Original Research Article

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SNAPPE II score: predictor of mortality in NICU

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ABSTRACT

Background: Advances in the NICU (neonatal intensive care unit) have significantly decreased mortality and morbidity and increased survival rate in neonates. SNAPPE II (Score for Neonatal Acute Physiology-Perinatal Extension II) score, which is a modified version of the SNAP score (Score for Neonatal Acute Physiology) helps in predicting the neonatal mortality. The aim of the study was to assess the risk of mortality using SNAPPE II score in neonates admitted to NICU.

Methods: It was a prospective validation study done in a tertiary care hospital. Data was collected from 116 new borns admitted to NICU within 48 hours of birth who required respiratory support between December 2017 to June 2018

Results: A total of 116 newborns admitted to the NICU was included in present study. Out of 116 babies, 56 (48%) had mild SNAPPE-II score, 44 (38%) had moderate score and 16 (14%) had severe score. Among the 44 babies with moderate score, 12 (27%) died, which was statistically significant (P<0.001). Among 16 babies with severe score, 13 (81%) babies died, which was highly statistically significant (P<0.0001). Urine output, seizures, serum pH in the first 24 hours of life are independent predictors of mortality with significant p value (0.001).

Conclusions: The SNAPPE-II score recorded in the first 48 hours of life could be a good predictor of mortality in babies admitted to NICU.

Keywords: Moderate score, NICU, Seizures, SNAP score, SNAPPE II score

INTRODUCTION

Illness severity scores have been widely used in Neonatal Intensive Care Unit (NICU). Scoring systems that quantify initial risk have an important role in aiding execution of optimal health by predicting the mortality and few scores predict morbidity.

Some of the scoring systems used are CRIB (Clinical Risk Index of Babies), CRIB II (Clinical Risk Index of Babies II), SNAP (Score for Neonatal Acute Physiology), SNAP II (Score for Neonatal Acute Physiology-II), SNAPPE (Score for Neonatal Acute Physiology-Perinatal

Extension) and SNAPPE II (Score for Neonatal Acute Physiology-Perinatal Extension II).¹

One of the neonatal illness severity indices which is used to assess the mortality rate and the length of the stay of newborns in NICU is the SNAP score, developed by Richardson et al.³ As the data collection for SNAP score was cumbersome, a modified simpler version of the original called SNAPPE II score was derived.³ This score involves recording of 9 parameters namely mean blood pressure, PO₂/FiO₂, lowest temperature (°F), serum pH, multiple seizures, urine output, birth weight, Apgar score and small for gestational age.¹

METHODS

Present study was a prospective validation study done in a tertiary care hospital.

Inclusion criteria

 A total of 116 newborns admitted to NICU within 48 hours of birth who required respiratory support between December 2017 to June 2018 were included in this study.

Exclusion criteria

 Newborns who were admitted for observation (first 4 hours of admission), out born babies with unknown Apgar, genetic disorders, life threatening surgical conditions were excluded from the study.

Data was collected within 48 hours of birth using a predesigned proforma. The data collected from the neonates include: mean blood pressure, PO₂/FiO₂, lowest temperature (°F), serum pH (lowest serum pH within 24 hours of admission), multiple seizures (>1 seizure within 12 hours of admission), urine output, birth weight, Apgar score and gestational age. Authors assessed the correlation between the SNAPPE II score recorded in the first 48 hours of birth and the mortality rate in babies admitted to NICU. Data was analyzed using mean, percentage, proportion, net sensitivity, net specificity, positive predictive value and negative predictive value.

RESULTS

A total of 116 newborns admitted to NICU between December 2017 to June 2018 at Father Muller Medical College Hospital was included in present study.

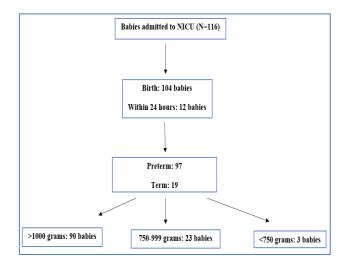


Figure 1: Flow diagram of babies in the study.

Out of 116 babies, 104 (90%) were admitted at birth while 12 babies (10%) were admitted within 24 hours of life. Birth weight of 90 babies was more than 1000 grams, 23 babies were between 750-999 grams and 3 were less than 750 grams. Preterm babies (>36 weeks) accounted for 97 and 19 were term babies (Figure 1).

Frequency distribution of SNAPPE-2 score	Survived	Died	Mean score among died	Total	P value
Mild (0-20)	48 (85.7%)	8 (14.2%)	7.7	56	>0.1
Moderate (20-40)	32 (72.7%)	12 (27%)	30.8	44	< 0.001
Severe (>40)	3 (18%)	13 (81%)	47	16	< 0.0001

Table 1: Frequency distribution of SNAPPE-2 score.

Frequency distribution of SNAPPE-2 score in babies who survived and expired

Out of 116 babies, 56 (48%), 44 (38%) and 16 (14%) had mild (0-20), moderate (20-40) and severe (>40) SNAPPE-2 score respectively. Among the 44 babies with moderate score, mortality was observed in 12 (27%) which was statistically significant (P<0.001). Out of 16 babies with severe score, mortality was observed in 13 (81%) babies which was statistically highly significant (P<0.0001) (Table 1). ROC (receiver Operator Characteristics) analysis was done and a score more than 34 was found to be a good predictor of mortality with a significant p value of <0.0001. The sensitivity of the score was 78.8% while specificity was 47% with AUC (Area Under Curve) of 0.622 (Figure 2).

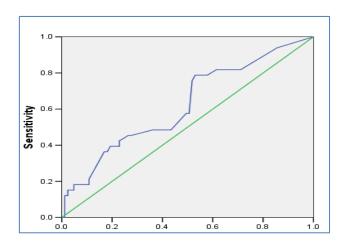


Figure 2: ROC curve (AUC:0.622).

Correlation between urine output and mortality rate

From the total of 116 babies, 16 (14%) had a reduced urine output less than 0.1ml/kg/hour, out of which mortality was observed in 13 (81%) which was statistically significant with a p value of <0.001. Hence, this variable could be used as an independent predictor of mortality (Figure 3).

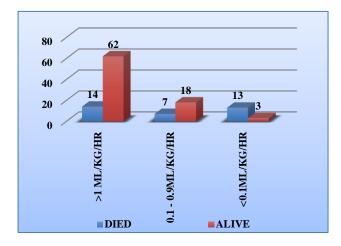


Figure 3: Correlation between urine output and mortality rate.

ROC analysis was done and urine output less than <0.1ml/kg/hour was found to be a good predictor of mortality. The sensitivity of the urine output as a predictor of mortality was 77%, specificity of 52% with ROC of 0.667 (Figure 4).

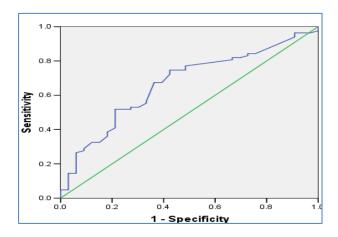


Figure 4: ROC curve (AUC:0.667).

From the total of 116 babies, 5 (4%) had multiple seizures (>1 seizure in the first 24 hours of life), out of which mortality was observed in (60%) which was statistically significant with a p value of <0.001. Hence, this variable could be used as an independent predictor of mortality with high specificity of 97.7% and sensitivity of 56% (Figure 5).

Out of 116 babies, serum pH of <7.1 was observed in 19 (16%) babies, out of which 6 babies survived and

mortality was observed in 13 (68%) which was statistically significant with a p value of <0.001. Hence, this variable could be used as an independent predictor of mortality (Figure 6).

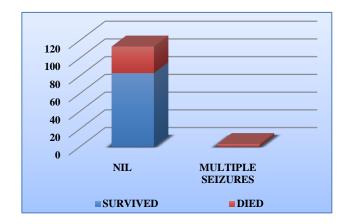


Figure 5: Correlation between seizures and mortality rate.

ROC analysis was done and serum pH less than 7.1 was found to be a good predictor of mortality with a sensitivity and specificity of 70% and 58% and ROC of 0.73 (Figure 7).

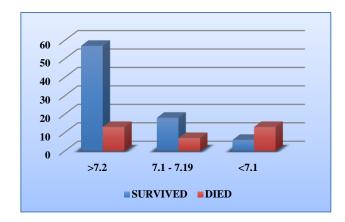


Figure 6: Correlation between lowest serum pH and mortality rate.

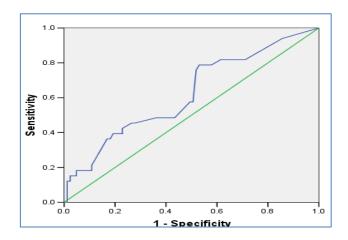


Figure 7: ROC curve (AUC:0.73).

DISCUSSION

A total of 116 babies admitted to the NICU were prospectively recruited in the study which assessed the relationship between SNAPPE-2 score and the mortality rate. present study showed that the SNAPPE-2 score showed good correlation with significant p value in terms of mortality irrespective of gestational ages.

A validation study done by Richardson et al with the primary outcome being the in-hospital mortality rate concluded that SNAPPE-2 score had excellent association with the mortality rate with AUC of 0.91. Compared to their study, present study also showed significant association between the score and the mortality rate (p value <0.0001) but the ROC showed a moderate association with AUC 0.62. ³

Sreeharsha S et al have done a prospective observational study concluded that SNAPPE II score is a good predictor of mortality but does not accurately predict the length of the stay with PPV of 95.3%, sensitivity of 76.9% and specificity of 87.1%. Compared to present study (specificity 47%), this study had high specificity (87.1%) and a good PPV which highly signifies the association between the score and the mortality rate.⁴

Contrary to present study, a prospective observational study done by Ramirez et al concluded that results were not strong enough to establish the correlation between the score and the risk of mortality.⁵

A prospective cohort study conducted by Aryan et al concluded that SNAPPE II score is a good predictor of mortality in NICU babies with ROC of 0.92 which highly signifies the association between the score and the mortality rate, but in present study the ROC was 0.622 which indicates a moderate association between the severity of the score and the mortality rate.⁶

In present study, the mean SNAPPE 2 score associated with mortality was 34 with sensitivity of 78.8% and specificity of 47% (ROC 0.622) compared to a prospective observational study done by Ra M et al where a score of 30 was associated with higher mortality (ROC 0.863) with sensitivity 81.8%, specificity 76.9%.⁷

Gagliardi L et al collected data from 720 very low birth weight infants compared different neonatal illness scores. Results showed CRIB and CRIB-II have a greater discriminatory ability than SNAPPE II.⁸

Brattli S et al done a prospective cohort study on 189 very low birth weight infants concluded that both CRIB-II and SNAPPE-II were found to predict mortality of very low birth weight babies whereas their value was poor in predicting morbidity.⁹

Contrary to present study, ELGAN (extremely low gestational age newborns) study done by Damann O et al

concluded that severity score in the first 12 hours postnatal hours conveys information about the risk of death among infants at lower gestational age.¹⁰

Not many studies correlated the individual variables of the SNAPPE 2 score (urine output, serum pH, multiple seizures in the first 48 hours of life) with the mortality. present study showed that the above variables in the SNAPPE 2 score were independent predictors of mortality and was statistically significant.

Limitations: Present study included all the babies (including congenital heart diseases) which by itself have risk factors for mortality irrespective of the SNAPPE 2 score.

Since the data was collected within 48 hours of life, the subsequent clinical course was not taken into consideration. Hence, few babies with mild score in the first hour of life were associated with mortality due to deteriorating clinical condition.

CONCLUSION

The SNAPPE-II score recorded in the first 48 hours of life could be a good predictor of mortality in babies admitted to NICU.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- 1. Dorling J. Neonatal disease severity scoring systems. Arch Dis Child. 2005;90(1):11-6.
- 2. Maiya P, Nagashree S, Shaik M. Role of score for neonatal acute physiology (SNAP) in predicting neonatal mortality. Indian J Pediatr. 2001;68(9):829-34.
- 3. Richardson DK, Corcoran JD, Escobar GJ, Lee SK. SNAP-II and SNAPPE-II: Simplified newborn illness severity and mortality risk scores. J Pediatr. 2001;138(1):92-100.
- 4. Harsha S. SNAPPE-II (Score for Neonatal Acute Physiology with Perinatal Extension-II) in predicting mortality and morbidity in NICU. J Clin Diagn Res. 2015;9(10):10-2.
- Mesquita Ramirez M, Godoy L, Alvarez Barrientos E. SNAP II and SNAPPE II as predictors of neonatal mortality in a pediatric intensive care unit: does postnatal age play a role?. Int J Pediatr. 2014;2014:1-5.

- 6. Aryana I, Kardana I, Adipura I. Predictive value of score for neonatal acute physiology and perinatal extension II for neonatal mortality in hospital. Pediatr Indones. 2017;56(5):257.
- 7. Etika AMR, Harianto A, Indarso F, Damanik S. The use of score for neonatal acute physiology perinatal extention II (SNAPPE II) in predicting neonatal outcome in neonatal intensive care unit. Paediatr Indones. 2016;45(6):241.
- 8. Gagliardi L. Assessing mortality risk in very low birthweight infants: A comparison of CRIB, CRIB-II, and SNAPPE-II. Arch Dis Child. 2004;89(5):419-22.
- 9. Brattli S, Bratlid D. 41 Comparisons of Crib score and Snappe-II score as predictors of mortality and

- morbidity in premature infants with birth weight <1501 Grams. Pediatr Res. 2004;56(3):471.
- Dammann O, Shah B, Naples M, Bednarek F, Zupancic J, Allred EN, et al. Interinstitutional variation in prediction of death by SNAP-II and SNAPPE-II among extremely preterm infants. Pediatr. 2009;124(5):1-6.

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