

Anna Sigríður Ólafsdóttir

Titill:

Diet and lifestyle of women of childbearing age

Impact of cod liver oil consumption on maternal health, birth outcome and breast milk composition and associations between diet, lifestyle and weight gain in pregnancy

## ABSTRACT

The aim of this thesis was to increase knowledge of the diet and lifestyle of women in their childbearing

years. Iceland is a community with traditional fish and cod liver oil consumption, and the average

birthweight in Iceland is among the highest worldwide. The population therefore gives an opportunity to

study the contribution of cod liver oil consumption, rich in n-3 LCPUFA, to important health aspects for mother and newborn infant as well as the impact of other dietary and lifestyle factors.

### **Dietary intake, lifestyle, weight gain in pregnancy and birth outcome**

Obesity is one of the most threatening health issues worldwide. It can be difficult to assess dietary intake

among women, as they tend to underreport more than men and do so even more if they are overweight or

obese. Dietary intake with 24-hour dietary recalls and food frequency questionnaires (FFQ) along with biomarkers was compared among 53 non-pregnant women of childbearing age. Intake data from both methods correlated with each other and with their respective biomarkers. Underreporting was more common for FFQ than 24-h recalls, and women who were defined as underreporters had higher BMI.

Underreporting was not common among pregnant women (n=495) when the validated FFQ was used to

assess their dietary intake. In this prospective study questionnaires were filled out early and late in pregnancy and data on birth outcome were collected from maternity records. At the beginning of

pregnancy, 39% of the women were overweight or obese, and 26% gained suboptimal weight and 34%

excessive weight during pregnancy. Results suggest that the composition of macronutrients may have an

impact on weight gain, but women especially have to avoid increasing their energy intake too much and

should limit their sweets consumption, as these factors increased the odds of excessive weight gain.

Additionally, increased milk consumption in late pregnancy was associated with a two- to threefold

increased likelihood of gaining both optimal and excessive weight, depending on the amount consumed.

Smoking cessation doubled the risk of excessive weight gain, but this association disappeared after

adjustment for dietary and other confounding factors. Excessive weight gain following smoking cessation

may be prevented through healthier dietary habits, most profoundly through increased fruit and vegetable

consumption, but consumption of these food groups was lowest among former smokers. Pregnancy may

be a time of life that women are especially responsive to smoking cessation and dietary change.

Women gaining suboptimal weight as well as smokers gave birth to infants with lower birthweight

than women gaining optimal or excessive weight, but excessive weight gain did not add significantly to

birthweight. Quitting smoking is one of the most important actions a woman can take to improve the

outcome of her pregnancy. Maternal weight gain during pregnancy has a strong correlation with

birthweight, but it is important in terms of a healthy pregnancy and optimal birth outcome to keep the

weight gain within limits, i.e., neither too low nor too high. This thesis strengthens the value of the

recommendations given on gestational weight gain in Iceland.

### **Cod liver oil consumption, maternal health, birth outcome and breast milk composition**

Consumption of liquid cod liver oil increased the odds for developing hypertensive disorders in

pregnancy, after adjusting for confounding factors. A u-shaped curve was found for the association of the

amount of n-3 LCPUFA with hypertensive disorders, suggesting that high doses of n-3 LCPUFA may

increase the risk. Healthy women consuming liquid cod liver oil early in pregnancy gave birth to heavier

babies, and they were 11 times more likely to give birth to an infant of 4500 g or more. Consumption of

PUFA was low among women unless they consumed liquid cod liver oil. Furthermore, a higher

proportion of EPA, DPA and DHA was found in the breast milk of mothers consuming liquid cod liver oil during breastfeeding. Regular cod liver oil use could thus be recommended for increasing the percentage of PUFA in the typical Icelandic diet. Considering the special physiological function of DHA in early human life regular maternal cod liver oil intake could also be relevant for the developing infant. Larger offspring have been related to a lower risk of several diseases in adult life, and therefore the relationship seen between n-3 LCPUFA intake early in pregnancy and larger offspring suggests that maternal cod liver oil use in early pregnancy could also be important for the health of the infant in adult life. The minimum requirements of total PUFA for adults are not known. Certainly, n-3 LCPUFA may have positive health effects, but at a certain level, high amounts may be detrimental, for example, for the development of hypertensive disorders in pregnancy. Emerging research supports that major benefit of n-3 LCPUFA supplements may occur within the low range of intakes, and thus further studies investigating an optimal and safe amount would be of importance for a community with traditional cod liver oil consumption.

Keywords: pregnancy, maternal weight gain; energy intake; smoking; cod liver oil; birth outcome; breastfeeding