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Influence of pre-pregnancy body mass index, physical activity and dietary habits on glucose tolerance during pregnancy

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BACKGROUND -1

✓Abnormal glucose tolerance during pregnancy (AGT), including all condition from minor degree of glucose tolerance to overt gestational diabetes, confers increased risk of maternal morbidity and adverse pregnancy outcome.

✓Maternal over-weight and obesity are considered the most important risk factors for AGT.

BACKGROUND - 2

✓ To date, other factors that may influence glucose tolerance during pregnancy, such as ***physical activity and dietary habits***, are not considered as risk factors for AGT.

OBJECTIVE

The aim of the present study is to investigate the relative contribution of
- ✓ physical activity
- ✓ dietary habits

on glucose tolerance during pregnancy.

MATERIALS AND METHODS - 1

Universal screening (50-g glucose challange test [GCT]) was performed at 27±6.9 week of gestation in a cohort of 268 pregnant women. GCT was considered positive if 1-hr post-load plasma glucose (PG) was ≥140mg/dl.

On the morning of the test, demographic, anthropometric and clinical data (age, family history of diabetes, obstetric history and pre-pregnancy BMI) were recorded.

MATERIALS AND METHODS - 2

To assess physical activity, all women were invited to fill the short form of the International Physical Activity Questionnaire (IPAQ) (Fig.1,2,3).

We calculated the average amount of time per week spent during 7 days before the test (MET$_{\text{h}}$/week).

Fig.1- INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (IPAQ)

Fig.2- INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (IPAQ)

Fig.3- INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (IPAQ)

MATERIALS AND METHODS - 3

To evaluate dietary habits, all women presented to a food frequency questionnaire performed by 3 trained dieticiens (Fig. 4)

The energy intake and dietary nutrient content were calculated by a computerized program (**MetaDiet®**)(Fig. 5,6)

Fig. 4 – FOOD FREQUENCY QUESTIONNAIRE (MetaDiet®)

Fig. 5 - PHOTOGRAPHS TO COMPARE DIFFERENT PORTIONS FOR EACH ITEM (MetaDiet®)

Fig. 6 - COMPUTERIZED PROGRAM TO CALCULATE ENERGY INTAKE AND DIETARY NUTRIENT CONTENT (MetaDiet®)

RESULTS - 1

We studied 268 pregnant women.
GCT was found positive (GCT +) in 106 (39%) and negative (GCT -) in 163 cases (61%).

No difference in demographic and clinical data resulted between GCT+ and GCT-.

Only pre-pregnancy BMI and weight gain were significantly different between GCT+ and GCT- groups respectively (Table 1).

Tab.1 - CLINICAL CHARACTERISTICS

	All (n=268)	GCT + (n=106)	GCT- (n=163)
Age (years)	33.5 ± 4.9	33.8 ± 4.2	33.4 ± 5
Pre-pregnancy BMI (kg/m²)	22.6 ± 3.8	23.9 ± 4	22 ± 3.6*
Weight gain (Kg)	8 ± 5.7	6.5 ± 4.9	7.6 ± 5.8**
Positive family history of DM (%)	15	15.4	15.9
Primiparous (%)	50	50	50
Smokers (%)	6	7.4	5.6

RESULTS - 2

✓The physical activity performed by women during the last 7 days was on average 1.8±1±1.3 MET$_{\text{h}}$/week.

✓The mean daily energy intake of the cohort was 2012 ± 400 Kcal : carbohydrates 49%, total fats 36%, proteins 14%, cholesterol intake 221±78 mg/d and fibers 18.5±5.8 g/d

All parameters referring energy, macronutrient, cholesterol and fiber intake were not different between GCT+ and GCT- (Table 2)

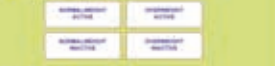
Tab. 2 - NUTRITIONAL DATA

	GCT+	GCT-
Daily energy intake (Kcal/day)	1976 ± 410	2043 ± 400
Carbohydrates (CHO) (g/day)	226.7±64.2	242.8±65
Complex CHO (g/day)	134±41.6	146±50
Refined CHO (g/day)	81.3±50.2	85.3±54.3
Total Fats	80.8±25.1	85.7±32.9
Saturated Fatty Acids (g/day)	24.8±7.8	25.1±7
Monounsaturated FA (g/day)	32.4±10	32.3±10
Polyunsaturated FA (g/day)	8.7±2.7	9.8±3.6
Proteins (g/day)	75.8±19	77±17.3
Cholesterol (mg/day)	212.8±73.2	226±81.4
Fibers (g/day)	18.5±6.1	18.6 ± 5.6

Data are mean ± SD

RESULTS - 3

The joint analysis of pre-pregnancy BMI and physical activity divided the population into 4 groups:



NORMAL WEIGHT: Pre-pregnancy BMI < 25 kg/m²
OVERWEIGHT: Pre-pregnancy BMI ≥ 25 kg/m²
ACTIVE: Exercise ≥1.8 MET$_{\text{h}}$/week
INACTIVE: Exercise <1.8 MET$_{\text{h}}$/week

1-hr PG was not significantly different among the 4 groups (Tab.3)

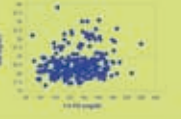
Tab. 3: 1-hr PG ACCORDING TO BMI AND PHYSICAL ACTIVITY

	OVERWEIGHT		p
	ACTIVE	INACTIVE	
1-hr PG (mg/dl)	148±31	139 ±28	NS
	NORMAL WEIGHT		
	ACTIVE	INACTIVE	
1-hr PG (mg/dl)	126±23	132±29	NS

Data are mean ± SD. T-test was used to assess differences between groups and Fisher's exact test was used for categorical data.

RESULTS - 4

After a multivariate analysis including pre-pregnancy BMI, physical activity and energy intake only the BMI (F-value 9.264, p=0.02) remained significantly associated with 1-hr PG.



CONCLUSIONS

✓**Pre-pregnancy BMI is the most important risk factor for the development of AGT.**

✓**This result suggests the importance of life style, especially weight reduction in overweight women during the pre-conceptional period.**

✓**The contribution of physical activity and diet to the development of AGT during pregnancy remains to be studied.**

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