Short communication

Maternal serum screening of Palestinian women in the West Bank

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تحرِّي مصل الأمهات الفلسطينيات في الضفة الغربية

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الخلاصة: تم في هذه الدراسة مراجعة السجلات المختبرية لنتائج اختبار ثلاثي أجري لـ 943 امرأة فلسطينية من المقيمات في الضفة الغربية، في ما بين عامَيْ 2000 و2003. وكان متوسط العمر المتوقع عند الولادة في العيّنة المدروسة: 25.5 عاماً؛ وكان 12٪ منهن في عمر 35 عاماً أو أكثر. وكان العمر هو العامل الرئيسي المرتبط بالأحراز غير الطبيعية المحسوبة للاختطار. وبلغ معدل تواتُر وجود البروتين الجنيني ألفا المرتفع في المصل: 1.3٪، ومقدار الهرمون المشيمي البشري الموجِّه للغدد التناسلية، غير الطبيعي (المرتفع أو المنخفض): 1.9٪، وبلغ الاستريول المختزل اللامقترن 0.3٪.

ABSTRACT An audit was made of laboratory records of triple test results from 943 Palestinian women residing in the West Bank from 2000–03. The mean expected age at delivery of the subjects was 25.5 years; 12% were 35 years old or above. Age was the main factor associated with an abnormal calculated risk score. The frequency of elevated serum alpha-fetoprotein was 1.3%, abnormal human choriogonic gonadotropin (elevated or reduced) was 1.9% and reduced unconjugated estriol was 0.3%.

Dépistage sérologique maternel chez des Palestiniennes en Cisjordanie

RÉSUMÉ On a procédé à un audit des dossiers de laboratoire pour les résultats du triple test de 943 Palestiniennes résidentes en Cisjordanie durant la période 2000-2003. L'âge moyen des sujets prévu à la date de l'accouchement était de 25,5 ans ; 12 % étaient âgés de 35 ans ou plus. L'âge était le principal facteur associé à un score de risque calculé anormal. La fréquence du taux élevé de l'alpha-foeto-protéine sérique était de 1,3 % ; pour la gonadotropine choriogonique humaine anormale (élévation ou diminution), la fréquence était de 1,9 %, et pour le taux diminué de l'estriol non conjugué de 0,3 %.

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Introduction

Maternal screening of pregnant women utilizing the serum triple test and other newly introduced investigations has become a common tool for the detection of certain syndromes and defects *in utero* [*1–3*]. These include Down syndrome, trisomy 18, neural tube defects and other defects [*1,3*]. The mid-trimester triple test can also be used to predict early onset pre-eclampsia [*4*].

Down syndrome is caused by the presence of an extra copy of chromosome 21, which leads to mental retardation, birth defects and some physical features that can be identified at birth [*1,6*]. In general, Down syndrome is the most common disorder of the autosomal chromosomes, with an incidence of 1:800 live births [*5*]. The risk of Down syndrome increases with maternal age [*7*]. The incidence of Down syndrome in a study conducted on 3000 consecutive neonates in Egypt was 1.33 per 1000 [*8*]. In Bahrain, the incidence of Down syndrome was reported to be 1.14 per 1000 compared with an international estimated incidence of 1.40 per 1000 [*9*]. In Israel the incidence of Down syndrome was 1.00 per 1000 for Jews and 1.20 per 1000 for non-Jews (mostly Arabs) [*7*].

Neural tube defects usually occur in 1/500 births. They can be anencephaly (incomplete closure of the brain) or spina bifida (incomplete closure of the spine). Neural tube defects are usually marked by elevated levels of maternal serum alpha-fetoprotein [*10*].

The triple test is usually performed between the 14th and the 20th weeks of pregnancy, preferably between the 16th and 18th weeks. Three different substances are measured in the medical laboratory, namely alpha-fetoprotein (AFP), unconjugated estriol (uE3), and human chorionic gonadotropin (hCG). High levels of AFP are suggestive of neural tube defects while low levels of AFP may indicate Down syndrome. Abnormal levels of hCG and estriol are indicators for chromosome abnormalities. The values of the 3 tests are factored together with information about the pregnant woman including maternal age, gestational age, weight and race to give a summary risk value. An additional risk value based on the age risk may be included in some reports [*5*].

The importance of maternal screening is well established. This is the first study to describe the results of such tests among Palestinian women and to describe the characteristics of Palestinian women undergoing the triple test. It also aimed to explore the risks for Down syndrome and neural tube defects estimated in the study subjects.

Methods

A record audit was made of triple test results from 943 Palestinian women collected in the period 2000–03. The women were living in different areas of the West Bank, mainly East Jerusalem. The following variables were noted from the records: age at expected date of delivery, weight in kilograms, gestational age in weeks, history of in vitro fertilization and twins status. Blood samples were collected from women attending laboratories or clinics and sent to the medical laboratory for analysis.

All triple tests were performed in Zer Laboratories, Jerusalem, utilizing standardized techniques for analysis. The cut-off values [expressed as multiple of median (MOM)] were as follows: elevated AFP > 2.50 MOM, elevated hCG > 3.00 MOM, reduced hCG < 0.20, reduced uE3 < 0.15 MOM.

Basic descriptive statistics including means, medians, modes, standard deviation

and frequencies were calculated. Cross-tabulations and chi-squared tests were used to explore the relation between different variables. Wald tests were used for risk calculation according to age and according to age and triple test. The cut-off point utilized in this analysis was 1:270.

Results

Characteristics of the subjects

The mean (standard error) expected age at delivery of the 943 women was 25.5 (SE 0.2) years; 12% of the participants were 35 years old or above. The mean weight at the time of testing was 64.9 (SE 0.4) kg. The range of gestational age when the test was performed was 15 to 21 weeks, with a mean of 17.2 weeks (SE 0.03).

Triple test results

The mean (SE) serum concentration of AFP was 41.53 (0.88) IU/mL, hCG was 27.93 (0.61) IU/mL and uE3 was 1.28 (0.03) IU/mL.

The frequency of elevated AFP was 1.3%, abnormal hCG (elevated or reduced) was 1.9% and reduced uE3 was 0.3% (Table 1).

Age plays an important role as a risk factor for chromosomal diseases, especially Down syndrome. The calculated risk for Down syndrome varied widely between the age groups. Table 1 shows the data for the women divided into 3 age groups (15–24, 25–34 and > 35 years). The calculated risk ranged from 1.2% in the lowest age group up to 16.2% in the highest. The total calculated risk for all subjects was 2.8%. This may be due to the young mean age of the subjects.

Cross-tabulation of a binary variable of calculated risk (age- and triple-test) categorized as high-risk and low-risk with age categorized into 2 age groups (≤ 34 and > 35 years) yielded a 10-fold statistically significant relationship between age and calculated risk as estimated by chi-squared tests.

Nine (9) pregnancies were twins and 6 pregnancies were from *in vitro* fertilization but the numbers were too small for further analysis.

Discussion

Maternal AFP is a very important and effective indicator of neural tube defects, detect-

Table 1 **Triple test results for 943 Palestinian women and calculated risk by age group**

Age (years)	% of women				Calculated risk[a] %
	Elevated AFP	Elevated hCG	Reduced hCG	Reduced uE3	
15–24	1.8	2.2	0.4	0.2	1.2
25–34	0.8	0.8	0.3	0.3	2.2
> 35	0.0	1.4	0.0	1.4	16.2
Total	1.3	1.6	0.3	0.3	2.8

AFP = alpha-fetoprotein.
hCG = human chorionic gonadotropin.
uE3 = unconjugated estriol.
[a]By age and triple test.

ing up to 90% of cases. Although the incidence of neural tube defects is usually about 1/500, it increases greatly to 2% when a previous child of the same parents had neural tube defects [*5*]. The AFP results show that only 1.3% of the tested subjects had high concentrations. Usually, in screening for neural tube defects about 3% of patients will have a high AFP [*5*]. This may reflect a lower incidence of neural tube defects in the offspring of tested subjects.

Using the originally proposed cut-off value of 1:190 would classify about 5% of the women as having abnormal results in Down syndrome screening. This should detect about 60% of Down syndrome and 60% of Edwards syndrome cases [*5*]. In this study the calculated risk for Down syndrome was about 13-fold higher in women aged 35 and above compared with younger women aged 15–24 years. At age 35 years, the risk at birth is 1:385 and increases dramatically at age 40 to 1:105. Usually 1 in every 50 women with abnormal triple test results will be found to have a fetus with Down syndrome [*5*].

In conclusion, the generally low calculated risk of Down syndrome among Palestinian women tested is probably due to the young age of the subjects. In addition to its clinical benefits, the introduction of the triple test has helped to raise awareness about Down syndrome, neural tube defect and chromosomal diseases in general among Palestinian women.

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