

CORRELATION OF THE C-REACTIVE PROTEIN WITH RENAL MARKERS, SPO₂ AND LACTATE DEHYDROGENASE IN MECONIUM ASPIRATE PATIENTS

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Abstract:

Introduction: Meconium is the earliest stool of a newborn. Meconium aspiration syndrome (MAS) is a medical situation characterized by respiratory failure occurring in neonates born through meconium-stained amniotic fluid (MSAF). It is necessary to find out the factors associated with syndrome. Therefore this study had been conducted to find out the correlation of the C-reactive protein with renal markers, spO₂ and lactate dehydrogenase in meconium aspirate patients.

Material and methods: Total 100 diagnosed Meconium Aspirated patients were taken for this study. Serum CRP was estimated by Latex enhanced Nephelometry Method, Serum Urea was estimated by Urease Method, Serum Creatinine was estimated by Jaffe's Method, Serum LDH was estimated by DGKC Method and SpO₂ by Pulse Oximeter.

Result: In this study there was a positive correlation (P-value <0.001) of CRP with serum urea levels, serum creatinine levels, serum LDH level and negative correlation (P-value <0.001) with SpO₂.

Discussion and conclusion: Meconium Aspiration Syndrome (MAS) is respiratory distress in a newborn baby who requires neonatal intensive care units (NICU). Several studies had reported that inflammatory markers are closely associated with the disease. Quick and early detection is needed for early treatment and prognosis of disease.

Keywords: Meconium aspiration syndrome, CRP, LDH, Inflammation

INTRODUCTION: Meconium is the earliest stool of a newborn. [1]. Meconium is a shady olive color, sticky fluid that's amassed in the fetal intestinal tract at some stage in the 3rd trimester of pregnancy, being the initial intestinal expulsion out within 48 hours after birth. Antenatal or intrapartum meconium discharge is called as meconium staining of amniotic fluid (MSAF) and it has been estimated to occur in 8- 20% [2]. Meconium aspiration syndrome (MAS) is the neonatal respiratory distress caused by the appearance of meconium in the tracheobronchial airways [3]. When aspirated, meconium can cause obstacle, gas ambushing, exasperation and inflammation leading to damaged lung surfactant, pneumonitis and hypoxia and influence the reactivity of both vascular and airway smooth muscle. It can also create a medium for bacteria to grow in the lung [4, 5]. It seems that the hypoxia leads to lactate formation from pyruvate in MAS patients. Newborns with meconium aspiration syndrome often have inappropriate secretion of antidiuretic hormones. Acute renal failure is a complication of perinatal stress, so it is important to monitor kidney function. Therefore this study is intended to determine the association of the C-reactive protein with renal markers, spO₂ and lactate dehydrogenase in meconium aspirate patients. So, early and easily available diagnostics tools may help in rapid treatment of disease.

MATERIAL AND METHODS:

This study was accomplished in the Biochemistry department, Index Medical College & Research Centre (Malwanchal University), Indore, Madhya Pradesh and Central Investigation Laboratory. The study was approved by Institutional Ethics Committee and the informed consent was taken from the parents of all subjects.

Sample size:Total 100 diagnosed Meconium Aspirated patients were taken for this study.

Inclusion Criteria:-diagnosed Meconic Aspiration cases were taken for this study.

Exclusion Criteria:- Subjects suffering from any disease like early birth and presence of major congenital malformations were excluded from the study

Methodology:Serum CRP was estimated by Latex enhanced Nephelometry Method, Serum Urea was estimated by Urease Method, Serum Creatinine was be estimated by Jaffe’s 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

Result:This study comprises 100 diagnosed Meconic Aspiration cases. Table 1: Showing the correlation between blood urea levels with CRP level. It shows there was a significant positive correlation between these two suggesting that increasing urea is associated with elevated CRP level (p value = <0.0001). Table 2: Showing the correlation between serum creatinine levels with CRP level. It shows there was a significant positive correlation between these two suggesting that increasing creatinine is associated with elevated CRP level (p value = <0.0001). Table 3: showing the correlation between oxygen saturation (SPO₂) levels with CRP level. It shows there was a significant negative correlation between these two suggesting that decreasing oxygen saturation is associated with elevated CRP level (p value = <0.0001).Table 4:Showing the correlation between serum LDH levels with CRP. It shows there was a significant positive correlation between these two suggesting that increasing LDH is associated with elevated CRP level (p value = <0.0001).

Table 1: Showing the correlation between CRP with Urea

Correlations		
	CRP	Urea
CRP	Pearson Correlation	1
	P Value	.513**
	No of Cases	100
**. Correlation is significant at the 0.01 level (2-tailed).		

Table 2: Showing the correlation between CRP with Creatinine

Correlations		
	CRP	Creatinine
CRP	Pearson Correlation	1
	p Value	.709**
	No of Cases	100
**. Correlation is significant at the 0.01 level (2-tailed).		

Table 3: Showing the correlation between CRP with SPO₂

Correlations		
	CRP	SPO ₂
CRP	Pearson Correlation	1
	Sig. (2-tailed)	-.692**
	N	100
**. Correlation is significant at the 0.01 level (2-tailed).		

Table 4: Showing the correlation between CRP with LDH

Correlations		
	CRP	LDH
CRP	Pearson Correlation	.761**
	Sig. (2-tailed)	.000
	N	100

** . Correlation is significant at the 0.01 level (2-tailed).

Discussion and conclusion: Meconium Aspiration Syndrome (MAS) is respiratory distress in a newborn baby who requires intensive care [6]. The prevalence of MAS is 5-10% of neonates born with Meconium Stained Amniotic Fluid (MSAF) [7]. It is necessary to identify the factors associated with disease and related complication. Early identification of risk associated factors helps in early and better treatment and prognosis. This also constitutes the cornerstone of effective prevention and treatment strategy in low-resource settings [8,9]. In this study, there was a positive correlation (P-value <0.001) of CRP with serum urea levels, serum creatinine levels, serum LDH level and negative correlation (P-value <0.001) with SpO₂. Hypoxia and Inflammation is one of the main causes of derangements of various biochemical analytes in newborn. Karabayir N et al. study the effect of blood lactate level on the development of MAS and found that altered blood pH value and high blood lactate level could be a threat for the progression of MAS in infants born with MSAF [10]. Further studies are needed to elucidate the role of lactate level, which is an important indicator of hypoxia during the development of MAS. Hofner et al. also studied the = the CRP in MAS and determine the correlation with disease severity and concluded that High CRP was closely linked to a more severe course of MAS during the early phases of the disease. These findings reflect the role of inflammation in the pathogenesis of MAS [11]. The key pathophysiological mechanism behind the MAS is inflammation and elevated levels of inflammatory markers have been associated in MSAF. A new study found that the incidence of meconium in the alveoli of stillbirths, which recommended an antemortem meconium passage in utero due to hypoxia and inflammatory progression. Further, histological findings showed an increased acute placental inflammation in MSAF [12-15]. Inflammation causes activation of inflammatory cascade which leads to release of various cytokines and complement activation. The cytokines and complementation causes local damage despite of protective role. More study is needed to confirm the underline mechanism [16-18]. CRP, LDH and associated parameters could be used as an early tool for detection of MAS and, with appropriate measures taken sooner, reduces morbidity and mortality. Meconium aspiration syndrome (MAS) is linked to inflammation, but data on C-reactive protein (CRP) in MAS are lacking. More intensive researches must be carried out to find the association of CRP with other variables.

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