



TO FIND OUT CLINICO-ETIOLOGICAL PROFILE OF NEONATAL HYPERTHERMIA IN REFERENCE TO ENVIRONMENTAL TEMPERATURE AND HUMIDITY

Paediatrics

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ABSTRACT

This is a cross-sectional/observational study done on 300 newborns admitted to the NICU facility of gg hospital Jamnagar over the period November 2020 to October 2021. The aim of the study is to find out the clinical-etiological profile of neonatal hyperthermia regarding environmental temperature and humidity. Ethical clearance for the study was obtained from the Shri M.P. shah medical college ethical committee. Consent for the study was taken from the guardian of the subject. study duration was 1 year. A total number of 300 patients in the age group of 0-30 days(neonate) are included in this study. Neonates having hyperthermia indoors in NICU facility included in the study. The clinical correlation of neonatal hyperthermia with environmental temperature and relative humidity was done by Pearson correlation. The relative humidity and temperature of the NICU were measured by a digital hygrometer. The newborn temperature was measured by a digital thermometer. Pearson correlation Statical test was applied to evaluate this study. in our study 50.66 % of newborns are full-term and 49.33 % are preterm. There is a statistically significant association between NICU environment temperature and newborn temperature. As the NICU environment temperature increases newborn temperature also increased. There is a statistically significant association between heat index and newborn temperature as the heat index rises newborn temperature also rises. there is a weak correlation between NICU R.H. and newborn temperature. We can prove the effect of R.H. on newborns in further study by eliminating the effect of confounding factors on newborns' temperature. so we conclude that maintaining NICU temperature and relative humidity is vital to maintaining newborn temperature.

KEYWORDS

hyperthermia, relative humidity, newborn, NICU

INTRODUCTION

Hyperthermia is defined as a body temperature above 37.5. Hyperthermia can have serious consequences.¹ So thermal care is central to reducing morbidity and mortality in newborns. Normal newborn temperature range from 36.5 to 37.5. Maintaining a neutral thermal environment is a key physiological challenge in newborns. Overheating from the incubator and radiant warmer, maternal fever, phototherapy light, infection, dehydration, excessive swaddling, environmental temperature, and humidity lead to hyperthermia. Hyperthermia leads to tachycardia, tachypnea, lethargy, weak cry, irritability, and seizure in newborns. Humidity is the concentration of water vapor present in the air. Humidity depends on the temperature and pressure of the system. Relative humidity is the ratio of how much water vapor is in the air and how much water vapor air can hold at a given temperature. As temperature increase holding capacity increase and relative humidity decrease². A device used to measure humidity is a hygrometer. The ideal relative humidity for a newborn is 40-60 %. High relative humidity leads to heat exhaustion and dehydration, heat syncope, and hyperthermia in the newborn. Low relative humidity leads to hypothermia. The rise in relative humidity hinders the evaporation of perspiration from the skin. So at higher relative humidity human feel warmer. The heat index also known as the apparent temperature, is what the temperature feels like to the human body when relative humidity is combined with air temperature.

AIMS and OBJECTIVES:

- To find out the clinico-etiological profile of neonatal hyperthermia in reference to environmental temperature and relative humidity.
- To establish a correlation between neonatal hyperthermia with environmental temperature and relative humidity.

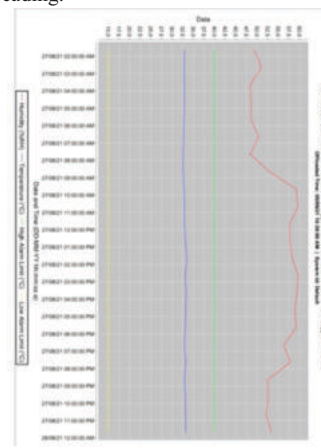
MATERIAL AND METHOD:

- This is a cross-sectional/observational study performed on 300 newborn admitted to the NICU of gg hospital Jamnagar. the study was performed from 1 November 2020 to 30 October 2021. Ethical clearance for the study was obtained from the Shri M.P. shah medical college's ethical committee on the human subject. Informed consent was taken from parents/guardians for enrollment of the patient for the study
- Inclusion criteria-(1) patient in the age group of 0-30 days admitted to the NICU facility. (2) patient having hyperthermia temp>99.5 Fahrenheit or >37.5 Celsius after admission.
- Exclusion criteria- (1) patient greater than 30 days of age (2) patient not admitted to NICU facility (3) parents not giving consent.

- The relative humidity and temperature of the NICU were measured by a digital hygrometer. (tlogSMART USB temperature+relative humidity logger with LCD record temperature range- -30 to +70 Celsius and R.H. - 0 to 100%). the digital hygrometer will automatically create a tamper-proof secured and unalterable adobe pdf report of recorded in-transit reading. Hygrometer specification-Range - -30 to +70 Celsius and 0 to 100 % R.H., Accuracy- better than 0.4 Celsius and 3% R.H., Memory capacity- 32,000 reading.



Digital Hygrometer And Its Temperature And Relative Humidity Record.



The newborn temperature was measured by a digital thermometer. The temperature was taken by the axillary method³. Relative humidity and temperature of the external environment were taken from the digital website. (www. Accuweather.com)⁷. After recording the temperature and relative humidity of the NICU from a digital hygrometer Pearson correlation test was applied between newborn temperature with NICU environment temperature and NICU environment R.H. to check the statical significance of the study and the p-value considered.

RESULTS AND DISCUSSION

This study was performed on 300 newborn admitted to the NICU of mp shah medical college for a one-year duration. In this study, 50.66 % of newborns are full-term and 49.33% are preterm. the subject of all gestation provides a better view and nullifies this effect of gestation.

70.66% of newborns are LBW and 29.34% of newborns are normal birth weight. the study was conducted on admitted patients in NICU facilities. so, more numbers of low birth weight and premature babies.

In this study, 31.33% of newborns are sepsis positive and 68.66% are sepsis negative. Sepsis is also considered a cause of fever but the current study looks at also other factors for fever like environmental temperature, Relative humidity.

In our study 8.33 % of the newborn had dehydration and 91.66% had no dehydration excluding sepsis.

Table 1: NICU Temperature In Hyperthermic Newborn

NICU TEMPERATURE	Several newborns have a fever	% Of newborn
26-30	60	20%
30-36.5	240	80%

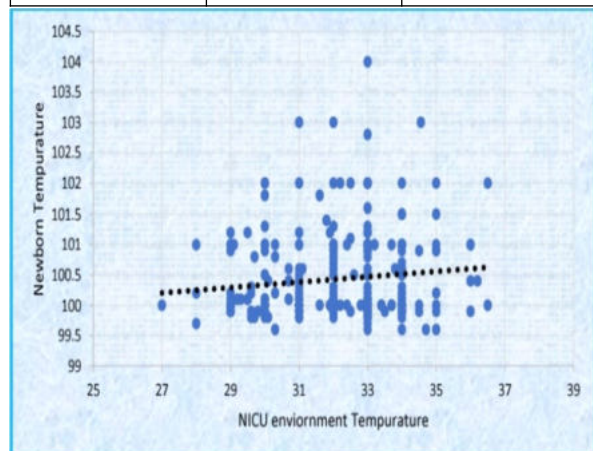
- In our study more cases of neonatal hyperthermia at a higher NICU environment temperature range. As 80% of newborns develop hyperthermia at NICU temperatures above 30 Celsius.
- a study done by jay sheth et al also found that newborn have a fever at a higher temperature.⁵
- a study by T L cheng et al also found that newborn have a fever at higher environmental temperature.⁶

Table 2 : Monthly Average NICU Environment R.H. And NICU Temperature Measured By Digital Hygrometer.

Month	NICU average R.H. %	NICU average temperature	No of hyperthermic newborn
Dec-2020	45.14	30	19
Jan-2021	51.52	27.33	21
Feb-2021	44.21	27.6	24
July-2021	46.35	30.5	46
Aug-2021	55.76	33.2	58
Sep-2021	65	32.9	110
Oct-2021	48.77	31	22

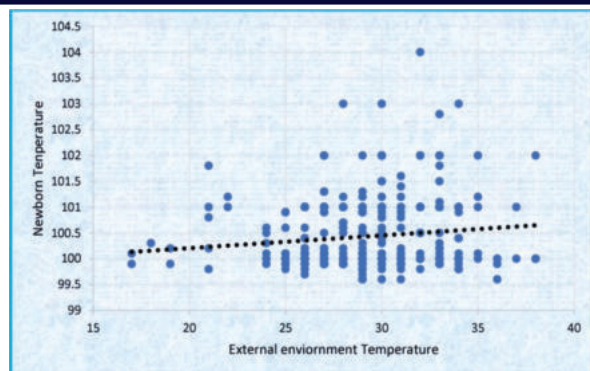
Table 3 : Monthly Average External Environmental R.H. And Temperature

Month	ENVIRONMENT TEMPERATURE	ENVIRONMENT R.H.
DEC-2020	22	52%
JAN-2021	20	51%
FEB-2021	25	45%
JULY-2021	29	76%
AUG-2021	29	73%
SEP-2021	27	90%
OCT-2021	28	64%



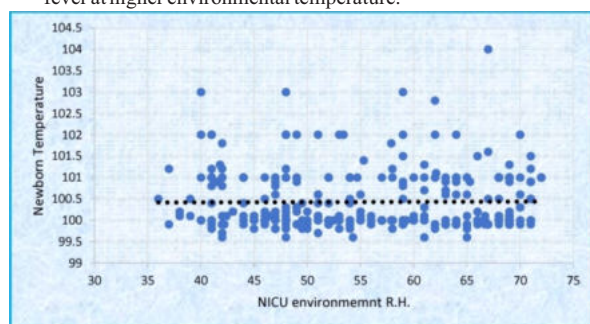
Graph1: Pearson Correlation Between Newborn Temperature And NICU Environment Temperature

There is a statistically significant association between NICU environment temperature and newborn temperature. As the NICU environment temperature increases newborn temperature also increased.



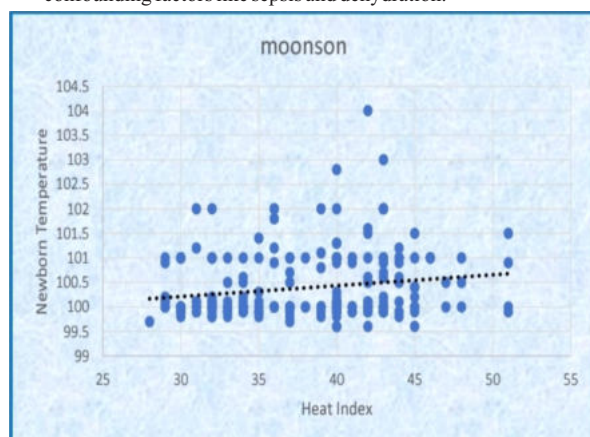
Graph 2: Pearson Correlation between newborn temperature and external environment temperature

- There is a statistically significant correlation between external environmental temperature and newborn temperature as external environmental temperature rise leads to a rise in newborn temperature.
- a study done by jay sheth et al also found that newborn have a fever at a higher temperature.
- a study done by T L cheng et al also found that newborn have a fever at higher environmental temperature.



Graph 3: Pearson Correlation Between Newborn Temperature And NICU R.H. In Monsoon Month.

- In the Pearson correlation, a very weakly positive association was seen between R.H. and newborn temperature. A very weak significant statistical association between NICU R.H. and the newborn temperature was seen.
- In our study highest % of R.H. was seen in September month followed by august. And a higher number of hyperthermic patients was seen during that period. Pearson correlation was seen as very weakly positive in R.H. and newborn temperature due to some confounding factors like sepsis and dehydration.



Graph 4: Pearson correlation between heat index and newborn temperature in the monsoon month

- There is a significant statistical association between heat index and newborn temperature in the monsoon season. as the heat index rises newborn temperature also rises.

SUMMARY AND CONCLUSION:

- In our study more cases of neonatal hyperthermia at a higher NICU environment temperature range. As 80% of newborns develop hyperthermia at NICU temperatures above 30 Celsius. There is a statistically significant association between NICU environment temperature and newborn temperature. As the NICU environment temperature increase newborn temperature also increased.
- There is a statistically significant correlation between external environmental temperature and newborn temperature as external environmental temperature rise leads to a rising in newborn temperature.
- There is a significant statistical association between heat index and newborn temperature. as the heat index rises newborn temperature also rises.
- there is a weak association between newborn temperature and NICU R.H. due to confounding factors. We can prove the effect of R.H. on a newborn in further study by eliminating the effect of confounding factors on newborn temperature.
- we can conclude that maintaining NICU temperature and relative humidity is vital to maintaining newborn temperature.

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