A Study on the Dynamics of Postpartum Amenorrhoea in a Minyong Society Using Cox's Proportional Hazards Analysis

MAITREYEE SHARMA†

Department of Anthropology,
Dibrugarh University,
Dibrugarh 786004, Assam
E-mail: maitreyeesharma@dibru.ac.in

KEYWORDS: Postpartum Amenorrhoea (PPA). Age and birth order. Breastfeeding. Child death. Minyong tribe. Arunachal Pradesh.

ABSTRACT: The reproductive span of a woman is interrupted by many phenomena and one of such a universal phenomenon is the period between birth of a child and subsequent return of menstrual cycle. Though the period of gestation is universally constant in the species; the duration of postpartum amenorrhoea (PPA) varies from one woman to another and also after every childbirth of the same woman. The present study aimed at investigating the covariates that influence the duration of PPA. This community-based, cross-sectional anthropological study was conducted among the Minyong tribe that inhabits the West Siang district of Arunachal Pradesh to analyze the dynamics and determinants of duration of PPA and the relative risk of returning into ovulation after child birth. The Log-Rank test (Chi-square) was adopted to compare the survival experience of the groups as categorized in the tables and Cox's Proportional Hazards model was utilized to assess if the duration of PPA is associated with any of the selected demographic variables. The median duration of PPA was found to be 9.8 months.

INTRODUCTION

The reproductive span of a woman is interrupted by many phenomena and one of such a universal phenomenon is the period between birth of a child and subsequent return of menstrual cycle, which is known as postpartum amenorrhea. This period varies from one woman to another and also after every childbirth of the same woman. This period of temporary sterility tends to reduce the effective reproductive span of a woman and acts as a natural contraceptive mechanism. Postpartum amenorrhea, as a physiological process, lengthens the inter-live birth interval and, in societies where the use of contraceptive methods is not widespread, there, amenorrhea period can exert a dominant fertility inhibiting effect on fertility. Literature review suggests that it is influenced by many demographic and socio-cultural factors such as duration of breastfeeding, parity, birth order, age at entry into marriage, child and maternal nutritional status (Delgado *et al*.,'82; Aguirre and Jones, 2005). Empirical evidence indicates that longer and more frequent breastfeeding may increase the length of an ovulatory period (Brajesh *et al.*, 2016) particularly in societies where breastfeeding is intense and universal (Nath *et al.*,'93). Other studies highlight that the amenorrhea period is found to be shorter for lower parity and younger mothers (Aryal,

† Associate Professor

2007). Some studies indicate a strong association between the duration of post-partum amenorrhea and socio-economic status of mothers as well as the survival status of the child. As PPA is quite variable and depends on several factors, so, it is important to document and focus on the pattern and determinants of PPA in different populations to highlight the practical implications in the primary health status of the mothers.

MATERIALS AND METHODS

This anthropological study was conducted among the Minyong tribe, that inhabits the West Siang district of Arunachal Pradesh. The ever married women having at least one live birth were selected for the purpose. A pre-tested semi-structured interview schedule was prepared to collect the required information on the various covariates. The sample consists of 400 eligible women. The duration of PPA is considered as the response variable and the resumption of menstruation after childbirth is regarded as the end of amenorrhoea period. The mothers who had reported termination of PPA before the survey date were also included in the study and considered as uncensored cases, however, the mothers who were still in amenorrhoea at the time of survey were considered as censored cases and the duration is taken up to the date of survey. The mothers who had more than one live birth, the PPA duration of the last birth was asked to minimize the data recall error. Various demographic covariates include duration of breast feeding, birth order, age at marriage of the mother, age at child birth, sex of the last child, type of family, educational and occupational status of the couples and survival status of the preceding child were considered. The covariates so considered are interdependent and had to quantify these to adjust the effects of other covariates (Singh *et al*., 2012).

The Log-Rank test (Chi-square) was adopted to compare the survival experience of the groups as categorized in the tables and Cox's Proportional Hazards model was utilized to assess if the duration of PPA is associated with any of the selected demographic variables.

The Cox's Proportional Hazards model:

$\lambda(t;z) = \lambda_0(t) \exp(z\beta)$,

Where, $\lambda(t;z)$ refers to the time a specific event takes to happen (here, it is resumption of menses); $\lambda_0(t)$ is the baseline hazard function when all covariates are set to zero and β is a vector of regression coefficients (Cox,'72). Therefore, the ratio: $\lambda(t;z)/\lambda_0(t) = \exp(z\beta)$ represents the 'relative risk'(rr) of resumption of menstruation in the present study. When the value for the relative risk for a group is greater than one and lesser than unity for the reference group indicate that the risk of resumption of menstruation is higher and lower for this group respectively when compared with the baseline group (Singh *et al*., 2012).

RESULTS

Table 1 indicates the analysis of Log-rank test on the median durations of PPA according to some socio-demographic variables of the Minyong couples. The overall median duration of PPA is found to be 8.9 months and the median durations of PPA are observed to increase with the increasing duration of breastfeeding. The median duration of PPA is found to be quite longer (9.8 months) when the mothers breastfeed their children up to two years or more. Thus, the median duration of PPA is positively and significantly associated with the duration of breastfeeding ($\chi^2 = 39.77$, $p < 0.01$). It is interesting that the median duration of PPA is also strongly and positively associated with the birth order of the children ($\chi^2 = 24.29$, $p < 0.01$). The table indicates that the median duration of PPA increases with increasing birth order. The duration of resumption of menses after the birth of the youngest child of the mother may be higher than older births. A strong and negative association is observed between the age at first delivery or childbirth of the mothers and the median durations of PPA. The median durations of PPA shows a decreasing trend with the increasing age at first child birth of the mothers. The mothers who entered into wedding lock at the age of 18 years or below and deliver the first child between 18 years to 23 years show comparatively higher durations of PPA. The sex of the child does not influence the duration of PPA ($\chi^2 = 2.85$, $p > 0.01$) in the study population. However, a pertinent result has been found between the duration of PPA and the survival status of the previous child. The mothers who had experienced a death of the child preceeding the last child show higher duration of PPA than the mothers

who did not experience such an incident. The association between these two variables is

TABLE 1

Log-rank test (χ^2) on the duration of post-partum amenorrhea with some demographic variables

Duration of breastfeeding (in months)	Median of PPA (in months)	FLog-rank test (χ^2)
<12	7.2	39.77, p<0.01
12-24	8.6	
≥24	9.8	
Birth order		
1	6.0	24.29, p<0.01
2-3	6.9	
4-5	7.5	
6+	8.1	
Age at marriage of woman (in years)		
<18	8.8	25.53, p<0.01
18-23	7.9	
23-28	6.6	
Age at first child birth		
18-23	7.6	23.61, p<0.01
23-28	6.1	
Sex of the child		
Male	8.9	2.85, p>0.01
Female	7.8	
Survival status of the preceding child		
Surviving	7.1	9.06, p<0.01
Death	8.7	
Type of family		
Joint	8.6	6.61, p<0.05
Nuclear	7.3	
Educational status of husband		
Illiterate	8.2	14.52, p<0.01
Primary standard	7.0	
Middle standard	6.6	
Secondary standard and above	6.1	
Educational status of wife		
Illiterate	9.8	14.17, p<0.01
Primary standard	8.8	
Middle standard	7.4	
Secondary standard and above	6.5	
Occupational status of husband		
Cultivation	8.8	14.03, p<0.01
Petty business	7.6	
Skilled work	6.6	
Service	5.7	
Occupational status of wife		
Cultivation	9.6	17.32, p<0.01
Petty business	8.7	
Skilled work	7.6	
Service	6.4	
Overall	8.9	

found to be statistically significant ($\chi^2 = 9.06$, $p < 0.01$). On the other hand, the type of family (nuclear or joint) shows an association with the duration of PPA. The mothers in the joint family show statistically longer duration of PPA than those who are in the nuclear family ($\chi^2 = 6.61$, $p < 0.05$). The variation in the median durations of PPA according to the educational level of the couples shows a strong linear negative association. The variation in the median durations of PPA according to the occupational status of the couples also reveals a strong association between the two, which is again statistically significant. The couples engaged entirely on cultivation show the highest median duration of PPA followed by the couples who are engages in petty business. The couples in service show the lowest median of PPA (5.7) ($\chi^2 = 14.03$, $p < 0.01$).

Table 2 shows the Cox's multivariate regression analysis of the duration of PPA. It is observed that the risk of returning into menstruation becomes higher with the decreasing duration of breastfeeding. Thus, after adjusting the other covariates, the duration of breastfeeding shows a negative association with the risk of termination of PPA (β=-0.019, eβ=0.986, 13.577, $p<0.01$). It is interesting that the duration of PPA increases by 1 percent with every one month increase in the duration of breastfeeding. The birth order is another covariate which has an effect on the relative risk (RR) of the termination of PPA. The educational and occupational statuses of the couples do not seem to influence the duration of PPA. The age at first child birth is another covariate which is directly associated with the relative risk of resumption of menstruation. The relative risk of resumption increases with the increase in age at first child birth. In addition, after adjusting the other covariates, the history of previous child death shows a negative association with the risk of termination of PPA (β=-0.458, eβ=0.958, 8.646, $p<0.01$).

DISCUSSION

In many times, PPA is also termed as Lactational amenorrhoea, due to its strong association with the duration of breastfeeding. Though, PPA is a biological event, the time to resumption of menstruation is determined by various socio-cultural and demographic factors. The societal attitude towards the practice and

TABLE 2

Cox's proportional hazards analysis of PPA

Variables	Coefficient (β)	Wald Test (p value)	Relative Risk (eβ)	95% CI for Relative Risk
Duration of breastfeeding (in months)	-0.019	13.577, p<0.01	0.986	0.975-0.996
Birth order	-0.022	12.018, p<0.01	0.983	0.876-0.993
Age at marriage of woman (in years)	0.016	1.272, p>0.05	1.004	0.912-1.016
Age at child birth of woman (in years)	0.009	8.571, p<0.01	0.999	0.980-1.101
Sex of the child	0.007	0.732, p>0.05	0.977	0.876-1.020
Survival status of the preceding child	-0.458	8.646, p<0.01	0.958	0.705-0.976
Type of family	-0.211	7.542, p<0.05	0.733	0.711-0.866
Educational status of husband	-0.205	7.211, p<0.05	0.639	0.576-0.788
Educational status of wife	-0.007	4.061 p>0.05	0.733	0.666-0.878
Occupational status of husband	0.000	0.746, p>0.05	0.908	0.990-1.001
Occupational status of wife	0.002	0.752, p>0.05	0.1001	0.994-1.146

duration of breastfeeding the newborn is another important factor that determines the duration of PPA and the return to fertility (Pirincci *et al*., 2016). The Minyong mothers consider the duration of PPA as a natural contraceptive method and the use of chemical or medicinal and IUCD are not common among them.

The multivariate analysis of determinants of duration of postpartum amenorrhea among Minyong women in Arunachal Pradesh has been investigated in relation to characteristics of mother and her child indicate that the duration of breastfeeding, Birth order, age at first birth, age at first marriage, Survival status of the preceding child, Type of Family have direct or indirect impact on the duration of postpartum amenorrhea. In the present study, the overall median duration of PPA is found to be 8.9 months and it is found to be statistically associated either positively or negatively with other explanatory variables. The findings highlighted that the duration of lactation has a strong and positive association with PPA, thus, reducing the relative risk (RR) of returning into menstruation. This is because longer and frequent lactation reduces the secretion of gonadotropin releasing hormone, luteinizing hormone and thyroid stimulating hormone which induces amenorrhoea for longer time duration. Reduced lactation increases the relative risk (RR) of the resumption of menstruation (Vokemans,'97). A similar picture appeared in the study by Singh (2007) who reported that the mean and median time of termination of PPA was higher in full breast feeding women than in partial breast feeding. It is evident from the Log rank test that the birth order is negatively associated with the duration of PPA and it is one of the factors that affects PPA. It is observed that the Minyong mothers breastfeed their youngest child (irrespective of sex of the child) for longer duration which extends their PPA duration than the lower birth orders. The sex of the last child (the child in question) does not have any influence on the duration of PPA. A child's sex had no effect on duration of PPA, indicating that the Minyong mothers invested equally in daughters and sons in breastfeeding. It is observed that the mothers who had experienced a child death prior to the youngest child show a higher risk returning into normal ovulation than the mothers who had not experienced the same. The reason may be that the mothers develop more emotional attachment with the child succeeding the dead child and thus invest higher duration in breastfeeding which implicitly increases the PPA duration. This corroborates with the study done by Brajesh *et al.* (2016). An opposite result is evident in the study made by Singh *et al.* (2012), Chakraborty *et al.* ('96) and Mturi *et al.* ('97).

CONCLUSION

The findings from the study clearly suggest that the postpartum amenorrhoea (PPA) is no doubt a physiological event but moderated by other variables which are socio-demographic in nature. Analysis revealed that the duration of breastfeeding, age at marriage, type of family, age of mother at child birth, birth order, survival status of the preceeding child and family type have significant effects on the return of menses in the Minyong traditional society. The duration of breastfeeding, survival status of the child

preceeding the last child and birth order have strong and negative association with the relative risk of returning into menstruation after child birth. It is observed that the previous child death suddenly terminates the nursing period which result in early resumption of menses and ovulation. In this Minyong society, negligible number of mothers uses modern contraceptive devices and an increase in the duration of PPA may extend the duration between two successive conceptions; hence improving the health of the mother as well as the children implicitly.

REFERENCES CITED

Aguirre, G. P. and R. E. Jones 2005. Breastfeeding and post-partum amenorrhea in rural Guatemala. *Pollaciony Saluden Masoamerica*, 3:1-18.

Aryal, T. R. 2006. Retrospective reporting of the duration of post-partum amenorrhea: A survival analysis. *Kathmandu University Medical Journal,* 4: 211-217.

Brajesh, R. Mukesh, D. A. Nagdeve and S. Chander 2016. Determinants and differentials of postpartum amenorrhea associated with breastfeeding among women in Bihar, India. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, 5(1):154-165.

Chakraborty, N., S. Sharmin, M. A.Islam 1996. Differential pattern of birth interval in Bangladesh. *Asia-Pacific Population Journal*, 11:73-86.

Cox, D. R. 1972. Regression models and life tables. *Journal of the Royal Statistical Society*, Series B. 34:187-220.

Delgado, H., R. Martorell, E. Brineman and R. E. Klein 1982. Nutritional, lactational and birth interval components in rural Guatemala. *American Journal of Clinical Nutrition*, 31: 1468-1476.

Mturi, A. J. and J. Akim 1997. The determinants of birth interval among non-contracepting Tanzania women. *African Population Studies*, 12:14-21.

Nath, D. C., K. K. Singh, K. C. Land and P. K. Talukdar 1993. Breastfeeding and postpartum amenorrhea in a traditional society: A hazards model analysis. *Social Biology*, 40(1-2):74-86.

Pirincci, E., R. Tasdemir, A. R. Oguzoncul 2016. Knowledge of lactational amenorrhea as a contraceptive method among mothers of infants aged 0-6 months in a district, eastern Turkey. *International Journal of Community Medicine and Public Health*, 3(6):1363-1370.

Singh, G. 2007. Estimation of the duration of postpartum amenorrhea in the presence of some censored data. *Journal of Obstetrics and Gynaecology of India*, 57(1): 53-57.

Singh, N. Sanalaoba, N. Sharat Singh and R. K. Narendra 2012. Postpartum amenorrhoea among Manipuri women: A survival analysis. *Journal of Health, Population and Nutrition*, 30(1): 93-98.

Vekemans, M. 1997. Postpartum Contraception: The lactational amenorrhea method. *The European Journal of Contraception & Reproductive Health Care*, 2:105-111.