**Thesis Protocol**

Comparing the myocardial performance index in term neonates with respiratory distress before and after the treatment

**Guide**

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# NATIONAL BOARD OF EXAMINATIONS, NEW DELHI

Thesis/ Dissertation protocol for **DIPLOMATE OF NATIONAL BOARD**

Study Title: Determination of myocardial performance index using tissue doppler in

neonates with respiratory distress

**Name of candidate :** Dr. Nikita Kumari Panigrahi **Subject :** DNB Neonatology

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**Date of Joining :** 30/04/2022

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1. **PROJECT SUMMARY**

# INTRODUCTION AND BACKGROUND:

Respiratory distress is one of the most common emergency responsible NICU admission in the neonatal period. The clinical presentation of neonatal respiratory distress includes apnea,cyanosis, grunting, inspiratory stridor, nasal flaring, poor feeding tachypnea and retractions . severity of respiratory distress is assessed by Downes and Silvermann -anderson score which uses some of the above clinical parameters. Most cases of neonatal respiratory distress are caused by transient tachypnea of newborn, respiratory distress syndrome, meconium aspiration syndrome, early onset sepsis but other various cases are possible.

Cardiovascular compromise is a common complication of neonatal respiratory distress. This reduced cardiovascular reserve may present clinically with hypotension, which is associated with increased mortality and adverse overall outcome. To evaluate cardiac involvement in neonates with respiratory distress generally ECG, echocardiography recording along with cardiac enzymes and other cardiac biomarkers are routinely done in NICUs. The myocardial performance index (MPI) or Tei index has been proposed to be useful, non-invasive, doppler-derived index indicator of global cardiac function in neonates with respiratory distress,persistant pulmonary hypertension, perinatal asphyxia and other clinical conditions.

MPI is defined as the sum of isovolumetric contraction time (IVCT) and isovolumetric relaxation time (IVRT) divided by ejection time (ET). By incorporating only time intervals, the index is less dependent on anatomy or precise imaging; also, it is independent of both heart rate and ventricular geometry. It is easily measurable and there is little intra-observer and inter-observer variability in the measurement of MPI

In this study, we will document the myocardial performance index of neonates while on respiratory support and the variation when weaned off from the respiratory support.

# REVIEW OF LITERATURE:

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Ahmed Anwer etal did a study toassess role of MPI versus cardiac troponin I as early indicator of hypoxic cardiac damage in neonates with respiratory distress or perinatal asphyxia. They included forty neonates, 15 with neonatal respiratory distress (group I), 15 with perinatal asphyxia (group II), and 10 apparently healthy neonates as a control (group III). There was statistically significant increase in serum cardiac troponin I and MPI in neonates with respiratory distress and perinatal asphyxia

than the control group. No correlation between Tei index and each of postnatal age, APGAR score at 5-min, heart rate, serum cardiac troponin I, ejection fraction and fractional shortening.

K Vats et al did a study in term appropriate - and small for gestational age babies to assess the difference in MPI and found MPI had a higher absolute value in the SGA babies as compared to AGA babies. Mean ±SD values for right ventricular MPI in AGA and SGA groups were 0.268 + 0.007 and 0.30 + 0.026 respectively (*p* < 0.001). Mean±SD values for left ventricular MPI in AGA and SGA groups were 0.25 + 0.012 and 0.30 + 0.017 respectively (*p* < 0.001). There was significant negative correlation between MPI values for either ventricles and the birth weight (spearmen’s rho of –0.66) (*p* < 0.001). These observations point towards suboptimal cardiac performance among SGA babies as compared to AGA babies on the basis of myocardial performance index.

A study done by Edem BW etal to assess the impact of altered preload or afterload on right ventricular (RV) function and the RV MPI in the clinical setting of congenital heart disease.

The RV MPI in 152 normal children (ages 3 to 18 years) and 37 adults (ages 18 to 51 years) was 0.32 +/- 0.03 and 0.28 +/- 0.04, respectively. In pediatric patients (n = 45) and adult patients (n = 40) with ASD, the RV MPI was 0.35 +/- 0.09 (p = NS) and 0.38 +/- 0.04 (p < 0.01 compared with normal adults), respectively. Patients with pulmonary stenosis (n = 21, ages 1 day to 19 years) had a RV MPI of 0.32 +/- 0.06 (p = NS). CC-TGA patients had a RV MPI of 0.72 +/- 0.17 (p < 0.001). No significant change in the RV MPI was seen in any postoperative patient group despite relief of RV volume or pressure overload. Thus, they concluded MPI is a quantitative measure of RV performance that is appears to be relatively independent of changes in preload or afterload in the clinical setting

# RESEARCH QUESTION:

**Prime / Main research question:** Does myocardial performance index changes in neonates with respiratory support and after weaning from respiratory support

**Null Hypothesis**: The myocardial performance index does not change in neonates with respiratory support and after weaning from respiratory support

Al**ternate Hypothesis:** The myocardial performance index changes in neonates with respiratory support and after weaning from respiratory support

**-PICOT format:**

**Population: Term N**eonates with respiratory distress admitted in NICU.

**Observation:** To determine the myocardial performance index by using tissue doppler in neonates admitted to NICU

**Comparison:** To compare the MPI in neonates on respiratory support and after weaning from respiratory support

**Outcome:** To evaluate the global function of the heart

**Time:** Data will be collected prospectively for two years.

# AIMS AND OBJECTIVE

# To compare the myocardial performance index in neonates admitted to NICU with respiratory support and after weaning from respiratory support

# MATERIAL & METHODS:

1. **Study Setting:** The study will be carried out at NICU
2. **Study Design:** - A prospective observational study
3. **Study Population: N**eonates admitted in NICU requiring respiratory support .

# Selection criteria for study participants (study subjects):

* **Inclusion criteria:**
* Term neonates admitted in NICU requiring respiratory support.

# Exclusion criteria:

* Major congenital anomaly

# Sample Size (Calculation/Estimation):

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1. **Duration of Study:** Two years

# Methodology :

1. Neonates admitted in NICU and satisfying eligibility criteria will be enrolled for the study after taking written informed consent from the parents. The baseline data of neonates like perinatal risk factors, APGAR score, mode of delivery, gestational age, birth weight, day of life, vital parameters, clinical history, and physical findings- respiratory distress score (Downes score) , capillary blood gas values will be noted in all neonates enrolled using predefined proforma.
2. Enrolled neonates will be stared on respiratory support based on clinical assessment
3. Functional echocardiography along with Tissue doppler to measure MPI will be performed within 24 hours of starting respiratory support will be performed , along with noting all other vital parameters , capillary blood gas. Respiratory support can be in form of invasive or non invasive ventilation ( CPAP/HHFNC/NIMV MODE). Repeat estimation of MPI will be done with in 24 to 30 hours after the neonate is weaned off respiratory support.
4. Transthoracic Echocardiography examinations will be performed by the same single investigator trained in performing echocardiography with a footprint probe( S12-4 ) with a frequency of ….. MHZ and the results will be validated by senior consultant neonatologist and pediatric cardiologist. ECHO will be performed under the thermoneutral environment with the neonate lying quiet under a radiant warmer. No sedation will be used during the procedure. Aseptic precautions including hand wash, wearing gloves, and using sterile gel will be taken. The gel will be removed immediately from the skin surface after performing an ECHO.
5. **STATISTICAL ANALYSIS**

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1. **ETHICAL CONSIDERATION**:

Neonates will be enrolled after taking informed written consent from parents. The study protocol will be screened by the Ethics Committee of Manipal hospitals before the commencement of enrolment

Funding and conflict of interest: none

# ANNEXURE 1-

# STUDY PROFORMA :

1. Name:
2. Date of birth:
3. Date of examination:
4. Age in hours:
5. Hospital number:
6. male/female:
7. Gestational age in weeks :
8. Birth weight in kg:
9. SGA / AGA / LGA:
10. Mode of delivery : Vaginal / LSCS
11. APGAR at 1 mins and 5 mins

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |

1. clinical examination-

respiratory system- RDS score

1. ECHO cardiographic findings:

|  |  |  |
| --- | --- | --- |
|  | On respiratory support | Off respiratory support |
| IVRT |  |  |
| IVCT |  |  |
| ET |  |  |
| MPI |  |  |
| Vital parameter |  |  |
| RDS score |  |  |
|  |  |  |