GENDER BIAS AND POSTPARTUM DEPRESSION TOGETHER MILITATE AGAINST BREASTFEEDING OF GIRLS

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GENDER BIAS AND POSTPARTUM DEPRESSION TOGETHER MILITATE AGAINST BREASTFEEDING OF GIRLS: AN OBSERVATIONAL COHORT STUDY

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ABSTRACT

OBJECTIVES AND HYPOTHESIS: To examine influence of gender of baby on breastfeeding and incidence of postpartum depression (PPD) and their interrelationship. We hypothesize that in a society with a male gender bias there may be more PPD and less exclusive breastfeeding of girls.

DESIGN: Prospective study

SETTING: The study was conducted in an urban, tertiary hospital in Delhi.

PARTICIPANTS: Mothers delivering normally with their babies roomed-in.1537 eligible women participated in the study.

PRIMARY AND SECONDARY OUTCOME MEASURES: Breast feeding and score on Edinburgh post partum depression scale (EPDS) was recorded.

RESULTS: 3,466 babies were born in the hospital. There were 792 girls for every 1000 boys. Among primparous women sex-ratio was 901 girls per 1000 boys. In second babies the sex-ratio was 737:1000. If first child was a girl the ratio fell to 632. 1026 mothers were exclusively breastfeeding. Exclusive breast feeding of boys was significantly higher (70.8% vs 61.5% $p<0.001$). The EPDS score was significantly higher with birth of girls (EPDS 6.0±3.39 vs 5.4±2.87 $p< 0.01$). Women with EPDS <11 were less likely to breast feed ($p<0.01$).

CONCLUSION: The results point to a pro male gender bias evidenced by a low sex ratio at birth, higher EPDS score in mothers of girls and less breastfeeding of female children.

IMPLICATIONS-Mothers of girls may need more help to overcome postpartum depression/ postpartum blues and for improving breastfeeding rates. This in turn would enhance the survival of girl children and improve the sex ratio in the country.

AREAS FOR FURTHER RESEARCH: Studies in other populations are needed to confirm our findings. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

Further studies done later in the post natal period to examine how many of these mothers with high initial scores have longer lasting PPD.

INTRODUCTION:

Breast milk is the preferred food for all infants including premature and sick babies (1). UNICEF has promoted breastfeeding initiation within an hour of childbirth (2) (3). It provides nutritional, immunological, developmental, psychological advantages to the child besides health advantages to the mother and economic benefits to the family (1). It establishes skin-to-skin contact providing warmth to the newborn. Suckling at breast stimulates oxytocin release which further increasing flow of milk from breast. Breast milk reduces mortality in the first month of life (4). Early breast feed initiation is also associated with increased exclusive breastfeeding and longer duration of breastfeeding in following months (5). The WHO and UNICEF launched the baby friendly hospital initiative in 1991 to strengthen maternity unit practices to support breastfeeding (6). However in spite of all these promotions and the known benefits of breastfeeding, exclusive breastfeeding and early initiation of breastfeeding are not often practiced. Factors intrinsic to the mother or baby may play a crucial role. One such factor is post partum depression (PPD) and there is evidence that mothers with PPD are less likely to breastfeed (7) (8).

Expression of postpartum depression may extend from the more transient baby blues to a longer lasting depression going on for several weeks (9). In both conditions there are mood swings, crying jags, sadness, insomnia and irritability. (10, 11)

The 10-question Edinburgh Postnatal Depression Scale (EPDS) is a validated, valuable and efficient way of identifying patients at risk for perinatal depression. It can be applied for depression screening during pregnancy. (12) The scale has been used as early as 1st or 2nd postpartum day in order to screen women at risk

of PPD, by Teissedre F. In his study 1154 women completed EPDS at 2 to 3 postpartum days and again at 4 to 6 weeks postpartum. He found that there was a highly significant positive correlation between EPDS scores on the two occasions (Spearman rank correlation: r = 0.59, P < 0.0001) (13). Although the studies done in the immediate postpartum period are likely to pick up many cases of postpartum blues, Dennis found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (14).

Studies looking at sex ratio at birth have shown that there is a strong gender bias in India, favouring boys (15) (16) (17). Jayachandran et al have shown that boys tend to be breast fed longer (18). The EPDS in relation to sex of the child has not been studied. Also the inter-relationship between births of girl babies (in the society with a male sex bias), EPDS score soon after birth and exclusive breast feeding have not been examined previously. We hypothesize that there may be higher EPPD score and less exclusive early breast feeding of girl children. Recognition of these possible barriers to breast feeding may allow for more focussed support to mothers that will hopefully both promote breast feeding and improve survival of the girl baby.

Ethics statement: This study was approved by the St Stephen's Hospital Research Ethics Committee. Informed written consent was obtained from participants. The data and the names of the respondents are kept confidential. The paper we propose to publish does not contain any identifying information, so

no response the patient made can be attributed to any of the participants in the study.

MATERIALS AND METHODS:

This was an observational cohort study conducted between August 2010 and July 2011, at St. Stephens Hospital, Delhi. Only mothers delivering normally with their babies roomed-in were invited to participate. Mothers who consented to participate were interviewed on each of the first 2 days after delivery to enquire about breast feeding. The weight of the baby, sex of the child, mother's education, history of previous births and socio-economic status were recorded.

Mothers were administered Edinburgh Post Partum Depressions (EPPD) questionnaire on day 2(19). A Hindi translation of the EPPD was administered to mother who preferred Hindi (20). This translation has been back translated and validated previously (21).

Outcomes measured were exclusive breastfeeding in first 48 hours and postpartum depression on EPDS scale.

The socioeconomic status was assigned grades 1 to 5 taking in to account the skill levels and formal education using the 'Major Groups and Skill Levels Classification' of University of Warwick. ISCO-88 skill level 4 is considered grade 1 of socio-economic status, skill level 3 - grade 2, skill level 2 - grade 4, skill level 4 and those not working - grade 5 (22).

The education level was also graded as follows - grade 1: mothers who have not completed primary school education, grade 2: primary school graduates up to secondary school, grade 3: if they had passed up to higher secondary education,

grade 4: college graduates and grade 5: mother who have completed a postgraduates.

Correlates of exclusive breastfeeding were examined. The incidence of exclusive breastfeeding in boys and girls was examined separately and also for primi-parous mothers, separately from mothers who have had previous babies. EPPDS in relation to sex of the child was also examined. Depression score above 11 on EPDS was considered as significant using cut-off determined previously by Teissedre (13). Pearson chi square test was used to look for significance. Odds ratio and 95% CI of exclusive breastfeeding were calculated. For proportions; 95% CI of the observed proportion is reported. Multiple regression analysis of correlates of exclusive breastfeeding was also done. CI was calculated using CIA software (23).

Sample size calculation: We calculated that in order to get results that reflect the target population at the 95% confidence level with a margin of error of less than 2.5%, we would need to interview 1537 mothers (24).

***RESULTS*:**

During the study period 3,466 babies were born at the hospital. There were only 792 girls for every 1000 boys. Among women delivering their first babies, there were 901 girls per 1000 boys. Among mothers delivering their second babies the sex ratio was 737 girls to 1000 boys. If first child was a girl the ratio in the second delivery fell to 632:1000 but if the first child was a boy the sex ratio in second children was 841:1000.

1537 mothers of singleton babies were enrolled in the study. 1026 mothers were exclusively breastfeeding their babies. The sex ratio in the study sample 797 girls per 1000 boys was similar to the sex ratio of overall deliveries.
Babies with birth weight 2.5 kg or heavier were more likely to be breast fed compared to those less than 2.5 kg (low birth weight) (68.2% vs 59.8%, $p<0.01$). Multiparous mothers were more likely to be breast feeding than primiparous mothers (71.6% vs 62.8%, Difference = 0.089, 95% CI= 0.042 to 0.135).

Exclusive breast feeding was significantly more among mothers of boys as compared to those of girls (70.8 % vs 61.5 % $p<0.001$). Gender of baby had less influence on exclusive breastfeeding of first born children. 64.3% boy babies and 61.0% girl babies were exclusively breastfed ($p=0.32$). If the first born was a girl and second baby was also a girl, 60% of second children were breastfed compared to 77.3%, if the second child was a boy ($p<0.05$). The chances of breastfeeding the baby was highest if there was a boy sibling in the family; 78.9% compared to 67.9%, if there was no boy ($p<0.01$).

No significant difference in breastfeeding was found related to maternal age, socioeconomic status, maternal education, working status.

The EPDS score was significantly higher in mothers giving birth to a girl child (mean EPDS score 6.0 ± 3.39 compared to 5.4 ± 2.87, p< 0.01). Significantly more mothers of girl babies had a EPDS score higher than 11 compared to mothers of boys (9.7% vs 5.4%, difference in proportion=-0.045, CI= -0.072 to -0.019).

Higher EPDS score affects breastfeeding rates. Only 52.4% mothers with score ≥11 were breast feeding compared to 67.8 % in those with score <11 (p < 0.01). The depression score was significantly lower in mothers with at least one male child when compared to those with no male child (5.21±3.25 vs 5.9 ± 3.2, p < 0.01).

To eliminate the influence of depression on breastfeeding subgroup analysis was also done to look at incidence of breastfeeding against gender of the baby in mothers with low EPDS. Even in the group with low EPDS score (namely in those EPDS ≤ 11), 71.5% of male babies were exclusively breastfed compared to 63.0% of female babies, (p < 0.01). This suggested that birth of a girl child independently influences breastfeeding as well as resulting in increased EPDS score which further reduces the chance of breastfeeding.

The multiple logistic regression analysis indicated that birth of a female baby (OR = 0.69, 95% CI: 0.56 to 0.87), high EPDS (OR = 0.53, 95% CI: 0.36 to 0.80) and low birth weight (OR = 0.72, 95% CI: 0.55 to 0.95) are associated with lower odds of exclusive breastfeeding.

***DISCUSSION*:**

Low female to male sex ratio is used as an index of the sex bias in the community and can result from antenatal sex screening and selective abortion of female babies. In India, male: female sex ratio is 914:1000. Sex ratio at birth is a better index of antenatal sex selection than the overall sex ratio (20). Previous studies have shown that the sex ratio was particularly low in 2nd children if the first was a girl (17) (25).

The same phenomenon was seen again in the fresh cohort studied here. The sex ratio in 2nd order deliveries was 792 girls to 1000 boys but it was 632:1000 when 1st child was a girl child.

There was a male bias in breastfeeding too. More boys were being breastfed than girls (70.8% vs 61.5%, p< 0.001). Jaychandran and Ilyana hypothesise that since breastfeeding inhibits post-natal fertility, a mother might limit the nursing of an infant if she wants to continue having children. Mothers of girl children may want a boy soon and so may limit the duration of her feeding (18). Kimani et al also found sex of the child to be one of the factors for suboptimal breastfeeding in Kenya (n = 4299) (26).

Gender of baby and PPD

Our study found that depression score done after 24 hours of birth was higher in mothers of girls (6.0 vs 5.4 ±, p< 0.01) and significantly more mothers of girl children had depression score > 11 (9.7 vs 5.4). The influence of gender of baby on PPD in mothers has been reported before. Adewuya et al in a study on Nigerian women found female sex of the baby was one of the predictors for PPD (OR 2.74, CI 1.87-4.03) (27). Chandran et al in Tamilnadu showed that birth of

a daughter, when a son was desired, was among the important risk factors for depression (28). In a study of women in Iran from two to 12 months after delivery, gender of the child was found to be one of the important factors contributing to PPD (29). The mothers with low EPDS score in our study done in the first 48 hours could be those with postpartum blues and not all of them will have persistent postpartum depression. Only follow up study will identify those with persistent postpartum depression. Our study protocol aimed to examine early breastfeeding did not examine the issue of long lasting depression in mothers of girl children.

PPD and Breast feeding

We found that mothers with higher EPDS score were less likely to breastfeed (Only 52.4 % mothers with score ≥11 were breast feeding compared to 67.8 % in those with score <11) . The effects of PPD on breastfeeding have been reported earlier. Dennis also found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (31). In a cohort of 1745 Australian women it was found that median duration of breastfeeding was 26 weeks for women with early-onset depression, 28 weeks for women with late-onset depression, and 39 weeks for women without depression (30). Dennis and McQueen found maternal depression to be associated with delayed initiation (31) and Ip and colleagues found its association with early discontinuation (8) of breast feeding.

The birth of the girl child is associated with greater depression, and the lower breastfeeding in girls could be mediated by the depression. To examine the

effect of depression on breastfeeding we studied breastfeeding in mothers of girls who had high EPDS score against those with low score. We found that in mothers of girls with higher depression score, only 47.7% were breastfed and in those with low score 63.0% were breastfed (Difference in proportion= 0.154, 95% CI = -0.26 to -0.028). To see the influence of sex of the child on breast feeding independent of associated depression, we performed a sub group analysis by sex of child in mothers with (EPDS greater than 11 and EPDS less than 11). In mothers with low EPDS 71.5% mothers of boys were exclusively breastfeeding compared to 63.0% of girl babies ($p < 0.01$). This suggests that sex of the child affects breastfeeding rates independently.

The results point to a pro male gender bias. Mothers of girls may need more help to overcome postpartum depression and for improving breastfeeding rates. This in turn would enhance the survival of girl children and improve the sex ratio in the country.

This study does suffer from some shortcomings in as much as it was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups. Studies in other populations are needed to confirm our findings.

We studied the initiation of breastfeeding and exclusive breast feeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

We studied the EPDS in mothers within 48 hours of delivery. Many of those with high scores may be suffering from post partum blues rather than full fledged post partum depression. Our findings suggest that there are more mothers with

a higher score on the EPPD scale within 48 hours if they had a girl child. Further studies done later in the post natal period need to be done to examine how many of these mothers with high initial scores have longer lasting PPD.

TABLE 1:

Characteristic	EPDS (Mean ± SD)	P	Exclusive Breast Feeding			
			No (N = 511)	Yes (N = 1026)	P	Odds Ratio (95% CI)
Maternal age (years)						
< 25	5.8 ± 2.96		171 (33.5)	299 (29.1)		1.00
25 – 29	5.5 ± 3.17		237 (46.6)	474 (46.2)		1.14 (0.90 1.46)
30 – 34	5.8 ± 3.35		84 (16.4)	210(20.5)		1.43 (1.04 1.96)
≥ 35	5.3 ± 2.71	0.25	19 (3.7)	43 (4.2)	0.16	1.20 (0.73 2.29)
SES						
Academic	5.2 ± 3.12		79 (15.5)	165 (16.1)		1.00
Vocational	5.2 ± 2.87		109 (21.4)	199 (19.4)		0.87 (0.61 1.25)
Short education	5.5 ± 3.07		130 (25.5)	261 (25.5)		0.96 (0.68 1.35)
Skilled	6.2 ± 3.18		147 (28.8)	315 (30.8)		1.03 (0.74 1.43)
Semi/Unskilled	5.8 ± 3.42	< 0.001	45 (8.8)	84 (8.2)	0.86	0.89 (0.57 1.40)
Birth weight (Kg)						
≥ 2.5	5.5 ± 3.18		402 (78.8)	865 (84.3)		1.00
< 2.5	6.1 ± 2.98	< 0.01	108 (21.2)	161 (15.7)	<0.01	0.69 (0.53 0.91)
Maternal education						
< Primary	6.8 ± 4.14		23 (4.5)	34 (3.3)		1.00
Up to Secondary	6.0 ± 3.02		61 (11.9)	122 (11.9)		1.35 (0.73 2.49)
Higher secondary	5.8 ± 2.93		111 (21.7)	201 (19.6)		1.22 (0.69 2.18)
Graduate	5.5 ± 3.03		226 (44.2)	499 (48.7)		1.49 (0.86 2.59)
Post graduate	5.3 ± 3.33	< 0.01	90 (17.6)	169 (16.5)	0.44	1.27 (0.71 2.29)
Working status						
Yes	4.9 ± 3.07		87 (17.1)	212 (20.7)		1.00
No	5.8 ± 3.11	< 0.001	423 (82.9)	813 (79.3)	0.09	0.79 (0.60 1.04)
EPDS						
< 11	-	-	460 (90.0)	972 (94.7)		1.00
≥ 11			51 (10.0)	54 (5.3)	0.001	0.50 (0.34 0.75)
Sex of the newborn						
Male	5.4 ± 2.87		249 (48.7)	606 (59.1)		1.00
Female	6.0 ± 3.39	< 0.001	262 (51.3)	420 (40.9)	< 0.001	0.66 (0.34 0.75)
Sex of the newborn – Primi						

Male	5.7 ± 2.68		163 (81.4)	294 (54.9)		1.00
Female	5.6 ± 3.27	0.87	154 (48.6)	241 (45.1)	0.32	0.87 (0.66 1.15)
No siblings			317(62.0)	535(52.12		1.00
MM	4.9 ± 3.49		17 (3.3.)	90 (8.8)		3.1 (1.83 5.36)
MF	5.8 ± 3.4		17 (3.3)	54 (5.3)		1.9(1.07 1.30)
FM	5.4 ± 3.59		24 (4.7)	82 (8.0)		2.0 (1.26 3.26)
FF	6.6 ± 3.39		14 (2.7)	21 (2.0)		0.89 (0.45 1.77)
>2 children	5.8 ± 3.14	0.06	122(23.9)	244 (23.8)	<0.001	1.2(0.92 1.53)

M = male, F = female, MM = 2nd male child, FF = 2nd female child, FM = male child after a female child

REFFERENCE :

1. American Academy of Paediatrics. Work Group on Breastfeeding. Breastfeeding and the Use of Human Milk. PEDIATRICS; 1997, Vol. 100 No. 6 pp. 1035-1039.

2. Huffman SL, Zehner ER, Victora C. Can improvements in breast-feeding practices reduce neonatal mortality in developing countries? Midwifery. 2001; 17:80-92.

3. Sheehan D, Bridle B, Hillier T, Feightner K, Hayward S, Lee KS, Krueger P, Sword W, James M. Breastfeeding outcomes of women following uncomplicated birth in Hamilton-Wentworth. *Can J Public Health* 1999; 90(6):408.

4. Anderson GC, Moore E, Hepworth J, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev. 2003;(2):CD003519

5. Unicef. Breastfeeding – The Remarkable First Hour Of Life. Malasia. Unicef 2007. htpp:/ /www.unicef.org /malaysia /Breastfeeding_First_Hour_of_Life.pdf , Accessed on 27/6/12)

6 Unicef. Baby Friendly Hospital Initiative Revised, updated and expanded for integrated care. New York. World Health Organization and UNICEF 2009. http://www.unicef.org/nutrition/files/BFHI_2009_s4.pdf (Accessed 27/6/12)

7. McLearn KT, Minkovitz CS, Strobino DM, Marks E, Hou W.Maternal depressive symptoms at 2 to 4 months post partum and early parenting practices. Arch Pediatr Adolesc Med. 2006; 160:279-848.

8. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J.Breastfeeding and maternal and infant health outcomes in developed countries.Evid Rep Technol Assess . 2007 ;(153):1-186.

9. A-C Bernard-Bonnin; Canadian Paediatric Society, Mental Health and Developmental Disabilities Committee Paediatr Child Health 2004;9(8):575-83

10. Melinda Smith, M.A., Jeanne Segal. Postpartum Depression and the Baby Blue;Symptoms, Treatment, and Support for New Moms. www.helpguide.org/mental/postpartum_depression.htm. (Accessed on 10/3/13)

11. U. Ottawa. Postpartum depression .www.med.uottawa.ca/sim/data/Depression_postpartum_e.htm (Accessed on 3/10/13)

12. Murray D, Cox JL. Screening for depression during pregnancy with the Edinburgh Depression Scale (EPDS). J Repro Infant Psychol 1990: 8, 99-107

13. Teissèdre F, Chabrol H. Detecting women at risk for postnatal depression using the Edinburgh Postnatal Depression Scale at 2 to 3 days postpartum. Can J Psychiatry. 2004 Jan; 49(1):51-419.

14. Dennis CL, McQueen K. Does maternal postpartum depressive symptomatology influence infant feeding outcomes? Acta Paediatr. 2007; 96:590-4.

15. Nayar U. Doomed before Birth: Study of Declining Sex Ratio in the Age Group 0-6 Years in Selected Districts of Punjab and Haryana. New Delhi : NCERT; Department of Women's Studies. 1995. pp. 287

16. Sahni M, Verma N, Narula D, Varghese RM, Sreenivas V, Puliyel JM. Missing girls in India: infanticide, feticide and made-to-order pregnancies? Insights from hospital-based sex-ratio-at-birth over the last century. PLoS One. 2008 21;3:e2224.

17. Manchanda S, Saikia B, Gupta N, Chowdhary S, Puliyel JM. Sex ratio at birth in India, its relation to birth order, sex of previous children and use of indigenous medicine. PLoS One. 2011;6(6):e20097. Epub 2011 Jun 15.

18. Jayachandran S, Kuziemko I. Why do mothers breastfeed girls less than boys? Evidence and implications for child health in India. Q J Econ. 2011; 126:1485-1538.

19. Hewitt C, Gilbody S, Brealey S, Paulden M, Palmer S, Mann R, Green J, Morrell J, Barkham M, Light K, Richards D. Methods to identify postnatal depression in primary care: an integrated evidence synthesis and value of information analysis. Health Technol Assess. 2009; 13:1-145, 147-230.

20. Dubey C, Gupta N, Bhasin S, Muthal RA, Arora R . Prevalence and associated risk factors for postpartum depression in women attending a tertiary hospital, Delhi, India. Int J Soc Psychiatry. 2011 Aug 5.

21. Nagpal J, Dhar RS, Sinha S, Bhargava V, Sachdeva A, Bhartia A. An exploratory study to evaluate the utility of an adapted Mother Generated Index (MGI) in assessment of postpartum quality of life in India. Health Qual Life Outcomes. 2008 Dec 2; 6:107.

22. Warwik Institiue For Employment Research. Major Groups and Skill Levels ISCO 88 Guide Section 2; http://www2.warwick.ac.uk/fac/soc/ier/research/links/isco88/english/s2/, (Accessed on 2/7/2012)

23. Confidence Interval Analysis (CIA) Software. Available at www.som.soton.ac.uk/cia . (Accessed on 10/4/12)

24. Creative Research Systems. Sample size calculator. Available at http://www.surveysystem.com/sscalc.htm#one.(Accessed on 12/4/12)

25. Jha P, Kumar R, Vasa P, Dhingra N, Thiruchelvam D, Moineddin R.Low female[corrected]-to-male [corrected] sex ratio of children born in India: national survey of 1.1 million households. Lancet. 2006 21;367:211-8.

26. Kimani-Murage EW, Madise NJ, Fotso JC, Kyobutungi C, Mutua MK, Gitau TM, Yatich N. Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. BMC Public Health. 2011 26;11:396

27. Adewuya AO, Fatoye FO, Ola BA, Ijaodola OR, Ibigbami SM.Sociodemographic and obstetric risk factors for postpartum depressive symptoms in Nigerian women. J Psychiatr Pract. 2005; 11:353-8.

28. Chandran M, Thayan P, Muliyil J, Abraham S. Post-partum depression in a cohort of women from a rural area of Tamil Nadu, India. Incidence and risk factors. Br J Psychiatry. 2002; 181:499-504

29. Kheirabadi GR, Maracy MR, Barekatain M, Salehi M, Sadri GH, Kelishadi M, Cassy P. Risk factors of postpartum depression in rural areas of Isfahan Province, Iran.Arch Iran Med. 2009; 12:461-7.

30. Henderson JJ, Evans SF, Straton JA, Priest SR, Hagan R. Impact of postnatal depression on breastfeeding duration.Birth. 2003 Sep;30(3):175-80. Erratum in: Birth. 2004; 31:76.

31. Dennis CL, McQueen K. The relationship between infant-feeding outcomes and postpartum depression: a qualitative systematic review.Pediatrics. 2009; 123e736-51.

Article focus:

We hypothesise that in a society with a pro-male bias there would be:

1. Higher Postnatal Depression score in mothers of girl babies.
2. Less breastfeeding of girl children.

Key Message:

1. Sex bias was evident in the low sex ratio at birth and the significantly lower ratio in families where first child was a girl.

2. Postnatal depression score were higher after birth of a girl child.

3. There was less exclusive breastfeeding of girl children.

4. Mothers with high postnatal depression score were less likely to breastfeed

Strength of study:

1. The postpartum depression was evaluated using a widely validated EPDS scoring system.

Limitations of study:

1. It was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups.

2. We studied the initiation of breastfeeding and exclusive breast feeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

3. EPDS scoring was done in first 48 hrs and would include mothers with transient postpartum blues not amounting to postpartum depression. Follow up studies are needed to see that how many of them develop significant depression.

ASSOCIATION OF BIRTH OF GIRLS, POSTPARTUM DEPRESSION AND EXCLUSIVE BREASTFEEDING – AN OBSERVATIONAL STUDY

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Study was guided by Dr Jacob Puliyel.

ABSTRACT

OBJECTIVES AND HYPOTHESIS: To examine influence of gender of baby on exclusive breastfeeding and incidence of postpartum depression (PPD). We hypothesize that in a society with a male gender bias there may be more PPD and less exclusive breastfeeding of girls.

DESIGN: Prospective study

SETTING: The study was conducted in an urban, tertiary hospital in Delhi.

PARTICIPANTS: Mothers delivering normally with their babies roomed-in.1537 eligible women participated in the study.

PRIMARY AND SECONDARY OUTCOME MEASURES: Exclusive breastfeeding within first 48 hours of life and score on Edinburgh post partum depression scale (EPDS) were recorded.

RESULTS: 3,466 babies were born in the hospital. There were 792 girls for every 1000 boys. Among primparous women, sex-ratio was 901 girls per 1000 boys. In second babies the sex-ratio was 737:1000. If the first child was a girl the birth ratio fell to 632. 1026 mothers were exclusively breastfeeding. Exclusive breast feeding of boys was significantly higher (70.8% vs 61.5% $p<0.001$). The EPDS score was significantly higher with birth of girls (EPDS 6.0±3.39 vs 5.4±2.87 $p< 0.01$). Women with EPDS >11 were less likely to exclusively breast feed ($p<0.01$).

CONCLUSION: The results point to a pro male gender bias evidenced by a low sex ratio at birth, higher EPDS score in mothers of girls and less breastfeeding of female children.

Article Summary

- The postpartum depression was evaluated using a widely validated EPDS scoring system.
- It was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups.
- We studied the initiation of exclusive breastfeeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.
- EPDS scoring was done in first 48 hrs and would include mothers with transient postpartum blues not amounting to postpartum depression. Follow up studies are needed to see that how many of them develop significant depression.

Reporting Checklist

Section/Topic	Item #	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any pre-specified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of fo *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if appli
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe compatabil methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		

Participants	13 *	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed e study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14 *	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potentialcon
		(b) Indicate number of participants with missing data for each variable of interest
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)
Outcome data	15 *	*Cohort study*—Report numbers of outcome events or summary measures over time
		Case-control study—Report numbers in each exposure category, or summary measures of exposure
		Cross-sectional study—Report numbers of outcome events or summary measures
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence inter confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnit bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which t based

The above reporting checklist is included in the article

INTRODUCTION:

Breast milk is the preferred food for all infants including premature and sick babies (1). UNICEF has promoted breastfeeding initiation within an hour of childbirth (2) (3). It provides nutritional, immunological, developmental and psychological advantages to the child besides health advantages to the mother and economic benefits to the family. (1). It establishes skin-to-skin contact providing warmth to the newborn. Suckling at breast stimulates oxytocin release which further increasing flow of milk from breast. Breast milk reduces mortality in the first month of life (4). Early breast feed initiation is also associated with increased exclusive breastfeeding and longer duration of breastfeeding (5). The WHO and UNICEF launched the baby friendly hospital initiative in 1991 to strengthen maternity unit practices to support breastfeeding (6). However in spite of all these promotions and the known benefits of breastfeeding, exclusive breastfeeding and early initiation of breastfeeding are not often practiced. Factors intrinsic to the mother or baby may play a crucial role. One such factor is post partum depression (PPD) and there is evidence that mothers with PPD are less likely to breastfeed (7) (8).

Expression of postpartum depression may extend from the more transient baby blues to a longer lasting depression going on for several weeks (9). In both conditions there are mood swings, crying jags, sadness, insomnia and irritability. (10, 11)

The 10-question Edinburgh Postnatal Depression Scale (EPDS) is a validated, valuable and efficient way of identifying patients at risk for perinatal depression. It can be applied for depression screening during pregnancy. (12) The scale has been used as early as 1st or 2nd postpartum day in order to screen women at risk

of PPD, by Teissedre F. In his study 1154 women completed EPDS at 2 to 3 postpartum days and again at 4 to 6 weeks postpartum. He found that there was a highly significant positive correlation between EPDS scores on the two occasions (Spearman rank correlation: r = 0.59, P < 0.0001) (13). Although studies done in the immediate postpartum period are likely to pick up many cases of postpartum blues, Dennis found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (14).

Studies looking at sex ratio at birth have shown that there is a strong gender bias in India, favouring boys (15) (16) (17). Jayachandran et al have shown that boys tend to be breast fed longer (18). The EPDS score in relation to sex of the child has not been studied. Also the association between births of girl babies (in the society with a male sex bias), EPDS score soon after birth and exclusive breast feeding have not been examined previously. We hypothesize that there may be higher EPDS score and less exclusive early breast feeding of girl children. Recognition of these possible barriers to exclusive breast feeding may allow more focussed support to mothers that will promote breast feeding and improve survival of the girl baby.

Ethics statement: This study was approved by the St Stephen's Hospital Research Ethics Committee. Informed written consent was obtained from participants. The data and the names of the respondents are kept confidential. The paper we propose to publish does not contain any identifying information, so

no response the patient made can be attributed to any of the participants in the study.

MATERIALS AND METHODS:

This was an observational cross sectional study conducted between August 2010 and July 2011, at St. Stephens Hospital, Delhi. Only mothers delivering normally with their babies roomed-in were invited to participate. Mothers who consented to participate were interviewed on each of the first 2 days after delivery to enquire about breast feeding. The weight of the baby, sex of the child, mother's education, history of previous births and socio-economic status were recorded.

Mothers were administered Edinburgh Post Partum Depression Scale (EPDS) on day 2(19). A Hindi translation of the EPDS was administered to mother who preferred Hindi (20). This translation has been back translated and validated previously (21). The outcomes measured were exclusive breastfeeding in first 48 hours and postpartum depression on EPDS.

The socioeconomic status was assigned grades 1 to 5 taking in to account the skill levels and formal education using the 'Major Groups and Skill Levels Classification' of University of Warwick. ISCO-88 skill level 4 is considered grade 1 of socio-economic status, skill level 3 - grade 2, skill level 2 - grade 4, skill level 4 and those not working - grade 5 (22).

The education level was also graded as follows - grade 1: mothers who have not completed primary school education, grade 2: primary school graduates up to secondary school, grade 3: if they had passed up to higher secondary education,

grade 4: college graduates and grade 5: mother who have completed a postgraduate degree course.

Correlates of exclusive breastfeeding were examined. The incidence of exclusive breastfeeding in boys and girls was examined separately and also for primi-parous mothers, separately from mothers who have had previous babies. EPDS score in relation to sex of the child was also examined. Depression score above 11 on EPDS was considered as significant using cut-off determined previously by Teissedre (13). Pearson chi square test was used to look for significance. Odds ratio and 95% CI of exclusive breastfeeding were calculated. For proportions; 95% CI of the observed proportion is reported. Multiple regression analysis of correlates of exclusive breastfeeding was also done. CI was calculated using CIA software (23).

Sample size calculation: We calculated that in order to get results that reflect the target population at the 95% confidence level with a margin of error of less than 2.5%, we would need to interview 1537 mothers (24).

***RESULTS*:**

During the study period 3,466 babies were born at the hospital. There were only 792 girls for every 1000 boys. Among women delivering their first babies, there were 901 girls per 1000 boys. Among mothers delivering their second babies the sex ratio was 737 girls to 1000 boys. If first child was a girl the ratio in the second delivery fell to 632:1000 but if the first child was a boy the sex ratio in second children was 841:1000.

1537 mothers of singleton babies were enrolled in the study. The sex ratio in the study sample 797 girls per 1000 boys was similar to the sex ratio of overall deliveries. 1026 mothers in the study group were exclusively breastfeeding their babies.

Babies with birth weight 2.5 kg or heavier were more likely to be exclusively breast fed compared to those less than 2.5 kg (low birth weight) (68.2% vs 59.8%, $p<0.01$). Multiparous mothers were more likely to be exclusively breastfeeding than primiparous mothers (71.6% vs 62.8%, Difference = 0.089, 95% CI= 0.042 to 0.135).

Exclusive breast feeding was significantly more among mothers of boys as compared to those of girls (70.8 % vs 61.5 % $p<0.001$). Gender of baby had less influence on exclusive breastfeeding of first born children. 64.3% of primi boy babies and 61.0% of primi girl babies were exclusively breastfed ($p=0.32$). If the first born was a girl and second baby was also a girl, 60% of second children were exclusively breastfed compared to 77.3%, if the second child was a boy ($p=0.05$). The chances of exclusively breastfeeding the baby was highest if there was a boy sibling in the family; 78.6% compared to 67.9%, if there was no boy ($p<0.01$).

No significant difference in exclusive breastfeeding was found related to maternal age, socioeconomic status, maternal education, working status.

The EPDS score was significantly higher in mothers giving birth to a girl child (mean EPDS score 6.0 ± 3.39 compared to 5.4 ± 2.87, p< 0.01). The depression score was significantly lower in mothers with at least one male child when compared to those with no male child (5.21±3.25 vs 5.9 ± 3.2, p < 0.01). Significantly more mothers of girl babies had an EPDS score higher than 11 compared to mothers of boys (9.7% vs 5.4%, difference in proportion=-0.045, CI= -0.072 to -0.019).

Higher EPDS score affects exclusive breastfeeding rates. Only 52.4% mothers with score ≥11 were exclusively breastfeeding compared to 67.8 % in those with score <11 (p < 0.01).

Multiple logistic regression analysis indicated that birth of a female baby (OR = 0.69, 95% CI: 0.56 to 0.87), high EPDS (OR = 0.53, 95% CI: 0.36 to 0.80) and low birth weight (OR = 0.72, 95% CI: 0.55 to 0.95) are associated with lower odds of exclusive breastfeeding. This analysis suggests that sex of the baby, EPDS score and birth weight are significant, independent factors influencing EBF.

***DISCUSSION*:**

Low female to male sex ratio is used as an index of the sex bias in the community and can result from antenatal sex screening and selective abortion of female babies. In India, male: female sex ratio is 914:1000. Sex ratio at birth is a better index of antenatal sex selection than the overall sex ratio (20). Previous studies have shown that the sex ratio was particularly low in 2nd children if the first was a girl (17) (25).

The same phenomenon was seen again in the fresh cohort studied here. The sex ratio in 2nd order deliveries was 792 girls to 1000 boys but it was 632:1000 when 1st child was a girl child.

There was a male bias in breastfeeding too. More boys were being exclusively breastfed than girls. Jaychandran and Kuziemko hypothesise that since breastfeeding inhibits post-natal fertility, a mother might limit the nursing of an infant if she wants to continue having children. Mothers of girl children may want a boy soon and so may limit the duration of her feeding (18). Kimani et al also found sex of the child to be one of the factors for suboptimal breastfeeding in Kenya (n = 4299) (26).

Gender of baby and PPD

Our study found that depression score was higher in mothers of girls. The influence of gender of baby on postpartum depression in mothers has been reported before. Adewuya et al in a study on Nigerian women found female sex of the baby was one of the predictors for PPD· (OR 2.74, CI 1.87-4.03) (27). Chandran et al in Tamilnadu south India showed that birth of a daughter, when a son was desired, was an important risk factors for depression (28). In a study of

women in Iran also gender of the child was found to be an important factor contributing to PPD (29). Mothers who conceive female fetus have higher level of beta hcg. This along with other similar hormonal changes may be a biological explanation for the child gender to affect PPD. (30) (31) However this has not been elucidated clearly as yet.

Our study of EPDS was done on the second day after delivery. The mothers with low EPDS score could be those with postpartum blues and not all of them will have persistent postpartum depression. Only follow up study will identify those with persistent postpartum depression. Our study protocol aimed at investigating early breastfeeding did not examine the issue of long lasting depression in mothers of girl children.

PPD and Breast feeding

We found that mothers with higher EPDS score were less likely to be exclusively breastfeeding. The effects of PPD on exclusive breastfeeding have been reported earlier. Dennis also found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (32). In a cohort of 1745 Australian women it was found that median duration of breastfeeding was 26 weeks for women with early-onset depression, 28 weeks for women with late-onset depression, and 39 weeks for women without depression (33). Dennis and McQueen found maternal depression to be associated with delayed initiation (32) and Ip and colleagues found its association with early discontinuation (8) of breast feeding.

The birth of the girl child is associated with greater depression, and the lower exclusive breastfeeding in girls could be mediated by the depression. To examine the effect of depression on exclusive breastfeeding we studied exclusive breastfeeding in mothers of girls who had high EPDS score against those with low score. We found that in mothers of girls with higher depression score, only 47.7% were exclusively breastfeeding compared to 63.0% with low depression levels (Difference in proportion= 0.154, 95% CI = -0.26 to -0.028). To look at the influence of sex of the child on exclusive breastfeeding independent of associated depression, we performed multiple logistic regression analysis which showed that female sex of the child was independently associated with lower odds of exclusive breastfeeding even after adjusting for depression. .

The results point to a pro male gender bias. Mothers of girls may need more help to overcome postpartum depression and for improving breastfeeding rates. This in turn could enhance the survival of girl children and improve the sex ratio in the country.

This study does suffer from some shortcomings in as much as it was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups. Studies in other populations are needed to confirm our findings.

We studied exclusive breast feeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

We studied the EPDS in mothers within 48 hours of delivery. Many of those with high scores may be suffering from post partum blues rather than full fledged post partum depression. Further studies done later in the post natal period need

to be done to examine how many of these mothers with high initial scores have longer lasting PPD.

Although multiple regression analysis shows that higher depression score and female sex of child is associated with lower odds of exclusive breastfeeding, a causal relationship is not implied.

TABLE 1: Table showing correlates of Exclusive breast feeding and Postpartum depression

Characteristic	EPDS (Mean ± SD)	P	Exclusive Breast Feeding			
			No (N = 511)	Yes (N = 1026)	P	Odds Ratio (95% CI)
Maternal age (years)						
< 25	5.8 ± 2.96		171 (36.4)	299 (63.6)		1.00
25 – 29	5.5 ± 3.17		237 (33.3)	474 (66.7)		1.14 (0.90 1.46)
30 – 34	5.8 ± 3.35		84 (28.6)	210(71.4)		1.43 (1.04 1.96)
≥ 35	5.3 ± 2.71	0.25	19 (30.6)	43 (69.4)	0.16	1.20 (0.73 2.29)
SES						
Academic	5.2 ± 3.12		79 (32.4)	165 (67.6)		1.00
Vocational	5.2 ± 2.87		109 (35.4)	199 (64.6)		0.87 (0.61 1.25)
Short education	5.5 ± 3.07		130 (33.2)	261 (67.8)		0.96 (0.68 1.35)
Skilled	6.2 ± 3.18		147 (31.8)	315 (68.2)		1.03 (0.74 1.43)
Semi/Unskilled	5.8 ± 3.42	< 0.001	45 (34.9)	84 (65.1)	0.86	0.89 (0.57 1.40)
Birth weight (Kg)						
≥ 2.5	5.5 ± 3.18		402 (31.7)	865 (68.3)		1.00
< 2.5	6.1 ± 2.98	< 0.01	108 (40.1)	161 (59.9)	<0.01	0.69 (0.53 0.91)
Maternal education						
< Primary	6.8 ± 4.14		23 (40.4)	34 (59.6)		1.00
Up to Secondary	6.0 ± 3.02		61 (33.3)	122 (66.7)		1.35 (0.73 2.49)
Higher secondary	5.8 ± 2.93		111 (35.6)	201 (64.4)		1.22 (0.69 2.18)
Graduate	5.5 ± 3.03		226 (31.2)	499 (68.8)		1.49 (0.86 2.59)
Post graduate	5.3 ± 3.33	< 0.01	90 (34.7)	169 (65.3)	0.44	1.27 (0.71 2.29)
Working status						

Yes	4.9 ± 3.07		87 (29.1)	212 (70.9)		1.00
No	5.8 ± 3.11	< 0.001	423 (34.2)	813 (65.8)	0.09	0.79 (0.60 1.04)
EPDS						
< 11	-	-	460 (32.1)	972 (67.9)		1.00
≥ 11			51 (48.6)	54 (51.4)	0.001	0.50 (0.34 0.75)
Sex of the newborn						
Male	5.4 ± 2.87		249 (29.1)	606 (70.9)		1.00
Female	6.0 ± 3.39	< 0.001	262 (38.4)	420 (61.6)	< 0.001	0.66 (0.34 0.75)
Sex of the newborn – Primi						
Male	5.7 ± 2.68		163 (35.7)	294 (64.3)		1.00
Female	5.6 ± 3.27	0.87	154 (39.0)	241 (61.0)	0.32	0.87 (0.66 1.15)
No siblings			317(37.2)	535(62.7)		1.00
MM	4.9 ± 3.49		17 (15.9.)	90 (84.1)		3.1 (1.83 5.36)
MF	5.8 ± 3.4		17 (23.9)	54 (76.1)		1.9(1.07 1.30)
FM	5.4 ± 3.59		24 (22.6)	82 (77.4)		2.0 (1.26 3.26)
FF	6.6 ± 3.39		14 (40.0)	21 (60.0)		0.89 (0.45 1.77)
>2 children	5.8 ± 3.14	0.06	122(33.3)	244 (66.7)	<0.001	1.2(0.92 1.53)

M = male, F = female, MM = 2nd male child, FF = 2nd female child, FM = male child after a female child

Table 2: Birth order 2 or more

Characteristic	EPDS (Mean ± SD)	P	No EBF	EBF	P	Odds Ratio (95% CI)
Male sib	5.21±3.52		52 (26.8)	191 (38.9)		1.00
No Male sib	5.9±3.2	<0.01	142 (73.2)	300 (61.1)	<0.01	0.58 (0.40-0.83)

Table 3: Breastfeeding by EPPDS and sex of child

Characteristic	EBF in males	EBF in females	P
EPDS <11	583/815 (71.5%)	389/617 (63.0%)	0.001
EPDS ≥ 11	23/40 (57.5%)	31/65 (47.7%)	0.33

Table 4: Multiple Logistic Regression Analysis

bf	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.6900392	.0761006	-3.36	0.001	.5559035	.8565409
high_epds	.5326528	.1094171	-3.07	0.002	.3561157	.7967046
low_bwt	.719286	.1005456	-2.36	0.018	.5469104	.9459912

Table 5: Edinburgh Postnatal Depression Scale

INSTRUCTIONS FOR USERS

1. The mother is asked to underline the response that comes closest to how she has been feeling in the previous 7 days.
2. All 10 items must be completed.
3. Care should be taken to avoid the possibility of the mother discussing her answers with others.
4. The mother should complete the scale herself, unless she has limited English or has difficulty with reading.
5. The Edinburgh Postnatal Depression Scale may be used at 6–8 weeks to screen postnatal women. The child health clinic, a postnatal checkup, or a home visit may provide a suitable opportunity for its completion.

Edinburgh Postnatal Depression Scale

Name:

Address:

Baby's age:

Because you have recently had a baby, we would like to know how you are feeling. Please underline the answer that comes closest to how you have felt in the past 7 days, not just how you feel today.

Here is an example, already completed.

I have felt happy:

Yes, all the time

Yes, most of the time

No, not very often

No, not at all

This would mean: "I have felt happy most of the time" during the past week. Please complete the other questions in the same way.

In the past 7 days:

1. I have been able to laugh and see the funny side of things
- As much as I always could
- Not quite so much now
- Definitely not so much now
- Not at all

2. I have looked forward with enjoyment to things
- As much as I ever did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all

***3.** I have blamed myself unnecessarily when things went wrong
- Yes, most of the time
- Yes, some of the time
- Not very often
- No, never

4. I have been anxious or worried for no good reason
- No, not at all
- Hardly ever
- Yes, sometimes
- Yes, very often

***5.** I have felt scared or panicky for no very good reason
- Yes, quite a lot
- Yes, sometimes
- No, not much
- No, not at all

***6.** Things have been getting on top of me
- Yes, most of the time I haven't been able to cope at all
- Yes, sometimes I haven't been coping as well as usual
- No, most of the time I have coped quite well
- No, I have been coping as well as ever

***7.** I have been so unhappy that I have had difficulty sleeping
- Yes, most of the time
- Yes, sometimes

Not very often

No, not at all

***8.** I have felt sad or miserable

Yes, most of the time

Yes, quite often

Not very often

No, not at all

***9.** I have been so unhappy that I have been crying

Yes, most of the time

Yes, quite often

Only occasionally

No, never

***10.** The thought of harming myself has occurred to me

Yes, quite often

Sometimes

Hardly ever

Never

Response categories are scored 0, 1, 2, and 3 according to increased severity of the symptom. Items marked with an asterisk (*) are reverse scored (i.e., 3, 2, 1, and 0). The total score is calculated by adding the scores for each of the 10 items.

(34)(Permitted for general use)

Table 6: ISCO-88 major groups and skill level

Major group	ISCO skill levels
1. Legislators, senior officials and managers	-
2. Professionals	4th
3. Technicians and associate professionals	3rd

4. Clerks 2nd

5. Service workers and shop and market sales worker 2nd

6. Skill agricultural and fishery workers 2nd

7. Craft and related workers 2nd

8. Plants and machine operators and assemblers 2nd

9. Elementary occupations 1st

10. Armed forces -

(22)

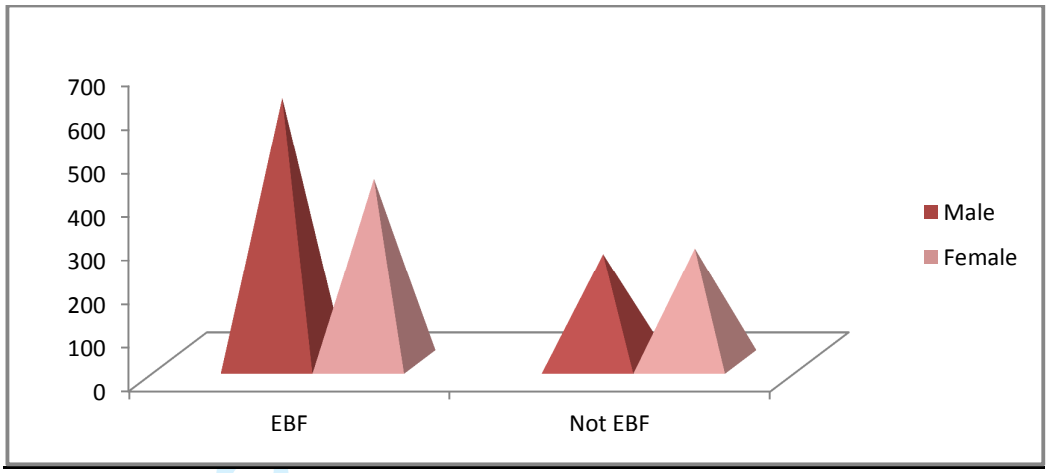

Fig 1: Breast feeding and sex of the child

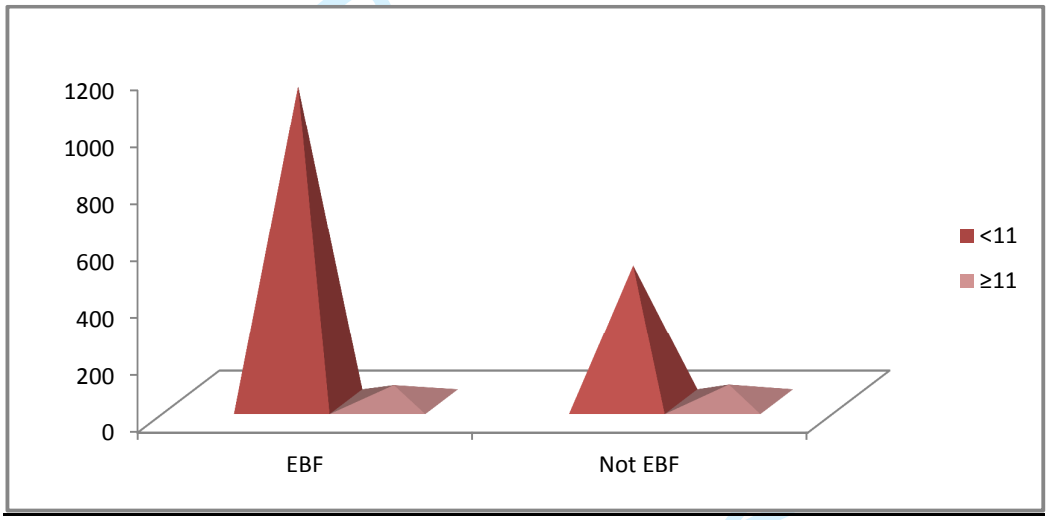

Fig 2: Breast feeding and postpartum depression

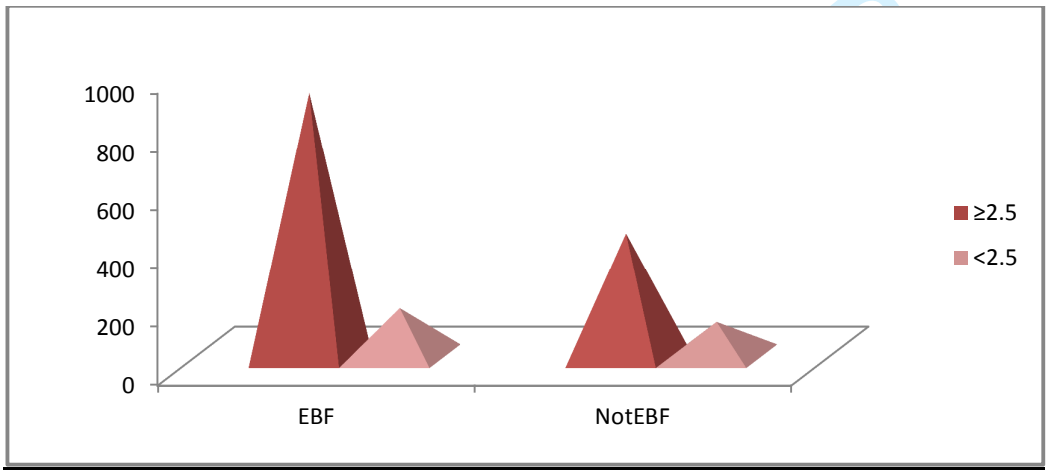

Fig 3: Breast feeding and birth weight

Article focus:

We hypothesise that in a society with a pro-male bias there would be:

1. Higher Postnatal Depression score in mothers of girl babies.
2. Less breastfeeding of girl children.

Key Message:

1. Sex bias was evident in the low sex ratio at birth and the significantly lower ratio in families where first child was a girl.

2. Postnatal depression score were higher after birth of a girl child.

3. There was less exclusive breastfeeding of girl children.

4. Mothers with high postnatal depression score were less likely to breastfeed

Strength of study:

1. The postpartum depression was evaluated using a widely validated EPDS scoring system.

Limitations of study:

1. It was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups.

2. We studied the initiation of exclusive breastfeeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

3. EPDS scoring was done in first 48 hrs and would include mothers with transient postpartum blues not amounting to postpartum depression. Follow up studies are needed to see that how many of them develop significant depression.

REFFERENCES:

1. American Academy of Paediatrics. Work Group on Breastfeeding. Breastfeeding and the Use of Human Milk. PEDIATRICS; 1997, Vol. 100 No. 6 pp. 1035-1039.
2. Huffman SL, Zehner ER, Victora C. Can improvements in breast-feeding practices reduce neonatal mortality in developing countries? Midwifery. 2001; 17:80-92.
3. Sheehan D, Bridle B, Hillier T, Feightner K, Hayward S, Lee KS, Krueger P, Sword W, James M. Breastfeeding outcomes of women following uncomplicated birth in Hamilton-Wentworth. *Can J Public Health* 1999; 90(6)**:**408.
4. Anderson GC, Moore E, Hepworth J, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev. 2003;(2):CD003519
5. Unicef. Breastfeeding – The Remarkable First Hour Of Life. Malasia. Unicef 2007. htpp:/ /www.unicef.org /malaysia /Breastfeeding_First_Hour_of_Life.pdf , Accessed on 27/6/12)
6. Unicef. Baby Friendly Hospital Initiative Revised, updated and expanded for integrated care. New York. World Health Organization and UNICEF 2009. http://www.unicef.org/nutrition/files/BFHI_2009_s4.pdf (Accessed 27/6/12)
7. McLearn KT, Minkovitz CS, Strobino DM, Marks E, Hou W.Maternal depressive symptoms at 2 to 4 months post partum and early parenting practices. Arch Pediatr Adolesc Med. 2006; 160:279-848.

8. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J.Breastfeeding and maternal and infant health outcomes in developed countries.Evid Rep Technol Assess . 2007 ;(153):1-186.

9. A-C Bernard-Bonnin; Canadian Paediatric Society, Mental Health and Developmental Disabilities Committee Paediatr Child Health 2004;9(8):575-83

10. Melinda Smith, M.A., Jeanne Segal. Postpartum Depression and the Baby Blue;Symptoms, Treatment, and Support for New Moms. www.helpguide.org/mental/postpartum_depression.htm. (Accessed on 10/3/13)

11. U. Ottawa. Postpartum depression .www.med.uottawa.ca/sim/data/Depression_postpartum_e.htm (Accessed on 3/10/13)

12. Murray D, Cox JL. Screening for depression during pregnancy with the Edinburgh Depression Scale (EPDS). J Repro Infant Psychol 1990: 8, 99-107

13. Teissèdre F, Chabrol H. Detecting women at risk for postnatal depression using the Edinburgh Postnatal Depression Scale at 2 to 3 days postpartum. Can J Psychiatry. 2004 Jan; 49(1):51-419.

14. Dennis CL, McQueen K. Does maternal postpartum depressive symptomatology influence infant feeding outcomes? Acta Paediatr. 2007; 96:590-4.

15. Nayar U. Doomed before Birth: Study of Declining Sex Ratio in the Age Group 0-6 Years in Selected Districts of Punjab and Haryana. New Delhi : NCERT; Department of Women's Studies. 1995. pp. 287

16. Sahni M, Verma N, Narula D, Varghese RM, Sreenivas V, Puliyel JM. Missing girls in India: infanticide, feticide and made-to-order pregnancies? Insights from hospital-based sex-ratio-at-birth over the last century. PLoS One. 2008 21;3:e2224.

17. Manchanda S, Saikia B, Gupta N, Chowdhary S, Puliyel JM. Sex ratio at birth in India, its relation to birth order, sex of previous children and use of indigenous medicine. PLoS One. 2011;6(6):e20097. Epub 2011 Jun 15.

18. Jayachandran S, Kuziemko I. Why do mothers breastfeed girls less than boys? Evidence and implications for child health in India. Q J Econ. 2011; 126:1485-1538.

19. Hewitt C, Gilbody S, Brealey S, Paulden M, Palmer S, Mann R, Green J, Morrell J, Barkham M, Light K, Richards D. Methods to identify postnatal depression in primary care: an integrated evidence synthesis and value of information analysis. Health Technol Assess. 2009; 13:1-145, 147-230.

20. Dubey C, Gupta N, Bhasin S, Muthal RA, Arora R . Prevalence and associated risk factors for postpartum depression in women attending a tertiary hospital, Delhi, India. Int J Soc Psychiatry. 2011 Aug 5.

21. Nagpal J, Dhar RS, Sinha S, Bhargava V, Sachdeva A, Bhartia A. An exploratory study to evaluate the utility of an adapted Mother Generated Index (MGI) in assessment of postpartum quality of life in India. Health Qual Life Outcomes. 2008 Dec 2; 6:107.

22. Warwik Institiue For Employment Research. Major Groups and Skill Levels ISCO 88 Guide Section 2; http://www2.warwick.ac.uk/fac/soc/ier/research/links/isco88/english/s2/, (Accessed on 2/7/2012)

23. Confidence Interval Analysis (CIA) Software. Available at www.som.soton.ac.uk/cia . (Accessed on 10/4/12)

24. Creative Research Systems. Sample size calculator. Available at http://www.surveysystem.com/sscalc.htm#one.(Accessed on 12/4/12)

25. Jha P, Kumar R, Vasa P, Dhingra N, Thiruchelvam D, Moineddin R.Low female[corrected]-to-male [corrected] sex ratio of children born in India: national survey of 1.1 million households. Lancet. 2006 21;367:211-8.

26. Kimani-Murage EW, Madise NJ, Fotso JC, Kyobutungi C, Mutua MK, Gitau TM, Yatich N. Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. BMC Public Health. 2011 26;11:396

27. Adewuya AO, Fatoye FO, Ola BA, Ijaodola OR, Ibigbami SM.Sociodemographic and obstetric risk factors for postpartum depressive symptoms in Nigerian women. J Psychiatr Pract. 2005; 11:353-8.

28. Chandran M, Thayan P, Muliyil J, Abraham S. Post-partum depression in a cohort of women from a rural area of Tamil Nadu, India. Incidence and risk factors. Br J Psychiatry. 2002; 181:499-504

29. Kheirabadi GR, Maracy MR, Barekatain M, Salehi M, Sadri GH, Kelishadi M, Cassy P. Risk factors of postpartum depression in rural areas of Isfahan Province, Iran.Arch Iran Med. 2009; 12:461-7.

30. Yaron Y, Lehavi O, Orr-Urtreger A, Gull I, Lessing JB, Amit A, Ben-Yosef D. Maternal serum HCG is higher in the presence of a female fetus as early as week 3 post-fertilization. Hum Reprod. 2002 Feb; 17(2):485-9.

31.Hendrick V, Altshuler LL, Suri R. Hormonal changes in the postpartum and implications for postpartum depression. Psychosomatics. 1998 Mar-Apr; 39(2):93-101.

32.Dennis CL, McQueen K. The relationship between infant-feeding outcomes and postpartum depression: a qualitative systematic review.Pediatrics. 2009; 123e736-51.

33. Henderson JJ, Evans SF, Straton JA, Priest SR, Hagan R. Impact of postnatal depression on breastfeeding duration.Birth. 2003 Sep; 30(3):175-80. Erratum in: Birth. 2004; 31:76.

34.*Currie ML, Rademacher R: The pediatrician's role in recognizing and intervening in postpartum depression. Pediatr Clin North Am 2004; 51:785–801.*

~~GENDER BIAS AND POSTPARTUM DEPRESSION TOGETHER MILITATE AGAINST BREASTFEEDING OF GIRLS:~~ ***ASSOCIATION OF ~~NEWBORN GENDERB~~IRTH OF GIRLS,~~irth of Girls~~ POSTPARTUM DEPRESSION AND EXCLUSIVE BREASTFEEDING – AN OBSERVATIONAL STUDY*** ~~AN OBSERVATIONAL COHORT STUDY~~

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Study was guided by Dr Jacob **Puliyel.**

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ABSTRACT

OBJECTIVES AND HYPOTHESIS: To examine influence of gender of baby on exclusive breastfeeding and incidence of postpartum depression (PPD) ~~and their interrelationship~~. We hypothesize that in a society with a male gender bias there may be more PPD and less exclusive breastfeeding of girls.

DESIGN: Prospective study

SETTING: The study was conducted in an urban, tertiary hospital in Delhi.

PARTICIPANTS: Mothers delivering normally with their babies roomed-in.1537 eligible women participated in the study.

PRIMARY AND SECONDARY OUTCOME MEASURES: Exclusive ~~B~~breast ~~-~~feeding within first 48 hours of life and score on Edinburgh post partum depression scale (EPDS) were~~as~~ recorded ~~within first 48 hours of life~~.

RESULTS: 3,466 babies were born in the hospital. There were 792 girls for every 1000 boys. Among primparous women, sex-ratio was 901 girls per 1000 boys. In second babies the sex-ratio was 737:1000. If the first child was a girl the birth ratio fell to 632. 1026 mothers were exclusively breastfeeding. Exclusive breast feeding of boys was significantly higher (70.8% vs 61.5% p<0.001). The EPDS score was significantly higher with birth of girls (EPDS 6.0±3.39 vs 5.4±2.87 p< 0.01). Women with EPDS ~~<~~>11 were less likely to exclusively breast feed (p<0.01).

CONCLUSION: The results point to a pro male gender bias evidenced by a low sex ratio at birth, higher EPDS score in mothers of girls and less breastfeeding of female children.

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IMPLICATIONS Mothers of girls may need more help to overcome postpartum depression/ postpartum blues and for improving breastfeeding rates. This in turn would enhance the survival of girl children and improve the sex ratio in the country.

AREAS FOR FURTHER RESEARCH: Studies in other populations are needed to confirm our findings. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

Further studies done later in the post natal period to examine how many of these mothers with high initial scores have longer lasting PPD.

Article Summary

- The postpartum depression was evaluated using a widely validated EPDS scoring system.
- It was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups.
- We studied the initiation of exclusive breastfeeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.
- EPDS scoring was done in first 48 hrs and would include mothers with transient postpartum blues not amounting to postpartum depression. Follow up studies are needed to see that how many of them develop significant depression.

Reporting Checklist

Section/Topic	Item #	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any pre-specified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		

Participants		13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
			(b) Give reasons for non-participation at each stage
			(c) Consider use of a flow diagram
Descriptive data		14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
			(b) Indicate number of participants with missing data for each variable of interest
			(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)
Outcome data		15*	*Cohort study*—Report numbers of outcome events or summary measures over time
			Case-control study—Report numbers in each exposure category, or summary measures of exposure
			Cross-sectional study—Report numbers of outcome events or summary measures
Main results		16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
			(*b*) Report category boundaries when continuous variables were categorized
			(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses		17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion			
Key results		18	Summarise key results with reference to study objectives
Limitations		19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation		20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability		21	Discuss the generalisability (external validity) of the study results
Other information			
Funding		22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

The above reporting checklist is included in the article

INTRODUCTION:

Breast milk is the preferred food for all infants including premature and sick babies (1). UNICEF has promoted breastfeeding initiation within an hour of childbirth (2) (3). It provides nutritional, immunological, developmental~~,~~ and psychological advantages to the child besides health advantages to the mother and economic benefits to the family (1). It establishes skin-to-skin contact providing warmth to the newborn. Suckling at breast stimulates oxytocin release which further increasing flow of milk from breast. Breast milk reduces mortality in the first month of life (4). Early breast feed initiation is also associated with increased exclusive breastfeeding and longer duration of breastfeeding ~~in following months~~ (5). The WHO and UNICEF launched the baby friendly hospital initiative in 1991 to strengthen maternity unit practices to support breastfeeding (6). However in spite of all these promotions and the known benefits of breastfeeding, exclusive breastfeeding and early initiation of breastfeeding are not often practiced. Factors intrinsic to the mother or baby may play a crucial role. One such factor is post partum depression (PPD) and there is evidence that mothers with PPD are less likely to breastfeed (7) (8).

Expression of postpartum depression may extend from the more transient baby blues to a longer lasting depression going on for several weeks (9). In both conditions there are mood swings, crying jags, sadness, insomnia and irritability. (10, 11)

The 10-question Edinburgh Postnatal Depression Scale (EPDS) is a validated, valuable and efficient way of identifying patients at risk for perinatal depression. It can be applied for depression screening during pregnancy. (12) The scale has been used as early as 1st or 2nd postpartum day in order to screen women at risk

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of PPD, by Teissedre F. In his study 1154 women completed EPDS at 2 to 3 postpartum days and again at 4 to 6 weeks postpartum. He found that there was a highly significant positive correlation between EPDS scores on the two occasions (Spearman rank correlation: r = 0.59, P < 0.0001) (13). Although ~~the~~ studies done in the immediate postpartum period are likely to pick up many cases of postpartum blues, Dennis found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (14).

Studies looking at sex ratio at birth have shown that there is a strong gender bias in India, favouring boys (15) (16) (17). Jayachandran et al have shown that boys tend to be breast fed longer (18). The EPDS score in relation to sex of the child has not been studied. Also the association ~~inter-relationship~~ between births of girl babies (in the society with a male sex bias), EPDS score soon after birth and exclusive breast feeding have not been examined previously. We hypothesize that there may be higher EPDS~~PD~~ score and less exclusive early breast feeding of girl children. Recognition of these possible barriers to exclusive breast feeding may allow ~~for~~ more focussed support to mothers that will ~~hopefully both~~ promote breast feeding and improve survival of the girl baby.

Ethics statement: This study was approved by the St Stephen's Hospital Research Ethics Committee. Informed written consent was obtained from participants. The data and the names of the respondents are kept confidential. The paper we propose to publish does not contain any identifying information, so

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no response the patient made can be attributed to any of the participants in the study.

MATERIALS AND METHODS:

This was an observational cross sectional ~~cohort~~ study conducted between August 2010 and July 2011, at St. Stephens Hospital, Delhi. Only mothers delivering normally with their babies roomed-in were invited to participate. Mothers who consented to participate were interviewed on each of the first 2 days after delivery to enquire about breast feeding. The weight of the baby, sex of the child, mother's education, history of previous births and socio-economic status were recorded.

Mothers were administered Edinburgh Post Partum Depression~~s~~ Scale (EP~~P~~DS) ~~questionnaire~~ on day 2(19). A Hindi translation of the EP~~P~~DS was administered to mother who preferred Hindi (20). This

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translation has been back translated and validated previously (21).

The ~~O~~outcomes measured were exclusive breastfeeding in first 48 hours and postpartum depression on ~~EPDS~~ EPDS~~scale~~.

The socioeconomic status was assigned grades 1 to 5 taking in to account the skill levels and formal education using the 'Major Groups and Skill Levels Classification' of University of Warwick. ISCO-88 skill level 4 is considered grade 1 of socio-economic status, skill level 3 - grade 2, skill level 2 - grade 4, skill level 4 and those not working - grade 5 (22).

The education level was also graded as follows - grade 1: mothers who have not completed primary school education, grade 2: primary school graduates up to secondary school, grade 3: if they had passed up to higher secondary education, grade 4: college graduates and grade 5: mother who have completed a postgraduate~~s~~ degree course.

Correlates of exclusive breastfeeding were examined. The incidence of exclusive breastfeeding in boys and girls was examined separately and also for primi-parous mothers, separately from mothers who have had previous babies. E~~P~~PDS score in relation to sex of the child was also examined. Depression score above 11 on EPDS was considered as significant using cut-off determined previously by Teissedre (13). Pearson chi square test was used to look for significance. Odds ratio and 95% CI of exclusive breastfeeding were calculated.

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For proportions; 95% CI of the observed proportion is reported. Multiple regression analysis of correlates of exclusive breastfeeding was also done. CI was calculated using CIA software (23).

Sample size calculation: We calculated that in order to get results that reflect the target population at the 95% confidence level with a margin of error of less than 2.5%, we would need to interview 1537 mothers (24).

***RESULTS*:**

During the study period 3,466 babies were born at the hospital. There were only 792 girls for every 1000 boys. Among women delivering their first babies, there were 901 girls per 1000 boys. Among mothers delivering their second babies the sex ratio was 737 girls to 1000 boys. If first child was a girl the ratio in the second delivery fell to 632:1000 but if the first child was a boy the sex ratio in second children was 841:1000.

1537 mothers of singleton babies were enrolled in the study. ~~1026 mothers were exclusively breastfeeding their babies.~~ The sex ratio in the study sample 797

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girls per 1000 boys was similar to the sex ratio of overall deliveries. 1026 mothers in the study group were exclusively breastfeeding their babies. Babies with birth weight 2.5 kg or heavier were more likely to be exclusively breast fed compared to those less than 2.5 kg (low birth weight) (68.2% vs 59.8%, p<0.01). Multiparous mothers were more likely to be exclusively breast feeding than primiparous mothers (71.6% vs 62.8%, Difference = 0.089, 95% CI= 0.042 to 0.135).

Exclusive breast feeding was significantly more among mothers of boys as compared to those of girls (70.8 % vs 61.5 % p<0.001). Gender of baby had less influence on exclusive breastfeeding of first born children. 64.3% of primi boy babies and 61.0% of primi girl babies were exclusively breastfed (p=0.32). If the first born was a girl and second baby was also a girl, 60% of second children were exclusively breastfed compared to 77.3%, if the second child was a boy (p~~<~~=0.05). The chances of exclusively breastfeeding the baby was highest if there was a boy sibling in the family; 78.6~~9~~% compared to 67.9%, if there was no boy (p<0.01).

No significant difference in exclusive breastfeeding was found related to maternal age, socioeconomic status, maternal education, working status.

The EPDS score was significantly higher in mothers giving birth to a girl child (mean EPDS score 6.0 ± 3.39 compared to 5.4 ± 2.87, p< 0.01). The depression score was significantly lower in mothers with at least one male child when compared to those with no male child (5.21±3.25 vs 5.9 ± 3.2, p < 0.01). Significantly more mothers of girl babies had ~~a~~an EPDS score higher than 11

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compared to mothers of boys (9.7% vs 5.4%, difference in proportion=-0.045, CI= -0.072 to -0.019).

Higher EPDS score affects exclusive breastfeeding rates. Only 52.4% mothers with score ≥11 were exclusively breast-feeding compared to 67.8 % in those with score <11 ($p < 0.01$). ~~The depression score was significantly lower in mothers with at least one male child when compared to those with no male child (5.21±3.25 vs 5.9 ± 3.2, p < 0.01).~~

~~To eliminate the influence of depression on breastfeeding subgroup analysis was also done to look at incidence of breastfeeding against gender of the baby in mothers with low EPDS. Even in the group with low EPDS score (namely in those EPDS ≤ 11), 71.5% of male babies were exclusively breastfed compared to 63.0% of female babies, (p < 0.01). This suggested that birth of a girl child independently influences breastfeeding as well as resulting in increased EPDS score which further reduces the chance of breastfeeding.~~

~~The m~~Multiple logistic regression analysis indicated that birth of a female baby (OR = 0.69, 95% CI: 0.56 to 0.87), high EPDS (OR = 0.53, 95% CI: 0.36 to 0.80) and low birth weight (OR = 0.72, 95% CI: 0.55 to 0.95) are associated with lower odds of exclusive breastfeeding. This analysis suggests that sex of the baby, EPDS score and birth weight are significant, independent factors influencing EBF.

***DISCUSSION*:**

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Low female to male sex ratio is used as an index of the sex bias in the community and can result from antenatal sex screening and selective abortion of female babies. In India, male: female sex ratio is 914:1000. Sex ratio at birth is a better index of antenatal sex selection than the overall sex ratio (20). Previous studies have shown that the sex ratio was particularly low in 2nd children if the first was a girl (17) (25).

The same phenomenon was seen again in the fresh cohort studied here. The sex ratio in 2nd order deliveries was 792 girls to 1000 boys but it was 632:1000 when 1st child was a girl child.

There was a male bias in breastfeeding too. More boys were being exclusively breastfed than girls ~~(70.8% vs 61.5%, p< 0.001)~~. Jaychandran and ~~Ilyana~~ Kuziemko hypothesise that since breastfeeding inhibits post-natal fertility, a mother might limit the nursing of an infant if she wants to continue having children. Mothers of girl children may want a boy soon and so may limit the duration of her feeding (18). Kimani et al also found sex of the child to be one of the factors for suboptimal breastfeeding in Kenya (n = 4299) (26).

Gender of baby and PPD

Our study found that depression score ~~done after 24 hours of birth~~ was higher in mothers of girls ~~(6.0 vs 5.4 ±, p< 0.01) and significantly more mothers of girl children had depression score > 11 (9.7 vs 5.4)~~. The influence of gender of baby on postpartum depression ~~PPD~~ in mothers has been reported before. Adewuya et al in a study on Nigerian women found female sex of the baby was one of the predictors for PPD. (OR 2.74, CI 1.87-4.03) (27). Chandran et al in Tamilnadu south India showed that birth of a daughter, when a son was desired, was

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anmong the important risk factors for depression (28). In a study of women in Iran alsofrom two to 12 months after delivery, gender of the child was found to be anone of the important factors contributing to PPD (29).Bmothers and this may be a biological explanation for the phenomenon However this has not been elucidated clearly as yet. Mothers who conceive female fetus have higher level of beta hcg. This along with other similar hormonal changes may be a biological explanation for the child gender to affect PPD. (30) (31) However this has not been elucidated clearly as yet.

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Ourt study of EPDS was done on the second day after delivery. The mothers with low EPDS score in our study done in the first 48 hours could be those with postpartum blues and not all of them will have persistent postpartum depression. Only follow up study will identify those with persistent postpartum depression. Our study protocol aimed atto examine investigating early breastfeeding did not examine the issue of long lasting depression in mothers of girl children.

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PPD and Breast feeding

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We found that mothers with higher EPDShigher EPDS score were less likely to be exclusively breastfeeding (Only 52.4 % mothers with score ≥11 were breast feeding compared to 67.8 % in those with score <11) . The effects of PPD on exclusive breastfeeding have been reported earlier. Dennis also found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (3132). In a cohort of 1745 Australian

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women it was found that median duration of breastfeeding was 26 weeks for women with early-onset depression, 28 weeks for women with late-onset depression, and 39 weeks for women without depression (~~30~~33). Dennis and McQueen found maternal depression to be associated with delayed initiation (~~31~~32) and Ip and colleagues ~~–~~found its association with early discontinuation (8) of breast feeding.

The birth of the girl child is associated with greater depression, and the lower exclusive breastfeeding in girls could be mediated by the depression. To examine the effect of depression on exclusive breastfeeding we studied exclusive breastfeeding in mothers of girls who had high EPDS score against those with low score. We found that in mothers of girls with higher depression score, only 47.7% were exclusively ~~-~~breastfeeding compared to~~and in those with low score~~ 63.0% with low depression levels ~~were breastfed~~ (Difference in proportion= 0.154, 95% CI = -0.26 to -0.028). To look at~~see~~ the influence of sex of the child on exclusive breast~~-~~feeding independent of associated depression, we performed multiple logistic regression analysis which showed that female sex of the child was independently associated with lower odds of exclusive breastfeeding even after adjusting for depression. ~~a sub-group analysis by sex of child in mothers with (EPDS greater than 11 and EPDS less than 11). In mothers with low EPDS 71.5% mothers of boys were exclusively breastfeeding compared to 63.0% of girl babies (p < 0.01). This suggests that sex of the child affects breastfeeding rates independently.~~

The results point to a pro male gender bias. Mothers of girls may need more help to overcome postpartum depression and for improving breastfeeding rates.

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This in turn could ~~would~~ enhance the survival of girl children and improve the sex ratio in the country.

This study does suffer from some shortcomings in as much as it was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups. Studies in other populations are needed to confirm our findings.

We studied ~~the~~ ~~initiation of breastfeeding and~~ exclusive breast feeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

We studied the EPDS in mothers within 48 hours of delivery. Many of those with high scores may be suffering from post partum blues rather than full fledged post partum depression. ~~Our findings suggest that there are more mothers with a higher score on the EPPD scale within 48 hours if they had a girl child.~~ Further studies done later in the post natal period need to be done to examine how many of these mothers with high initial scores have longer lasting PPD.

Although multiple regression analysis shows that higher depression score and female sex of child is associated with lower odds of exclusive breastfeeding, a causal relationship is not implied.

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TABLE 1: Table showing correlates of Exclusive breast feeding and Postpartum depression

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Characteristic	EPDS (Mean ± SD)	P	Exclusive Breast Feeding			
			No (N = 511)	Yes (N = 1026)	P	Odds Ratio (95% CI)
Maternal age (years)						
< 25	5.8 ± 2.96		171 (33.536.4)	299 (29.163.6)		1.00
25 – 29	5.5 ± 3.17		237 (46.633.3)	474 (46.266.7)		1.14 (0.90 1.46)
30 – 34	5.8 ± 3.35		84 (16.428.6)	210(20.571.4)		1.43 (1.04 1.96)
≥ 35	5.3 ± 2.71	0.25	19 (3.730.6)	43 (4.269.4)	0.16	1.20 (0.73 2.29)
SES						
Academic	5.2 ± 3.12		79 (15.532.4)	165 (16.167.6)		1.00
Vocational	5.2 ± 2.87		109 (21.435.4)	199 (19.464.6)		0.87 (0.61 1.25)
Short education	5.5 ± 3.07		130 (25.533.2)	261 (25.567.8)		0.96 (0.68 1.35)
Skilled	6.2 ± 3.18		147 (28.831.8)	315 (30.868.2)		1.03 (0.74 1.43)
Semi/Unskilled	5.8 ± 3.42	< 0.001	45 (8.834.9)	84 (8.265.1)	0.86	0.89 (0.57 1.40)
Birth weight (Kg)						
≥ 2.5	5.5 ± 3.18		402 (78.831.7)	865 (84.368.3)		1.00
< 2.5	6.1 ± 2.98	< 0.01	108 (21.240.1)	161 (15.759.9)	<0.01	0.69 (0.53 0.91)
Maternal education						
< Primary	6.8 ± 4.14		23 (4.540.4)	34 (3.359.6)		1.00
Up to Secondary	6.0 ± 3.02		61 (11.933.3)	122 (11.966.7)		1.35 (0.73 2.49)
Higher secondary	5.8 ± 2.93		111 (21.735.6)	201 (19.664.4)		1.22 (0.69 2.18)
Graduate	5.5 ± 3.03		226 (44.231.2)	499 (48.768.8)		1.49 (0.86 2.59)
Post graduate	5.3 ± 3.33	< 0.01	90 (17.634.7)	169 (16.565.3)	0.44	1.27 (0.71 2.29)
Working status						
Yes	4.9 ± 3.07		87 (17.129.1)	212 (20.770.9)		1.00
No	5.8 ± 3.11	< 0.001	423 (82.934.2)	813 (79.365.8)	0.09	0.79 (0.60 1.04)
EPDS						
< 11	-	-	460 (90.032.1)	972 (94.767.9)		1.00
≥ 11			51 (10.048.6)	54 (5.351.4)	0.001	0.50 (0.34 0.75)
Sex of the newborn						
Male	5.4 ± 2.87		249 (48.729.1)	606 (59.170.9)		1.00
Female	6.0 ± 3.39	< 0.001		420 (40.961.6)	< 0.001	0.66 (0.34

			262 (51.338.4)			0.75)
Sex of the newborn – Primi Male Female	5.7 ± 2.68 5.6 ± 3.27	0.87	163 (81.435.7) 154 (48.639.0)	294 (54.964.3) 241 (45.161.0)	0.32	1.00 0.87 (0.66 1.15)
No siblings MM MF FM FF >2 children	4.9 ± 3.49 5.8 ± 3.4 5.4 ± 3.59 6.6 ± 3.39 5.8 ± 3.14	0.06	317(62.037.2) 17 (3.315.9.) 17 (3.323.9) 24 (4.722.6) 14 (2.740.0) 122(23.933.3)	535(52.1262.7) 90 (84.18) 54 (5.376.1) 82 (8.077.4) 21 (2.060.0) 244 (23.866.7)	<0.001	1.00 3.1 (1.83 5.36) 1.9(1.07 1.30) 2.0 (1.26 3.26) 0.89 (0.45 1.77) 1.2(0.92 1.53)

M = male, F = female, MM = 2nd male child, FF = 2nd female child, FM = male child after a female child

Table 2: Birth order 2 or more

Characteristic	EPDS (Mean ± SD)	P	No EBF	EBF	P	Odds Ratio (95% CI)
Male sib	5.21±3.52		52 (26.8)	191 (38.9)		1.00
No Male sib	5.9±3.2	<0.01	142 (73.2)	300 (61.1)	<0.01	0.58 (0.40-0.83)

Table 3: Breastfeeding by EPPDS and sex of child

Characteristic	EBF in males	EBF in females	P
EPDS <11	583/815 (71.5%)	389/617 (63.0%)	0.001
EPDS ≥ 11	23/40 (57.5%)	31/65 (47.7%)	0.33

Table 4: Multiple Logistic Regression Analysis

bf | Odds Ratio Std. Err. z P>|z| [95% Conf. Interval]

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sex	.6900392	.0761006	-3.36	0.001	.5559035 .8565409
high_epds	.5326528	.1094171	-3.07	0.002	.3561157 .7967046
low_bwt	.719286	.1005456	-2.36	0.018	.5469104 .9459912

Table 5: Edinburgh Postnatal Depression Scale

INSTRUCTIONS FOR USERS

1. The mother is asked to underline the response that comes closest to how she has been feeling in the previous 7 days.
2. All 10 items must be completed.
3. Care should be taken to avoid the possibility of the mother discussing her answers with others.
4. The mother should complete the scale herself, unless she has limited English or has difficulty with reading.
5. The Edinburgh Postnatal Depression Scale may be used at 6–8 weeks to screen postnatal women. The child health clinic, a postnatal checkup, or a home visit may provide a suitable opportunity for its completion.

Edinburgh Postnatal Depression Scale

Name:

Address:

Baby's age:

Because you have recently had a baby, we would like to know how you are feeling. Please underline the answer that comes closest to how you have felt in the past 7 days, not just how you feel today.

Here is an example, already completed.

I have felt happy:

Yes, all the time

Yes, most of the time

No, not very often

No, not at all

This would mean: "I have felt happy most of the time" during the past week. Please complete the other questions in the same way.

In the past 7 days:

1. I have been able to laugh and see the funny side of things

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_ As much as I always could
_ Not quite so much now
_ Definitely not so much now
_ Not at all

_ **2.** I have looked forward with enjoyment to things
_ As much as I ever did
_ Rather less than I used to
_ Definitely less than I used to
_ Hardly at all

_ ***3.*** I have blamed myself unnecessarily when things went wrong
_ Yes, most of the time
_ Yes, some of the time
_ Not very often
_ No, never

_ **4.** I have been anxious or worried for no good reason
_ No, not at all
_ Hardly ever
_ Yes, sometimes
_ Yes, very often

_ ***5.*** I have felt scared or panicky for no very good reason
_ Yes, quite a lot
_ Yes, sometimes
_ No, not much
_ No, not at all

_ ***6.*** Things have been getting on top of me
_ Yes, most of the time I haven't been able to cope at all
_ Yes, sometimes I haven't been coping as well as usual
_ No, most of the time I have coped quite well
_ No, I have been coping as well as ever

_ ***7.*** I have been so unhappy that I have had difficulty sleeping
_ Yes, most of the time
_ Yes, sometimes
_ Not very often
_ No, not at all

_ ***8.** I have felt sad or miserable

_ Yes, most of the time

_ Yes, quite often

_ Not very often

_ No, not at all

_ ***9.** I have been so unhappy that I have been crying

_ Yes, most of the time

_ Yes, quite often

_ Only occasionally

_ No, never

_ ***10.** The thought of harming myself has occurred to me

_ Yes, quite often

_ Sometimes

_ Hardly ever

_ Never

Response categories are scored 0, 1, 2, and 3 according to increased severity of the symptom. Items marked with an asterisk (*) are reverse scored (i.e., 3, 2, 1, and 0). The total score is calculated by adding the scores for each of the 10 items.

(34)(Permitted for general use)

Table 6: ISCO-88 major groups and skill level

Major group	ISCO skill levels
1. Legislators, senior officials and managers	-
2. Professionals	4th
3. Technicians and associate professionals	3rd
4. Clerks	2nd

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5. Service workers and shop and market sales worker 2nd

6. Skill agricultural and fishery workers 2nd

7. Craft and related workers 2nd

8. Plants and machine operators and assemblers 2nd

9. Elementary occupations 1st

10. Armed forces -

(22)

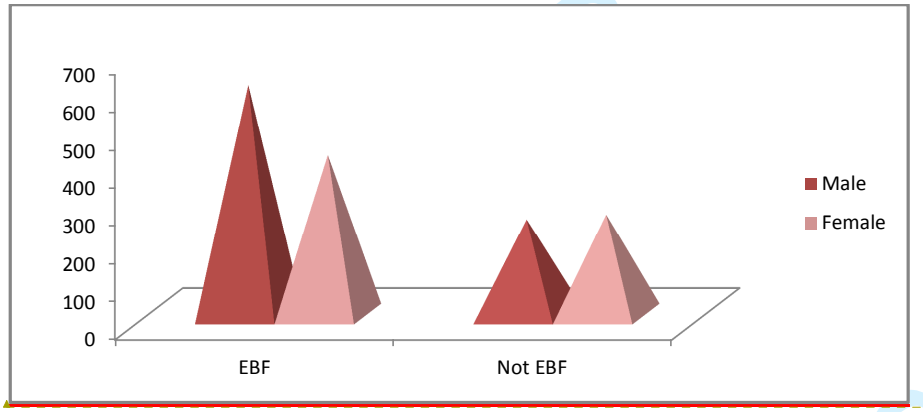

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Fig 1:Breast feeding and sex of the child

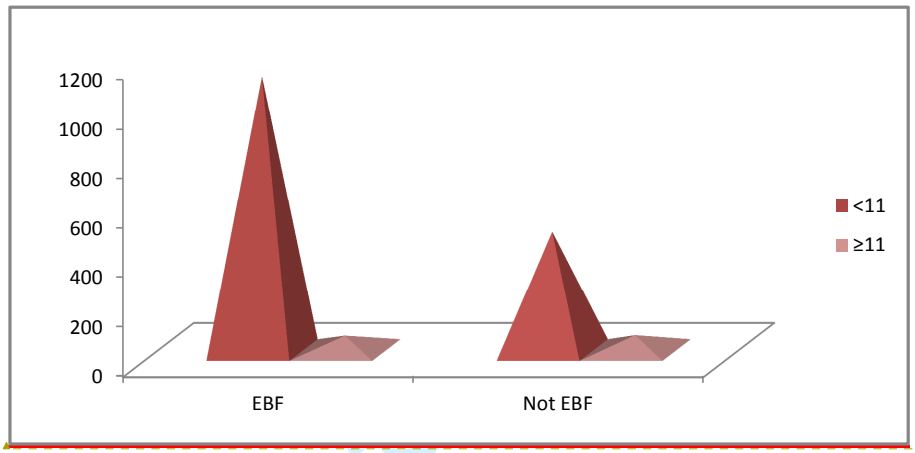

Fig 2: Breast feeding and postpartum depression

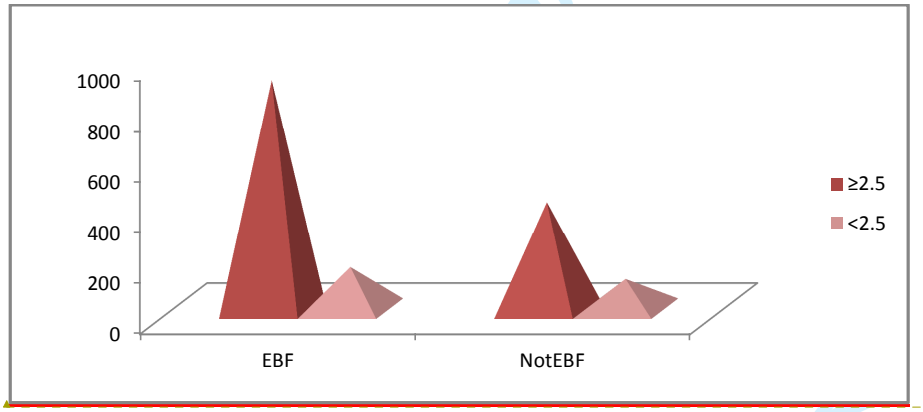

Fig 3: Breast feeding and birth weight

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REFFERENCES:

1. American Academy of Paediatrics. Work Group on Breastfeeding. Breastfeeding and the Use of Human Milk. PEDIATRICS; 1997, Vol. 100 No. 6 pp. 1035-1039.

2. Huffman SL, Zehner ER, Victora C. Can improvements in breast-feeding practices reduce neonatal mortality in developing countries? Midwifery. 2001; 17:80-92.

3. Sheehan D, Bridle B, Hillier T, Feightner K, Hayward S, Lee KS, Krueger P, Sword W, James M. Breastfeeding outcomes of women following uncomplicated birth in Hamilton-Wentworth. *Can J Public Health* 1999; 90(6):408.

4. Anderson GC, Moore E, Hepworth J, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev. 2003;(2):CD003519

5. Unicef. Breastfeeding – The Remarkable First Hour Of Life. Malasia. Unicef 2007. htpp:/ /www.unicef.org /malaysia /Breastfeeding First Hour of Life.pdf , Accessed on 27/6/12)

6. Unicef. Baby Friendly Hospital Initiative Revised, updated and expanded for integrated care. New York. World Health Organization and UNICEF 2009. http://www.unicef.org/nutrition/files/BFHI 2009 s4.pdf (Accessed 27/6/12)

7. McLearn KT, Minkovitz CS, Strobino DM, Marks E, Hou W.Maternal depressive symptoms at 2 to 4 months post partum and early parenting practices. Arch Pediatr Adolesc Med. 2006; 160:279-848.

8. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J.Breastfeeding and maternal and infant health outcomes in developed countries.Evid Rep Technol Assess . 2007 ;(153):1-186.

9. A-C Bernard-Bonnin; Canadian Paediatric Society, Mental Health and Developmental Disabilities Committee Paediatr Child Health 2004;9(8):575-83

10. Melinda Smith, M.A., Jeanne Segal. Postpartum Depression and the Baby Blue;Symptoms, Treatment, and Support for New Moms. www.helpguide.org/mental/postpartum_depression.htm. (Accessed on 10/3/13)

11. U. Ottawa. Postpartum depression .www.med.uottawa.ca/sim/data/Depression_postpartum_e.htm (Accessed on 3/10/13)

12. Murray D, Cox JL. Screening for depression during pregnancy with the Edinburgh Depression Scale (EPDS). J Repro Infant Psychol 1990: 8, 99-107

13. Teissèdre F, Chabrol H. Detecting women at risk for postnatal depression using the Edinburgh Postnatal Depression Scale at 2 to 3 days postpartum. Can J Psychiatry. 2004 Jan; 49(1):51-419.

14. Dennis CL, McQueen K. Does maternal postpartum depressive symptomatology influence infant feeding outcomes? Acta Paediatr. 2007; 96:590-4.

15. Nayar U. Doomed before Birth: Study of Declining Sex Ratio in the Age Group 0-6 Years in Selected Districts of Punjab and Haryana. New Delhi : NCERT; Department of Women's Studies. 1995. pp. 287

16. Sahni M, Verma N, Narula D, Varghese RM, Sreenivas V, Puliyel JM. Missing girls in India: infanticide, feticide and made-to-order pregnancies? Insights from hospital-based sex-ratio-at-birth over the last century. PLoS One. 2008 21;3:e2224.

17. Manchanda S, Saikia B, Gupta N, Chowdhary S, Puliyel JM. Sex ratio at birth in India, its relation to birth order, sex of previous children and use of indigenous medicine. PLoS One. 2011;6(6):e20097. Epub 2011 Jun 15.

18. Jayachandran S, Kuziemko I. Why do mothers breastfeed girls less than boys? Evidence and implications for child health in India. Q J Econ. 2011; 126:1485-1538.

19. Hewitt C, Gilbody S, Brealey S, Paulden M, Palmer S, Mann R, Green J, Morrell J, Barkham M, Light K, Richards D. Methods to identify postnatal depression in primary care: an integrated evidence synthesis and value of information analysis. Health Technol Assess. 2009; 13:1-145, 147-230.

20. Dubey C, Gupta N, Bhasin S, Muthal RA, Arora R . Prevalence and associated risk factors for postpartum depression in women attending a tertiary hospital, Delhi, India. Int J Soc Psychiatry. 2011 Aug 5.

21. Nagpal J, Dhar RS, Sinha S, Bhargava V, Sachdeva A, Bhartia A. An exploratory study to evaluate the utility of an adapted Mother Generated Index (MGI) in assessment of postpartum quality of life in India. Health Qual Life Outcomes. 2008 Dec 2; 6:107.

22. Warwik Institiue For Employment Research. Major Groups and Skill Levels ISCO 88 Guide Section 2; http://www2.warwick.ac.uk/fac/soc/ier/research/links/isco88/english/s2/, (Accessed on 2/7/2012)

23. Confidence Interval Analysis (CIA) Software. Available at www.som.soton.ac.uk/cia . (Accessed on 10/4/12)

24. Creative Research Systems. Sample size calculator. Available at http://www.surveysystem.com/sscalc.htm#one.(Accessed on 12/4/12)

25. Jha P, Kumar R, Vasa P, Dhingra N, Thiruchelvam D, Moineddin R.Low female[corrected]-to-male [corrected] sex ratio of children born in India: national survey of 1.1 million households. Lancet. 2006 21;367:211-8.

26. Kimani-Murage EW, Madise NJ, Fotso JC, Kyobutungi C, Mutua MK, Gitau TM, Yatich N. Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. BMC Public Health. 2011 26;11:396

27. Adewuya AO, Fatoye FO, Ola BA, Ijaodola OR, Ibigbami SM.Sociodemographic and obstetric risk factors for postpartum depressive symptoms in Nigerian women. J Psychiatr Pract. 2005; 11:353-8.

28. Chandran M, Thayan P, Muliyil J, Abraham S. Post-partum depression in a cohort of women from a rural area of Tamil Nadu, India. Incidence and risk factors. Br J Psychiatry. 2002; 181:499-504

29. Kheirabadi GR, Maracy MR, Barekatain M, Salehi M, Sadri GH, Kelishadi M, Cassy P. Risk factors of postpartum depression in rural areas of Isfahan Province, Iran.Arch Iran Med. 2009; 12:461-7.

30. Yaron Y, Lehavi O, Orr-Urtreger A, Gull I, Lessing JB, Amit A, Ben-Yosef D. Maternal serum HCG is higher in the presence of a female fetus as early as week 3 post-fertilization. Hum Reprod. 2002 Feb;17(2):485-9.

31.Hendrick V, Altshuler LL, Suri R. Hormonal changes in the postpartum and implications for postpartum depression. Psychosomatics. 1998 Mar-Apr; 39(2):93-101.

32.Dennis CL, McQueen K. The relationship between infant-feeding outcomes and postpartum depression: a qualitative systematic review.Pediatrics. 2009; 123e736-51.

33. Henderson JJ, Evans SF, Straton JA, Priest SR, Hagan R. Impact of postnatal depression on breastfeeding duration.Birth. 2003 Sep;30(3):175-80. Erratum in: Birth. 2004; 31:76.

34.*Currie ML, Rademacher R: The pediatrician's role in recognizing and intervening in postpartum depression. Pediatr Clin North Am 2004;51:785–801.*

~~REFFERENCE :~~

~~1. American Academy of Paediatrics. Work Group on Breastfeeding. Breastfeeding and the Use of Human Milk. PEDIATRICS; 1997, Vol. 100 No. 6 pp. 1035-1039.~~

~~2. Huffman SL, Zehner ER, Victora C. Can improvements in breast feeding practices reduce neonatal mortality in developing countries? Midwifery. 2001; 17:80-92.~~

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3. Sheehan D, Bridle B, Hillier T, Feightner K, Hayward S, Lee KS, Krueger P, Sword W, James M. Breastfeeding outcomes of women following uncomplicated birth in Hamilton-Wentworth. *Can J Public Health* 1999; 90(6):408.

4. Anderson GC, Moore E, Hepworth J, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev. 2003;(2):CD003519

5. Unicef. Breastfeeding – The Remarkable First Hour Of Life. Malasia. Unicef 2007. htpp:/ /www.unicef.org /malaysia /Breastfeeding_First_Hour_of_Life.pdf, Accessed on 27/6/12)

6 Unicef. Baby Friendly Hospital Initiative Revised, updated and expanded for integrated care. New York. World Health Organization and UNICEF 2009. http://www.unicef.org/nutrition/files/BFHI_2009_s4.pdf (Accessed 27/6/12)

7. McLearn KT, Minkovitz CS, Strobino DM, Marks E, Hou W.Maternal depressive symptoms at 2 to 4 months post partum and early parenting practices. Arch Pediatr Adolesc Med. 2006; 160:279-848.

8. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J.Breastfeeding and maternal and infant health outcomes in developed countries.Evid Rep Technol Assess . 2007 ;(153):1-186.

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10. Melinda Smith, M.A., Jeanne Segal. **Postpartum Depression and the Baby Blue;Symptoms, Treatment, and Support for New Moms. www.helpguide.org/mental/postpartum_depression.htm. (Accessed on 10/3/13**

)

11. U. Ottawa. Postpartum depression .www.med.uottawa.ca/sim/data/Depression_postpartum_e.htm (Accessed on 3/10/13)

12. , Murray D, Cox JL. Screening for depression during pregnancy with the Edinburgh Depression Scale (EPDS). J Repro Infant Psychol 1990: 8, 99-107

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13. Teissèdre F, Chabrol H. Detecting women at risk for postnatal depression using the Edinburgh Postnatal Depression Scale at 2 to 3 days postpartum. Can J Psychiatry. 2004 Jan; 49(1):51-419.

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16. Sahni M, Verma N, Narula D, Varghese RM, Sreenivas V, Puliyel JM. Missing girls in India: infanticide, feticide and made-to-order pregnancies? Insights from hospital-based sex-ratio at birth over the last century. PLoS One. 2008 21;3:e2224.

17. Manchanda S, Saikia B, Gupta N, Chowdhary S, Puliyel JM. Sex ratio at birth in India, its relation to birth order, sex of previous children and use of indigenous medicine. PLoS One. 2011;6(6):e20097. Epub 2011 Jun 15.

18. Jayachandran S, Kuziemko I. Why do mothers breastfeed girls less than boys? Evidence and implications for child health in India. Q J Econ. 2011; 126:1485-1538.

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21. Nagpal J, Dhar RS, Sinha S, Bhargava V, Sachdeva A, Bhartia A. An exploratory study to evaluate the utility of an adapted Mother Generated Index (MGI) in assessment of postpartum quality of life in India. Health Qual Life Outcomes. 2008 Dec 2; 6:107.

22. Warwik Institiue For Employment Research. Major Groups and Skill Levels ISCO 88 Guide Section 2; http://www2.warwick.ac.uk/fac/soc/ier/research/links/isco88/english/s2/, (Accessed on 2/7/2012)

23. Confidence Interval Analysis (CIA) Software. Available at www.som.soton.ac.uk/cia . (Accessed on 10/4/12)

24. Creative Research Systems. Sample size calculator. Available at http://www.surveysystem.com/sscalc.htm#one.(Accessed on 12/4/12)

25. Jha P, Kumar R, Vasa P, Dhingra N, Thiruchelvam D, Moineddin R.Low female[corrected] to male [corrected] sex ratio of children born in India: national survey of 1.1 million households. Lancet. 2006 21;367:211-8.

26. Kimani Murage EW, Madise NJ, Fotso JC, Kyobutungi C, Mutua MK, Gitau TM, Yatich N. Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. BMC Public Health. 2011 26;11:396

27. Adewuya AO, Fatoye FO, Ola BA, Ijaodola OR, Ibigbami SM.Sociodemographic and obstetric risk factors for postpartum depressive symptoms in Nigerian women. J Psychiatr Pract. 2005; 11:353-8.

28. Chandran M, Thayan P, Muliyil J, Abraham S. Post-partum depression in a cohort of women from a rural area of Tamil Nadu, India. Incidence and risk factors. Br J Psychiatry. 2002; 181:499-504

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29. Kheirabadi GR, Maracy MR, Barekatain M, Salehi M, Sadri GH, Kelishadi M, Cassy P. Risk factors of postpartum depression in rural areas of Isfahan Province, Iran.Arch Iran Med. 2009; 12:461-7.

30. Henderson JJ, Evans SF, Straton JA, Priest SR, Hagan R. Impact of postnatal depression on breastfeeding duration.Birth. 2003 Sep;30(3):175-80. Erratum in: Birth. 2004; 31:76.

31. Dennis CL, McQueen K. The relationship between infant-feeding outcomes and postpartum depression: a qualitative systematic review.Pediatrics. 2009; 123e736-51.

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Article focus:

We hypothesise that in a society with a pro-male bias there would be:

1. Higher Postnatal Depression score in mothers of girl babies.
2. Less breastfeeding of girl children.

Key Message:

1. Sex bias was evident in the low sex ratio at birth and the significantly lower ratio in families where first child was a girl.

2. Postnatal depression score were higher after birth of a girl child.

3. There was less exclusive breastfeeding of girl children.

4. Mothers with high postnatal depression score were less likely to breastfeed

Strength of study:

1. The postpartum depression was evaluated using a widely validated EPDS scoring system.

Limitations of study:

1. It was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups.

2. We studied the initiation of breastfeeding and exclusive breast feeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

3. EPDS scoring was done in first 48 hrs and would include mothers with transient postpartum blues not amounting to postpartum depression. Follow up studies are needed to see that how many of them develop significant depression.

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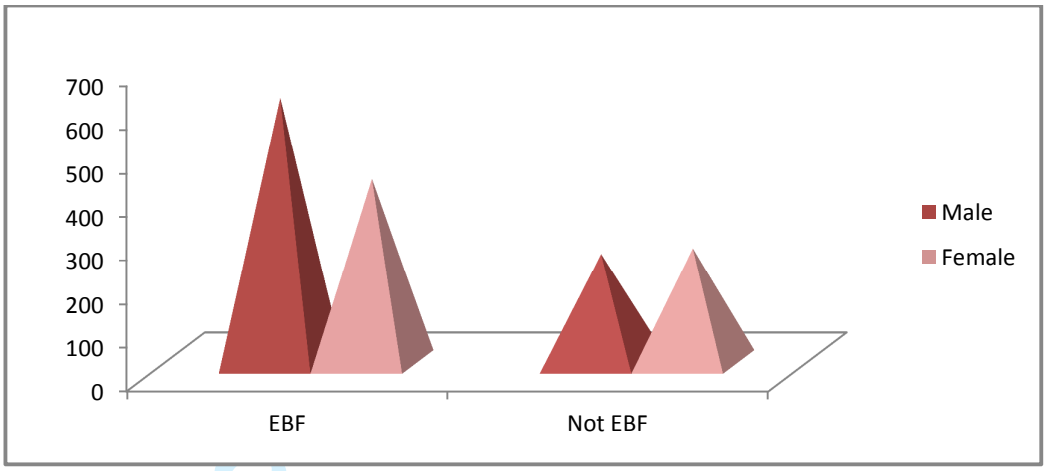

Fig 1: Breast feeding and sex of the child

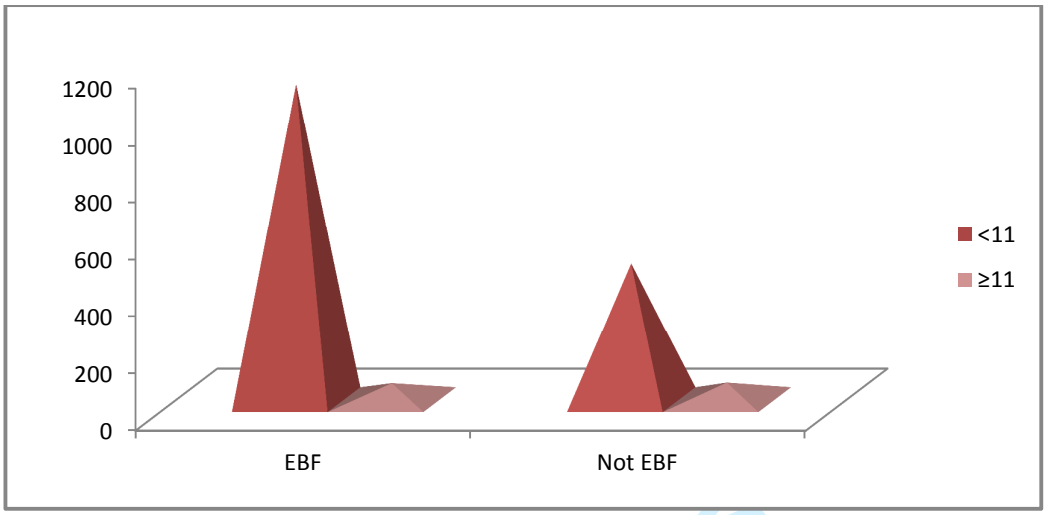

Fig 2: Breast feeding and postpartum depression

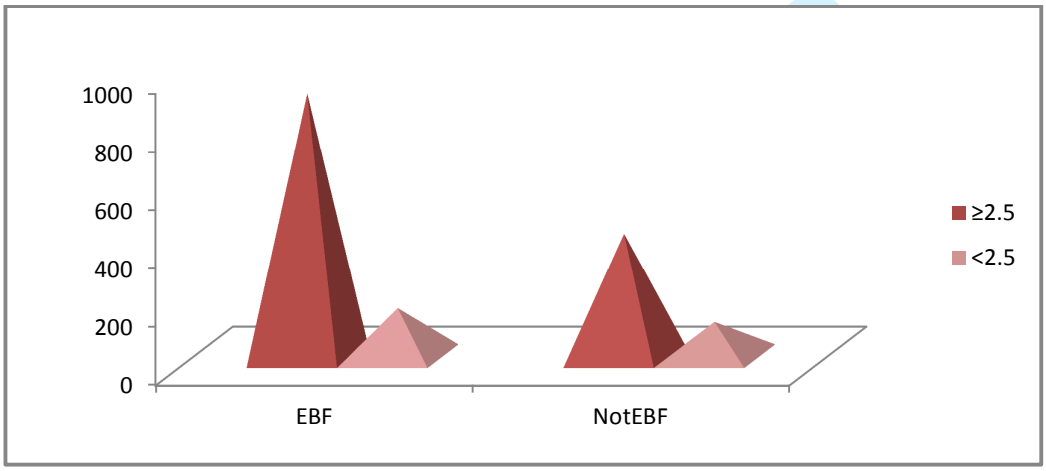

Fig 3: Breast feeding and birth weight

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ASSOCIATION OF BIRTH OF GIRLS, POSTPARTUM DEPRESSION AND EXCLUSIVE BREASTFEEDING – AN OBSERVATIONAL STUDY

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ASSOCIATION OF BIRTH OF GIRLS, POSTPARTUM DEPRESSION AND EXCLUSIVE BREASTFEEDING – AN OBSERVATIONAL STUDY

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ABSTRACT

OBJECTIVES AND HYPOTHESIS: To examine influence of gender of baby on exclusive breastfeeding and incidence of postpartum depression (PPD). We hypothesize that in a society with a male gender bias there may be more PPD and less exclusive breastfeeding of girls.

DESIGN: Prospective study

SETTING: The study was conducted in an urban, tertiary hospital in Delhi.

PARTICIPANTS: Mothers delivering normally with their babies roomed-in.1537 eligible women participated in the study.

PRIMARY AND SECONDARY OUTCOME MEASURES: Exclusive breastfeeding within first 48 hours of life and score on Edinburgh post partum depression scale (EPDS) were recorded.

RESULTS: 3,466 babies were born in the hospital. There were 792 girls for every 1000 boys. Among primparous women, sex-ratio was 901 girls per 1000 boys. In second babies the sex-ratio was 737:1000. If the first child was a girl the birth ratio fell to 632. 1026 mothers were exclusively breastfeeding. Exclusive breast feeding of boys was significantly higher (70.8% vs 61.5% $p<0.001$). The EPDS score was significantly higher with birth of girls (EPDS 6.0±3.39 vs 5.4±2.87 $p< 0.01$). Women with EPDS >11 were less likely to exclusively breast feed ($p<0.01$).

CONCLUSION: The results point to a pro male gender bias evidenced by a low sex ratio at birth, higher EPDS score in mothers of girls and less breastfeeding of female children.

Article Summary

- The postpartum depression was evaluated using a widely validated EPDS scoring system.
- It was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups.
- We studied the initiation of exclusive breastfeeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.
- EPDS scoring was done in first 48 hrs and would include mothers with transient postpartum blues not amounting to postpartum depression. Follow up studies are needed to see that how many of them develop significant depression.
- Although multiple regression analysis shows that higher depression score and female sex of child is associated with lower odds of exclusive breastfeeding, a causal relationship is not implied.
- High rate of sex selective abortion may complicate the interpretation of results by family composition.

INTRODUCTION:

Breast milk is the preferred food for all infants including premature and sick babies (1). UNICEF has promoted breastfeeding initiation within an hour of childbirth (2) (3). It provides nutritional, immunological, developmental and psychological advantages to the child besides health advantages to the mother and economic benefits to the family. (1). It establishes skin-to-skin contact providing warmth to the newborn. Suckling at breast stimulates oxytocin release which further increasing flow of milk from breast. Breast milk reduces mortality in the first month of life (4). Early breast feed initiation is also associated with increased exclusive breastfeeding and longer duration of breastfeeding (5). The WHO and UNICEF launched the baby friendly hospital initiative in 1991 to strengthen maternity unit practices to support breastfeeding (6). However in spite of all these promotions and the known benefits of breastfeeding, exclusive breastfeeding and early initiation of breastfeeding are not often practiced. Factors intrinsic to the mother or baby may play a crucial role. One such factor is post partum depression (PPD) and there is evidence that mothers with PPD are less likely to breastfeed (7) (8).

Expression of postpartum depression may extend from the more transient baby blues to a longer lasting depression going on for several weeks (9). In both conditions there are mood swings, crying jags, sadness, insomnia and irritability. (10, 11)

The 10-question Edinburgh Postnatal Depression Scale (EPDS) is a validated, valuable and efficient way of identifying patients at risk for perinatal depression. It can be applied for depression screening during pregnancy. (12) The scale has been used as early as 1st or 2nd postpartum day in order to screen women at risk

of PPD, by Teissedre F. In his study 1154 women completed EPDS at 2 to 3 postpartum days and again at 4 to 6 weeks postpartum. He found that there was a highly significant positive correlation between EPDS scores on the two occasions (Spearman rank correlation: r = 0.59, P < 0.0001) (13). Although studies done in the immediate postpartum period are likely to pick up many cases of postpartum blues, Dennis found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (14).

Studies looking at sex ratio at birth have shown that there is a strong gender bias in India, favouring boys (15) (16) (17). Jayachandran and Kuziemko have shown that boys tend to be breast fed longer (18). The EPDS score in relation to sex of the child has not been studied. Also the association between births of girl babies (in the society with a male sex bias), EPDS score soon after birth and exclusive breast feeding have not been examined previously. We hypothesize that there may be higher EPDS score and less exclusive early breast feeding of girl children. Recognition of these possible barriers to exclusive breast feeding may allow more focussed support to mothers that will promote breast feeding and improve survival of the girl baby.

Ethics statement: This study was approved by the St Stephen's Hospital Research Ethics Committee. Informed written consent was obtained from participants. The data and the names of the respondents are kept confidential. The paper we propose to publish does not contain any identifying information, so

no response the patient made can be attributed to any of the participants in the study.

MATERIALS AND METHODS:

This was an observational cross sectional study conducted between August 2010 and July 2011, at St. Stephens Hospital, Delhi. Only mothers delivering normally with their babies roomed-in were invited to participate. Mothers who consented to participate were interviewed on each of the first 2 days after delivery to enquire about breast feeding. The weight of the baby, sex of the child, mother's education, history of previous births and socio-economic status were recorded.

Mothers were administered Edinburgh Post Partum Depression Scale (EPDS) on day 2(19). A Hindi translation of the EPDS was administered to mother who preferred Hindi (20). This translation has been back translated and validated previously (21). The outcomes measured were exclusive breastfeeding in first 48 hours and postpartum depression on EPDS.

The socioeconomic status was assigned grades 1 to 5 taking in to account the skill levels and formal education using the 'Major Groups and Skill Levels Classification' of University of Warwick (Table 5). ISCO-88 skill level 4 is considered grade 1 of socio-economic status, skill level 3 - grade 2, skill level 2 - grade 4, skill level 4 and those not working - grade 5 (22).

The education level was also graded as follows - grade 1: mothers who have not completed primary school education, grade 2: primary school graduates up to secondary school, grade 3: if they had passed up to higher secondary education, grade 4: college graduates and grade 5: mother who have completed a postgraduate degree course.

Correlates of exclusive breastfeeding were examined. The incidence of exclusive breastfeeding in boys and girls was examined separately and also for primi-parous mothers, separately from mothers who have had previous babies. EPDS score in relation to sex of the child was also examined. Depression score above 11 on EPDS was considered as significant using cut-off determined previously by Teissedre (13). Pearson chi square test was used to look for significance. Odds ratio and 95% CI of exclusive breastfeeding were calculated. For proportions; 95% CI of the observed proportion is reported. Multiple regression analysis of correlates of exclusive breastfeeding was also done. CI was calculated using CIA software (23).

Sample size calculation: We calculated that in order to get results that reflect the target population at the 95% confidence level with a margin of error of less than 2.5%, we would need to interview 1537 mothers (24).

***RESULTS*:**

During the study period 3,466 babies were born at the hospital. There were only 792 girls for every 1000 boys. Among women delivering their first babies, there were 901 girls per 1000 boys. Among mothers delivering their second babies the sex ratio was 737 girls to 1000 boys. If first child was a girl the ratio in the second delivery fell to 632:1000 but if the first child was a boy the sex ratio in second children was 841:1000.

1537 mothers of singleton babies were enrolled in the study. The sex ratio in the study sample 797 girls per 1000 boys was similar to the sex ratio of overall deliveries. 1026 mothers in the study group were exclusively breastfeeding their babies.

Babies with birth weight 2.5 kg or heavier were more likely to be exclusively breast fed compared to those less than 2.5 kg (low birth weight) (68.2% vs 59.8%, $p<0.01$). Multiparous mothers were more likely to be exclusively breastfeeding than primiparous mothers (71.6% vs 62.8%, Difference = 0.089, 95% CI= 0.042 to 0.135).

Exclusive breast feeding was significantly more among mothers of boys as compared to those of girls (70.8 % vs 61.5 % $p<0.001$). Gender of baby had less influence on exclusive breastfeeding of first born children. 64.3% of primi boy babies and 61.0% of primi girl babies were exclusively breastfed ($p=0.32$). If the first born was a girl and second baby was also a girl, 60% of second children were exclusively breastfed compared to 77.3%, if the second child was a boy ($p=0.05$). The chances of exclusively breastfeeding the baby was highest if there was a boy sibling in the family; 78.6% compared to 67.9%, if there was no boy ($p<0.01$).

No significant difference in exclusive breastfeeding was found related to maternal age, socioeconomic status, maternal education, working status.

The EPDS score was significantly higher in mothers giving birth to a girl child (mean EPDS score 6.0 ± 3.39 compared to 5.4 ± 2.87, p< 0.01). The depression score was significantly lower in mothers with at least one male child when compared to those with no male child (5.21±3.25 vs 5.9 ± 3.2, p < 0.01). Significantly more mothers of girl babies had an EPDS score higher than 11 compared to mothers of boys (9.7% vs 5.4%, difference in proportion=-0.045, CI= -0.072 to -0.019).

Higher EPDS score is associated with exclusive breastfeeding rates. Only 52.4% mothers with score ≥11 were exclusively breastfeeding compared to 67.8 % in those with score <11 (p < 0.01).

Multiple logistic regression analysis indicated that birth of a female baby (OR = 0.69, 95% CI: 0.56 to 0.87), high EPDS (OR = 0.53, 95% CI: 0.36 to 0.80) and low birth weight (OR = 0.72, 95% CI: 0.55 to 0.95) are associated with lower odds of exclusive breastfeeding. This analysis suggests that sex of the baby, EPDS score and birth weight are significant, independent factors influencing EBF.

***DISCUSSION*:**

Low female to male sex ratio is used as an index of the sex bias in the community and can result from antenatal sex screening and selective abortion of female babies (25). In India, male: female sex ratio is 914:1000. Sex ratio at birth is a better index of antenatal sex selection than the overall sex ratio (20). Previous studies have shown that the sex ratio was particularly low in 2nd children if the first was a girl (17) (26).

The same phenomenon was seen again in the fresh cohort studied here. The sex ratio in 2nd order deliveries was 792 girls to 1000 boys but it was 632:1000 when 1st child was a girl child.

There was a male bias in breastfeeding too. More boys were being exclusively breastfed than girls. Jaychandran and Kuziemko hypothesise that since breastfeeding inhibits post-natal fertility, a mother might limit the nursing of an infant if she wants to continue having children. Mothers of girl children may want a boy soon and so may limit the duration of her feeding (18). Kimani et al also found sex of the child to be one of the factors for suboptimal breastfeeding in Kenya (n = 4299) (27).

Gender of baby and PPD

Our study found that depression score was higher in mothers of girls. The influence of gender of baby on postpartum depression in mothers has been reported before. Adewuya et al in a study on Nigerian women found female sex of the baby was one of the predictors for PPD· (OR 2.74, CI 1.87-4.03) (28). Chandran et al in Tamilnadu south India showed that birth of a daughter, when a son was desired, was important risk factors for depression (29). In a study of

women in Iran also gender of the child was found to be an important factor contributing to PPD (30). Mothers who conceive female fetus have higher level of beta hcg. This along with other similar hormonal changes may be a biological explanation for the child gender to affect PPD. (31) (32) However this has not been elucidated clearly as yet.

Our study of EPDS was done on the second day after delivery. The mothers with low EPDS score could be those with postpartum blues and not all of them will have persistent postpartum depression. Only follow up study will identify those with persistent postpartum depression. Our study protocol aimed at investigating early breastfeeding did not examine the issue of long lasting depression in mothers of girl children.

PPD and Breast feeding

We found that mothers with higher EPDS score were less likely to be exclusively breastfeeding. The effects of PPD on exclusive breastfeeding have been reported earlier. Dennis also found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (33). In a cohort of 1745 Australian women it was found that median duration of breastfeeding was 26 weeks for women with early-onset depression, 28 weeks for women with late-onset depression, and 39 weeks for women without depression (34). Dennis and McQueen found maternal depression to be associated with delayed initiation (33) and Ip and colleagues found its association with early discontinuation (8) of breast feeding.

The birth of the girl child is associated with greater depression, and the lower exclusive breastfeeding in girls could be mediated by the depression. To examine the effect of depression on exclusive breastfeeding we studied exclusive breastfeeding in mothers of girls who had high EPDS score against those with low score. We found that in mothers of girls with higher depression score, only 47.7% were exclusively breastfeeding compared to 63.0% with low depression levels (Difference in proportion= 0.154, 95% CI = -0.26 to -0.028). To look at the influence of sex of the child on exclusive breastfeeding independent of associated depression, we performed multiple logistic regression analysis which showed that female sex of the child was independently associated with lower odds of exclusive breastfeeding even after adjusting for depression. The comparison between the female odds ratio on table1 (0.66) and the one on table 4 (0.69) suggests that controlling for PPD and birth weight does not affect the gender difference in exclusive breastfeeding much.

The results point to a pro male gender bias. Mothers of girls may need more help to overcome postpartum depression and for improving breastfeeding rates. This in turn could enhance the survival of girl children and improve the sex ratio in the country.

This study does suffer from some shortcomings in as much as it was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups. Studies in other populations are needed to confirm our findings.

We studied exclusive breast feeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

We studied the EPDS in mothers within 48 hours of delivery. Many of those with high scores may be suffering from post partum blues rather than full fledged post partum depression. Further studies done later in the post natal period need to be done to examine how many of these mothers with high initial scores have longer lasting PPD.Although multiple regression analysis shows that higher depression score and female sex of child is associated with lower odds of exclusive breastfeeding, a causal relationship is not implied.

In India the sex ratio is affected by antenatal sex determination and sex selective feticide (25). High rate of sex selective abortion may complicate the interpretation of results by family composition.

TABLE 1: Table showing correlates of Exclusive breast feeding and Postpartum depression

Characteristic	EPDS (Mean ± SD)	P	Exclusive Breast Feeding			
			No (N = 511)	Yes (N = 1026)	P	Odds Ratio (95% CI)
Maternal age (years)						
< 25	5.8 ± 2.96		171 (36.4)	299 (63.6)		1.00
25 – 29	5.5 ± 3.17		237 (33.3)	474 (66.7)		1.14 (0.90 1.46)
30 – 34	5.8 ± 3.35		84 (28.6)	210(71.4)		1.43 (1.04 1.96)
≥ 35	5.3 ± 2.71	0.25	19 (30.6)	43 (69.4)	0.16	1.20 (0.73 2.29)
SES						
Academic	5.2 ± 3.12		79 (32.4)	165 (67.6)		1.00
Vocational	5.2 ± 2.87		109 (35.4)	199 (64.6)		0.87 (0.61 1.25)
Short education	5.5 ± 3.07		130 (33.2)	261 (67.8)		0.96 (0.68 1.35)
Skilled	6.2 ± 3.18		147 (31.8)	315 (68.2)		1.03 (0.74 1.43)
Semi/Unskilled	5.8 ± 3.42	< 0.001	45 (34.9)	84 (65.1)	0.86	0.89 (0.57 1.40)
Birth weight (Kg)						
≥ 2.5	5.5 ± 3.18		402 (31.7)	865 (68.3)		1.00
< 2.5	6.1 ± 2.98	< 0.01	108 (40.1)	161 (59.9)	<0.01	0.69 (0.53 0.91)
Maternal education						
< Primary	6.8 ± 4.14		23 (40.4)	34 (59.6)		1.00
Up to Secondary	6.0 ± 3.02		61 (33.3)	122 (66.7)		1.35 (0.73 2.49)
Higher secondary	5.8 ± 2.93		111 (35.6)	201 (64.4)		1.22 (0.69 2.18)
Graduate	5.5 ± 3.03		226 (31.2)	499 (68.8)		1.49 (0.86 2.59)
Post graduate	5.3 ± 3.33	< 0.01	90 (34.7)	169 (65.3)	0.44	1.27 (0.71 2.29)
Working status						
Yes	4.9 ± 3.07		87 (29.1)	212 (70.9)		1.00
No	5.8 ± 3.11	< 0.001	423 (34.2)	813 (65.8)	0.09	0.79 (0.60 1.04)
EPDS						
< 11	-	-	460 (32.1)	972 (67.9)		1.00
≥ 11			51 (48.6)	54 (51.4)	0.001	0.50 (0.34 0.75)
Sex of the newborn						
Male	5.4 ± 2.87		249 (29.1)	606 (70.9)		1.00
Female	6.0 ± 3.39	< 0.001	262 (38.4)	420 (61.6)	< 0.001	0.66 (0.34 0.75)
Sex of the newborn – Primi						
Male	5.7 ± 2.68		163 (35.7)	294 (64.3)		1.00
Female	5.6 ± 3.27	0.87	154 (39.0)	241 (61.0)	0.32	0.87 (0.66 1.15)
No siblings			317(37.2)	535(62.7)		1.00
MM	4.9 ± 3.49		17 (15.9.)	90 (84.1)		3.1 (1.83 5.36)
MF	5.8 ± 3.4		17 (23.9)	54 (76.1)		1.9(1.07 1.30)
FM	5.4 ± 3.59		24 (22.6)	82 (77.4)		2.0 (1.26 3.26)
FF	6.6 ± 3.39		14 (40.0)	21 (60.0)		0.89 (0.45 1.77)
>2 children	5.8 ± 3.14	0.06	122(33.3)	244 (66.7)	<0.001	1.2(0.92 1.53)

M = male, F = female, MM = 2nd male child, FF = 2nd female child, FM = male child after a female child

Table 2: Birth order 2 or more

Characteristic	EPDS (Mean ± SD)	P	No EBF	EBF	P	Odds Ratio (95% CI)
Male sib	5.21±3.52		52 (26.8)	191 (38.9)		1.00
No Male sib	5.9±3.2	<0.01	142 (73.2)	300 (61.1)	<0.01	0.58 (0.40-0.83)

Table 3: Breastfeeding by EPPDS and sex of child

Characteristic	EBF in males	EBF in females	P
EPDS <11	583/815 (71.5%)	389/617 (63.0%)	0.001
EPDS ≥ 11	23/40 (57.5%)	31/65 (47.7%)	0.33

Table 4: Multiple Logistic Regression Analysis

bf	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.6900392	.0761006	-3.36	0.001	.5559035	.8565409
high_epds	.5326528	.1094171	-3.07	0.002	.3561157	.7967046
low_bwt	.719286	.1005456	-2.36	0.018	.5469104	.9459912

Table 5: ISCO-88 major groups and skill level

Major group ISCO skill levels

1. Legislators, senior officials and managers	-
2. Professionals	4th
3. Technicians and associate professionals	3rd
4. Clerks	2nd
5. Service workers and shop and market sales worker	2nd
6. Skill agricultural and fishery workers	2nd
7. Craft and related workers	2nd
8. Plants and machine operators and assemblers	2nd
9. Elementary occupations	1st
10. Armed forces	-

(22)

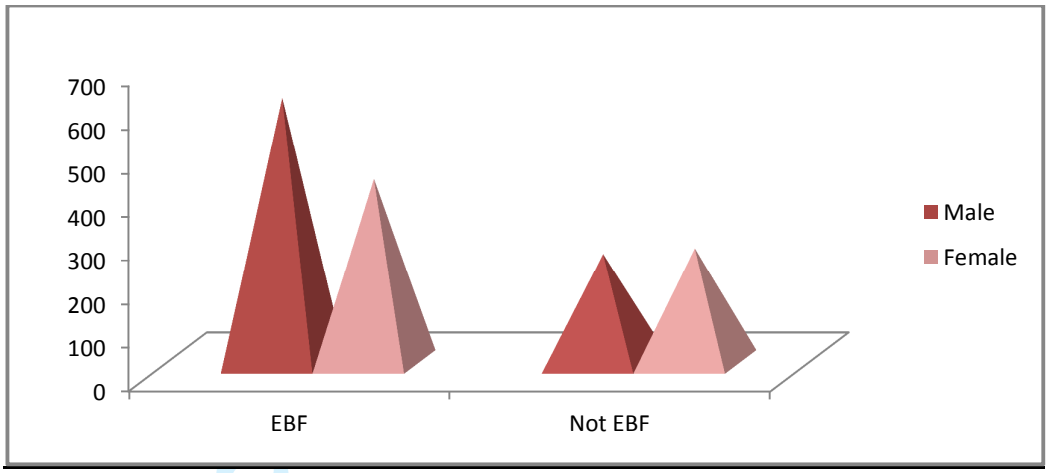

Fig 1: Breast feeding and sex of the child

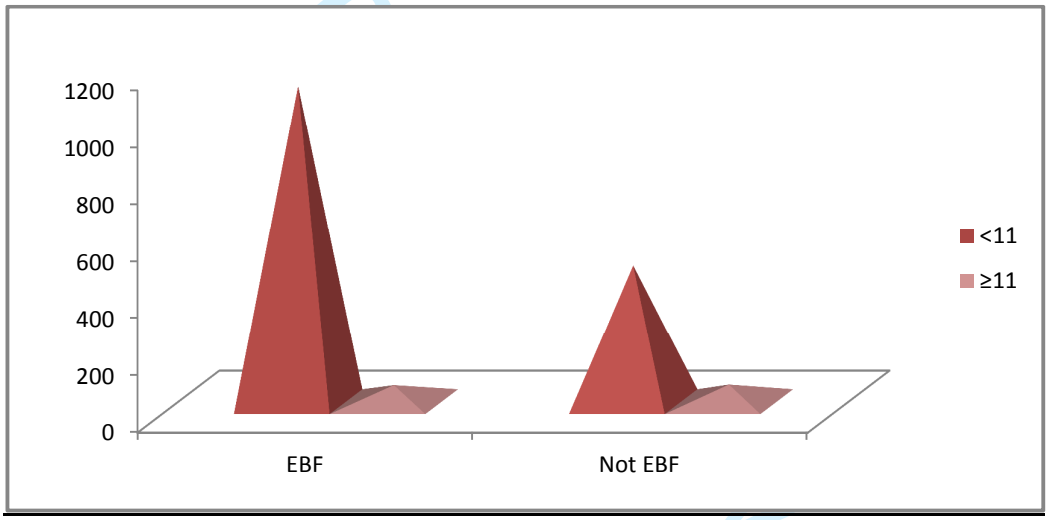

Fig 2: Breast feeding and postpartum depression

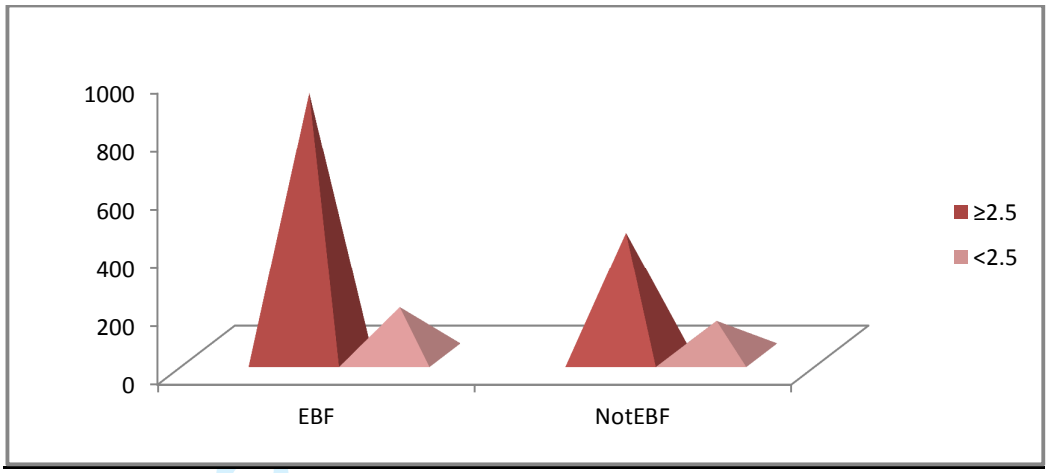

Fig 3: Breast feeding and birth weight

Article focus:

We hypothesise that in a society with a pro-male bias there would be:

1. Higher Postnatal Depression score in mothers of girl babies.
2. Less breastfeeding of girl children.

Key Message:

1. Sex bias was evident in the low sex ratio at birth and the significantly lower ratio in families where first child was a girl.

2. Postnatal depression score were higher after birth of a girl child.

3. There was less exclusive breastfeeding of girl children.

4. Mothers with high postnatal depression score were less likely to breastfeed

Strength of study:

1. The postpartum depression was evaluated using a widely validated EPDS scoring system.

Limitations of study:

1. It was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups.

2. We studied the initiation of exclusive breastfeeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

3. EPDS scoring was done in first 48 hrs and would include mothers with transient postpartum blues not amounting to postpartum depression. Follow up studies are needed to see that how many of them develop significant depression.

4. Although multiple regression analysis shows that higher depression score and female sex of child is associated with lower odds of exclusive breastfeeding, a causal relationship is not implied.

5. High rate of sex selective abortion may complicate the interpretation of results by family composition.

Contributorship Statement:

Akanksha Jain concieved the research project with Dr. Jacob Puliyel.

Akanksha collected the data.

V.Sreenivasan helped with analysis of data and statistics

Prabhajeet Kaur and Prashant Tyagi helped with writeup and review of litrature.

Funding

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Competing Interests

No competing interests

Data Sharing Statement

Original mastersheet containing annonimised patient data is available with the author and can be provided to anyone reuesting the same**.**

REFFERENCES:

1. American Academy of Paediatrics. Work Group on Breastfeeding. Breastfeeding and the Use of Human Milk. PEDIATRICS; 1997, Vol. 100 No. 6 pp. 1035-1039.
2. Huffman SL, Zehner ER, Victora C. Can improvements in breast-feeding practices reduce neonatal mortality in developing countries? Midwifery. 2001; 17:80-92.
3. Sheehan D, Bridle B, Hillier T, Feightner K, Hayward S, Breastfeeding outcomes of women following uncomplicated birth in Hamilton-Wentworth. *Can J Public Health* 1999; 90(6)**:**408.
4. Anderson GC, Moore E, Hepworth J, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev. 2003;(2):CD003519
5. Unicef. Breastfeeding – The Remarkable First Hour Of Life. Malasia. Unicef 2007. htpp:/ /www.unicef.org /malaysia /Breastfeeding_First_Hour_of_Life.pdf , Accessed on 27/6/12)
6. Unicef. Baby Friendly Hospital Initiative Revised, updated and expanded for integrated care. New York. World Health Organization and UNICEF 2009. http://www.unicef.org/nutrition/files/BFHI_2009_s4.pdf (Accessed 27/6/12)
7. McLearn KT, Minkovitz CS, Strobino DM, Marks E, Hou W.Maternal depressive symptoms at 2 to 4 months post partum and early parenting practices. Arch Pediatr Adolesc Med. 2006; 160:279-848.

8. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J.Breastfeeding and maternal and infant health outcomes in developed countries.Evid Rep Technol Assess . 2007 ;(153):1-186.

9. A-C Bernard-Bonnin; Canadian Paediatric Society, Mental Health and Developmental Disabilities Committee Paediatr Child Health 2004;9(8):575-83

10. Melinda Smith, M.A., Jeanne Segal. Postpartum Depression and the Baby Blue;Symptoms, Treatment, and Support for New Moms. www.helpguide.org/mental/postpartum_depression.htm. (Accessed on 10/3/13)

11. U. Ottawa. Postpartum depression .www.med.uottawa.ca/sim/data/Depression_postpartum_e.htm (Accessed on 3/10/13)

12. Murray D, Cox JL. Screening for depression during pregnancy with the Edinburgh Depression Scale (EPDS). J Repro Infant Psychol 1990: 8, 99-107

13. Teissèdre F, Chabrol H. Detecting women at risk for postnatal depression using the Edinburgh Postnatal Depression Scale at 2 to 3 days postpartum. Can J Psychiatry. 2004 Jan; 49(1):51-419.

14. Dennis CL, McQueen K. Does maternal postpartum depressive symptomatology influence infant feeding outcomes? Acta Paediatr. 2007; 96:590-4.

15. Nayar U. Doomed before Birth: Study of Declining Sex Ratio in the Age Group 0-6 Years in Selected Districts of Punjab and Haryana. New Delhi : NCERT; Department of Women's Studies. 1995. pp. 287

16. Sahni M, Verma N, Narula D, Varghese RM, Sreenivas V, Puliyel JM. Missing girls in India: infanticide, feticide and made-to-order pregnancies? Insights from hospital-based sex-ratio-at-birth over the last century. PLoS One. 2008 21;3:e2224.

17. Manchanda S, Saikia B, Gupta N, Chowdhary S, Puliyel JM. Sex ratio at birth in India, its relation to birth order, sex of previous children and use of indigenous medicine. PLoS One. 2011;6(6):e20097. Epub 2011 Jun 15.

18. Jayachandran S, Kuziemko I. Why do mothers breastfeed girls less than boys? Evidence and implications for child health in India. Q J Econ. 2011; 126:1485-1538.

19. *Currie ML, Rademacher R: The pediatrician's role in recognizing and intervening in postpartum depression. Pediatr Clin North Am 2004; 51:785–801.*

20. Dubey C, Gupta N, Bhasin S, Muthal RA, Arora R . Prevalence and associated risk factors for postpartum depression in women attending a tertiary hospital, Delhi, India. Int J Soc Psychiatry. 2011 Aug 5.

21. Nagpal J, Dhar RS, Sinha S, Bhargava V, Sachdeva A, Bhartia A. An exploratory study to evaluate the utility of an adapted Mother Generated Index (MGI) in assessment of postpartum quality of life in India. Health Qual Life Outcomes. 2008 Dec 2; 6:107.

22. Warwik Institiue For Employment Research. Major Groups and Skill Levels ISCO 88 Guide Section 2; http://www2.warwick.ac.uk/fac/soc/ier/research/links/isco88/english/s2/, (Accessed on 2/7/2012)

23. Confidence Interval Analysis (CIA) Software. Available at www.som.soton.ac.uk/cia . (Accessed on 10/4/12)

24. Creative Research Systems. Sample size calculator. Available at http://www.surveysystem.com/sscalc.htm#one.(Accessed on 12/4/12)

25. Sharma BR, Gupta N, Relhan N. Misuse of prenatal diagnostic technology for sex-selected abortions and its consequences in India. Public Health.2007 Nov;121(11):854-60.

26. Jha P, Kumar R, Vasa P, Dhingra N, Thiruchelvam D, Moineddin R.Low female[corrected]-to-male [corrected] sex ratio of children born in India: national survey of 1.1 million households. Lancet. 2006 21;367:211-8.

27. Kimani-Murage EW, Madise NJ, Fotso JC, Kyobutungi C, Mutua MK, Gitau TM, Yatich N. Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. BMC Public Health. 2011 26;11:396

28. Adewuya AO, Fatoye FO, Ola BA, Ijaodola OR, Ibigbami SM.Sociodemographic and obstetric risk factors for postpartum depressive symptoms in Nigerian women. J Psychiatr Pract. 2005; 11:353-8.

29. Chandran M, Thayan P, Muliyil J, Abraham S. Post-partum depression in a cohort of women from a rural area of Tamil Nadu, India. Incidence and risk factors. Br J Psychiatry. 2002; 181:499-504

30. Kheirabadi GR, Maracy MR, Barekatain M, Salehi M, Sadri GH, Kelishadi M, Cassy P. Risk factors of postpartum depression in rural areas of Isfahan Province, Iran.Arch Iran Med. 2009; 12:461-7.

31. Yaron Y, Lehavi O, Orr-Urtreger A, Gull I, Lessing JB, Amit A, Ben-Yosef D. Maternal serum HCG is higher in the presence of a female

fetus as early as week 3 post-fertilization. Hum Reprod. 2002 Feb; 17(2):485-9.

32. Hendrick V, Altshuler LL, Suri R. Hormonal changes in the postpartum and implications for postpartum depression. Psychosomatics. 1998 Mar-Apr; 39(2):93-101.

33. Dennis CL, McQueen K. The relationship between infant-feeding outcomes and postpartum depression: a qualitative systematic review.Pediatrics. 2009; 123e736-51.

34. Henderson JJ, Evans SF, Straton JA, Priest SR, Hagan R. Impact of postnatal depression on breastfeeding duration. Birth. 2003 Sep; 30(3):175-80. Erratum in: Birth. 2004; 31:76.

ASSOCIATION OF BIRTH OF GIRLS, POSTPARTUM DEPRESSION AND EXCLUSIVE BREASTFEEDING – AN OBSERVATIONAL STUDY

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~~**Study was guided by Dr Jacob Puliyel.**~~

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ABSTRACT

OBJECTIVES AND HYPOTHESIS: To examine influence of gender of baby on exclusive breastfeeding and incidence of postpartum depression (PPD). We hypothesize that in a society with a male gender bias there may be more PPD and less exclusive breastfeeding of girls.

DESIGN: Prospective study

SETTING: The study was conducted in an urban, tertiary hospital in Delhi.

PARTICIPANTS: Mothers delivering normally with their babies roomed-in.1537 eligible women participated in the study.

PRIMARY AND SECONDARY OUTCOME MEASURES: Exclusive breastfeeding within first 48 hours of life and score on Edinburgh post partum depression scale (EPDS) were recorded.

RESULTS: 3,466 babies were born in the hospital. There were 792 girls for every 1000 boys. Among primparous women, sex-ratio was 901 girls per 1000 boys. In second babies the sex-ratio was 737:1000. If the first child was a girl the birth ratio fell to 632. 1026 mothers were exclusively breastfeeding. Exclusive breast feeding of boys was significantly higher (70.8% vs 61.5% $p<0.001$). The EPDS score was significantly higher with birth of girls (EPDS 6.0±3.39 vs 5.4±2.87 $p< 0.01$). Women with EPDS >11 were less likely to exclusively breast feed ($p<0.01$).

CONCLUSION: The results point to a pro male gender bias evidenced by a low sex ratio at birth, higher EPDS score in mothers of girls and less breastfeeding of female children.

Article Summary

- The postpartum depression was evaluated using a widely validated EPDS scoring system.
- It was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups.
- We studied the initiation of exclusive breastfeeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.
- EPDS scoring was done in first 48 hrs and would include mothers with transient postpartum blues not amounting to postpartum depression. Follow up studies are needed to see that how many of them develop significant depression.
- Although multiple regression analysis shows that higher depression score and female sex of child is associated with lower odds of exclusive breastfeeding, a causal relationship is not implied.
- High rate of sex selective abortion may complicate the interpretation of results by family composition.

Reporting Checklist

Section/Topic	Item #	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any pre-specified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical	12	(*a*) Describe all statistical methods, including those used to control for confounding

methods		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time
		Case-control study—Report numbers in each exposure category, or summary measures of exposure
		Cross-sectional study—Report numbers of outcome events or summary measures
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

The above reporting checklist is included in the article

INTRODUCTION:

Breast milk is the preferred food for all infants including premature and sick babies (1). UNICEF has promoted breastfeeding initiation within an hour of childbirth (2) (3). It provides nutritional, immunological, developmental and psychological advantages to the child besides health advantages to the mother and economic benefits to the family (1). It establishes skin-to-skin contact providing warmth to the newborn. Suckling at breast stimulates oxytocin release which further increasing flow of milk from breast. Breast milk reduces mortality in the first month of life (4). Early breast feed initiation is also associated with increased exclusive breastfeeding and longer duration of breastfeeding (5). The WHO and UNICEF launched the baby friendly hospital initiative in 1991 to strengthen maternity unit practices to support breastfeeding (6). However in spite of all these promotions and the known benefits of breastfeeding, exclusive breastfeeding and early initiation of breastfeeding are not often practiced. Factors intrinsic to the mother or baby may play a crucial role. One such factor is post partum depression (PPD) and there is evidence that mothers with PPD are less likely to breastfeed (7) (8).

Expression of postpartum depression may extend from the more transient baby blues to a longer lasting depression going on for several weeks (9). In both conditions there are mood swings, crying jags, sadness, insomnia and irritability. (10, 11)

The 10-question Edinburgh Postnatal Depression Scale (EPDS) is a validated, valuable and efficient way of identifying patients at risk for perinatal depression. It can be applied for depression screening during pregnancy. (12) The scale has been used as early as 1st or 2nd postpartum day in order to screen women at risk

of PPD, by Teissedre F. In his study 1154 women completed EPDS at 2 to 3 postpartum days and again at 4 to 6 weeks postpartum. He found that there was a highly significant positive correlation between EPDS scores on the two occasions (Spearman rank correlation: r = 0.59, P < 0.0001) (13). ~~Although studies~~Although studies done in the immediate postpartum period are likely to pick up many cases of postpartum blues, Dennis found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (14).

Studies looking at sex ratio at birth have shown that there is a strong gender bias in India, favouring boys (15) (16) (17). Jayachandran and Kuziemko~~et al~~ have shown that boys tend to be breast fed longer (18). The EPDS score in relation to sex of the child has not been studied. Also the ~~association between~~association between births of girl babies (in the society with a male sex bias), EPDS score soon after birth and exclusive breast feeding have not been examined previously. We hypothesize that there may be higher EPDS score and less exclusive early breast feeding of girl children. Recognition of these possible barriers to exclusive breast feeding may allow more focussed support to mothers that will promote breast feeding and improve survival of the girl baby.

Ethics statement: This study was approved by the St Stephen's Hospital Research Ethics Committee. Informed written consent was obtained from participants. The data and the names of the respondents are kept confidential. The paper we propose to publish does not contain any identifying information, so

no response the patient made can be attributed to any of the participants in the study.

MATERIALS AND METHODS:

This was an observational cross sectional study conducted between August 2010 and July 2011, at St. Stephens Hospital, Delhi. Only mothers delivering normally with their babies roomed-in were invited to participate. Mothers who consented to participate were interviewed on each of the first 2 days after delivery to enquire about breast feeding. The weight of the baby, sex of the child, mother's education, history of previous births and socio-economic status were recorded.

Mothers were administered Edinburgh Post Partum Depression Scale (EPDS) on day 2(19). A Hindi translation of the EPDS was administered to mother who preferred Hindi (20). This translation has been back translated and validated previously (21). The outcomes measured were exclusive breastfeeding in first 48 hours and postpartum depression on EPDS.

The socioeconomic status was assigned grades 1 to 5 taking in to account the skill levels and formal education using the 'Major Groups and Skill Levels Classification' of University of Warwick (Table 5). ISCO-88 skill level 4 is considered grade 1 of socio-economic status, skill level 3 - grade 2, skill level 2 - grade 4, skill level 4 and those not working - grade 5 (22).

The education level was also graded as follows - grade 1: mothers who have not completed primary school education, grade 2: primary school graduates up to secondary school, grade 3: if they had passed up to higher secondary education,

grade 4: college graduates and grade 5: mother who have completed a postgraduate degree course.

Correlates of exclusive breastfeeding were examined. The incidence of exclusive breastfeeding in boys and girls was examined separately and also for primi-parous mothers, separately from mothers who have had previous babies. EPDS score in relation to sex of the child was also examined. Depression score above 11 on EPDS was considered as significant using cut-off determined previously by Teissedre (13). Pearson chi square test was used to look for significance. Odds ratio and 95% CI of exclusive breastfeeding were calculated. For proportions; 95% CI of the observed proportion is reported. Multiple regression analysis of correlates of exclusive breastfeeding was also done. CI was calculated using CIA software (23).

Sample size calculation: We calculated that in order to get results that reflect the target population at the 95% confidence level with a margin of error of less than 2.5%, we would need to interview 1537 mothers (24).

***RESULTS*:**

During the study period 3,466 babies were born at the hospital. There were only 792 girls for every 1000 boys. Among women delivering their first babies, there were 901 girls per 1000 boys. Among mothers delivering their second babies the sex ratio was 737 girls to 1000 boys. If first child was a girl the ratio in the second delivery fell to 632:1000 but if the first child was a boy the sex ratio in second children was 841:1000.

1537 mothers of singleton babies were enrolled in the study. The sex ratio in the study sample 797 girls per 1000 boys was similar to the sex ratio of overall deliveries. 1026 mothers in the study group were exclusively breastfeeding their babies.

Babies with birth weight 2.5 kg or heavier were more likely to be exclusively breast fed compared to those less than 2.5 kg (low birth weight) (68.2% vs 59.8%, $p<0.01$). Multiparous mothers were more likely to be exclusively breastfeeding than primiparous mothers (71.6% vs 62.8%, Difference = 0.089, 95% CI= 0.042 to 0.135).

Exclusive breast feeding was significantly more among mothers of boys as compared to those of girls (70.8 % vs 61.5 % $p<0.001$). Gender of baby had less influence on exclusive breastfeeding of first born children. 64.3% of primi boy babies and 61.0% of primi girl babies were exclusively breastfed ($p=0.32$). If the first born was a girl and second baby was also a girl, 60% of second children were exclusively breastfed compared to 77.3%, if the second child was a boy ($p=0.05$). The chances of exclusively breastfeeding the baby was highest if there was a boy sibling in the family; 78.6% compared to 67.9%, if there was no boy ($p<0.01$).

No significant difference in exclusive breastfeeding was found related to maternal age, socioeconomic status, maternal education, working status.

The EPDS score was significantly higher in mothers giving birth to a girl child (mean EPDS score 6.0 ± 3.39 compared to 5.4 ± 2.87, p< 0.01). The depression score was significantly lower in mothers with at least one male child when compared to those with no male child (5.21±3.25 vs 5.9 ± 3.2, p < 0.01). Significantly more mothers of girl babies had an EPDS score higher than 11 compared to mothers of boys (9.7% vs 5.4%, difference in proportion=-0.045, CI= -0.072 to -0.019).

Higher EPDS score is associated with ~~affects~~ exclusive breastfeeding rates. Only 52.4% mothers with score ≥11 were exclusively breastfeeding compared to 67.8 % in those with score <11 (p < 0.01).

Multiple logistic regression analysis indicated that birth of a female baby (OR = 0.69, 95% CI: 0.56 to 0.87), high EPDS (OR = 0.53, 95% CI: 0.36 to 0.80) and low birth weight (OR = 0.72, 95% CI: 0.55 to 0.95) are associated with lower odds of exclusive breastfeeding. This analysis suggests that sex of the baby, EPDS score and birth weight are significant, independent factors influencing EBF.

***DISCUSSION*:**

Low female to male sex ratio is used as an index of the sex bias in the community and can result from antenatal sex screening and selective abortion of female babies (25). In India, male: female sex ratio is 914:1000. Sex ratio at birth is a better index of antenatal sex selection than the overall sex ratio (20). Previous studies have shown that the sex ratio was particularly low in 2nd children if the first was a girl (17) (265).

The same phenomenon was seen again in the fresh cohort studied here. The sex ratio in 2nd order deliveries was 792 girls to 1000 boys but it was 632:1000 when 1st child was a girl child.

There was a male bias in breastfeeding too. More boys were being exclusively breastfed than girls. Jaychandran and Kuziemko hypothesise that since breastfeeding inhibits post-natal fertility, a mother might limit the nursing of an infant if she wants to continue having children. Mothers of girl children may want a boy soon and so may limit the duration of her feeding (18). Kimani et al also found sex of the child to be one of the factors for suboptimal breastfeeding in Kenya (n = 4299) (276).

Gender of baby and PPD

Our study found that depression score was higher in mothers of girls. The influence of gender of baby on postpartum depression in mothers has been reported before. Adewuya et al in a study on Nigerian women found female sex of the baby was one of the predictors for PPD· (OR 2.74, CI 1.87-4.03) (287). Chandran et al in Tamilnadu south India showed that birth of a daughter, when a son was desired, was ~~an important~~important risk factors for depression (298). In

a study of women in Iran also gender of the child was found to be an important factor contributing to PPD (~~29~~30). Mothers who conceive female fetus have higher level of beta hcg. This along with other similar hormonal changes may be a biological explanation for the child gender to affect PPD. (3~~1~~0) (3~~2~~1) However this has not been elucidated clearly as yet.

Our study of EPDS was done on the second day after delivery. The mothers with low EPDS score could be those with postpartum blues and not all of them will have persistent postpartum depression. Only follow up study will identify those with persistent postpartum depression. Our study protocol aimed at investigating early breastfeeding did not examine the issue of long lasting depression in mothers of girl children.

PPD and Breast feeding

We found that mothers with higher EPDS score were less likely to be exclusively breastfeeding. The effects of PPD on exclusive breastfeeding have been reported earlier. Dennis also found that mothers with a EPDS >12 at 1 week postpartum were significantly more likely at 4 and/or 8 weeks to discontinue breastfeeding, be unsatisfied with their infant feeding method, experience significant breastfeeding problem and report lower levels of breastfeeding self-efficacy (3~~3~~2). In a cohort of 1745 Australian women it was found that median duration of breastfeeding was 26 weeks for women with early-onset depression, 28 weeks for women with late-onset depression, and 39 weeks for women without depression (3~~4~~3). Dennis and McQueen found maternal depression to be associated with delayed initiation (3~~3~~2) and Ip and colleagues found its association with early discontinuation (8) of breast feeding.

The birth of the girl child is associated with greater depression, and the lower exclusive breastfeeding in girls could be mediated by the depression. To examine the effect of depression on exclusive breastfeeding we studied exclusive breastfeeding in mothers of girls who had high EPDS score against those with low score. We found that in mothers of girls with higher depression score, only 47.7% were exclusively breastfeeding compared to 63.0% with low depression levels (Difference in proportion= 0.154, 95% CI = -0.26 to -0.028). To look at the influence of sex of the child on exclusive breastfeeding independent of associated depression, we performed multiple logistic regression analysis which showed that female sex of the child was independently associated with lower odds of exclusive breastfeeding even after adjusting for depression.~~.~~ The comparison between the female odds ratio on table1 (0.66) and the one on table 4 (0.69) suggests that controlling for PPD and birth weight does not affect the gender difference in exclusive breastfeeding much.

The results point to a pro male gender bias. Mothers of girls may need more help to overcome postpartum depression and for improving breastfeeding rates. This in turn could enhance the survival of girl children and improve the sex ratio in the country.

This study does suffer from some shortcomings in as much as it was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups. Studies in other populations are needed to confirm our findings.

We studied exclusive breast feeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

We studied the EPDS in mothers within 48 hours of delivery. Many of those with high scores may be suffering from post partum blues rather than full fledged post partum depression. Further studies done later in the post natal period need to be done to examine how many of these mothers with high initial scores have longer lasting PPD.

Although multiple regression analysis shows that higher depression score and female sex of child is associated with lower odds of exclusive breastfeeding, a causal relationship is not implied.

In India the sex ratio is affected by antenatal sex determination and sex selective feticide (25). High rate of sex selective abortion may complicate the interpretation of results by family composition.

~~Although multiple regression analysis shows that higher depression score and female sex of child is associated with lower odds of exclusive breastfeeding, a causal relationship is not implied.~~

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TABLE 1: Table showing correlates of Exclusive breast feeding and Postpartum depression

Characteristic	EPDS (Mean ± SD)	P	Exclusive Breast Feeding			
			No (N = 511)	Yes (N = 1026)	P	Odds Ratio (95% CI)
Maternal age (years)						
< 25	5.8 ± 2.96		171 (36.4)	299 (63.6)		1.00
25 – 29	5.5 ± 3.17		237 (33.3)	474 (66.7)		1.14 (0.90 1.46)
30 – 34	5.8 ± 3.35		84 (28.6)	210(71.4)		1.43 (1.04 1.96)
≥ 35	5.3 ± 2.71	0.25	19 (30.6)	43 (69.4)	0.16	1.20 (0.73 2.29)
SES						
Academic	5.2 ± 3.12		79 (32.4)	165 (67.6)		1.00
Vocational	5.2 ± 2.87		109 (35.4)	199 (64.6)		0.87 (0.61 1.25)
Short education	5.5 ± 3.07		130 (33.2)	261 (67.8)		0.96 (0.68 1.35)
Skilled	6.2 ± 3.18		147 (31.8)	315 (68.2)		1.03 (0.74 1.43)
Semi/Unskilled	5.8 ± 3.42	< 0.001	45 (34.9)	84 (65.1)	0.86	0.89 (0.57 1.40)
Birth weight (Kg)						
≥ 2.5	5.5 ± 3.18		402 (31.7)	865 (68.3)		1.00
< 2.5	6.1 ± 2.98	< 0.01	108 (40.1)	161 (59.9)	<0.01	0.69 (0.53 0.91)
Maternal education						
< Primary	6.8 ± 4.14		23 (40.4)	34 (59.6)		1.00
Up to Secondary	6.0 ± 3.02		61 (33.3)	122 (66.7)		1.35 (0.73 2.49)
Higher secondary	5.8 ± 2.93		111 (35.6)	201 (64.4)		1.22 (0.69 2.18)
Graduate	5.5 ± 3.03		226 (31.2)	499 (68.8)		1.49 (0.86 2.59)
Post graduate	5.3 ± 3.33	< 0.01	90 (34.7)	169 (65.3)	0.44	1.27 (0.71 2.29)
Working status						
Yes	4.9 ± 3.07		87 (29.1)	212 (70.9)		1.00
No	5.8 ± 3.11	< 0.001	423 (34.2)	813 (65.8)	0.09	0.79 (0.60 1.04)
EPDS						
< 11	-	-	460 (32.1)	972 (67.9)		1.00
≥ 11			51 (48.6)	54 (51.4)	0.001	0.50 (0.34 0.75)
Sex of the newborn						
Male	5.4 ± 2.87		249 (29.1)	606 (70.9)		1.00
Female	6.0 ± 3.39	< 0.001	262 (38.4)	420 (61.6)	< 0.001	0.66 (0.34 0.75)
Sex of the newborn – Primi						
Male	5.7 ± 2.68		163 (35.7)	294 (64.3)		1.00
Female	5.6 ± 3.27	0.87	154 (39.0)	241 (61.0)	0.32	0.87 (0.66 1.15)
No siblings			317(37.2)	535(62.7)		1.00
MM	4.9 ± 3.49		17 (15.9.)	90 (84.1)		3.1 (1.83 5.36)
MF	5.8 ± 3.4		17 (23.9)	54 (76.1)		1.9(1.07 1.30)
FM	5.4 ± 3.59		24 (22.6)	82 (77.4)		2.0 (1.26 3.26)
FF	6.6 ± 3.39		14 (40.0)	21 (60.0)		0.89 (0.45 1.77)
>2 children	5.8 ± 3.14	0.06	122(33.3)	244 (66.7)	<0.001	1.2(0.92 1.53)

M = male, F = female, MM = 2nd male child, FF = 2nd female child, FM = male child after a female child

Table 2: Birth order 2 or more

Characteristic	EPDS (Mean	P	No EBF	EBF	P	Odds Ratio

	± SD)					(95% CI)
Male sib	5.21±3.52		52 (26.8)	191 (38.9)		1.00
No Male sib	5.9±3.2	<0.01	142 (73.2)	300 (61.1)	<0.01	0.58 (0.40-0.83)

Table 3: Breastfeeding by EPPDS and sex of child

Characteristic	EBF in males	EBF in females	P
EPDS <11	583/815 (71.5%)	389/617 (63.0%)	0.001
EPDS ≥ 11	23/40 (57.5%)	31/65 (47.7%)	0.33

Table 4: Multiple Logistic Regression Analysis

bf	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.6900392	.0761006	-3.36	0.001	.5559035	.8565409
high_epds	.5326528	.1094171	-3.07	0.002	.3561157	.7967046
low_bwt	.719286	.1005456	-2.36	0.018	.5469104	.9459912

~~**Table 5: Edinburgh Postnatal Depression Scale**~~

~~**INSTRUCTIONS FOR USERS**~~

- ~~**1.** The mother is asked to underline the response that comes closest to how she has been feeling in the previous 7 days.~~
- ~~**2.** All 10 items must be completed.~~
- ~~**3.** Care should be taken to avoid the possibility of the mother discussing her answers with others.~~

- 4. The mother should complete the scale herself, unless she has limited English or has difficulty with reading.
- 5. The Edinburgh Postnatal Depression Scale may be used at 6–8 weeks to screen postnatal women. The child health clinic, a postnatal checkup, or a home visit may provide a suitable opportunity for its completion.

- Edinburgh Postnatal Depression Scale
- Name:
- Address:
- Baby's age:

Because you have recently had a baby, we would like to know how you are feeling. Please underline the answer that comes closest to how you have felt in the past 7 days, not just how you feel today.

Here is an example, already completed.

- I have felt happy:
- Yes, all the time
- *Yes, most of the time*
- No, not very often
- No, not at all

This would mean: "I have felt happy most of the time" during the past week. Please complete the other questions in the same way.

In the past 7 days:

- 1. I have been able to laugh and see the funny side of things
- As much as I always could
- Not quite so much now
- Definitely not so much now
- Not at all
- 2. I have looked forward with enjoyment to things
- As much as I ever did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all
- *3. I have blamed myself unnecessarily when things went wrong
- Yes, most of the time
- Yes, some of the time
- Not very often

- No, never
- **4.** I have been anxious or worried for no good reason
- No, not at all
- Hardly ever
- Yes, sometimes
- Yes, very often
- ***5.** I have felt scared or panicky for no very good reason
- Yes, quite a lot
- Yes, sometimes
- No, not much
- No, not at all
- ***6.** Things have been getting on top of me
- Yes, most of the time I haven't been able to cope at all
- Yes, sometimes I haven't been coping as well as usual
- No, most of the time I have coped quite well
- No, I have been coping as well as ever
- ***7.** I have been so unhappy that I have had difficulty sleeping
- Yes, most of the time
- Yes, sometimes
- Not very often
- No, not at all
- ***8.** I have felt sad or miserable
- Yes, most of the time
- Yes, quite often
- Not very often
- No, not at all
- ***9.** I have been so unhappy that I have been crying
- Yes, most of the time
- Yes, quite often
- Only occasionally
- No, never
- ***10.** The thought of harming myself has occurred to me
- Yes, quite often
- Sometimes

- ~~Hardly ever~~
- ~~Never~~

~~Response categories are scored 0, 1, 2, and 3 according to increased severity of the symptom. Items marked with an asterisk (*) are reverse scored (i.e., 3, 2, 1, and 0). The total score is calculated by adding the scores for each of the 10 items.~~

~~*(34)(Permitted for general use)*~~

Table ~~56~~: ISCO-88 major groups and skill level

Major group	ISCO skill levels
1. Legislators, senior officials and managers	-
2. Professionals	4th
3. Technicians and associate professionals	3rd
4. Clerks	2nd
5. Service workers and shop and market sales worker	2nd
6. Skill agricultural and fishery workers	2nd
7. Craft and related workers	2nd
8. Plants and machine operators and assemblers	2nd
9. Elementary occupations	1st
10. Armed forces	-

(22)

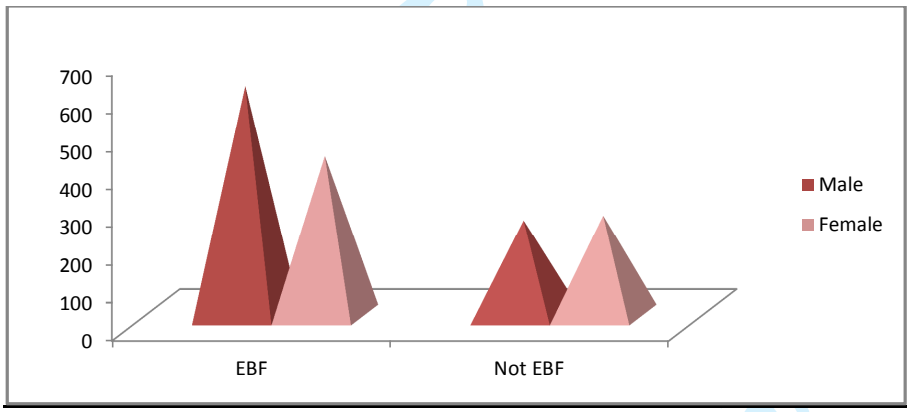

Fig 1: Breast feeding and sex of the child

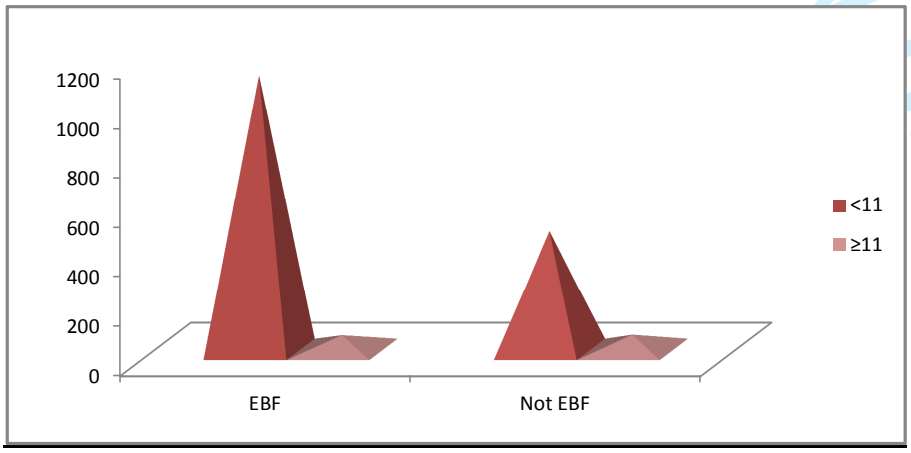

Fig 2: Breast feeding and postpartum depression

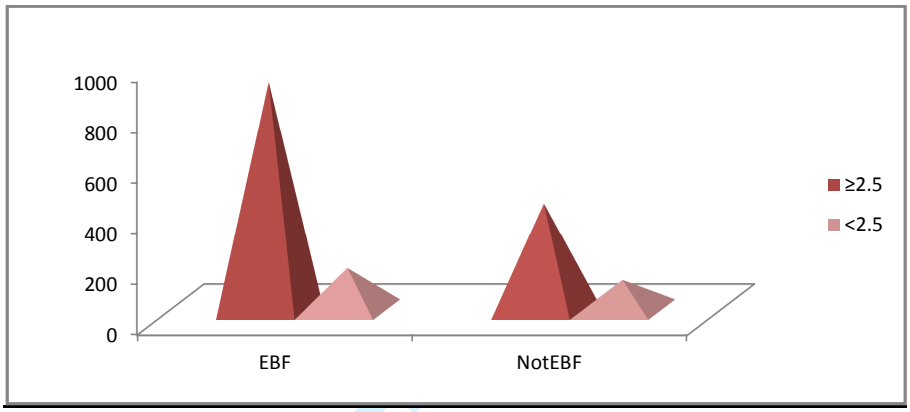

Fig 3: Breast feeding and birth weight

Article focus:

We hypothesise that in a society with a pro-male bias there would be:

1. Higher Postnatal Depression score in mothers of girl babies.
2. Less breastfeeding of girl children.

Key Message:

1. Sex bias was evident in the low sex ratio at birth and the significantly lower ratio in families where first child was a girl.

2. Postnatal depression score were higher after birth of a girl child.

3. There was less exclusive breastfeeding of girl children.

4. Mothers with high postnatal depression score were less likely to breastfeed

Strength of study:

1. The postpartum depression was evaluated using a widely validated EPDS scoring system.

Limitations of study:

1. It was done in an urban hospital catering mostly to a middle class clientele. The findings on sex ratio may therefore not be generaliseable to the other social groups.

2. We studied the initiation of exclusive breastfeeding in the first 48 hours. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

3. EPDS scoring was done in first 48 hrs and would include mothers with transient postpartum blues not amounting to postpartum depression. Follow up studies are needed to see that how many of them develop significant depression.

4. Although multiple regression analysis shows that higher depression score and female sex of child is associated with lower odds of exclusive breastfeeding, a causal relationship is not implied.

5. High rate of sex selective abortion may complicate the interpretation of results by family composition.

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REFFERENCES:

1. American Academy of Paediatrics. Work Group on Breastfeeding. Breastfeeding and the Use of Human Milk. PEDIATRICS; 1997, Vol. 100 No. 6 pp. 1035-1039.

2. Huffman SL, Zehner ER, Victora C. Can improvements in breast-feeding practices reduce neonatal mortality in developing countries? Midwifery. 2001; 17:80-92.

3. Sheehan D, Bridle B, Hillier T, Feightner K, Hayward S, Lee KS, Krueger P, Sword W, James M. Breastfeeding outcomes of women following uncomplicated birth in Hamilton-Wentworth. *Can J Public Health* 1999; 90(6)**:**408.

4. Anderson GC, Moore E, Hepworth J, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev. 2003;(2):CD003519
5. Unicef. Breastfeeding – The Remarkable First Hour Of Life. Malasia. Unicef 2007. htpp:/ /www.unicef.org /malaysia /Breastfeeding_First_Hour_of_Life.pdf , Accessed on 27/6/12)
6. Unicef. Baby Friendly Hospital Initiative Revised, updated and expanded for integrated care. New York. World Health Organization and UNICEF 2009. http://www.unicef.org/nutrition/files/BFHI_2009_s4.pdf (Accessed 27/6/12)
7. McLearn KT, Minkovitz CS, Strobino DM, Marks E, Hou W.Maternal depressive symptoms at 2 to 4 months post partum and early parenting practices. Arch Pediatr Adolesc Med. 2006; 160:279-848.
8. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J.Breastfeeding and maternal and infant health outcomes in developed countries.Evid Rep Technol Assess . 2007 ;(153):1-186.
9. A-C Bernard-Bonnin; Canadian Paediatric Society, Mental Health and Developmental Disabilities Committee Paediatr Child Health 2004;9(8):575-83
10. Melinda Smith, M.A., Jeanne Segal. Postpartum Depression and the Baby Blue;Symptoms, Treatment, and Support for New Moms. www.helpguide.org/mental/postpartum_depression.htm. (Accessed on 10/3/13)

11.U. Ottawa. Postpartum depression .www.med.uottawa.ca/sim/data/Depression_postpartum_e.htm (Accessed on 3/10/13)

12. Murray D, Cox JL. Screening for depression during pregnancy with the Edinburgh Depression Scale (EPDS). J Repro Infant Psychol 1990: 8, 99-107

13.Teissèdre F, Chabrol H. Detecting women at risk for postnatal depression using the Edinburgh Postnatal Depression Scale at 2 to 3 days postpartum. Can J Psychiatry. 2004 Jan; 49(1):51-419.

14. Dennis CL, McQueen K. Does maternal postpartum depressive symptomatology influence infant feeding outcomes? Acta Paediatr. 2007; 96:590-4.

15. Nayar U. Doomed before Birth: Study of Declining Sex Ratio in the Age Group 0-6 Years in Selected Districts of Punjab and Haryana. New Delhi : NCERT; Department of Women's Studies. 1995. pp. 287

16.Sahni M, Verma N, Narula D, Varghese RM, Sreenivas V, Puliyel JM. Missing girls in India: infanticide, feticide and made-to-order pregnancies? Insights from hospital-based sex-ratio-at-birth over the last century. PLoS One. 2008 21;3:e2224.

17. Manchanda S, Saikia B, Gupta N, Chowdhary S, Puliyel JM. Sex ratio at birth in India, its relation to birth order, sex of previous children and use of indigenous medicine. PLoS One. 2011;6(6):e20097. Epub 2011 Jun 15.

18.Jayachandran S, Kuziemko I. Why do mothers breastfeed girls less than boys? Evidence and implications for child health in India. Q J Econ. 2011; 126:1485-1538.

19. *Currie ML, Rademacher R: The pediatrician's role in recognizing and intervening in postpartum depression. Pediatr Clin North Am 2004; 51:785–801.*

~~19. Hewitt C, Gilbody S, Brealey S, Paulden M, Palmer S, Mann R, Green J, Morrell J, Barkham M, Light K, Richards D. Methods to identify postnatal depression in primary care: an integrated evidence synthesis and value of information analysis. Health Technol Assess. 2009; 13:1-145, 147-230.~~

20. Dubey C, Gupta N, Bhasin S, Muthal RA, Arora R . Prevalence and associated risk factors for postpartum depression in women attending a tertiary hospital, Delhi, India. Int J Soc Psychiatry. 2011 Aug 5.

21. Nagpal J, Dhar RS, Sinha S, Bhargava V, Sachdeva A, Bhartia A. An exploratory study to evaluate the utility of an adapted Mother Generated Index (MGI) in assessment of postpartum quality of life in India. Health Qual Life Outcomes. 2008 Dec 2; 6:107.

22. Warwik Institiue For Employment Research. Major Groups and Skill Levels ISCO 88 Guide Section 2; http://www2.warwick.ac.uk/fac/soc/ier/research/links/isco88/english/s2/, (Accessed on 2/7/2012)

23. Confidence Interval Analysis (CIA) Software. Available at www.som.soton.ac.uk/cia . (Accessed on 10/4/12)

24. Creative Research Systems. Sample size calculator. Available at http://www.surveysystem.com/sscalc.htm#one.(Accessed on 12/4/12)

25. Sharma BR, Gupta N, Relhan N. Misuse of prenatal diagnostic technology for sex-selected abortions and its consequences in India. Public Health.2007 Nov;121(11):854-60.

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25.26. Jha P, Kumar R, Vasa P, Dhingra N, Thiruchelvam D, Moineddin R.Low female[corrected]-to-male [corrected] sex ratio of children born in India: national survey of 1.1 million households. Lancet. 2006 21;367:211-8.

26.27. Kimani-Murage EW, Madise NJ, Fotso JC, Kyobutungi C, Mutua MK, Gitau TM, Yatich N. Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. BMC Public Health. 2011 26;11:396

27.28. Adewuya AO, Fatoye FO, Ola BA, Ijaodola OR, Ibigbami SM.Sociodemographic and obstetric risk factors for postpartum depressive symptoms in Nigerian women. J Psychiatr Pract. 2005; 11:353-8.

28.29. Chandran M, Thayan P, Muliyil J, Abraham S. Post-partum depression in a cohort of women from a rural area of Tamil Nadu, India. Incidence and risk factors. Br J Psychiatry. 2002; 181:499-504

29.30. Kheirabadi GR, Maracy MR, Barekatain M, Salehi M, Sadri GH, Kelishadi M, Cassy P. Risk factors of postpartum depression in rural areas of Isfahan Province, Iran.Arch Iran Med. 2009; 12:461-7.

30.31. Yaron Y, Lehavi O, Orr-Urtreger A, Gull I, Lessing JB, Amit A, Ben-Yosef D. Maternal serum HCG is higher in the presence of a female fetus as early as week 3 post-fertilization. Hum Reprod. 2002 Feb; 17(2):485-9.

31.32. Hendrick V, Altshuler LL, Suri R. Hormonal changes in the postpartum and implications for postpartum depression. Psychosomatics. 1998 Mar-Apr; 39(2):93-101.

~~32.~~33. Dennis CL, McQueen K. The relationship between infant-feeding outcomes and postpartum depression: a qualitative systematic review.Pediatrics. 2009; 123e736-51.

~~33.~~34. Henderson JJ, Evans SF, Straton JA, Priest SR, Hagan R. Impact of postnatal depression on breastfeeding duration. Birth. 2003 Sep; 30(3):175-80. Erratum in: Birth. 2004; 31:76.

~~*34.Currie ML, Rademacher R: The pediatrician's role in recognizing and intervening in postpartum depression. Pediatr Clin North Am 2004; 51:785–801.*~~

Reporting Checklist

Section/Topic	Item #	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any pre-specified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias

Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13 *	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14 *	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)
Outcome data	15 *	*Cohort study*—Report numbers of outcome events or summary measures over time
		Case-control study—Report numbers in each exposure category, or summary measures of exposure
		Cross-sectional study—Report numbers of outcome events or summary measures
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included

		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

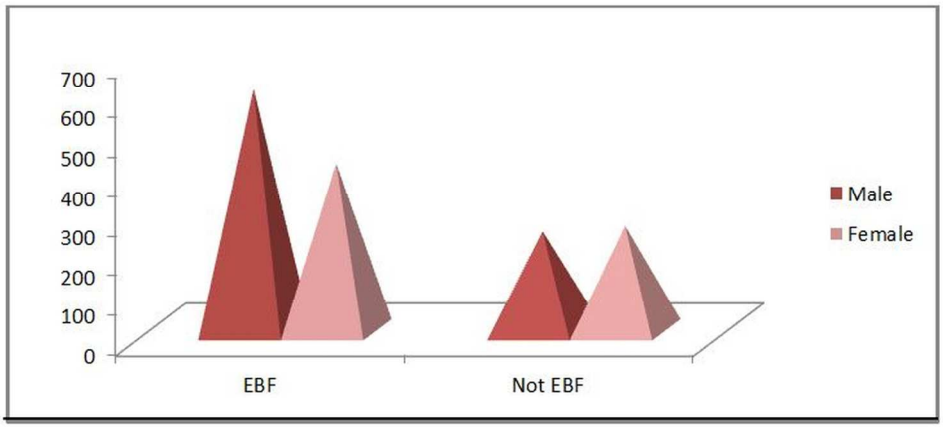

Fig 1: Breast feeding and sex of the child

169x90mm (300 x 300 DPI)

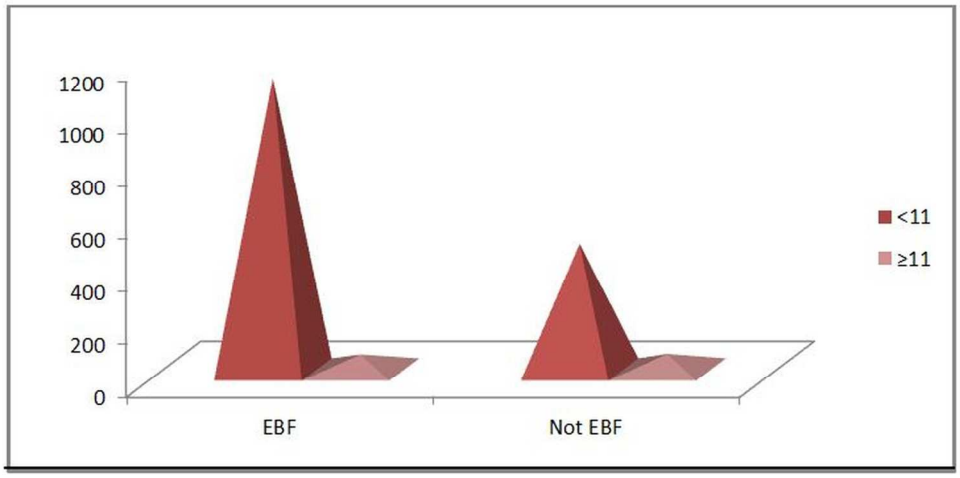

Fig 2: Breast feeding and postpartum depression

154x90mm (300 x 300 DPI)

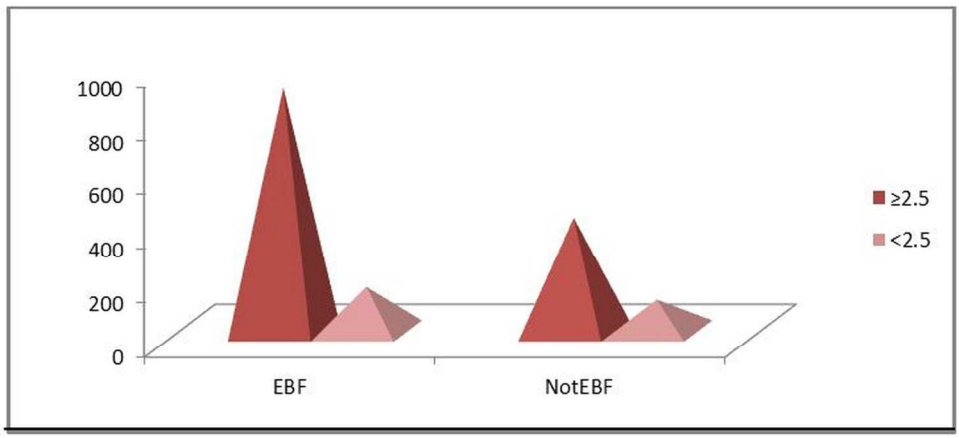

Fig 3: Breast feeding and birth weight

166x90mm (300 x 300 DPI)