RESEARCH

# COMPARATIVE STUDY OF ANTHROPOMETRIC PARAMETERS, RENAL MARKERS, LACTATE DEHYDROGENASE AND SPO2 IN MECONIUM ASPIRATION SYNDROME PATIENTS AND NORMAL CONTROL SUBJECTS

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## Abstract

**Background:** First stool of newborn is called as meconium. Meconium aspiration syndrome (MAS) is a medical situation characterized by respiratory failure occurring in neonates born through meconium-stained amniotic fluid (MSAF). The newborns that are born to MSAF need an early recognition and the plan for management towards the duration of NICU need to be done. This can also help in bringing down the mortality due to MAS. **Materials and Methods:** 100 diagnosed Meconium Aspirated patients and 100 healthy neonate subjects were taken for the study. BMI body mass index was calculated by measuring body weight in kilograms (kg) divided by square of body height (m2). Serum CRP, Serum Urea, Serum Creatinine, Uric acid, Serum LDH, $SpO_2$ was estimated by Latex enhanced Nephelometery Method, Urease Method, Jaffe's Method, Uricase method, DGKC Method and by Pulse Oximeter respectively. **Result:** Neonates with MAS had a significantly higher Respiration rate, $SpO_2$, elevated level of renal function variables, CRP level and LDH level as compared to healthy neonate. **Conclusion:** Meconium Aspiration Syndrome (MAS) is respiratory distress in a newborn baby who requires intensive care. Several studies had reported that LDH is an easily available indicator of severe illness in NICU. Early detection of respiratory distress and inflammation in neonates with MAS may help in treatment and prognosis in neonates with MAS.

## INTRODUCTION

Meconium is the first stool of a newborn.[1] Rarely, newborns pass meconium during labor or delivery, resulting in a meconium-stained amniotic fluid (MSAF).[2] Meconium aspiration syndrome (MAS) is a medical situation characterized by respiratory failure occurring in neonates born through meconium-stained amniotic fluid.[3] MAS reflect a spectrum of disorders in infants born with meconium-stained amniotic fluid, ranging from mild tachypnea to severe respiratory distress and significant mortality.[4] Uterine strain due to hypoxia or infection can cause premature fetal meconium passage.[5]

Disparate newborn stool, meconium is darker and chunky.[6] It is formed through the accumulation of fetal cellular debris (skin, gastrointestinal, hair) and secretions.[7] Aspiration of these materials causes airway obstruction, triggers inflammatory changes, and inactivates surfactant. Through these mechanisms, the neonate develops respiratory distress.[8] The newborns that are born to MSAF need an early recognition and the plan for management towards the duration of NICU need to be done. This can also help in bringing down the mortality due to MAS.

## MATERIALS AND METHODS

The present study was done in the Department of Biochemistry, Index Medical College & Research Centre (Malwanchal University), Indore, Madhya Pradesh and Central Investigation Laboratory. The study was carried after the approval of Institutional

Ethics Committee and the informed consent was taken from the parents of the infant subjects.
Sample size: The current study included 100 diagnosed Meconium Aspirated patients and 100 healthy neonate subjects

**Inclusion Criteria**
All the Meconic Aspiration cases that meets the guidelines of its diagnostic criteria

**Exclusion Criteria**
Subjects suffering from any disease like early birth and presence of major congenital malformations had been excluded from the study

**Methodology:** anthropometric parameters like BMI was calculated by measuring body weight in kilograms (kg) by Digital scale nearest to 0.1 kg divided by square of the body height which is measured by commercial stadiometer to the nearest 0.1cm in meter square ($m^2$) and Blood pressure was measured on left arm using mercury sphygmomanometer. Serum CRP, was estimated by Latex enhanced Nephelometery Method, Serum Urea was estimated by Urease Method, Serum Creatinine was be estimated by Jaffe's Method, Uric acid was estimated by Uricase method, Serum LDH was estimated by DGKC Method and SpO2 by Pulse Oximeter.

**Statistical Analysis**
The Data analysis was performed in Microsoft Office Excel 2016 and Statistical Package for the Social Sciences, version 24.0 (SPSS software). P-values considered significant were as follows:
P-value <0.05– As significant
P-value <0.001 – As highly significant.

## RESULTS

Total 200 subjects were taken for the analysis. [Table 1] showing the comparative changes of Anthropometric variables in meconium aspiration syndrome patients and normal healthy control subjects in which mean level of respiratory rate was significantly higher among patients with MAS (p value = <0.0001) while oxygen saturation was significantly low among babies with MAS (p value = <0.0001). [Table 2] showing the comparative changes of renal markers and inflammatory marker in Meconium aspiration syndrome patients and normal healthy control subjects in which the neonates with MAS had a significantly elevated level of renal function variables, CRP level and LDH level.

**Table1: Showing the comparative changes of Anthropometric variables and $SpO_2$ in meconium aspiration syndrome patients and normal healthy control subjects.**

| Anthropometric variables | Case Group (n=100) | | Control Group (n= 100) | | p value |
|---|---|---|---|---|---|
| | Mean | ±SD | Mean | ±SD | |
| Height (cm) | 50.57 | ±4.35 | 50.23 | ±4.20 | 0.715 |
| Weight (kg) | 2.90 | ±0.41 | 3.12 | ±0.42 | 0.367 |
| BMI ($kg/m^2$) | 11.66 | ±2.82 | 12.62 | ±2.72 | 0.926 |
| DBP (mmHg) | 50.98 | ±2.54 | 50.94 | ±2.37 | 0.524 |
| SBP (mmHg) | 72.18 | ±2.25 | 72.12 | ±2.13 | 0.472 |
| PR (per min) | 159.11 | ±14.10 | 157.47 | ±14.92 | 0.647 |
| RR (per minute) | 55.43 | ±13.12 | 46.07 | ±5.86 | 0.0001 |
| $SpO_2$ | 90.64 | ±5.91 | 94.55 | ±1.60 | <0.0001 |

**Table 2: Showing the comparative changes of renal markers and inflammatory marker in Meconium aspiration syndrome patients and normal healthy control subjects.**

| Parameters | Case Group (n=100) | | Control Group (n= 100) | | p value |
|---|---|---|---|---|---|
| | Mean | ±SD | Mean | ±SD | |
| Urea (mg/dl) | 16.16 | ±5.39 | 13.36 | ±2.73 | <0.0001 |
| Creatinine (mg/dl) | 0.56 | ±0.19 | 0.45 | ±0.11 | <0.0001 |
| Uric Acid (mg/dl) | 6.15 | ±0.43 | 5.95 | ±0.70 | <0.0001 |
| CRP (mg/dl) | 15.52 | ±3.38 | 3.46 | ±0.74 | <0.0001 |
| LDH (U/L) | 946.76 | ±265.03 | 286.66 | ±61.86 | <0.0001 |

## DISCUSSION

Meconium Aspiration Syndrome (MAS) is respiratory distress in a newborn baby who requires intensive care.[9] About, 5% of neonate born with Meconium Stained Amniotic Fluid (MSAF) develops MAS.[10] It is essential to recognize infants at high risk of acquiring MAS. This constitutes the cornerstone of effective prevention and treatment strategy in low-resource setting.[11,12] Inflammation is one of the reasons for the development of MSA.[13,14] Karabayir N et al. premeditated the causative reasons for Meconium Aspiration Syndrome and to explore the consequence of blood lactate level on the progression of Meconium Aspiration Syndrom and concluded that besides the blood pH levels, amplified blood lactate level might be a threatening feature for the progression of MAS in infants born with MSAF. This could assist in the in the early hours recognition of MAS and, with suitable trial taken earlier, decrease morbidity and mortality. LDH is routinely investigated and extensively studied marker in neonates for various similar conditions.[15] CRP is routinely used marker for inflammation.[16] Several studies had reported that LDH is an easily available indicator of severe


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illness in NICU.[17,18,19] In a study done by Balderrama R et al., in Mexico on risk factors and relation of lactic acid to neonatal mortality in first week of life, it showed that high lactate levels had good positive prediction towards the morbidity.[20] Hofer et al in their study evaluated CRP in MAS and to assess their association with disease severity. They concluded high CRP values were closely linked to disease severity in MAS.[21] Research conducted by Saeed H et al. in African-American population to find out the occurrence, stage and grade of placental histologic acute maternal inflammatory response (MIR) and fetal inflammatory response (FIR) in MSAF and concluded that Histologic MIR and FIR are recurrent results in MSAF. Thick MSAF is related with superior FIR stage when evaluate to thin MSAF. [22]

## CONCLUSION

The conclusion of the present study is that Meconium aspiration syndrome (MAS) is a common cause of severe respiratory distress in term infants, with an associated highly variable morbidity and mortality. Early detection of inflammatory markers and renal variables can help in treatment and prognosis in neonates with MAS. More researchers are looked-for to explicate the function of lactate that can be a vital marker of hypoxia throughout the progression of MAS.

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