Association between Maternal Age at Childbirth and Infant Health Outcome in a Prospective Birth Cohort from a Small Town Hospitals of Southern Gujarat

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ABSTRACT

Introduction: The practice of child marriage resulting to teenage pregnancy in rural India is deeply rooted in cultural values. This leads to adolescent pregnancy and poor child carrying resulting poor infant heath outcome.

Objective: To study an association between maternal age and infant health outcomes.

Study design: Community based prospective study.

Materials and methods: Community based prospective cohort study was carried out in the Gandevi Block of Gujarat. Selected participants were interviewed using pre designed and pre tested questionnaires.

Results: There were 37 Adolescent mothers and 68 adult mothers (control cohort). 32.4% Adolescent mothers were illiterate. 70.3% adolescent mothers and 30.9% adult mothers were primi. 43.2% adolescent mothers and 23.5% adult mothers gave birth to pre term babies. Proportion of low birth weight was also high among the adolescent mothers (62.2%) compared to adult mothers (39.7%). Episodes of illness and hospitalization of infants were higher among adolescent mothers.

Conclusion: This study concluded with the findings that maternal age at childbirth has significant impact on the health status of infant. Also factors like education, types of family, socio-economic status and occupation of the mothers were related to birth weight of the newborns. Avoiding teenage pregnancies, improving the socio-economic status of people and infant mortality rates were significantly associated with preterm delivery, low birth weight and per capita income.

Key Words: Maternal age, Teenage pregnancy, Infant health, Socio-economic status.

INTRODUCTION

Heath is associated with many factors like biological determinants, social and cultural factors. These all factors have many positive and negative impacts on heath. One such factor which influence maternal and child heath is teenage pregnancy[1].

World Health Organization defines Teenage Pregnancy as "any pregnancy from a girl who is 10-19 years of age", the age being defined as her age at the time the baby is born[2-3]. Often the terms "Teenage pregnancy" and "Adolescent pregnancy" are used as synonyms. According to UNICEF, worldwide every 5th child is born to teenage mother[4].

Worldwide 13 million births each year occur to girls younger than 19 years. The incidence of teenage pregnancies varies dramatically between the different countries. Approximately 90% of the teenage births occur in developing countries[5].

Data of the National Family Health Survey (NFHS)-3 revealed that About 16 million adolescent girls aged 15-19 give birth each year, roughly 11% of all births worldwide. Almost 95% of these births occur in developing countries[6]. These disproportionate risks seem to be related to social and health related vulnerabilities among adolescents, including increased rates of poverty, maternal depression, and malnutrition. Lack of education and inadequate access to health care may also account for adolescents' lower use of antenatal care, skilled delivery care, and complete infant vaccination schedules[7-9].

One of the salient slogans of the World Health Organization (WHO) is "Children's health is tomorrow's wealth." The concern for children's health and survival finds expression in the continuous monitor by WHO of low birth weight (LBW) worldwide as a public health indicator[10].

That's why study was plan to study the association between maternal age and child heath outcome staring from birth weight to infants total illness related visits to the hospitals and total episodes of illness.

OBJECTIVES

The objectives were to study an association between maternal age and infant health outcomes; and also to study socio demographic, cultural and personal factors affecting health of infants.

MATERIALS AND METHODS

Study Design: It is Community based prospective study. Written informed consent of the participants was taken prior to the study.

Study Population: All women who delivered in one of the three hospitals namely Gram Seva trust hospital, Jai Kishan hospital and Community Care Center of Gandevi Block.

Data collection: This community based prospective cohort study was carried out in the Gandevi Block of South Gujarat. Daily visit of all three hospitals of Gandevi Block was carried out for data collection. We assured that all mothers would be available at their home for next one year and detailed information of addresses and contact number taken from all participants. All precautions were taken to reduce attrition problems. Selected participants were interviewed using pre designed and pre tested questionnaires. The questionnaires containing information regarding socio demographic profile of the mothers, profile related to the mothers current pregnancy and infant's health profile was used.

Home visit was done after 4 months of hospital visit for interviewing the mothers for their infant's health status. Time table was prepared for the home visit showing which mother is to be visited on which date.

Relative Risk (RR) with 95% confidence interval (CI) has been computed using EPI-6 software. At appropriate places non-parametric test have been applied to calculate p value.

RESULTS

Table 1 shows basic characteristics of study cohort (adolescent mothers) and control cohort (adult mothers). Most of the adolescent mothers were illiterate (32.4%) or primary educated (40.5%). Most of adult mothers had secondary (36.8%) or higher secondary education (22.1%).

Table 1: Basic characteristics of adolescent and adult mothers

Variables	Adolescent mother (n =37) (%)	Adult mother (n =68) (%)
Educational status		
Illiterate	12 (32.4)	5 (7.4)
Primary	15 (40.5)	23 (33.8)
Secondary	8 (21.6)	25 (36.8)
Higher secondary and above	2 (5.5)	15 (22.1)
Caste		
Halpati	27 (73.0)	29 (42.6)
Nayaka	5 (13.5)	8 (11.8)
Koli	0 (0.0)	8 (11.8)
Dhodiya	3 (8.1)	7 (10.3)
Other	2 (5.4)	16 (23.5)
Occupation		
Farm labour	28 (75.7)	33 (48.5)
House wife	8 (21.6)	30 (44.1)
Other	1 (2.7)	4 (5.9)
Type of family		
Nuclear	6 (16.2)	11 (30.9)
Joint	31 (83.8)	57 (83.9)
Economical status		
Below poverty line (BPL)	36 (97.3)	41 (60.3)
Above poverty line(APL)	1 (2.7)	27 (39.7)
Parity of mother during delivery		
Primi	26 (70.3)	21 (30.9)
Multi	11 (29.7)	47 (69.1)
Availability of Mamta card		
Yes	37 (100)	64 (94.1)
No	0 (0.0)	4 (5.9)

Majority of mothers were from Halpati community. Nayaka, Dhodiya and Koli were other foremost castes of south Gujarat. Farm labour was main occupation of rural females. Around 76% of adolescent mothers and 49% adult mothers were occupied in farm labour. Most of adolescent and adult mothers belongs to joint family. 97 % of Adolescent mothers and 60 % adult mothers came from BPL families. 70% of the adolescent mothers were primi because their married life was short as compared with adult mothers. During home visits, all adolescent mothers have Mamta card. Only four adult mothers had not their Mamta card.

Table 2 shows biological characteristic of study participants. Mean weight of adolescent mothers and adult mother was 46.6 kg and 49.9 kg respectively. The mean weight difference was statistically significant. Mean height of adolescent mothers was 154.9 cm and of adult mothers was 153.1 cm. This mean height was statistically insignificant between adolescent and adult mothers. Mean body mass index was low in adolescent mothers and it is statistically significantly associated with age of mother. Mean gestational week was 37.6 in study cohort and 38.4 in adult mother.

Table 2: Biological characteristics of adolescent and adult mothers

Biological characteristic	Adolescent mother (n = 37)	Adult mother (n =68)	Total mother (n=105)	p value
Weight (kg) mean ± SD	46.6 ± 6.1	49.9 ± 7.6	48.8 ± 7.3	0.025
Height (cm) mean ± SD	154.9 ± 5.9	153.1 ± 5.8	153.7 ± 5.9	0.134
Mean BMI ± SD	18.9 ± 3.2	20.7 ± 3.2	20.1 ± 3.2	0.007
mean gestational weeks	37.6 ±2.7	38.4±2.6	38.1	0.143

Table 3: Effects of maternal age on health status of infant

Health Status	Adolescent mother (n =37) (%)	Adult mother (n =68)	p value
Term of gestation			
Pre term (<37 week)	16 (43.2)	16 (23.5)	0.06
Term (≥37 weeks)	21 (56.8)	52 (76.5)	
Birth weight			
Low birth weight (<2.5 kg)	23(62.2)	27(39.7)	0.04
Normal birth weight (≥2.5 kg)	14(37.8)	41 (60.3)	
Number of infants become ill for four month			
Yes	35 (94.6)	38 (55.9)	0.0001
No	2 (5.4)	30 (44.1)	
Exclusive breast feeding			
Yes	27(73.0)	50 (73.5)	0.86
No	10 (27.0)	18 (26.5)	

Table 4 Incidence rate of various events in infant of adolescent and adult mothers

Events	Infants of adolescent mother (n =36) (incident rate)	Infants of adult mother (n =67) (incident rate)	P value	Relative risk (95 %CI)	Risk difference (95% CI)	Attributable risk (95%CI)
Episode of illness	117(81.3)	94(35.1)	<0.001	2.3 (1.77-3.04)	46.1 (31.68–60.67)	56.8% (43.37- 67.09)
Hospitalization	13(10.4)	4(1.5)	<0.001	6.9 (2.32-21.03)	8.9 (4.58-13.27)	85.7% (56.83 – 95.24)
Reported illness						
Cold and Cough	13(9.0)	24(8.9)	0.98	1.01 (0.51-1.98)	0.07/100 (-6.00- 6.14)	0.80% (-94.82-49.49)
Cold	15(10.4)	8(2.9)	0.002	3.49 (1.48-8.23)	7.43/100 (2.65-12.22)	71.34% (32.41-87.85)
Cough	2(1.4)	8(2.9)	0.32	0.47 (0.10-2.19)	0.01/100(-4.76 – 3.6)	53.4 (-119.11-90.12)
Constipation	8(5.6)	8(2.9)	0.2	1.9 (0.70-4.96)	3.5 (-1.89 – 8.75)	46.27% (-43.16-79.83)
Diarrhea	7(4.9)	4(1.5)	0.04	3.26 (0.95-11.13)	4.5 (0.08 -8.90)	69.30% (-4.89-91.01)
Fever	16(11.1)	6(2.2)	0.002	4.96 (1.94-12.68)	11.9 (5.59-92.12)	79.85% (48.51-92.12)

43.2% infants of adolescent mothers were pre term while only 23.5% infants of adult mother were pre term. The association of maternal age at time of delivery with weeks of gestation revealed that there was statistically significant association between maternal age (age up to 20 years) and having pre term delivery. 62.2% infants of adolescent mothers were low birth weight, while only 39.7% infants of adult mothers had birth weight <2.5kg. The difference in birth weight was statistically significant. Out of 105 infants, 73 infants became ill during

four month of infancy. 94.6% infants of adolescent mothers and 55.9% infants of adult mothers became ill during first four months of infancy. Association of maternal age and illness of infants during first four month was also statistically significant. Nearly equal proportions of infants of adolescent mothers and of adult mothers (73%) were on the exclusive breast-feeding during first four months of infancy. The chi square test shows that there was no significant association between maternal age and infants feeding practices (Table 3).

Table 4 shows occurrence of illnesses (symptoms reported by mothers). Incidence of episodes of illnesses as well as hospitalization for illness was significantly higher among infants of adolescent mother as compared to infants of adult mothers. Relative risk of episodes of illness (2.3) and for hospitalization (6.9) were higher in a cohort of infants having maternal age up to 20 years as compared to control cohort having maternal age more than 20 years at time of delivery. Illnesses like cough, cough and cold and constipation (difficulty in passing stool) were not statistically significantly different for infants of adolescent and adult mothers. While incidence rates of cold, diarrhea and fever were significantly higher among infants of adolescent mothers as compared to their counterpart. Relative risk was significantly higher and more than three among infants of adolescent mothers for the symptoms like cold (3.5), diarrhea (3.3), fever (4.9).

DISCUSSION

The purpose of this study was to examine the association of maternal age at childbirth and infant health outcome. Both group, adolescent and adult were poorly formally educated, belong to under privilege group and are rural in origin.

It is important to mention that every third adolescent mother in this study was formerly illiterate. The proportion of illiteracy was only 7.4% in adult mothers. More numbers of adult mothers in this study reported their occupation as "housewife" as compare to adolescent mother. It means that activity in agricultural field was extra for adolescent mothers. Joshi et al point out that maternal education (x^2 = 9.42, p < 0.05), occupation (x^2 = 8.14, p<0.02) and per capita income of the family per month (x^2 = 22.02, p<0.001) were found to be significantly associated with birth weight of the newborn. Around 45% of the babies born to illiterate mothers and 43.94% of babies born to mothers who were laborers by occupation were of LBW [11]. 97% of adolescent mothers belong to BPL family. A cohort of adolescent mothers had appalling proportion of LBW children reaching up to 62%.

Thirty to forty percent children born in India and in Gujarat are reported to be Low birth weight babies (children having birth weight less than 2.5kg) [12, 13]. In this study, children born to adult mothers show similarity with regards to birth weight in rural India [12]. Almost 40% of the children are low birth weight. However, 62.2% of the children born to adolescent mothers were LBW, which is quite suggestive. Literature has reported quite a long list of risk factors for LBW. This study has tried to ex-

plore a number of biological factors likely to have an influence on birth weight of a child.

Current mean maternal body weight was significantly different in both the groups with higher mean body weight in adult women. Although the mean maternal height was not significantly different between the two groups, mean Body Mass Index (BMI) was significantly different in both the groups, with higher BMI in adult mothers.

Although the mean gestational age was not significantly different between the two groups, proportion of preterm babies was higher in adolescent (43.2%) mothers as compared to adult mothers (23.5%). Prianka et al reported similar higher proportion of preterm babies in their study and the association between the age at conception and the period of gestation during delivery was significant[14].

Also Samiran Bisai et al mention that teenage mothers (< 20 years) had 1.5 times more risk of delivering low birth weight babies compared with mothers aged 20 years and above[15]. It proves that an exposure variable of maternal age has significant influence on an outcome variable of low birth weight. In low birth weight study in Saudi Arabia, Nora et al revealed an association between early maternal marriage and low birth weight of infants. Mothers married before age 18 were more likely to give birth to low birth weight infants (OR 1.13, 1.004 to 1.26) than were mothers married as adults[16].

Relative risk of 2.3 with confidence interval (CI) of 1.77-3.04 for total number of episodes of illnesses indicates that infants of these young mothers are at double risk of developing illnesses. Bivariate analysis showed that most of this risk is attributed to being infants of adolescent mothers. Statistically highly significant association was observed between the number of infants becoming ill and the younger maternal age (a cohort of adolescent mothers). Thus, risk difference of 46.1 (31.7- 60.7) of episodes of illness between adolescent and adult mother may be the result of higher proportion of low birth weight babies and higher proportion of pre term babies delivered as result of lower maternal age.

Reported symptoms like cough and cold, cough and constipation (difficulty in passing stool) did not show significant association with age of mother at time of delivery. However, symptoms like fever, diarrhea and cold have shown statistically significant association with adolescent motherhood. Above symptoms are the illness perceived by infant's mothers. Anita Raj in her study reported that one in ten (10.6%, 1809/17 951) children under five born to young married women had experienced

acute respiratory infection. However, analysis showed no significant association between maternal child marriage and infant and child acute respiratory infection [17].

Bivariate analysis revealed higher proportion of hospitalization among infants of adolescent mothers with RR 6.9 (2.3, 21.0) and Attributable Risk of 85%. The association between hospitalization and young maternal age was highly significant. Thus, hospitalization for infants, taking emergency treatment, reporting symptoms like fever, diarrhea, cold and constipation were more in infants of adolescent mothers.

CONCLUSION

This study concluded with the findings that maternal age at childbirth has significant impact on the health status of infant. Also factors like education, types of family, socio-economic status and occupation of the mothers were related to birth weight of the newborns. Avoiding teenage pregnancies, improving the socio-economic status of people and infant mortality rates were significantly associated with preterm delivery, low birth weight and per capita income.

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