

Relationship between meconium staining and thymic stromal lymphopoietin

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Abstract. – OBJECTIVE: Epithelium-derived thymic stromal lymphopoietin (TSLP), is a key pro-allergic cytokine that has recently been linked to chronic airway diseases. Our aim is to determine cord blood TSLP levels in pregnancies with meconium stained amniotic fluid.

PATIENTS AND METHODS: A total of 44 pregnant women with meconium stained amniotic fluid and a total of 44 healthy pregnant women were enrolled in the study. Cord blood TSLP was measured with TSLP ELISA Kit.

RESULTS: We found no statistically significant differences between 2 groups in terms of age and parity. TSLP levels were found to be significantly higher in the cord blood of pregnant women with meconium stained amniotic fluid (104.3 ± 96.9 ng/ml) compared with the control group (63.2 ± 65.3 ng/ml) ($p = 0.022$).

CONCLUSIONS: TSLP is produced and released in response to meconium.

Key Words:

Thymic stromal lymphopoietin (TSLP), Meconium, Amniotic fluid.

Introduction

The passage of meconium into the amniotic fluid may be a response to stresses such as hypoxia, acidemia, or infection. Anal sphincter relaxation and provoked intestinal peristalsis may be caused by these factors. According to Ramin et al¹, the high incidence of meconium seen in the liquor during labor often revealed fetal passage of gastrointestinal contents in conjunction with normal physiologic processes such as meconium; however, could become an environmental hazard if followed by fetal acidemia.

Epithelium-derived thymic stromal lymphopoietin (TSLP), is an important pro-allergic cytokine, that has recently been associated with

to chronic airway diseases. It is expressed mainly by epithelial cells². TSLP, a novel IL-7-like cytokine, represents an early trigger of the allergic immune cascade. It has been disclosed that the number of cells expressing TSLP mRNA was increased in the epithelium of human beings who had asthma³. Vázquez et al⁴ presented that in children under two years of age, aspiration of meconium seemed to be an important risk factor of the early beginning of asthma symptoms. Risk of asthma symptoms increases in children with the meconium aspiration syndrome.

Our aim is to determine the cord blood TSLP levels in pregnancies with meconium stained amniotic fluid.

Patients and Methods

This cross-sectional study included 88 subjects: forty four patients with meconium stained amniotic fluid and 44 healthy pregnant women as the control subjects, with similar age. The study was approved by our local Institutional Ethics Committee.

Inclusion criteria were (1) laboring women, (2) singleton live gestation, (3) cephalic presentation, and (4) presumed gestational age of ≥ 36 weeks as determined by dates, by last menstrual period, or first-trimester ultrasonographic examination. Multiple gestations, presentation and fetal anomalies, women with hypertensive disorders of pregnancy, premature rupture of membranes, fetal growth restriction and diabetes mellitus were established as exclusion criteria. All control subjects were laboring women with singleton-vertex presenting fetus, with gestational age of ≥ 36 weeks. Patients with multiple gestations, non-cephalic presentations, hypertensive disorders of pregnancy, premature rupture of membranes, fe-

Table I. Characteristics of the two groups.

	Meconium group (n=44)	Control group (n=44)	<i>p</i>
Age (years)*	26.2 ± 4.7	25.7 ± 4.4	0.659
Gravidity**	2 (1-7)	2 (1-5)	0.301
Parity**	0 (0-4)	1 (0-2)	0.699
Gestational age (days)*	276 ± 10	275 ± 8	0.521
White blood count	11760 ± 3252	10608 ± 2478	0.065
Birth weight (g)	3351 ± 445	3307 ± 361	0.620
TSLP (pg/ml)	104.3 ± 96.9	63.25 ± 65.3	0.022

*Values are mean ± standard deviation; **Values are median (minimum-maximum).

tal growth restriction and diabetes were excluded. Age, parity, gestational age, white blood cell count, birth weight, neonatal intensive care unit admission were recorded.

Immediately after birth, fetal blood sample was taken from fetal umbilical cord. Then it was immediately centrifuged at 4.000 rpm for 10 minutes. After centrifugation, the serum was frozen and stored at minus 80°C until assayed. Frozen serum was thawed before analysis. Cord blood TSLP was measured with TSLP ELISA Kit (Cusabio, Whuhan, Hubei, China, Catalog Number. CSB-E09316h). The minimum detectable dose of human TSLP is typically less than 0.156 ng/ml. Intra-assay precision (Precision within an assay); coefficient of variation (CV) is < 8% and inter-assay precision (Precision between assays) is < 10%.

Statistical Analysis

Statistical Package for Social Sciences software, version 15.5 (SPSS, Chicago, IL, USA) was used for all statistical analyses. Student’s *t* test was used for parametric tests and Mann-Whitney U-test for nonparametric tests. Parametric test results were presented as mean ± standard deviation; nonparametric test results were presented as median (minimum-maximum). The probability of null hypothesis was set to 0.05 values (CI 95%).

Results

Statistically, no significant differences were found between the two groups in terms of age and parity (Table I). The two groups were similar in terms of gestational ages.

When compared to the control group (63.2 ± 65.3 ng/ml), the TSLP levels for the cord blood of pregnant women with meconium stained am-

niotic fluid (104.3 ± 96.9 ng/ml) were significantly higher (*p* = 0.022) (Figure 1).

The birth weight did not display any significant differences. No neonatal intensive care unit admission was noted in both groups.

Discussion

Since the terminal cap of the meconium is particularly viscous and fetuses do not have strong peristaltic forces that would propel the substance forward, approximately 12-15% of all fetuses pass their first bowel movement while in utero. It was found by Holeberg et al⁵ that meconium stained amniotic fluid induced vasoconstriction, extending to umbilical cord vessels of the chorionic plate and the intraplacental arteries and arterioles. We also know that low-risk infants born after meconium-stained amniotic fluid are not at an increased risk for neonatal complications associated with energy metabolism⁶. On the other hand, as far as we

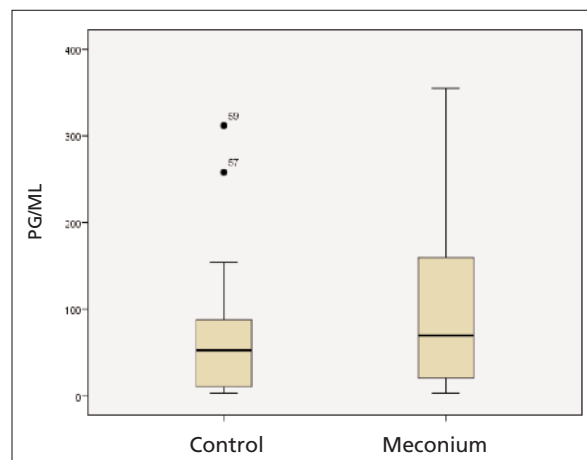


Figure 1. TSLP levels in two groups.

know this is the first study determining cord blood TSLP level in pregnancies with meconium stained amniotic fluid.

We found significantly higher TSLP levels in the cord blood of pregnant women with meconium stained amniotic fluid compared with the control group.

TSLP is an epithelial cell-derived cytokine and now to a great extent recognized as a principal regulator of TH2 inflammation⁷. TSLP is basically expressed in the intestine and is known to regulate inflammation in models of colitis⁸. Bronchial hyperresponsiveness is known as a risk factor for asthma⁹. A high prevalence of asthmatic symptoms (39%) and abnormal bronchial reactivity to exercise (33%), among survivors of neonatal meconium aspiration syndrome was found by Macfarlane et al¹⁰. TSLP has emerged as an important player involved in steering the inflammation seen in asthma and other atopic diseases¹¹.

Conclusions

These results support an association between the increase of cord blood TSLP levels and meconium staining of the amniotic fluid. It seems that TSLP is produced and released in response to meconium.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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