

# Metabolic syndrome in women 6 years post-partum and link to gestational health

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## Background

Currently 1 in 4 women die of cardiovascular disease (CVD), which is frequently preceded by the metabolic syndrome. The prevalence of metabolic syndrome in New Zealand women is not known, but recent American data reported 26.5% of women aged 18-44 years were affected. Around 85% of women undergo a pregnancy, which represents an opportunity to screen for metabolic syndrome risk markers. Pregnancy is an important physiological “stress” test, during which clinical factors and other biomarkers that signal increased risk for CVD may be identified early.

### Aims

- (1) To establish the prevalence of metabolic syndrome components (obesity, hypertension, dyslipidemia, hyperglycaemia) in the first pregnancy among NZ women
- (2) To establish the prevalence of metabolic syndrome and its components among NZ women 6 years post-partum.
- (3) To determine whether specific pregnancy complications (pre-eclampsia, gestational hypertension, placental abruption, preterm birth, fetal growth restriction or gestational diabetes) are associated with increased prevalence of metabolic syndrome 6 years later

## Subjects

The international SCOPE study, recruited 2065 Auckland women in their first ongoing pregnancy between 2005 and 2008. This study was designed to develop reliable early pregnancy prediction of women at high risk of serious, late pregnancy complications of pre-eclampsia, fetal growth restriction and spontaneous preterm birth. Limited maternal data of relevance to metabolic syndrome, such as smoking status, body measurements, and blood pressure were also collected within the Children of SCOPE follow up study at 6 years post first birth, (follow up completed in May 2014). Those women whose first SCOPE pregnancy resulted in fetal/neonatal death or a baby with major congenital abnormalities or those who at the time of the follow up visit were pregnant or breastfeeding were excluded. Fasting bloods were obtained from 630 women 6 years after the birth of their first child.

## Outcome

Metabolic syndrome was defined by the International Diabetes Federation criteria, as the presence of obesity (BMI  $\geq 30\text{kg/m}^2$ ) or central obesity (waist circumference  $\geq 80\text{cm}$ ), plus any two of the following four factors: raised fasting triglycerides ( $\geq 1.7\text{mmol/L}$ ), reduced fasting HDL cholesterol ( $< 1.29\text{mmol/L}$ ), raised blood pressure ( $\geq 130\text{ mmHg}$  systolic or  $\geq 85\text{ mmHg}$  diastolic), prediabetes or diabetes (classified by fasting glucose thresholds of  $\geq 5.5\text{mmol/L}$  and  $\geq 7\text{mmol/L}$  respectively). Each component of the metabolic syndrome was also considered during early pregnancy (15 weeks) and glycemia was assessed clinically using the polycose test and OGTT at 24 weeks gestation.

## Statistical analysis

Univariable analysis of pregnancy specific risk factors: maternal placental complications (pre-eclampsia, gestational hypertension, placental abruption, preterm birth, fetal growth restriction) or gestational diabetes, and baseline risk factors at the time of first pregnancy (obesity, hypertension, dyslipidemia, hyperglycemia), was performed to determine which factors should be carried through to the multivariable analyses (those with  $p < 0.1$ ). Analysis was carried out in SAS v9.3.

## Results

7% of women had metabolic syndrome 6 years post-partum.

Table 1. Prevalence of metabolic syndrome components among women at 15 weeks gestation and 6 years post-partum

	15 weeks gestation of first pregnancy N=630	6 years after first pregnancy N=630
Age range (years)	15-45	21-51
BMI $> 30\text{kg/m}^2$	66 (10.5%)	96 (15%)
Waist $\geq 80\text{cm}$	427 (67.9%)	400 (63.6%)
Diastolic $\geq 85\text{mmHg}$	11 (1.8%)	25 (4.0%)
Systolic $\geq 130\text{mmHg}$	32 (5.1%)	76 (12.1%)
Normotensive but on anti-hypertensive Rx	0 (as exclusion criterion)	5 (0.8%)
HDL cholesterol $< 1.29\text{ mmol/L}$	33 (5.2%)	103 (16.3%)
Triglycerides $\geq 1.7\text{ mmol/L}$	154 (24.4%)	33 (5.2%)
Fasting glucose $\geq 5.6\text{ mmol/L}$	not available	44 (7.0%)
Gestational Diabetes	14 (2.2%) at 28 weeks	
Metabolic Syndrome	12 (1.9%)	45 (7.1%)

Table 2. First pregnancy risk factors for metabolic syndrome 6 years post-partum

Risk factor during first pregnancy	Odds ratio of developing metabolic syndrome 6 years post-partum	Multivariable model*
Age $> 35\text{yrs}$ (n=175)	1.3 (0.7-2.5)	
Normal weight (n=348)	1.0	1.0
Overweight (n=185)	5.4 (2.4-12.2)	5.1 (2.2-11.5)
Obesity (n=96)	13.5 (5.7-32.2)	9.5 (3.6-24.9)
Gestational diabetes (n=14)	11.1 (3.7-33.6)	6.3 (1.7-23.4)
Maternal placental complications** (n=158)	3.8 (2.1-7.1)	3.1 (1.6-8.0)
Family history of CVA (n=42)	0.6 (0.1-2.7)	
Family history of T2D (n=63)	1.7 (0.7-4.1)	
Family history of CHD (n=126)	0.7 (0.3-1.7)	
Metabolic syndrome in pregnancy	10.3 (3.1-34.0)	1.8 (0.4-8.0)

\*Multivariable model contains maternal early pregnancy BMI, gestational diabetes, maternal placental complications and metabolic syndrome in pregnancy.

\*\*Maternal placental complications were defined as pre-eclampsia, placental abruption, gestational hypertension, fetal growth restriction or spontaneous preterm birth

## Conclusions

In NZ women, the most common metabolic syndrome components at 15 weeks gestation in first pregnancy were increased waist circumference (68%), hypertriglyceridemia (24%) and obesity (11%).

The prevalence of metabolic syndrome in NZ women aged 21-51, at 6 years postpartum was 7%. Metabolic syndrome was associated with overweight, gestational diabetes and placental complications during first pregnancy. Age, family history of DM or CVD, were not associated with subsequent metabolic syndrome.

## Acknowledgments

This study was supported by HRC, Curekids and a NZSSD-Sanofi grant