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RESEARCH ARTICLE
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A PROSPECTIVE INTERVENTIONAL STUDY ON STRESS LEVELS AMONGST PARENTS OF BABIES ADMITTED TO NEONATAL INTENSIVE CARE UNIT IN A RURAL TERTIARY CARE HOSPITAL

Dr. Aditi Gaonkar[1], Dr. K B Mahendrappa[2*]

[1]Junior Resident, Department of Pediatrics, Adichunchanagiri Institute of Medical Sciences Adichunchanagiri University, B G Nagara-571448, Karnataka, India.
Email id- gaonkar.aditi@bgsaims.edu.in
[2*]Professor and HOD, Department of Paediatrics, Adichunchanagiri Institute of Medical Sciences, Adichunchanagiri University, B G Nagara-571448, Karnataka, India,
Email id- drmahendrappakb@bgsaims.edu.in

***Corresponding Author:** Dr. K B Mahendrappa
*Email id- drmahendrappakb@bgsaims.edu.in

ABSTRACT

Background: The birth of a child is a period of high stress for a couple, especially as they become a parent. During this time, there can be a high stress, if the child gets admitted in the NICU. India is a developing country with a lot of newer advances in the field of paediatrics and the intensive care units. Very little research has been done regarding the perception of stress of parents in NICU. Our research is set in a rural tertiary hospital care setup with a level 3 NICU, which aims to perceive the stress of parents admitted to the neonatal intensive care units and the correlation of this stress pre and post counselling in NICU.

Objectives: To determine stress levels amongst parents of babies admitted to NICU and identify the parameters that affect the stress levels and to assess the effect of counselling using parental stress scale (PSS scale)

Methodology: It is a Hospital based observational study that involved all the Babies delivered in Adichunchanagiri Hospital and research institute. A sample size of 353 babies was taken and using the PSS scale, and all the parents of the babies admitted to NICU were given the questionnaire to look for the stressors in NICU. Data was analysed using licensed Version of SPSS 22.

Results: We studied 353 parents of babies admitted to the NICU regarding the stress scales.

There was noted to be a significant difference (p value <0.05) in all three subgroups of the PSS Scale when comparing the pre and post counselling stress levels of the parents.

The mean ± SD score of 4.1018 ± 0.43946 for sights and sounds has reduced to 3.4018 ± 0.68310 after counselling and it is statistically significant at p value of 0.001. significance.

For the sub category of "Sights and sounds" P value was found to be statistically significant for birthweight (p value of 0.003), Period of gestation (P value of 0.021) and mothers highest education (P value of 0.039) indicating that higher level of stress was noted to occur among parents with babies having low birth weight (<2500 gm), low gestational age (less than 37 weeks) and illiteracy in the mother.

Conclusion: With the above research our study concludes that there was a significant decrease in the stress levels of parents of babies admitted in the neonatal care unit, post counselling. As the Sights

and sounds subgroup was found to have a significant association with the sociodemographic details, thus NICU setup can help reduce the stress levels of parents, if we look into the above given components of "sights and sounds" along with the necessary counselling in reassurance .

Keywords: Neonatal intensive care unit, parental stress scale, stress, Counselling

INTRODUCTION

In Today's world everyone encounters stress from time to time. Stress has been understood in many ways and its various Psychological definitions have been discussed, its harmful effects on Personal, Relationships, Societal levels. Thus, requiring the need for understanding its nature is crucial for developing interventions to reduce these effects. This study aims to focus on the stress of parents of babies admitted to NICU (Neonatal Intensive Care Unit).

NICU can be defined as "a unit of hospital specialising in the care of ill or premature newborn infants" (NICUs: Definition, 2006)

This study reviews the various stressors that affects the parents in a rural tertiary hospital background and how one can reduce these stress events, and the effect of councelling in NICU. This study also notes if the effect of counselling reduces the stress in parents. This study is an attempt to try and find out the means with which these various stressors in NICU can be reduced. [7-20]

OBJECTIVES

1.) To determine stress levels amongst parents of babies admitted to NICU and identify the parameters that affect the stress levels and
2.) To assess the effect of counselling using parental stress scale (PSS scale)

MATERIALS AND METHODS

Source Of Data

- **Study Place:** Department of Paediatrics – Neonatal Intensive Care Unit
- **Study design:** Hospital Based Prospective Observational Study
- **Sampling method**: Convenient sampling
- **Sample Size:** Parents of all newborns admitted to NICU during the study period. (352)
  - Based on the previous 5 years admission cases of in born babies admitted in our NICU, 20 cases per month was taken as the average admissions per month. And study was conducted for a period of 18 months
  - Sample size calculation:
  - 20 cases x 16 months = 320
  - Considering non-responsive rate of 10% i.e., 32, minimum sample size to be studied was **352.**
  - Hence, in our study we collected a sample size of 353 participants, who were equally divided and taken from subsequent months. (17^{th} and 18^{th} month used for analysis of samples collected)
- **Study Period:** November 2022 to May 2024 (18 Months)

- **Inclusion criteria:**

All parents of babies born at Adichunchanagiri hospital and research centre and admitted in NICU.

- **Exclusion criteria:**
  - Babies born outside Adichunchanagiri Hospital, B G Nagar
  - Parents with psychiatric illness
- **Methodology**: Hospital Based Prospective Interventional Study

METHOD OF COLLECTION OF DATA

- Written and Informed Consent from the parents was taken.
- After obtaining ethics committee approval from Institutional Ethics committee, parents of all newborns admitted to NICU during the study period-were explained about the study. Parents were

given the questionnaire which included sociodemographic details and PSS-NICU standard questionnaire (Annexure 1 and 2) to assess the stress level on a Likert scale and parents were requested to rate their stress levels from 1 (lowest) to 5 (maximum).

- Data was collected on day 1 and day 3 of admission. Day 1 corresponds to before counselling and Day 3 corresponds to after counselling. The Counselling was done by specialised NICU trained staff who were specialised in counselling regarding the PSS: NICU scale and counselled parents on the 3 subcategories PSS: Scale to the Parents. Data collection using the questionnaire lasted for about 20-25 mins.

- **Data Analysis:**
  Data thus collected was coded for each item and entered in Microsoft excel sheet. Entered data was analysed using IBM SPSS Statistics for Windows, Version 22 (IBM Corp, Armonk, N.Y, USA). Data was represented as frequency, percentage, mean and standard deviation. Association between sociodemographic and stress level were assessed by ANOVA and stress levels Pre and post counselling was compared using T test and consider statistically significant at p value < 0.05. results were represented as tables and graphs.

RESULTS

Parental stress levels for sights and sounds in relation to socio-demographic variables: Amongst the sociodemographic variables, significant association was noted and p value was found to be significant (p value <0.05) for , birthweight, gestational age (in weeks) and mother's highest education.

Low gestational age, low birthweight (<2500 gm) and illiteracy in the mother are noted to have higher stress with sights and sounds. The other variables were found to be insignificant.

Table 15: Parental stress levels for sights and sounds in relation to socio-demographic variables

Variables		Sights and sounds			p value
		High stress	Low stress	Medium	
Gender	Male	146 (72.3%)	5 (2.5%)	51 (25.2%)	0.710
	Female	108 (71.5%)	2 (1.3%)	41 (27.2%)	
Birth weight	< 2500 Kg	134 (78.4%)	0	37 (21.6%)	**0.003**
	> 2500 Kg	120 (65.95)	7 (3.8%)	55 (30.2%)	
POG at birth	< 37 weeks	118 (77.15)	0	35 (22.9%)	**0.021**
	>37 weeks	136 (68%)	7 (3.5%)	57 (28.5%)	
Birth order	1	118 (75.6%)	5 (3.2%)	33 (21.2%)	0.161*
	2	120 (69.4%)	1 (0.6%)	52 (30.1%)	
	3	12 (66.7%)	1 (5.6%)	5 (27.8%)	
	4 and above	4 (66.7%)	0	2 (33.3%)	
Mothers age	< 18 years	6 (54.5%)	0	5 (45.5%)	0.377
	>25 years	86 (72.9%)	4 (3.4%)	28 (23.7%)	
	19 to 25 years	162 (72.3%)	3 (1.3%)	59 (26.3%)	
Mothers education	Illiterate	1 (50%)	1 (50%)	0	**0.039**
	Literate	253 (72.1%)	6 (1.7%)	92 (26.2%)	
Mothers occupation	Employed	135 (73.8%)	3 (1.6%)	45 (24.6%)	0.727
	Unemployed	119 (70%)	4 (2.4%)	47 (27.6%)	
Fathers age	< 18 years	2 (100%)	0	0	0.237
	>25 years	182 (72.5%)	7 (2.8%)	62 (24.7%)	
	19 to 25 years	70 (70%)	0	30 (30%)	
Fathers education	Illiterate	2 (100%)	0	0	0.624

	Literate	252 (71.8%)	7 (2%)	92 (26.2%)	
Fathers occupation	Employed	250 (72%)	7 (2%)	90 (25.9%)	1.000
	Unemployed	4 (66.7%)	0	2 (33.3%)	
Type of family	Single parent	0	0	1 (100%)	0.394
	Nuclear	142 (72.8%)	3 (1.5%)	50 (25.6%)	
	Joint	112 (71.3%)	4 (2.5%)	41 (26.1%)	

*Fishers exact value

A. Parental stress levels for Looks & behaviour in relation to socio-demographic variables:
The socio-demographic variables were noted to be insignificant for Looks and behavior.

Table 16: Parental stress levels for Looks & behaviour in relation to socio-demographic variables

Variable		**Looks and behaviour**			**p value**
		High stress	**Low stress**	**Medium Stress**	
Gender	Male	132 (65.3%)	2 (1%)	68 (33.7%)	0.425
	Female	105 (69.5%)	0	46 (30.5%)	
Birth weight	<2500 kg	119 (69.6%)	0	52 (30.4%)	0.302
	>2500 kg	118 (64.8%)	2 (1.1%)	62 (34.1%)	
POG at birth	<37 weeks	108 (70.6%)	0	45 (29.4%)	0.286
	>37 weeks	129 (64.5%)	2 (1%)	69 (34.5%)	
Birth order	1	107 (68.6%)	0	49 (31.4%)	0.273*
	2	115 (66.5%)	1 (0.6%)	57 (32.9%)	
	3	12 (66.7%)	1 (5.6%)	5 (27.8%)	
	4 and above	3 (50%)	0	3 (50%)	
Mothers age	<18 years	7 (63.6%)	0	4 (36.4%)	0.277
	>25 years	76 (64.4%)	2 (1.7%)	40 (33.9%)	
	19 to 25 years	154 (68.8%)	0	70 (31.3%)	
Mothers Education	Illiterate	1 (50%)	0	1 (50%)	1.000
	literate	236 (67.2%)	2 (0.6%)	113 (32.2%)	
Mothers Occupation	Employed	129 (70.5%)	1 (0.5%)	53 (29%)	0.514
	Unemployed	108 (63.5%)	1 (0.6%)	61 (35.9%)	
Fathers age	<18 years	1 (50%)	0	1 (50%)	0.270
	>25 years	162 (64.5%)	1 (0.4%)	88 (35.1%)	
	19 to 25 years	74 (74%)	1 (1%)	25 (25%)	
Fathers education	Illiterate	2 (100%)	0	0	0.565
	literate	235 (67%)	2 (0.6%)	114 (32.5%)	
Fathers occupation	Employed	235 (67.7%)	2 (0.6%)	110 (31.7%)	0.121
	Unemployed	2 (33.3%)	0	4 (66.7%)	
Type of family	Single parent	1 (100%)	0	0	0.787
	Nuclear	135 (69.2%)	1 (0.5%)	59 (30.3%)	
	Joint	101 (64.3%)	1 (0.6%)	55 (35%)	

*Fishers exact value

B. Parental stress levels for Parental role alteration in relation to socio-demographic variables:
The sociodemograohic details were found to have no significance to the Parental Role alteration.

Table 17: Parental stress levels for Parental role alteration in relation to socio-demographic variables

Variables		Parental role			p value
		High stress	Low stress	Medium Stress	
Gender	Male	138 (68.3%)	3 (1.5%)	61 (30.2%)	0.824
	Female	98 (64.9%)	2 (1.3%)	51 (33.8%)	
Birth weight	<2500 kg	116 (67.8%)	2 (1.2%)	53 (31%)	0.941
	>2500 kg	120 (65.9%)	3 (1.6%)	59 (32.4%)	
POG at birth	<37 weeks	104 (685)	2 (1.3%)	47 (30.7%)	0.907
	>37 weeks	132 (66%)	3 (1.5%)	65 (32.5%)	
Birth order	1	102 (65.4%)	0	54 (34.6%)	0.057*
	2	117 (67.6%)	3 (1.7%)	53 (30.6%)	
	3	13 (72.2%)	2 (11.1%)	3 (16.7%)	
	4 and above	4 (66.7%)	0	2 (33.3%)	
Mothers age	< 18 years	5 (45.5%)	0	6 (54.5%)	0.0546
	>25 years	79 (66.9%)	2 (1.7%)	37 (31.4%)	
	19 to 25 years	152 (67.9%)	3 (1.3%)	69 (30.8%)	
Mothers Education	Illiterate	1 (50%)	0	1 (50%)	1.000
	literate	235 (67%)	5 (1.4%)	111 (31.6%)	
Mothers Occupation	Employed	118 (64.5%)	3 (1.6%)	62 (33.9%)	0.618
	Unemployed	118 (69.4%)	2 (1.2%)	50 (29.4%)	
Fathers age	< 18 years	1 (50%)	0	1 (50%)	0.912
	>25 years	167 (66.5%)	3 (1.2%)	81 (32.3%)	
	19 to 25 years	68 (68%)	2 (2%)	30 (30%)	
Fathers education	Illiterate	0	0	2 (100%)	0.128
	literate	236 (67.2%)	5 (1.4%)	110 (31.3%)	
Fathers occupation	Employed	233 (67.1%)	5 (1.4%)	109 (31.4%)	0.442
	Unemployed	3 (50%)	0	3 (50%)	
Type of family	Single parent	1 (100%)	0	0	0.685
	Nuclear	135 (69.2%)	3 (1.5%)	57 (29.2%)	
	Joint	100 (63.7%)	2 (1.3%)	55 (35%)	

*Fishers exact value

C. Effect of Counselling on parental stress levels for various sub scales of PSS-NICU:
There was noted to be significant difference (p value <0.05) in all three subgroups of the PSS Scale when comparing the pre and post counselling stress levels of the parents.
The mean ± SD score of 4.1018 ± 0.43946 for sights and sounds has reduced to 3.4018 ± 0.68310 after counselling and it is statistically significant at p value of 0.001. significance in sights and sounds is noted in all the sub-scales except for other sick babies in the room.
The sub scales in looks and behaviour like Presence of tubes and equipment's on or near my baby, Unusual color of my baby (yellow/pale), Baby fed by tube or intravenous line, Baby not crying like other babies, Jerky movements of my baby, Seeing my baby in pain and Seeing my baby looking sick shows the reduction in stress level after counselling with the significant p value of <0.05.
In parental role alteration, the statistical significance was noted for sub-scales like Being separated from my baby (p value-<0.001), Not being able to hold my baby when I want (p value 0.038), Feeling helpless and unable to protect my baby from painful procedures (p value 0.011), Not having time to be alone with my baby (p value 0.046), Sometimes forgetting what my baby looks like (p value 0.003),

Not being able to share my baby with other family members (p value 0.003), and Feeling that staff is closer to my baby (p value 0.001).

Table 18: Effect of Counselling on parental stress levels for various sub scales of PSS-NICU

PSS-NICU Sub scales	Pre -Counselling		Post-Counselling		P value
	Mean	SD	Mean	SD	
Sights and Sounds					
Presence of monitors and equipment	4.762	.4943	3.915	.8846	**<0.001**
Constant Noises of monitors and equipment's	3.975	.5078	3.535	.8690	**0.003**
Sudden noises of monitor alarms	4.045	.6684	3.499	.8499	**0.003**
Other sick babies in the room	3.992	.8774	3.363	.9851	0.457
Large number of nurses and doctors in NICU	4.110	.8737	3.300	1.0742	**0.012**
Having a ventilator to breathe for the baby	3.725	1.2751	2.799	1.2163	**<0.001**
Mean Score	**4.1018**	**.43946**	**3.4018**	**.68310**	**0.001**
Looks and Behaviour					
Presence of tubes and equipment's on or near my baby	4.785	.5267	3.751	.9416	**<0.001**
Seeing needles and tubes being put on my baby	4.099	.6690	3.365	.8756	0.230
Unusual color of my baby (yellow/pale)	4.167	.7369	3.408	.9403	**0.017**
Small size of my baby	4.091	.8513	3.397	1.0204	0.094
Wrinkled appearance of my baby	4.125	.8669	3.286	1.0030	0.082
Baby fed by tube or intravenous line	4.085	.9068	3.326	.9993	**0.033**
The limp or weak appearance of my baby	3.958	.9360	3.348	1.0635	0.330
Baby not crying like other babies	3.963	.9147	3.331	1.0311	**<0.001**
Jerky movements of my baby	3.929	.9903	3.215	.9995	**<0.001**
Seeing my baby in pain	3.992	.8934	3.201	1.0589	**0.004**
Seeing my baby looking sick	3.924	.9338	2.932	1.1109	**<0.001**
Mean Score	**4.1011**	**.43168**	**3.3239**	**.69525**	**0.001**
Parental Role Alteration					
Being separated from my baby	4.765	.5422	3.640	.9524	**<0.001**
Not feeding my baby myself	3.915	.7100	3.283	.8914	0.475
Not being able to care for my baby myself	4.130	.7834	3.246	.9408	0.074
Not being able to hold my baby when I want	4.144	.8319	3.246	.9408	**0.038**
Feeling helpless and unable to protect my baby from painful procedures	4.176	.9031	3.255	1.0567	**0.011**
Feeling helpless about how to help my baby during this time	4.119	.9030	3.238	1.1155	0.081
Not having time to be alone with my baby	4.048	.8431	3.187	1.0413	**0.046**
Sometimes forgetting what my baby looks like	3.952	.9111	3.037	1.0747	**0.003**
Not being able to share my baby with other family members	3.898	.9540	2.966	1.0574	**0.003**
Feeling that staff is closer to my baby	3.711	.9423	2.663	1.0830	**0.001**
Mean Score	**4.086**	**.4697**	**3.173**	**.7441**	**<0.001**

DISCUSSION

The NICU environment is an area of High stress to parents and Coping with the birth of a sick or ill child can be taxing to the mental state of a parent. It is important to note down the stress causing components for a holistic approach to the treatment of the newborn. This helps in the development of appropriate protocols to reduce stress, and can be used as a source of information by occupational therapists. There have been multiple studies using the PSS scales which denotes the stress under 3 subscales of sights and sounds, Looks and behaviour of the baby, Parental role Alteration. Our results correlated the sociodemographic details to the stress levels of parents which noted that there was a significant correlation between the subscale "Sights and sounds" with the Birthweight of the baby (low birth weight <2500 gm) (p value 0.003), Lower gestational age (<37 weeks)(p value= 0.021) and Illiteracy (p value 0.039) of the mother was associated with a higher level of stress.

Age Distribution of Mothers and fathers:

Our study noted that most mothers were aged between 19-25 years (63.46%) with a Mean age of 24.35 when compared to Dudek and Shriber who had mothers aged between 22-32 years (46.3%) with a mean age of 26.6, Steedman, Wendy Kate had a mean age of 30.8 years and Chourasia N, et al had a mean age of 24.7. The study done by Dutta, et al, about the stress of Fathers of babies admitted in an NICU setup and that had a median father's age of 29 years. Our study had Most Fathers aged between 19-25 (40.51%) with a mean age of 28.07 demonstrating a younger male population. [1-5]

Educational Background Of Parents: Majority of the researchers had the parents with their highest education being completed until high school which is at par with our study. Dudek and Shriber had 36.4% participants, Chourasia N et al had 59 % and Zych B et al had 56.3% participants all of who had completed their education uptil high school. In Steedman, Wendy Kate's research they had 75% of mothers and 41% fathers who had completed their highest education uptil a professional degree. [1-5]

Occupation: Our research had parents with a majority of the mothers with no formal employment (48.16%) which was similar to most researches like Dudek and shriber (35%), and Chourasia N et al (67%). In Richard shaw's study, 52 % of mothers had a professional occupation (52%) as the majority. [1-5, 20]

Birth Weight: Our study had 48.4% cases less than 2500 grams (mean value 2474.07) which was similar to studies by Chourasia et al (mean value of 1780) , Dudek and shriber less than 2500 gm(71.7%) and Zych B, et al, with a range of 1500-2499(40.4%) [1-5]

Diagnosis At Birth: Our study revealed the most common diagnosis at birth was Preterm care (24.36%) which was similar to studies by Dudek and shriber (40.7%) , Chourasia et al. (56%)

Discussion on Parental stress scales with the parent and sociodemograohic details:

Unlike other studies, our study however noted that there was a significant level of stress noted in the subscale "Sights and sounds" and showed a significant correlation with the Low Birthweight of the baby (low birth weight <2500 gm) (p value 0.003), Lower gestational age (<37 weeks)(p value= 0.021) and Illiteracy (p value 0.039) of the mother. A similar finding (criterion I: Sights and sounds: p= 0.006) was noted by **Zych B, Et Al,** [5] who compared the effect of kangaroo mother care on the PSS scale in those mothers who practiced KMC (Kangaroo Mother care) when compared to the mothers who did not. **Dudek And Shriber** [1] did a research that revealed a higher stress level under "Sights and sounds" for Gender (t= 3.518, p=0.001), Marital status (F= 5.043, p= 0.001), Education (F= 3.399, p= 0.006) and occupation (F=5.043, p=0.004). Parents with high school education (M= 4.86, SD= 0.54) were noted to have higher stress than those with a bachelors degree (M=4.92, SD=

0.35). But The highest level of stress for **Dudek And Shriber** noted under their research was under the subscale of "Parental role alteration."[1]
Unlike our study, The studies done **Steedman, Wendy Kate, Chourasia N, Et Al, Dutta Et Al** by were noted to have Highest level of stress under "Parental role alteration" [16-19, 34]
Chourasia N, Et Al, (May 2013) Conducted a study on the maternal stress levels in NICU in India (Pondicherry) and noted that for Parental demographics there was no significant correlation.
Dutta Et Al (2016) conducted a study on Fathers to note the stress of Premature newborns admitted in NICU, which noted that the Fathers were mainly stressed due to financial burden in premature infants. Our study does not reveal any such correlation and the monthly income was noted to be insignificant. This could be because our setup offers Universal health insurance and Schemes from the state government for below poverty line card holders. [4]

Effect of counseling on the parental stress:
Our study noted that there was a significant reduction in stress post counseling (p value <0.05) in all 3 subscales. Which was similar to the study done by Chourasia N, et al.[6]

Conclusion
There was a significant level of stress noted amongst parents of babies admitted to NICU.
There was a significant reduction of stress levels amongst parents post counselling in the overall total of all 3 subscales. (Mean score of each subscale: p value <0.05).
Our research concluded the stress levels of parents in NICU was noted to be more in the subscale "Sights and sounds" and that there was a significant correlation of the stress levels with Low Birthweight of the baby (birth weight <2500 gm), Lower gestational age (<37 weeks) and Illiteracy of the mother.
Under "Sights and sounds" there was no significant difference in comparison of pre and post counselling with 'Other sick babies in the room', but was significant (p value <0.05) for all other components of the subscale.
Under "Looks and behaviour" there was no significant difference in pre and post counselling under, "seeing tubes and needles put on my baby, Small size of the baby, wrinkled appearance of the baby, Limp or weak appearance of my baby'. , but was significant (p value <0.05) for all other components of the subscale.
Under "Parental role alteration" There was no significant difference pre and post counselling noted under 'Not feeding the baby myself, Not being able to take care of the baby myself, Feeling helpless about how to help my baby during this time.' There was a significant difference (p value <0.05) in all the other components under the given subscale.

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