

Correlations of APNCU index and fetomaternal outcome in tribal area of Chhattisgarh

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Abstract

Objective: Adequacy of prenatal care utilization index [APNCU] assesses the adequacy of prenatal care by the time of and number of visits. The present study was conducted with the aim to find out the correlation of APNCU index with fetomaternal outcome in the tribal area of Chhattisgarh. **Material and Method:** This cross sectional observational study was conducted in the newly started medical college of Surguja district which is a tribal area of Chhattisgarh. It involved 400 women with singleton pregnancy who reported in the labor room for delivery. APNCU index was calculated and categorized as 1) Intensive: 110% (>16) received. 2) Adequate: 80% to 109% (13-16), c) Intermediate: 50% to 79% (8-15) and d) Inadequate: < 50% (<8) visits received. Care started by 4th month in first three and after that in the last category. The primary outcome was a composite arithmetic sum of adverse perinatal outcomes including fresh stillbirth, 5-minute Apgar score < 7 and NICU admission as well as the maternal outcome.

Results: 206 (51.5%) had Inadequate APNCU index whereas 187(46.75%) had Intermediate and only 07(1.75%) had Adequate and nobody had intensive index. Composite adverse perinatal outcome was significantly higher in the inadequate group women in comparison to intermediate and adequate groups. These cases also had poorer maternal outcome. Poverty, illiteracy and social/cultural taboos and access to antenatal care were the main reasons for poor PNC indices in our study.

Conclusion: Prenatal care is important to improve the fetomaternal outcome but needs awareness and optimization in tribal area of Chhattisgarh.

Keywords: APNCU, Fetomaternal outcome etc.

1. Introduction

Prenatal care has a history of more than 100 years. It is currently among the most important services provided by health care system and its use is gaining increasing popularity. The purpose of prenatal care is to deliver a healthy newborn without jeopardizing the mother's health.[1] WHO has estimated that more than 500,000 mothers die each year because of pregnancy and related complications. Nearly 88% to 98% of all maternal deaths can be avoided by proper care during pregnancy and labour. Around seven millions of perinatal deaths in the developing countries were due to maternal health problems. Four millions were still birth and three millions were early neonatal deaths[2] Adequate pre natal care was recognized as an important factor in the reduction of maternal and newborn deaths.[3] WHO has developed specific guidelines regarding the timing and content of prenatal care visit.[4] The new index used for more accurate and comprehensive measurement of prenatal care is called adequacy of prenatal care utilization index [APNCU], this index assesses the adequacy of prenatal

care by the time of and number of visits. APNCU index [referred to Kotelchuck index] is newly measured index comprised of two parts: the month in which PNC is initiated and the number of visit from initiation of care until delivery. The new index does not only measure the quality of service but also quantitative correlating. Prenatal care can be categorized on scale by using the number of visit were initiated. [5] Prenatal care is a comprehensive antepartum care involving a coordinated approach for the well being of the fetus as well as that of mother. Inadequate care during pregnancy leads to undesirable outcomes, including preterm labor and low birth weight, neonatal mortality or morbidity.[6]

Outcome of pregnancy depends, to a large extent, on the availability and effectiveness of antenatal care. In the low resource settings, unskilled care before, during and after child birth, late start and inconsistent attendance of antenatal care is frequently seen. The goal of antenatal is achieved by: detection and early treatment of problems and complications; prevention of complications and diseases; health promotion, preparation for child birth and potential complications.[7] A large majority of

deaths are preventable with three-quarters directly associated to obstetrics complications such as hemorrhage, infections, pregnancy induced hypertension.

Prenatal care is the best strategy to improving of mother and child health. There is no general agreement between the association of prenatal care (PNC) and pregnancy outcome and information about PNC are scarce.[8,9] The situation is assumed to be worse in remote tribal areas. The present study was conducted with the aim to find out the correlation of APNCU index with fetomaternal outcome in the tribal area of Chhattisgarh.

Method and Material

The present study was conducted in Surguja district which is a tribal area of Chhattisgarh between September 2016 to Feb2017 in the recently started Government Medical college Ambikapur. This cross sectional observational study of 400 women with singleton pregnancy was performed at the time of reporting in the labor room for delivery. A complete history was taken including previous antenatal visit, number as well as month of pregnancy in which antenatal care started on the recall basis and documentation. Based on the history and evaluation of her records, a composite measure was assessed based on gestational age, the trimester prenatal care began and the number of prenatal visit made based on ACOG standards of one visit per month till 28 week, one visit every 2 weeks till 36 weeks and after 36 weeks, one visit per week. APNCU index was calculated and categorized in following categories:

Intensive: prenatal care begins by the 4th month and 110% or more of recommended visits (>16) received.

Adequate: prenatal care begins by the 4th month and 80% to 109% of recommended visit (13-16) received.

Intermediate: prenatal care begins by the 4th month and 50% to 79% of recommended visit (8-15) received.

Inadequate: prenatal care begins after the 4th month or less than 50% of recommended visits (<8)

The primary outcome was a *composite* arithmetic sum of adverse perinatal outcomes including fresh stillbirth, 5-minute Apgar score < 7 and NICU admission. A 'born healthy' neonate was defined as a live neonate with 5-minute Apgar ≥7 and no neonatal morbidity.

Secondary outcomes were the individual components of the composite outcome and included serious maternal morbidity or mortality. The women and their neonates were followed up in the post-operative period till their discharge from hospital.

Statistical analysis was done and analyzed using the Statistical Package for Social Sciences (SPSS) version 20 software and presented in figures and tables. Chi square test was used to measure the strength of associations between the APNCU and outcomes.

Statistical significance was defined as a p value of less than or equal to 0.05.

Results

Majority women in the study group were between 18-35 year of age group, belonged to lower- middle income group, from rural area and had only school education. (table -1) Out of 400 women in the study group, maximum i.e. 206 (51.5%) had Inadequate APNCU index whereas 187(46.75%) had Intermediate and only 07(1.75%) Adequate index. None of the women had Intensive APNCU Index. (Table -2).

Table-1 Demographic distribution of cases according to APNCU index grade

| N=400 | Inadequate n=206 | Intermediate n=187 | Adequate n=7 | Intensive n=0 |
|------------------------------|------------------|--------------------|--------------|---------------|
| Age(years) | NO % | NO % | NO % | NO % |
| <18 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 |
| 18-30 | 188 | 180 | 07 | 0 |
| 375 | 50.13% | 48% | 1.86% | 0 |
| >30 | 18 | 07 | 0 | 0 |
| 25 | 72% | 28% | 0 | 0 |
| Socioeconomics Status | | | | |
| <5000 | 89 | 80 | 0 | 0 |
| 169 | 52.6% | 47.33% | 0 | 0 |
| 5000-15000 | 117 | 100 | 03 | 0 |
| 220 | 53.18% | 45.45% | 1.36% | 0 |
| >15000 | 0 | 07 | 04 | 0 |
| 11 | 0 | 63.63% | 36.36% | 0 |
| Residence | | | | |
| Urban | 40 | 50 | 05 | 0 |
| 95 | 42.10% | 52.63% | 5.26% | 0 |
| Rural | 166 | 137 | 02 | 0 |
| 305 | 54.42% | 44.91% | 0.65% | 0 |
| Educational Status | | | | |
| Higher secondary | 193 | 178 | 03 | 0 |
| 374 | 52.02% | 47.97% | 0.80% | 0 |
| Graduate | 13 | 09 | 03 | 0 |
| 25 | 59.09% | 40.90% | 13.63% | 0 |
| Post graduate | 0 | 0 | 01 | 0 |
| 01 | 0 | 0 | 100% | 0 |

Table -2 Distribution of cases according APNCU index

| Apncu Index grade | total number | Percentage |
|-------------------|--------------|------------|
| Inadequate | 206 | 51.5 |
| Intermediate | 187 | 46.75 |
| Adequate | 07 | 1.75 |
| Intensive | 0 | 0 |
| Total | 400 | 100 |

There were 68 (34.18%) preterm births, out of which 58 (29.3%) were live and 10 (4.85%) were still births, All the preterm still births occurred in the inadequate group only.

Table -3 APNCU index and mode of delivery

| APNCU index grade | | | Preterm vaginal delivery | | | | full term vaginal delivery | | | | caesarian section | | | | P value |
|-------------------|------------|------------|--------------------------|--------------|-----------|-------------|----------------------------|-------|-----------|-------------|-------------------|--------------|-----------|--------------|---------|
| | | | alive | | sb | | alive | | sb | | alive | | sb | | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | |
| Inadequate | 206 | 51.5 | 34 | 16.50 | 10 | 4.85 | 118 | 57.28 | 09 | 4.36 | 34 | 16.50 | 01 | 0.48 | |
| Intermediate | 187 | 46.75 | 24 | 12.83 | 0 | 0 | 120 | 64.17 | 1 | 0.53 | 42 | 22.45 | 0 | | |
| Adequate | 7 | 1.75 | 0 | 0 | 0 | 0 | 06 | 85.71 | 0 | | 0 | 0 | 01 | 14.27 | |
| Intensive | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Total | 400 | 100 | 58 | 29.33 | 10 | 4.85 | 244 | | 10 | 4.86 | 76 | 38.95 | 02 | 14.75 | |

<0.05

Table- 4 Distribution of cases according to APNCU index and composite adverse neonatal outcome

| APNCU index grade | | | Apgar <7 at 5 min (nicu admission) | | meconium aspiration (nicu admission) | | Perinatal mortality fresh still births + Early neonatal death | | Composite adverse neonatal outcome |
|-------------------|------------|------------|-------------------------------------|-------------|---------------------------------------|-------------|---|--------------|------------------------------------|
| | | | No. | % | No. | % | No. | % | |
| Inadequate | 206 | 51.5 | 06 | 2.91 | 11 | 5.33 | 20+3 | 11.1 | 40(19.4) |
| Intermediate | 187 | 46.75 | 02 | 1.06 | 3 | 1.45 | 01+2 | 1.6 | 08 (4.27%) |
| Adequate | 07 | 1.75 | 0 | 0 | 0 | 0 | 01 | 14.27 | 01 (14.27%) |
| Intensive | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 400 | 100 | 08 | 3.97 | 14 | 6.78 | 22 | 21.48 | 49 |

Table -5 Relation of APNCU index grade and maternal outcome

| APNCU index grade | | | No events | | Pph | | Septicemia | | Blood transfusion | | Total |
|-------------------|------------|------------|------------|--------------|-----------|-------------|------------|-------------|-------------------|-------------|--------------|
| No. | % | No. | % | No. | % | No. | % | No. | % | | |
| Inadequate | 206 | 51.5 | 192 | 97.08 | 02 | 0.97 | 04 | 1.94 | 08 | 3.88 | 14 (6.79 %) |
| Intermediate | 187 | 46.75 | 184 | 0 | 0 | 0 | 0 | 03 | 1.60 | 03 (1.60%) | |
| Adequate | 07 | 1.75 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 00 | |
| Intensive | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 | |
| Total | 400 | 100 | 383 | 97.08 | 02 | 0.97 | 04 | 1.94 | 11 | 5.48 | 17 |

Although greater number of these women had live preterm births in comparison to those of intermediate group, the difference was not significant statistically. Maximum women i.e. 6 (85.71%) with adequate index had full term delivery of a live infant in comparison to 118 (57.28%) of the inadequate indexed group. ($p = < 0.05$, significant). There was only one full term still birth in the adequate (delivered by caesarean section, the indication being cord prolapse) as well as intermediate group (delivered vaginally) each which when compared to 10 (4.84%) cases of inadequate group, was significant statistically ($p = < .05$). The mode of delivery in various groups was comparable.

There were higher incidences of neonatal morbidities necessitating NICU admission in the inadequate group, neonates with Apgar score < 7 at birth and having meconium aspiration together were 17(2.9+5.33= 8.24%) and by adding early neonatal death which occurred during treatment along with fresh still births, the composite adverse neonatal outcome of 40(19.4%) is significantly higher than 8 (4.27%) of intermediate group ($p < 0.05$).

The maternal outcome was also unfavourable in inadequate group with 14(6.79%) having labour or puerperal complications and needing blood transfusion owing to severe anemia or postpartum haemorrhage in

comparison to 03(1.60%) of the intermediate group needing blood transfusion due to severe anaemia. ($p < 0.01$) (table-5)

Discussion

Life begins not only at birth but also before birth. The health, diet and prenatal care can affect the early developments and future wellbeing of the child and health of mother. Prenatal care can improve the wellbeing of mother and/or the baby and decrease the burden of adverse prenatal outcome. Favorable outcome means delivery of normal healthy infant without any complication to the mother. The use and impact of prenatal care varies across socio economics, demographic, cultural and medical risk groups.

The present study was conducted in tribal area of Chhattisgarh where poverty, illiteracy and social/cultural taboos preclude availing antenatal care in the hospital. These factors are reflected in the demographic profile of women studied. The system of seeking guidance and advice from some elder women of the family or society outweighs the role offered by free medical consultation offered in the government health institution

The rates of inadequate (including no PNC utilization) among women in our study are more than 50 % and

indicates the unavailability and/or unwillingness to avail the PNC. The former precarious conditions an important factor to consider as majority women in the group belonged to rural area. Researchers have quoted relatively higher number of antenatal visits in semi-urban population in comparison to rural population. There was no such difference in our study. [17]

The percentage of women receiving adequate care was dismal and not a single woman had the intensive score.

Low birth weight is a serious public health problems in developing countries like India. Several studies using the PNC utilization indices have demonstrated an association between inadequate PNC utilization index and preterm birth or low birth weight (LBW) [10-15]. In our study too, women having inadequate APNCU index were having significantly higher incidence of lower Low birth weight (below 10th percentile for the gestational age) as well as and its major antecedent of prematurity (<37 completed weeks of gestation)

The reason for the observed association between inadequate PNC and such births is not fully understood. However it is likely that women who do not receive adequate PNC are less likely to receive appropriate supervision, early detection of pregnancy complications and treatment. The age of the women across various groups exhibiting adverse perinatal outcome was comparable. One study from India has observed the effect of teenage on pregnancy outcome which was worse in terms of preterm births, low birth weight, low APGAR score and incidence of dystocia in comparison to their non-teenage counterparts. In our study no such difference was found but the reason may be that none of the participant was below 18 years of age. [16]

The maternal outcome was worse in the inadequate group, the most prevalent medical complication was severe anemia needing blood transfusion. The compromised socio-economic status was a major contributing factor as the majority were nutritional anemia but the role of PNC, particularly supplementation of iron and folic acid tablets to prevent and treat the same cannot be understated.

Though, the adequate level of PNC is desirable for all pregnant women, even if the intermediate APNCU index is achieved, the outcome can be significantly improve as is found in our study. This is an important observation as the benefits of even a modest improvement in utilization would be potentially beneficial in terms of less perinatal mortality and morbidity and maternal health as well as reducing health care costs.

There are issues involving access to health care also, although the state government has started free transport facilities for delivery, the APNCU index remains inadequate in majority. Apart from increasing the healthcare centers offering PNC, access and acceptance for the same has to be improved. The need of hour is to create and enhance public awareness regarding optimal utilization of available healthcare facilities. This may be

achieved by electronic media, medico-social healthcare workers and women welfare groups.

The APNCU index does not measure the quality of PNC care which is an important determinant of the outcome. In our study too, few women across various index of PNC utilization failed to undergo investigations and compliance/ comprehension of medication.

Further studies should go beyond simply counting the number of visits and should also focus on the relationship between quality of PNC.

Conclusion

Our study found that majority of pregnant women in the tribal area of our state had inadequate PNC and has reiterated association between inadequate prenatal care and increased risk of perinatal death, preterm delivery, poor apgar score at birth and low birth weight, constituting adverse composite perinatal outcome. both of which are major risk factors for neonatal morbidity and mortality. Even the maternal outcome was worse than those with intermediate and adequate PNC index. Apart from availability and access for healthcare facilities, not seeking prenatal care may be a manifestation of deeply rooted social and economic factors. The need of the hour is to increase facilities as well as awareness regarding timely and preferably adequate otherwise at least intermediate level of prenatal care for pregnant women of tribal area of Chhattisgarh

Declaration of conflict of interests

Authors have no conflict of interest.

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References

- [1]. Tehereh Ashraf-Ganjoei, Fatemeh Mirzaei, Fatemeh Anari-Dokht. Relationship between prenatal care and the outcome of pregnancy in low risk pregnancies. *Open Journal of Obstetrics and Gynecology*.2011;1:109-112.
- [2]. Fatma Yousef Ziyoo, Fatma Ahmed Matly, Gazala Mohmaud, Essa Muftah Dofeny. Relation between Prenatal care and Pregnancy Outcome at Benghazi. *Sudanese Journal of Public Health*. October 2009;4(4):403-410.
- [3]. World Health Organization .Care of Mother and baby at health center. A practical guide . Geneva:WHO /FHE/93.2:1-46.
- [4]. World Health Organization. Antenatal Care. Report of technical working group. WHO Geneva:WHO/MSM/96.8:3-26.
- [5]. Jabberi Beyrami H. *et al.* Adequacy of prenatal care and its association with pregnancy outcome :A comparison of indices in Tabriz, Iran. *J Anal Res Clin Med*. 2015;3(1):12-16.
- [6]. Heaman *et al.* Inadequacy of prenatal care and its association with adverse pregnancy outcomes: A comparison of indices. *BioMed Central*. 2008;10(1186)1471-2393-8-15.

- [7]. Todd M. Koch. Maternal and Child Health Adequacy of Prenatal Care Utilization: Pregnancy outcomes, Montana Office of Epidemiology and Scientific Support , 2014.
- [8]. Tahereh Tayebi, Shahnaz Turk Zahrani and Rezaali Mohmmadpour. Relationship between adequacy of prenatal care utilization index and pregnancy outcome. *Iran j Nurs Midwifery Res.* 2013;18(5):360-366
- [9]. Gregory Edie Halle-Ekane . Quality of Antenatal Care and Outcome of Pregnancy in a Semi-Urban Area in Fako Division, Cameroon: A Cross- Sectional Study . *Women Health Open J.* 2015;1(2):31-39.
- [10]. Krueger PM, Scholl TO: Adequacy of prenatal care and pregnancy outcome. *J Am Osteopath Assoc* 2000, 100:485-492.
- [11]. Heaman MI, Blanchard JF, Gupton AL, Moffatt ME, Currie RF: Risk factors for spontaneous preterm birth among Aboriginal and non-Aboriginal women in Manitoba. *Paediatr Perinat Epidemiol* 2005, 19:181-193.
- [12]. El-Mohandes A, Herman AA, Nabil El-Khorazaty M, Katta PS, White D, Grylack L: Prenatal care reduces the impact of illicit drug use on perinatal outcomes. *J Perinatol* 2003, 23:354-360.
- [13]. Koroukian SM, Rimm AA: The "Adequacy of Prenatal Care Utilization"(APNCU) index to study low birth weight: is the index biased? *J Clin Epidemiol* 2002, 55:296-305.
- [14]. Gao W, Paterson J, Carter S, Percival T: Risk factors for preterm and small-for-gestational-age babies: A cohort from the Pacific Islands Families Study. *J Paediatr Child Health* 2006, 42:785-792.
- [15]. Panaretto K, Lee H, Mitchell M, Larkins S, Manassis V, Buettner P, Watson D: Risk factors for preterm, low birth weight and small for gestational age birth in urban Aboriginal and Torres Strait Islander women in Townsville. *Aust N Z J Public Health* 2006, 30:163-170.
- [16]. Kumar A, Singh T, Basu S, Pandey S, Bhargava V. Outcome of teenage pregnancy. *Indian J Pediatr.* 2007; 74: 927-931.
- [17]. Halle-Ekane GE, Fotabong CM, Njotang PN, et al. Quality of antenatal care and outcome of pregnancy in a semi-urban area in Fako Division, Cameroon: a cross-sectional study. *Women Health Open J.* 2015; 1(2): 31-39. doi: 10.17140/WHOJ-1-105