EVALUATION AND MANAGEMENT OF OBESITY IN PREGNANCY

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SUMMARY

150 obese pregnant women, weighing at 14 weeks of gestation more than 80 kg, were studied in pregnancy and in the earlier post-partum days.

Plasma total and unconjugated oestriol and placental lactogen values were measured weekly in 20 obese patients.

It was found a significant incidence of EPH syndrome, hypertensive disorders, diabetes, glycosuria, hemorrages in pregnancy and in postpartum.

No significant differences was found between the obese and nonobese patients for the other obstetric complication.

Plasma total and unconjugated oestriol concentration in obese gravidas are not significantly different from these found in normal patients, as in the pregnancies complicated by diabetes.

These results are of great importance to understand the problems that obesity implies in pregnancy.

The prevention and treatment of obesity before pregnancy is recommendable and thus is necessary the plane and installation of improved nutrition service programs.

Obesity is a common and a very important problem for the phisicians for developing a wide range of medical complications: ischemic heart disease, cardiac failure, respiratory insufficiency, arthrosis, gallstones, etc.

Obesity in pregnancy, the source of many obstetric complications, needs of a very careful obstetric care. The complications (hypertension, toxaemia, diabetes, thromboembolism, newborn obesity, etc.) are deleterius for the mother and the fetus ([1, 2, 3, 4]).

The greatest obstetric success in the past was the significant reduction of maternal mortality rate, while the modern trend is to improve the perinatal mortality and morbility still elevated.

To reach this goal it is mandatory to include the obesity in the list of prenatal factor of high risk pregnancy. The purpose of this study is to underline this statement.

MATERIAL AND METHODS

A total of 150 obese pregnant women, weighing at 14 weeks of gestation more than 80 kg, were studied in pregnancy and in the earlier postpartum days at the Department of "Fisiopatologia Ostetrica e Ginecologica" of the 2nd School of Medicine of the University of Naples, over the 5 years period from 1973-1977.

The mean weight was of 91.4 kg with a range from 80 to 135.5 kg. The age of the study group ranged from 16 to 45 years; 9% were under 20 years old, 55% ranged from 20 to 30 years old, 31% from 31 to 40, and at least 5% from 41 to 45 years old.

Their height ranged from 151 to 165 cm.

Cases of abortion were omitted from the study group.

Plasma total and unconjugated oestriol and placental lactogen values were measured weekly, between 30 weeks gestation and delivery, in 20 obese patients, 5 obese with class A diabetes, 1 with class D diabetes according White ([5]), and finally in 8 obese patients with moderate or severe pre-eclampsia.

The mean plasma total and unconjugated E_3 and HPL of these pregnant women was compared to the corresponding mean values of normal pregnant patients.

The hormonal determinations were assayed in duplicate by rapid radioimmunoassay (RIA),

using the standard kits of the Radiochemical Centre, Amersham.

RESULTS

Table 1 demonstrate that the obese women during pregnancy show a weight gain lower than controls. Moreover the weight gain of primiparas is higher than multiparas whether obese or not.

Table 1. — *Mean weight gain (Kg) in pregnancy.*

	Obese	Nonobese
Primiparas	9.2	11.8
Multiparas	8.6	10.2

As shown in table 2, the obese women have a significant incidence of EPH syndrome, hypertensive disorders, diabetes, glycosuria, hemorrages in pregnancy and in postpartum.

Table 2. — *Incidence of obstetric complications in obese and control patients.*

	Obese %	Nonobese %
EPH syndrome	18	7
Hypertensive disorders . .	25	9
Eclampsia	1	0
Glycosuria	9	1
Diabetes	8	2
Breech presentation . . .	6	3
Hemorrage in pregnancy .	21	10
Post-partum hemorrage . .	15	3
Emesis and hyperemesis . .	4	1
Varicose vein	13	6
Phlebites	4	0
Respiratory complications .	1	1
Cervical laceration . . .	4	3

No significant differences was found between the obese and nonobese patients for the other obstetric complications. The mean total duration of labour in the obese primiparas is longer than in the normal primiparas, as shown in table 3. There is no evident difference in the duration of labour between obese ad nonobese multiparas.

Table 3. — *Mean duration (hours) of labor in primipara and multipara obese women.*

	Obese	Nonobese
Primiparas	12.50	10.65
Multiparas	5.90	5.35

Premature rupture of the membranes is more common in the obese patients (20.1 %) than in the control group (16.8 %).

The breech presentation at term occurs in 6% of the obese pregnant women (3% in the control group).

There is no difference in the rate of operative deliveries of obese patients compared to the control group (table 4).

Table 4. — *Mode of delivery.*

Delivery	Obese	Nonobese
Spontaneous delivery	98 (65 %)	101 (67 %)
Forceps	5 (3 %)	1 (0.6%)
Vacuum extractor .	29 (19.3%)	34 (22.1%)
Cesarean section .	18 (12 %)	14 (9.5%)

We have observed in the obese women a cesarean section rate of 12%, a vacuum extraction rate of 19.3%. The incidence of forceps delivery is 3%, compared to 0.6% for women with normal weight.

Table 5 demonstrates the high frequency of large size infants in the obese group.

Table 5. — *Infant birth-weight in obese patients and control patients.*

Birth-Weight	Obese	Nonobese
<2500 g . . .	11 (7.3%)	18 (12%)
>4000 g . . .	33 (22 %)	12 (8%)

Plasma total und unconjugated oestriol concentrations in obese gravidas are not significantly different from those found in normal patients (fig. 1), as in the pregnancies complicated by diabetes.

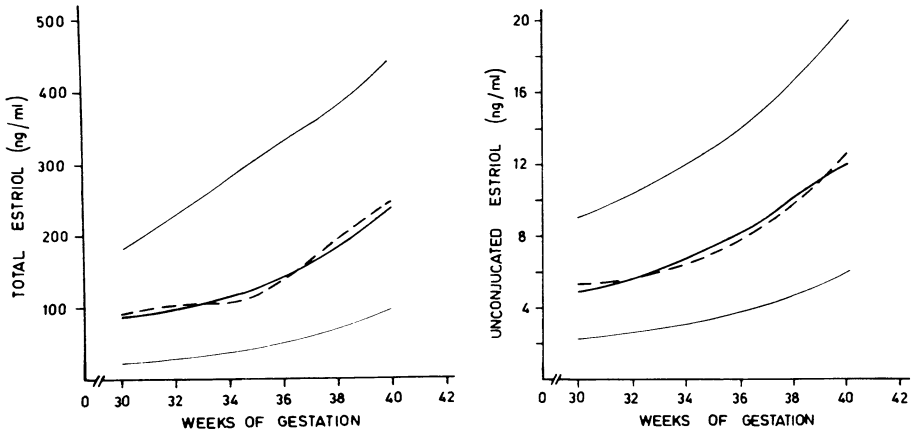

Fig. 1. — Mean plasma total and unconjugated E_3 concentrations (– – –) for 20 obese patients compared to the mean (———) for normal pregnant patients.

An interesting case is that of the obese class D diabetic patient with vascular complications and evidence of placental impairment. During the pregnancy the total oestriol and HPL levels were constantly low; cesarean section was performed at 34 weeks, when was observed a dramatic drop of total oestriol (fig. 2). The amniotic fluid contained thick meconium and the placenta was largely infarcited and fibrotic.

The newborn infant weighed 1650 g and Apgar scores were 2 and 5 respectively after 1 and 5 minutes.

Plasma oestriol concentrations in the obese women with preeclampsia or hypertension, specially if severe, are lower if confrontated with normal patients (fig. 3).

The circulating levels of HPL in the obese pregnant women are slightly elevated (fig. 4).

Plasma HPL levels are lower in the toxaemia and in the hypertension complicating the pregnancy of the obese women (fig. 5).

DISCUSSION

To the obese patients frequently occur prenatal, intrapartum and post partum complications.

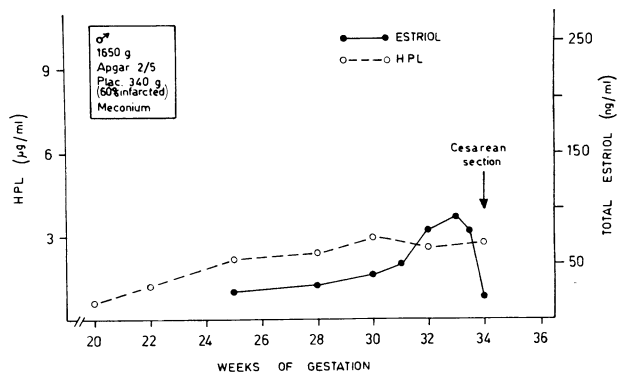

Fig. 2. — Plasma HPL and total E_3 for an obese patient with class D diabetes mellitus.

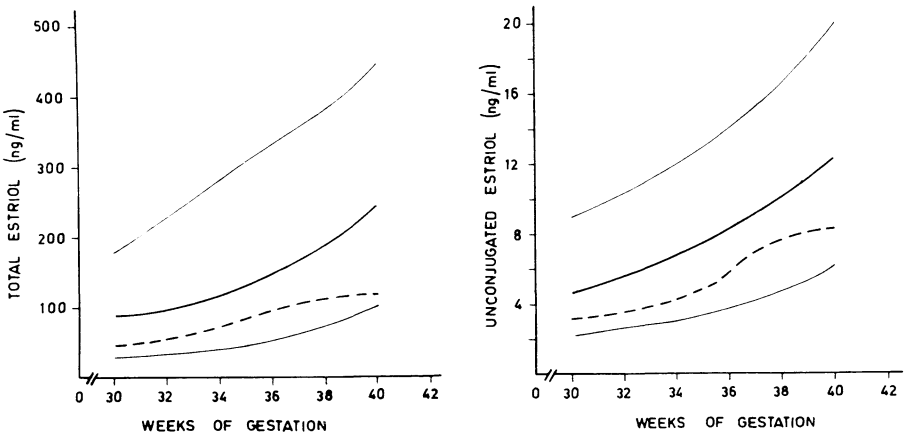

Fig. 3. — Mean plasma total and unconjugated E_3 concentrations (– – –) for 8 obese patients with moderate or severe preeclampsia compared to the mean (———) for normal pregnant patients.

The incidence of toxaemia and hypertension is significantly increased among the obese women (respectively 18% and 25% compared to 7% and 9% of controls).

Others authors have found higher incidence of hypertension in obese gravidas ([2, 3, 6]), specially in massively obese ([1, 7]).

The incidence of diabetes and persistent glycosuria increases in obese pregnant women, according to others ([1, 7, 8]).

Higher the incidence of varicose vein (23 % compared to 6 % of controls). Tromboembolic diseases proved to be a consistent cause of death. For this rea-

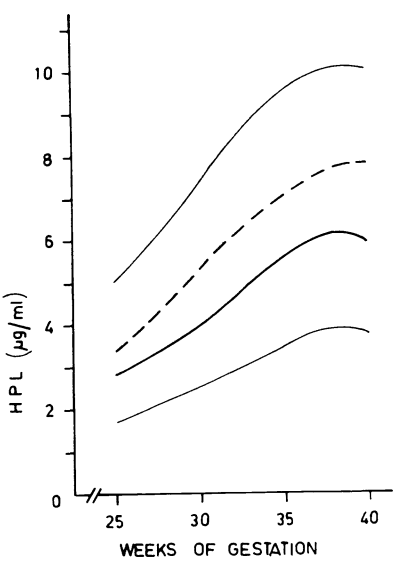

Fig. 4. — Mean plasma HPL concentrations (– – –) for 20 obese patients compared to the mean (———) for normal pregnant patients.

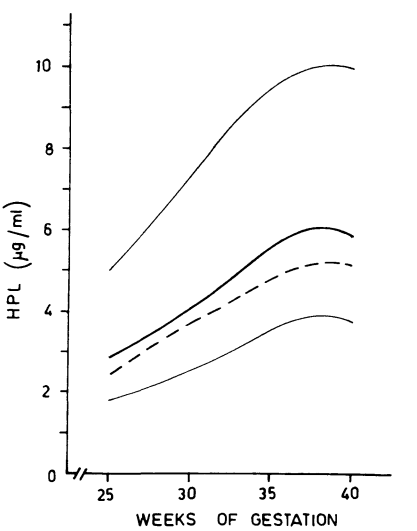

Fig. 5. — Mean plasma HPL concentrations (– – –) for 8 obese patients with moderate or severe preeclampsia compared to the mean (———) for normal pregnant patients.

son, has been suggested the prophylactic administration of anticoagulants in the pre and post operative state and in the post-partum days, if there is evidence of vascular disease ([9, 4]).

However no maternal death occurred among our overweight patients as instead referred by Efiong and Maeder ([8, 4]).

The frequency of uterine bleeding during pregnancy (incluse abortions) and in postpartum is significantly increased among the obese women (respectively 21% and 15%), in agreement with other authors ([6, 7]).

No reliable increase of other obstetrical complications was found.

Plasma total and unconjugated oestriol determinations are not predective of neonatal problems in the pregnancy of obese women, as in the pregnancy complicated by diabetes.

In obese gravidas with moderate and severe pre-eclampsia or chronic hypertension, serial plasma oestriol concentrations are an essential parameter for predicting neonatal performance: low oestriol values are associated with fetal placental compromise.

The HPL concentrations in obese women are normal or slightly elevated than in normal patients. A level, which is apparently normal, may, in obese pregnant women, be low and thus of prognostic value.

The high concentrations of HPL are probably dependent from larger placenta and big fetal weight. A significant correlation between placental weight and HPL concentrations is demonstrated ([10]). The relationship between HPL and fetal weight has been shown by some worker ([10, 11, 12]) in contrast to others ([13, 14]). Recently has been found that HPL concentrations in individual twin placental showed striking with placental weight, birth weight and birth lenght ([15]).

Marked rising and falling HPL levels are expression of complications that occur during pregnancy in obese women. We have found marked rise in ketoacidosis (the inadeguate weight gain in obese implies catabolism of maternal tissue), hypoglicemia and hydramnios. In obese women with hypertentsion, pre-eclampsia and diabetes associated with placental malfunction there were lower E_3 values.

The cesarean section in obese and non-obese patients has the same incidence in the both groups. This is in agreement with some authors ([6]) and in disaccord with others ([7, 16, 17]).

Our findings indicate a relationship between the mother and her infant weight, in agreement with Eastman and Jackson ([18]). As confirmed by Hytten *et al.* ([19]), this relationship is present despite the reduced weight gain in the obese mother. This is a further confirmation that the large size baby is the result of the characteristic metabolic and endocrine state of the obese pregnant women and does not show a direct correlation with the weight gain in pregnancy. In fact, as common agreement, the higher birth weight of these infants might well be the result of a diabetic tendency in obesity. On the other hand, we fill very important the low incidence of small-sized infants (<2500 g) in obese group (table 5), because unaspected since the elevated frequency of toxaemia and hypertension.

Both maternal excessive prepregnant weight and excessive weight gain in pregnancy are associated with increased birth weight.

It has shown that maternal obesity is associated with the amount of subcutaneos fat in the newborn infants ([19]). The cell number of adipose tissue, as demonstrated by Borjeson ([20]), increases quickly from the 30 weeks during pregnancy to the end of the first year of life.

It is possible that during intrauterine life, specific period of rapid proliferation of cells, the number of adipose cells can depend on the nourishment ([21]).

If the nourishment is inadeguate, the

newborn infant is small and subject to all risks of low birth weight.

On the contrary, the maternal obesity and the maternal overnourishment during pregnancy may, or may not, have a permanent repercussion throughout the life of newborn, increasing adipose cells number. That is the newborn is "programmed" within excessive number of fat cells and thus predisposed to obesity in later life.

The management of obese pregnant women is still a problem. The future living of obese pregnant women-newborn is dependent from right obstetric management. The rational and competent approach to these high risk patients, to avoid maternal and fetal complications, must concern the nutrition of the mother, careful determination of the fetal growth and hormone assays in conjunction with chemical and phisical methods for clinical assessment of fetal well-being.

These findings are of great importance to understand the problems that obesity implies in pregnancy.

The prevention and treatment of obesity before pregnancy is recommendable and thus the plane and installation of improved nutrition service programs is necessary for effective impact on clinical diagnosis of obesity.

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