Duration of Post-Partum Amenorrhoea during Full Breastfeeding incorporating Censored Data

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Citation

Abstract

The post-partum amenorrhoea (ppa) period in a woman is an interval that begins at the termination of a conception and ends with the resumption of ovulation. The duration of amenorrhoea depends on a number of factors and varies considerably in women.

Objective: To study the relationship between duration of post-partum amenorrhoea and full breastfeeding in the presence of some censored data using the Cox-Regression model.

Method: A sample of 112 women interviewed, 44 reporting continuance of amenorrhoea on the date of interview were considered as censored cases. To study the regression of ppa (dependent variable) on full breastfeeding (independent variable) Cox-Regression analysis suitable for such a situation was done.

Result: Cox-Regression was not statistically significant. However, simple regression analysis excluding censored cases resulted in highly significant data

Conclusion: A number of studies showed significant positive correlation and regression between duration of ppa and duration of breastfeeding including this study also but, it was interesting to note that though this relation was observed but did not result to be significant when data on those women who reported continuance of amenorrhoea at the date of interview were included in the study.

INTRODUCTION

Post partum amenorrhoea (ppa) is a biological variable associated with each conception regardless of its outcome. The fecundability of a woman is temporarily suspended following each conception when menstruation discontinues for some time. The length of ppa in women may vary from around a month to more than a year depending on a number of factors which may vary from woman to woman in a population and for a woman depending on age, marital duration, number of pregnancies, nutritional status of woman etc.[1,2] It has been well reported that duration of ppa period is positively correlated with duration and practice of breastfeeding.[3,4,5]

The objective of the present study was to examine the relationship between duration of ppa and duration of full breastfeeding for a group of women utilizing censored data through Cox-Regression procedure. Censored cases are cases for which the second event is not recorded or simply does not occur before the end of the study. In the present context first event is the date of delivery of last child when ppa period begins and the second event or terminal event is the onset of first menses which is the end of ppa period. Presence of censored data makes the traditional statistical techniques inappropriate. Cox Regression also known as proportional hazards regression analysis is used to study the relationship between time to an event and a set of independent variables. The time until an event occurs can be censored, that is the event of interest need not occur for all cases. If dependent variable is not censored (that is, if the terminal event has occurred for all cases) then linear regression procedure is used.

The aim of this paper was to perform Cox-Regression analysis considering the duration of post partum amenorrhoea as dependent variable and duration of full breastfeeding as independent variable for a group of women (n=112) who had delivered a child within last one year from survey date. Thus subjects of the study were women whose youngest child is less than or equal to one year on date of survey. Full breastfeeding here refers to exclusive breastfeeding, which is the practice of feeding only breast milk excluding water, breast milk substitutes, other liquids and solid foods. Full breastfeeding for the first six months is

the most appropriate infant feeding practice. Further, the aim was also to carryout simple linear regression analysis excluding 44-censored cases (n=68).

MATERIALS AND METHOD

A sample of 112 women was selected from child immunization centre at Varanasi in the year 2004 where they came with their child for vaccination. Women included in the study were those, whose youngest child was aged less than or equal to one year on the date of interview. Child immunization starts at birth and at regular interval various vaccines and its subsequent doses are recommended. Some children enter late in the immunization schedule and some do not observe perfect timing of the recommended doses. So it may be assumed that mothers visit immunization centre throughout the year, not necessarily at some fixed time point. Inclusion criteria : (1) women aged 20-34 years, (2) parity of any order, (3) visiting the immunization centre with her youngest child for vaccination, (4) youngest child aged less than or equal to 12 month. Exclusion criteria : (1) women who had taken any hormonal treatment after last delivery to prolong the time of resumption of ovulation to ensure prevention of early conception, (2) women who were not sure about time of their first menstruation after last delivery, (3) pregnant women reporting conception before the onset of first menses.

Since ovulation itself is difficult to identify, reliable estimate of the end of amenorrhoea is the return of menstruation itself. In this study the duration of ppa is estimated as an interval between termination of conception into last live birth and return of first menses. Total 112 women thus selected were interviewed through a study proforma, which included general information, socio-demographic, and some biological variables like no. of conceptions, no. of births, birth intervals, marital duration, date of birth of last child, period of amenorrhoea, whether amenorrhoea continuing or terminated, if terminated time of return of first menses, pattern of breastfeeding, full or partial, duration of full breastfeeding associated with the youngest child.

Subjects were asked about their duration of post-partum amenorrhoea in months. Women reporting continuance of amenorrhoea on the date of interview were considered censored cases and their durations of ppa (between last delivery and survey date) were recorded and treated as censored data. For such women it was not known when would they resume ovulation in future after the survey date. Subjects with censored data contribute valuable information

and they should not be omitted from the analysis. It would also be wrong to treat the observed time at censoring as the survival time. The assumption underlying Cox regression is that the effects of the different variables on survival are constant over time and are additive

RESULTS

The data obtained were analyzed using SPSS ver.-10 statistical software and results shown in the following tables. Table-1 shows sample size (n=112), age range (20-34 years), parity (greater than or equal to 1), no. of cases who experienced the event (68), no of cases censored (44). A large proportion of women were housewives belonging to middle class family and coming from urban area.

Figure 1
Table 1

Total Number of Women (n)	112
Age Range (years)	20 - 34
Parity	≥ 1
No. of women for whom event of interest occurred (ppa terminated on or before the survey date)	68 (60.7%)
No. of censored cases (continuance of amenorrhoea on survey date)	44 (39.3%)

The durations of post-partum amenorrhoea and full breastfeeding were divided into monthly time interval and there interrelation was shown in Table-2.

Figure 2
Table 2

Duration of PPA in months	Duration of Full Breastfeeding in months				No. of women with		Total
	2 – 4	4 – 6	6 – 8	8 - 10	PPA terminated	PPA continuing	
0 – 3	11	08	04	01	15	09	24
3 – 6	17	32	15	09	40	33	73
6 – 9	00	03	02	09	12	02	14
9 – 12	00	00	00	01	01	00	01
Total	28	43	21	20	68	44	112

Nearly 71% women among those who reported full breastfeeding for 6-8 months had 3-6 months of post-partum amenorrhoea period whereas, 74% of 4-6 months full breastfeeding women had also 3-6 months ppa period. This may be due to presence of a large proportion of censored cases in 3-6 months ppa interval. It is also to be noted that women reporting full breastfeeding for even 8-10 months, 50% observed ppa for less than 6 months and 50% greater than or equal to 6 months. As the data contains some censored cases having continuance of amenorrhoea in the class intervals, it may be argued that increase in full breastfeeding period leads to increase in ppa period though, upto certain period not beyond.

Regression analyses are statistical techniques that describe the relationship between an outcome or dependent, or response variable (here, ppa) and one or more explanatory or independent, or predictor variables (as here, full-breastfeeding) or risk factors. The choice of regression models depends largely on the research objectives and the measurement scales of the outcome variable in the study. Cox regression model estimates and interprets the effects of the risk factors (full breastfeeding) on the event occurring (termination of ppa). The partial maximum likelihood estimation technique is used to estimate the regression coefficients of the model equation. Table-3 shows the result of Cox-Regression analysis considering ppa period as dependent variable (outcome variable) and full breastfeeding period as independent variable (risk factor). The exponential expression of each regression coefficient in the Cox regression model is called relative risk or relative hazard. The magnitude of the relative hazard indicates the direction of the association between the outcome variable and the corresponding risk factor. Since the relative hazard, Exp(B) = 0.9021 is a positive fraction and less than one (i.e., negative regression coefficient, B = -0.1030) therefore, relative hazard of a woman experiencing the terminal event (end of amenorrhoea) decreases as the value of the risk factor (full breastfeeding period) increases. As chi-square resulted not statistically significant (p = 0.0996) it may be argued that the data did not provide sufficient evidence to generalize the findings. Wald test to examine whether or not the regression coefficient is significantly different from zero, also results not statistically significant (p = 0.1008) that is also reflected by 95% C.I. for Exp(B) which includes one.
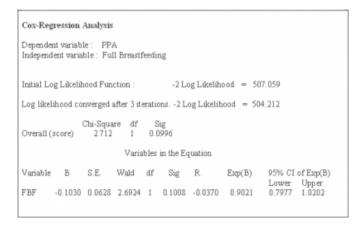
Figure 3

Table 3

Figure 4

Table 4

However, it was interesting to note that after excluding 44 censored cases (women reporting continuance of amenorrhoea on the date of interview) simple linear regression of ppa period on full breastfeeding period resulted statistically highly significant (F= 46.57, p= 0.000). The value of t=6.824 (p=0.000) shows that regression coefficient is significantly different from zero (Table-4).

DISCUSSION

The duration of temporary infecundability associated with the termination of a conception depends on a number of biological and socio-demographic factors, which vary considerably among women. There is a definite relationship between pattern of breastfeeding and amenorrhoea. Amenorrhoea increases upto certain time with breastfeeding.[6] This study also revealed similar significant relationship particularly when linear regression of duration of ppa on duration of full breastfeeding was studied

considering only those women whose amenorrhoea period ended prior to survey date. However, including the data on those women reporting continuance of amenorrhoea period at the time of interview, the application of Cox regression model revealed similar trend though not statistically significant. This might be due to presence of a large number of censored data in certain intervals.

The Cox regression model may be an appropriate choice for studying the risk factors in relation to the duration and timeline until occurrence of the critical event however; unlike linear regression analysis the model itself does not gear up for the purpose of future predictions. This study has reflected some interesting findings that may prove to be taking a lead to further explore various aspects of lactational amenorrhoea.

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