AMNIOTIC FLUID β_2-MICROGLOBULIN (β_2-m) AS AN INDEX OF FETAL MATURITY

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SUMMARY

Amniotic fluid β_2 microglobulin (β_2–m) levels were measured by radioimmunoassay in 78 pregnant women between the 14th and the 42nd week of gestation. 62 were healthy subjects, while eight were affected by EPH gestosis, seven by diabetes (cl. B–F) associated with Rh immunization in one case, one by hydramnios. There was no significant correlation either between β_2–m and creatinine (n=18), or between β_2–m and lecithin sphyngomielin ratio (L/S) (n=16), although low concentrations of β_2–m were usually observed after the 35th week of gestation. It is noteworthy that only in one case out of seven with amniotic levels <5 µg/ml L/S ratio was <2.

β_2 microglobulin (β_2–m), identified in 1968 by Bergaård and Bearn [1], is a low molecular weight protein (11,800 dalton) occurring in many biological fluids. Originally isolated from the urine of patients with tubular kidney abnormalities, where is present in increased amounts, it has been recently shown as a part of the hystocompatibility antigens of most mammalian cells [2, 3].

Although the biological function of β_2–m is still unknown, its similarity with a portion of immunoglobulins [4], and its "in vitro" production by stimulated lymphocytes [5] seem to suggest a possible role in the immunological response.

Serum levels have been reported to be higher in patients affected by myeloma and some other malignant tumors [6]. Amniotic fluid concentration shows a decrease from the 24th week of pregnancy onwards, probably due to the renal maturity that enables the tubule to reabsorb and catabolize small proteins [7].

Aim of this study was to assess the clinical value of amniotic β_2–m as an index of fetal maturity, as suggested by some Authors [8, 9].

MATERIAL AND METHODS

β_2–m levels were measured in 79 samples obtained by amniocentesis from 78 pregnant women between the 14th and the 42nd week of gestation; in 30 of them maternal plasma levels were also detected. In 62 cases pregnancy followed a normal course, while in eight cases it was complicated by EPH gestosis, in seven by diabetes (cl. B–F, While), associated with Rh immunization in one case, in one case by hydramnios.

The gestational age was considered reliable in any case as estimated by ultrasound and by pediatric evaluation at birth.

Determination of β_2–m was carried out by means of radioimmunoassay [10]. Creatinine was assayed in 18 cases using a common method [11]. Lecithin sphyngomielin ratio (L/S) was estimated in 16 cases by thin layer chromatography according to Gluck [12].

Clin. Exp. Obst. Gyn. - ISSN: 0390-6663
VIII, n. 2, 1981

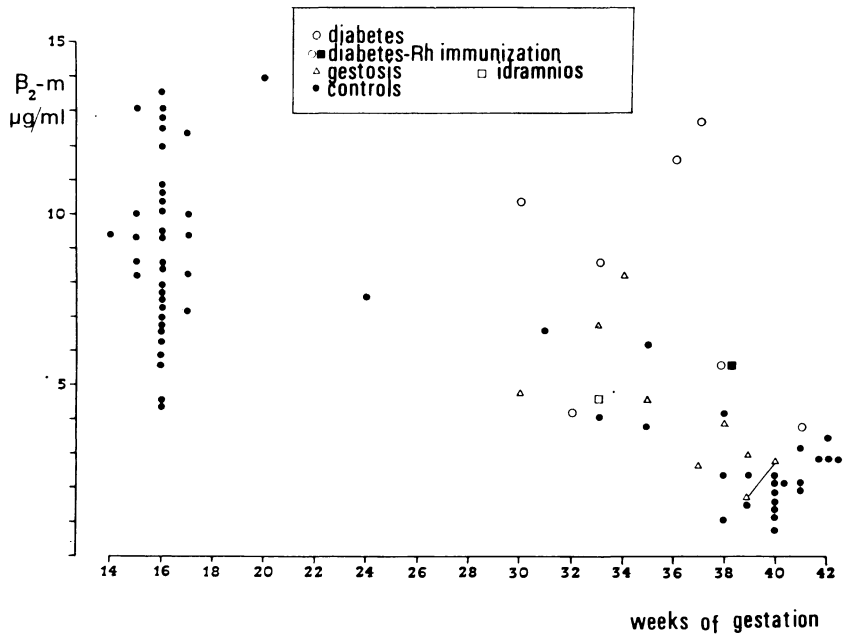

Fig. 1. — Amniotic fluid β_2–microglobulin (β_2–m) levels in 78 pregnant women between the 14th and the 42nd week of gestation.

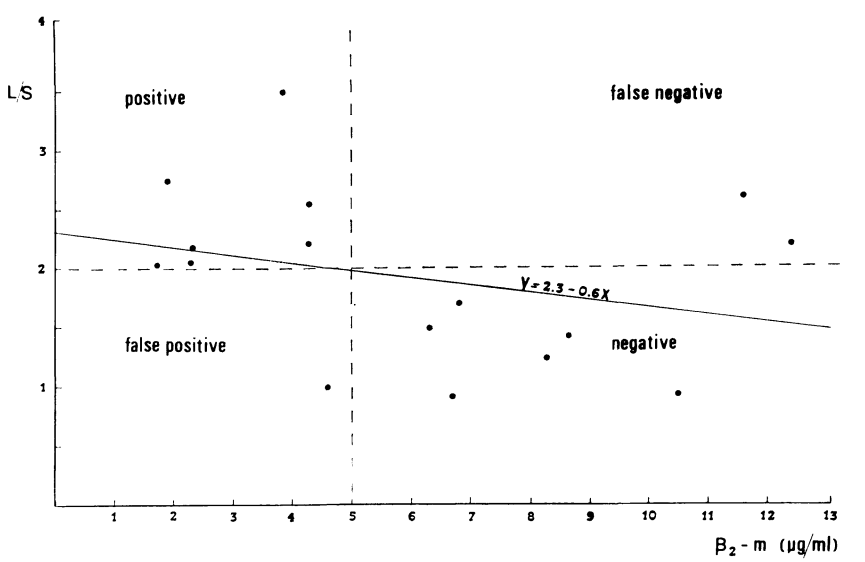

Fig. 2. — Correlation between β_2–microglobulin (β_2–m) and Lecithin Sphyngomielin ratios (L/S) in 16 cases. r non significant.

RESULTS

Amniotic β_2–m levels are plotted in fig. 1. In fig. 2 it is shown that in spite of the lack of a significant correlation between amniotic β_2–m and L/S ($n = 16$) a trend exists of cases with $L/S > 2$ to show β_2–m values < 5 µg/ml. No significant correlation was found between amniotic β_2–m and that in maternal plasma ($n = 30$).

Absence of significant correlation was also found between creatinine and β_2–m ($n = 18$).

DISCUSSION

The high levels of amniotic β_2–m during the first and second trimester of pregnancy (10-15 fold maternal values) seem to derive from the fetus itself rather than maternal influences as it is shown by the lack of correlation between maternal and amniotic concentration, reported by Jonasson [13] and confirmed in our series.

According to Hall and Roux [8] the elevated concentration of β_2–m depends on the development of the fetus, production preceding the renal catabolism of the protein.

Up to now the kidney represents in fact the unique demonstrated site of β_2–m catabolism [14, 15].

Another factor influencing the clearance of this protein in the third trimester should be fetal swallowing [13].

Jonasson reported poor correlation between cord serum and amniotic fluid β_2–m suggesting that the fetal excretion is of much more importance for amniotic levels than the actual serum concentration [13].

Amniotic β_2–m values found in this study are similar to those reported by Jonasson [13] and Cauchi [9]. In agreement with these Authors we didn't find a sharp reduction of concentration after the 36th week as reported by Hall and Roux in smaller series [8].

In order to assess the reliability of β_2–m as an index of fetal maturity we examined the amniotic behaviour of this microprotein by comparison with L/S ratio and creatinine.

No significant correlation was found between amniotic β_2–m and L/S ratio ($n = 16$). However, as it is shown in fig. 2, it is noteworthy that if a cut-off level of β_2–m $= 5$ µg/ml is considered, only in one case out of seven fetal lung immaturity ($L/S < 2$) was observed.

No significant correlation has been found between β_2–m and creatinine ($n = 18$). These findings partly agree with data reported by Cauchi [9].

Few and conflicting data are available in the literature about amniotic β_2–m levels in pathological pregnancies. Jonasson [13] reported significantly higher levels in patients with Rh immunization. Normal values, on the other side, have been found by Schuster [16] in several pathological conditions.

As it is shown in fig. 1, we found apparently high levels in diabetes; in the only case of Rh immunization in our series we observed the highest value of β_2–m for that week of pregnancy. The poor control group does not provide, however, statistical analyses.

Further studies with more selected patients are necessary to establish the exact role of amniotic β_2–m as a possible index of fetal maturity.

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