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Correlation of Infant Gender with Postpartum Maternal and Paternal Depression and Exclusive Breastfeeding Rates

Kanika Goyal, Pragati Purbiya, Sandeep N. Lal, Jaspreet Kaur, Pooja Anthwal, and Jacob M. Puliyel

Abstract

Introduction: Male bias in India has resulted in an altered sex ratio. It also results in maternal postpartum depression (PPD) and lower breastfeeding rates. We studied depression among fathers in this context.
Methods: Edinburgh postnatal depression scale (EPDS) questionnaire was administered to 479 parents separately. Breastfeeding on day 7 was determined.
Results: Depression was significantly higher in fathers of girls. Mean EPDS score was 5.86 ± 4.98 versus 2.5 ± 2.64 ($p < 0.001$). Concordance between parents was significant ($r = 0.95$, $p < 0.001$). Boys were more likely to be exclusively breastfed (64.46% versus 35.54%, $p < 0.001$). In second-order births, if the first born was a girl and second baby was again a girl, 23% were exclusively breastfed compared with 86% if it was boy after a girl ($p < 0.001$). Among parents who had EPDS scores ≥11, no babies were exclusively breastfed. Among the 25 babies who received no breast milk, 21 were girls and 4 were boys ($p < 0.042$). The multiple logistic regression analysis indicated that birth of girls (OR 0.269, 95% CI 0.076–0.953), high EPDS score in mothers (OR = 0.080, 95% CI 0.026–0.249), and high EPDS score in fathers (OR = 0.096, 95% CI 0.031–0.299) were associated with lower breastfeeding rates.
Conclusion: Paternal depression correlates closely with maternal PPD and low exclusive breastfeeding of girls. Breastfeeding has implications for survival of girls. Efforts are needed to support the parents of girl children with PPD and such support must extend to fathers to improve survival.

Keywords: paternal depression, gender bias, EPDS, breastfeeding

Introduction

Numerous studies have reported male bias in India.[1–8] It can skew the sex ratio among children through antenatal sex determination and selective abortions, infanticide of girls,[9] and increased mortality in girls through neglect.[10] It is responsible for the missing women described by Amartya Sen.[6]

The problem of antenatal sex selection can be gauged by looking at the sex ratio at birth. Manchanda et al. studied sex ratio at birth in hospital deliveries and found 1,000 boys to 806 girls. She reported that gender bias was better demonstrated in sex ratio of second children whereby the first was a girl. If the first child was a boy, sex ratio was 1,017:1,000 and if the first was a girl, the chance of having another girl was 720 per 1,000 boys. The sex ratio was 178:1,000 if the previous two children were girls.[11]

Jain et al. found that the birth of a girl child was associated with increased maternal postpartum depression (PPD) and reduced breastfeeding on day 2 of life.[12] Postnatal depression in fathers has also been reported but paternal depression related to sex of the child has not been studied earlier to the best of our knowledge.[13]

The Edinburgh postnatal depression scale (EPDS) has been used previously to measure paternal postnatal depression.[14–16] We propose to study paternal PPD against sex of the baby and its relationship with maternal depression. Maternal depression and exclusive breastfeeding (EBF) at day 7 of the infant's life will also be examined to extend the work of Jain et al.[12] We hypothesize that in a society with gender bias, the father's EPDS score may also be influenced by sex of the newborn.

Materials and Methods

This was an observational study conducted at St. Stephens Hospital, Delhi, from June 2014 to June 2015. Parents of all the babies who were roomed-in with their mothers, after normal vaginal delivery, were included if parental consent for participation was obtained. Details of baby such as birth weight, gestation, sex of baby, and previous pregnancy were

Department of Pediatrics, St. Stephen's Hospital, Tis Hazari, Delhi, India.

recorded. Parents were interviewed about 48 hours after delivery, after the mother had recovered from labor and father had settled the initial birth-related formalities. They were given the EPDS questionnaire.

A Hindi version was administered to fathers and mothers who preferred Hindi.[17] This translation has been back translated and validated previously.[14] Depression score more than 11 on the EPDS was considered as significant using a cut-off determined previously by others.[12,18] All mothers were contacted at day 7 to determine whether the baby was being exclusively breastfed.

Sample size calculation

From previous studies,[13,19] it has been found that the prevalence of postnatal depression in fathers is about 12.5%. To estimate a prevalence of 12.5% with 95% confidence and a margin of error of 3%, we needed to interview 466 fathers. We, therefore, proposed to study 480 parents assuming 1% records may be incomplete.

Statistical analysis

Data obtained was coded and entered into a Microsoft Excel spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0. Categorical data are expressed as rates, ratios, and percentages. Continuous data was expressed as mean ± standard deviation. Normality of data was tested by Kolmogorov–Smirnov test. If normality was rejected, then nonparametric tests were used. Quantitative variables were compared using Mann–Whitney test between the two groups and Kruskal Wallis test when there were more than two groups, as the data sets were not normally distributed. Qualitative variables were correlated using Chi-square test/Fisher's exact test. Univariate and multivariate logistic regression were used to assess the association of EBF with various parameters. A p value of <0.05 was considered statistically significant.

Ethics statement

St. Stephen's Hospital Research Ethics Committee approved this study. Informed written consent was obtained from participants. The names of the respondents and identifying information were removed before analysis.

Results and Observations

During the study period, 1,325 babies were born through normal delivery at the hospital. Among them, 1,102 qualified for inclusion in the study. Of those 223 excluded, 66 were twins, 118 were preterm deliveries, and 157 were not roomed-in because they were shifted to the neonatal intensive care unit (NICU), or special care baby unit for more than 24 hours. There was a lot of overlap as many of the preterm babies and some twins were admitted to the NICU. Parents of all the babies born through normal vaginal delivery and who were roomed-in with mother within the first 24 hours of life were invited to take part in the study. Recruitment was stopped when 479 parents consented to take part in the study, and they filled the EPDS proforma.

The sex ratio for all deliveries at the hospital in the study period was 851:1,000. Among the study participants, there were 221 girls and 258 boys. The sex ratio for study participants was 857:1,000, similar to that of the birth cohort that year. Sex ratio for overall second-born children was 1,034:1,000. If the first child was a female, the sex ratio was 848:1,000 (Table 1).

Table 1. Sex Ratio

Sex ratio of overall study population	857:1,000
Sex ratio in second child	1,034:1,000
Sex ratio in second child when first is female	848:1,000
Sex ratio in second child when first is male	1,421:1,000

EBF was significantly more among boys than among girls (64.46% boys versus 35.54%, $p<0.001$). In second-order births if the first born was a girl and the second baby was again a girl, only 23% of them were exclusively breastfed compared with 86% if a boy was born after a girl ($p<0.001$). When studying first-born children, there was little difference in the rate of breastfeeding according to gender. Breastfeeding of first-born girls was 78% and it was 84% in boys ($p=0.281$) (Table 2).

There was more depression among the parents of girls. Mothers of girl children had a mean score of 5.54 ± 4.78 compared with 2.43 ± 2.44 for mothers of boys ($p<0.001$). This was observed in fathers also, in whom the mean EPDS score was 5.86 ± 4.98 for girls as compared with 2.5 ± 2.64 for boys ($p<0.001$). A total 57 out of the 479 mothers (11.90%) interviewed had EPDS more than 11% and 91.23% of these were mothers of girl children ($p<0.001$). Among fathers too, EPDS ≥11 was seen in 62 out of 479 (12.94%) and 91.4% of them were fathers of girl children ($p<0.001$) (Table 3). Congruence in high EPDS score between father and mother was seen. Correlation between EPDS score of father and mother was statistically significant ($r=0.95$) ($p<0.001$).

Babies of parents with PPD were less likely to be breastfed. Further it was seen that among parents who had EPDS scores ≥11, none of the babies were exclusively breastfed. Subgroup analysis was done comparing partially breastfed (breastfed and top fed) with those who were not breastfed at all. Among the 25 babies who received no breast milk, 21 were girls and 4 were boys ($p<0.042$). The incidence of breastfeeding in parents without depression was analyzed to eliminate the influence of depression on breastfeeding. Even in the group with low depression scores (whereby parents had EPDS <11), 64.46% boys were breastfed as against only 35.54% girls ($p<0.01$).

Table 2. Sex of the Baby and Exclusive Breastfeeding

	EBF		
Sex of the baby	*No*	*Yes*	*p*
Overall			
Girl	103	118	<0.0001
Boy	44	214	
First born			
Girl	18	64	0.281
Boy	20	105	
Siblings (sex of first baby+sex of current baby)			
Girl+girl	52	15	<0.0001
Girl+boy	11	68	

EBF, exclusive breastfeeding.

Table 3. Sex of the Baby, EPDS Score, and Breastfeeding

	Mother		*Father*	
	≥11	*<11*	*≥11*	*<11*
EBF if child is boy	0/5 (0%)	214/253 (84.58%)	0/5 (0%)	214/253 (84.58%)
EBF if child is girl	0/52 (0%)	118/169 (69.82%)	0/57 (57%)	118/164 (71.95%)
p	<0.0001		<0.002	

EBF, exclusive breastfeeding; EPDS, Edinburgh postnatal depression scale.

The multiple logistic regression analysis indicated that birth of a female baby (OR = 0.269, 95% CI 0.076–0.953), high EPDS score in mothers (OR = 0.080, 95% CI 0.026–0.249), and high EPDS score in fathers (OR = 0.096, 95% CI 0.031–0.299) were associated with lower odds of EBF.

Discussion

Jha et al. found that in households where the first born was a girl, the chances of the second child being a girl were much lower than in households where the first born was a boy.[20] According to studies by Jha et al. and Sahni et al., gender bias is better demonstrated in attitudes toward second children when the first born was already a girl.[9,20] Sahni has shown that sex ratio for second children was 715:1,000 if the first born was a girl whereby the sex ratio was 1,140:1,000 if the first born was a boy. In our study, the overall sex ratio was 856:1,000. However, if the first child was a girl, the sex ratio declined to 848:1,000, but if the first born was a boy, then the sex ratio was 1,034:1,000.

Akanksha et al. have previously reported higher incidence of PPD in mothers of girl children (mean EPDS score 6.0 ± 3.39 compared with 5.4 ± 2.87 for mothers of boys, $p < 0.01$), which is comparable with what we found (mean score of mothers of girls was 5.54 ± 4.78 compared with 2.43 ± 2.44, $p < 0.001$). In this study, we found additionally that depression in fathers also correlated with gender of their newborns and this has not been reported previously to the best of our knowledge. There was congruence in high EPDS score between father and mother ($r = 0.95$) ($p < 0.001$).

There was a gender bias in breastfeeding. Akanksha found that fewer mothers of girl children were breastfeeding at day 2 of the newborn's life, and that although this correlated with high EPDS score, they demonstrated on multiple regression analysis that decreased breastfeeding was independently associated with birth of a girl child.[12] This study confirms their finding that there was decreased breastfeeding of girl children, and we showed that this was true on day 7 of life, suggesting that it was not merely a transient phenomenon.

It has been speculated that mothers of girls had increased beta human chorionic gonadotropin levels and this with other hormonal changes could influence the PPD naturally without the intervention of gender bias.[21,22] Our study of fathers found a significant correlation of the birth of a girl child and postnatal depression in fathers ($p < 0.01$), and this is unlikely to be because of natural hormones as seen in mothers of girls. It is likely that the depression must be the result of the societal bias in favor of boy children.

There was significant correlation between the depression scores of fathers and mothers ($r = 0.95$) ($p < 0.001$). It is possible that depression in one spouse can trigger depression in the partner. This has been studied previously.[13,23–26] However, there was only about 25% congruence in previous studies. We found depression in fathers in 99% cases if mothers were depressed. This high level of congruence suggests that depression in both parents may be stimulated by a common factor, which we speculate is societal bias in this case.

Jayachandran and Kuziemko hypothesize that because breastfeeding inhibits postnatal fertility, a mother might limit the nursing of an infant if she wants to continue having children. They concluded that mothers who have had a girl child may want a boy soon and so may limit the duration of her feeding.[27] Kimani-Murage et al. conducted a study in Kenya and found sex of the child to be one of the factors for suboptimal breastfeeding ($n = 4,299$).[28] This could be an explanation for reduced breastfeeding of girl babies by mothers who are desirous to get another baby soon.

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

Strength of our study

We studied EBF in the first 7 days of life of the newborn unlike Akanksha et al. (2014) who studied breastfeeding at 48 hours. Breastfeeding at day 7 is a better predictor of sustained breastfeeding. More studies are needed to elaborate the effect of sex bias on the duration of breastfeeding.

Weakness of the study

In our study, we had interviewed the parents after the birth of the child within first 48–72 hours during their hospital stay and taken the EPDS scores of both the parents. The parents should have been followed up to look at longer lasting PPD and the breastfeeding status of the baby.

Conclusion

Our study found PPD in fathers of girl children and it correlates closely with maternal PPD and low breastfeeding rates. This low breastfeeding has implications for survival of girls and infant deaths can further skew the sex ratio. Therefore, more efforts should be made to support the parents of girl children with PPD and such support must extend to fathers also to improve the survival of the girl child.

Authors' Contributions

Conception of the study was by K.G., S.N.L., and J.M.P.; literature search was done by K.G. and P.P.; study design was

carried out by K.G. and J.M.P.; data were collected by K.G., P.P., S.N.L., J.K., and P.A.; data were analyzed by K.G., S.N.L., P.P., J.K., P.A., and J.M.P.; data were interpreted by K.G., S.N.L., and J.M.P.; the first draft of the article was written by K.G., S.N.L., and J.M.P.; and the final version of the article was written by K.G., S.N.L., P.P., J.K., P.A., and J.M.P.

Disclosure Statement

No competing financial interests exist.

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Address correspondence to:
Kanika Goyal, MBBS
Department of Pediatrics
St. Stephen's Hospital
Tis Hazari
Delhi 110054
India

E-mail: gyl.knk@gmail.com

Jacob M. Puliyel, MD
Department of Pediatrics
St. Stephen's Hospital
Tis Hazari
Delhi 110054
India

E-mail: jacob@puliyel.com