Abhiyan*. It is admitted that comprehensive assessment could increase sensitivity of high risk pregnancy screening. iii) Most of the pregnancy outcomes research presented weight in form of BMI, which is more realistic morphological measure. Due to paucity of data, it was not possible to calculate BMI for present study. iii) Data Validation and cross-verification: As this project was conducted at very large scale, it was not possible to audit the data at every process node. Thus, cautious and contextual interpretation of the results is highly recommended.

## Conclusion

Cross sectional analysis was presented of 8065 women who attended antenatal clinic at tertiary care hospital. This snapshot showed that there was increased pregnancy risk in terms of lower-pre pregnancy weight and anaemic conditions. As anaemia was not found to be significantly associated with maternal literacy, age, economic status and location, poverty could be considered as an important determinant of iron deficiency anemia and thereby a strong case for evidence informed policy interventions in area of anemia prevention for better maternal outcomes.

**Conflict of Interest:** None.

## References

1. AbouZahr C. Safe Motherhood: a brief history of the global movement 1947-2002. *Br Med Bull* 2003;67(1):13-25.
2. World Health Organization. WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience Geneva World Health Organization 2016.
3. Omer K, Afi NJ, Baba MC, Adamu M, Malami SA, Oyo-Ita A, et al. Seeking evidence to support efforts to increase use of antenatal care: a cross-sectional study in two states of Nigeria. *BMC Pregnancy Childbirth* 2014;14:380.
4. Baby A, Venugopal J, D'silva R, Chacko S, Vineesha P, Kumary T. Knowledge on management of anemia during pregnancy: A descriptive study. *Arch Med Health Sci* 2014;2(2):140-144.
5. World Health Organization. Worldwide prevalence on anaemia 1993-2005 [updated 2018/07/11/09:27:49]. Available from: [http://www.who.int/vmnis/database/anaemia/anaemia\\_status\\_summary/en/](http://www.who.int/vmnis/database/anaemia/anaemia_status_summary/en/).
6. Allen LH. Anemia and iron deficiency: effects on pregnancy outcome. *The American journal of clinical nutrition*. 2000;71(5 Suppl):1280s-1284s.
7. Alayed N, Kezouh A, Oddy L, Abenhaim HA. Sickle cell disease and pregnancy outcomes: population-based study on 8.8 million births. *J Perinat Med* 2014;42(4):487-492.
8. Cantor AG, Bougatsos C, Dana T, Blazina I, McDonagh M. Routine iron supplementation and screening for iron deficiency anemia in pregnancy: a systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med* 2015;162(8):566-576.
9. Amo-Adjei J, Aduo-Adjei K, Opoku-Nyamah C, Izugbara C. Analysis of socioeconomic differences in the quality of antenatal services in low and middle-income countries (LMICs). *PloS one* 2018;13(2):e0192513.
10. Abir T, Ogbo FA, Stevens GJ, Page AN, Milton AH, Agho KE. The impact of antenatal care, iron-folic acid supplementation and tetanus toxoid vaccination during pregnancy on child mortality in Bangladesh. *PloS one* 2017;12(11):e0187090.
11. Baig-Ansari N, Badruddin SH, Karmaliani R, Harris H, Jehan I, Pasha O, et al. Anemia prevalence and risk factors in pregnant women in an urban area of Pakistan. *Food Nutr Bull* 2008;29(2):132-139.
12. MoHFW (Government of India). High Risk Conditions in Pregnancy (Modified)Final In: National Health Portal, editor. New Delhi MoHFW, GoI; 201.
13. Brooton D, Youngblut JM, Donahue D, Hamilton M, Hannan J, Neff DF. Women with High-Risk Pregnancies, Problems, and APN Interventions. *J Nurs Scholarsh* 2007;39(4):349-357.
14. Getahun W, Belachew T, Wolide AD. Burden and associated factors of anemia among pregnant women attending antenatal care in southern Ethiopia: cross sectional study. *BMC Res Notes* 2017;10:276.
15. Tadesse SE, Seid O, G/Mariam Y, Fekadu A, Wasihun Y, Endris K, et al. Determinants of anemia among pregnant mothers attending antenatal care in Dessie town health facilities, northern central Ethiopia, unmatched case -control study. *PloS one* 2017;12(3):e0173173.
16. Taner CE, Ekin A, Solmaz U, Gezer C, Çetin B, Keleşoğlu M, et al. Prevalence and risk factors of anemia among pregnant women attending a high-volume tertiary care center for delivery. *J Turk Ger Gynecol Assoc* 2015;16(4):231-236.
17. Charles AM, Campbell-Stennett D, Yatich N, Jolly PE. Predictors of anemia among pregnant women in Westmoreland, Jamaica. *Health Care Women Int* 2010;31(7):585-598.
18. World Health Organization. World Health Statistics 2016 Report 2016. Available from: <https://data.worldbank.org/indicator/SH.PRG.ANEM>.
19. Bora R, Sable C, Wolfson J, Boro K, Rao R. Prevalence of anemia in pregnant women and its effect on neonatal outcomes in Northeast India. *J Matern Fetal Neonatal Med* 2014;27(9):887-891.
20. Ahankari AS, Myles PR, Dixit JV, Tata LJ, Fogarty AW. Risk factors for maternal anaemia and low birth weight in pregnant women living in rural India: a prospective cohort study. *Public Health* 2017;151:63-73.

21. Suryanarayana R, Chandrappa M, Santhuram A, Prathima S, Sheela S. Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. *J Fam Med Prim Care* 2017;6(4):739-743.
22. Siddiqui MZ, Goli S, Reja T, Doshi R, Chakravorty S, Tiwari C, et al. Prevalence of Anemia and Its Determinants Among Pregnant, Lactating, and Nonpregnant Nonlactating Women in India. *SAGE Open*. 2017;7(3):2158244017725555.
23. Agarwal KN, Agarwal DK, Sharma A, Sharma K, Prasad K, Kalita MC, et al. Prevalence of anaemia in pregnant & lactating women in India. *Indian J Med Res* 2006;124(2):173-184.
24. International Institute of Population Sciences India. National Family Health Survey(NFHS-4), 2015-16. Mumbai IIPS; 2017. Available from: <http://rchiips.org/NFHS/NFHS-4Reports/Gujarat.pdf>.
25. Toteja GS, Singh P, Dhillon BS, Saxena BN, Ahmed FU, Singh RP, et al. Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. *Food Nutr Bull* 2006;27(4):311-315.
26. Vander Jagt DJ, Brock HS, Melah GS, El-Nafaty AU, Crossey MJ, Glew RH. Nutritional Factors Associated with Anaemia in Pregnant Women in Northern Nigeria. *J Health, Popul Nutr* 2007;25(1):75-81.
27. National Health Mission (Gujarat). Sickle Cell Anemia Control Program [cited 2018 24/5/2018]. Available from: <https://nrhm.gujarat.gov.in/sickle-cell.htm>
28. Desai G, Anand A, Shah P, Shah S, Dave K, Bhatt H, et al. Sickle cell disease and pregnancy outcomes: a study of the community-based hospital in a tribal block of Gujarat, India. *J Health, Popul Nutr* 2017;36:3.
29. Umesawa M, Kobashi G. Epidemiology of hypertensive disorders in pregnancy: prevalence, risk factors, predictors and prognosis. *Hypertension research: J Jpn Soc Hypertens* 2017;40(3):213-220.
30. Mehta B, Kumar V, Chawla S, Sachdeva S, Mahopatra D. Hypertension in Pregnancy: A Community-Based Study. *Indian J Community Med* 2015;40(4):273-278.
31. M.P.A Sailakshmi PS, R. Nagarathamma. Observational Study of Maternal and Fetal Outcome in Elderly Primigravida. *Int J Sci Res* 2017;3(6):1558-1560.
32. Gagan A, Sartaj A, Kapil G, Vijay Kumar, Parul G. Maternal Risk Factors Associated with Low Birth Weight Neonates in a Tertiary Care Hospital, Northern India. *J Community Med Health Educ* 2012;2:177. doi:10.4172/2161-0711.1000177
33. Balachandran L, Vaswani PR, Mogotlane R. Pregnancy Outcome in Women with Previous One Cesarean Section. *J Clin Diagn Res* 2014;8(2):99-102.
34. S S, P L, V S, Shivani, R K, R M. To study the outcome of previous one cesarean pregnancies in a rural tertiary center of Haryana, India. *Int J Reprod, Contracept, Obstet Gynecol* 2017;6(11):5008.
35. Thygesen LC, Erbsoll AK. When the entire population is the sample: strengths and limitations in register-based epidemiology. *Eur J Epidemiol* 2014;29(8):551-558.

**How to cite this article:** Chandrayan P, Shah V, Pandit N, Varghese R. High risk profile of antenatal mother with special focus on Anemia: A hospital based cross sectional study. *Indian J Obstet Gynecol Res* 2019;6(1):63-67.