Does a population-based multi-factorial lifestyle intervention increase social inequality in dietary habits? The Inter99 study ☆

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ABSTRACT

Objective. To investigate whether the effect of an individualised multi-factorial lifestyle intervention on dietary habits differs across socioeconomic groups.

Methods. The study was an individualised multi-factorial lifestyle intervention study with a control group, Inter99 (1999–2006), Copenhagen, Denmark. Participants in the intervention group (n = 6 091) received lifestyle intervention during a five-year period. The control group (n = 3 324) was followed by questionnaires. Multilevel regression analyses were used, including interaction term between intervention effect and socioeconomic position (SEP) and analysed separately for men and women. SEP was measured as length of education and employment status and dietary habits were measured by a validated food frequency questionnaire.

Results. Men with a short education improved their dietary habits more (net-change [95% confidence interval]) (0.25 points [−0.01;0.52]) than men with longer education (0.02 points [−0.09;0.14]), (interaction: p = 0.02). Furthermore, unemployed women improved their dietary intake more (0.33 points [0.05;0.61]) than employed women (0.01 points [−0.10;0.11]), (interaction: p = 0.03). Similar results were found for fruit intake, whereas no significant interactions were found for fish, fat and vegetable intake.

Conclusions. Individualised dietary interventions do not increase and may even decrease or hinder further widening of the social inequalities in health due to unhealthy dietary habits among socially disadvantaged individuals.

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Introduction

Inequalities in health across socioeconomic groups constitute one of the main challenges for public health. Throughout Europe, mortality and morbidity are higher among the socially disadvantaged (Mackenbach et al., 2008). Some of the inequalities in health are mediated through different exposures to risk factors such as an unhealthy diet and thus most studies from the European countries (including Denmark), Canada, Australia and USA have reported healthier dietary habits among individuals with high socioeconomic position (SEP)(Darmon and Drewnowski, 2008) (Dynesen et al., 2003; Groth et al., 2001).

There is evidence to support that dietary interventions delivered to individuals in many different settings can have a positive impact on dietary habits, especially in high risk individuals(Ammerman et al., 2002; Pignone et al., 2003; Pomerleau et al., 2005). We have earlier demonstrated that a multi-factorial lifestyle intervention can promote small, but significant positive long-term dietary changes in a general population (Toft et al., 2008). However, earlier studies have generally found that individuals with low SEP respond less to health education messages and experience more difficulties in changing lifestyle habits(Niederdeppe et al., 2008). Using a high risk strategy, defined as identifying individuals with a high risk/special need, and offering these a specific preventive action (e.g. dietary counseling)(Rose, 1992), has therefore been hypothesised to widen the social inequality(Blaxter, 2007; White et al., 2009). Other researchers, however, have advocated for the high-risk approach (Manuel et al., 2006; Zulman et al., 2008) and the issue is still debated (Capewell and Graham, 2010) but only few studies have actually addressed socioeconomic differences in the effect of dietary interventions(Blakely et al., 2011; Oldroyd et al., 2008).

The main purpose of this study was to investigate whether the effect of a multi-factorial lifestyle intervention differed across socioeconomic groups.

Methods

The Inter99 study was a population-based intervention study performed at the Research Centre for Prevention and Health, Glostrup, Denmark from March 1999 to April 2006. The aim was to prevent ischemic heart disease

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(IHD) by non-pharmacological multi-factorial lifestyle intervention. The study design is described in details elsewhere (Jorgensen et al., 2003) (www.inter99.dk).

Study population

The study population consisted of all 61301 individuals aged 30–60 years living in 11 municipalities in the suburbs south-west of Copenhagen City. An age- and sex-stratified random sample of 13 016 individuals was drawn from the Civil Registration by computer generated random numbers. Before invitation the sample was pre-randomised into a high-intensity intervention (n = 11708) and a low-intensity intervention group (n = 1308). Eighty-two persons had died or could not be traced. Of the remaining 12 934, a total of 6906 (53.4%) participated in the study. Of these, 122 were excluded because of alcoholism, drug abuse or linguistic barriers, leaving 6784. Because of the small sample size and in order to keep the design simple the low-intensity intervention group was not included in the present study, leaving 6091 for the analyses. From the remaining 48 285 individuals, a random sample of 5264 individuals was drawn (control group). The participation rate was 63.1% (3324 individuals). Flowchart of the study is shown in Fig. 1.

Written informed consent was obtained from all participants. The study was approved by the local Ethics Committee (KA 98 155) and is registered with ClinicalTrials.gov (registration number: NCT00289237).

Intervention

At baseline participants had an extensive health examination and were categorised as high risk individuals if they had a high absolute risk of IHD (Thomsen et al., 1997), were daily smoker or obese, had hypertension, hypercholesterolemia, diabetes or impaired glucose tolerance. A total of 60% were categorised as high-risk individuals.

Based on the personal risk estimate, each participant had individual lifestyle counselling (the intervention is described in more details elsewhere (Toft et al., 2008)). In addition to the individualised lifestyle counselling, high-risk individuals in the intervention group were offered lifestyle counselling in groups.
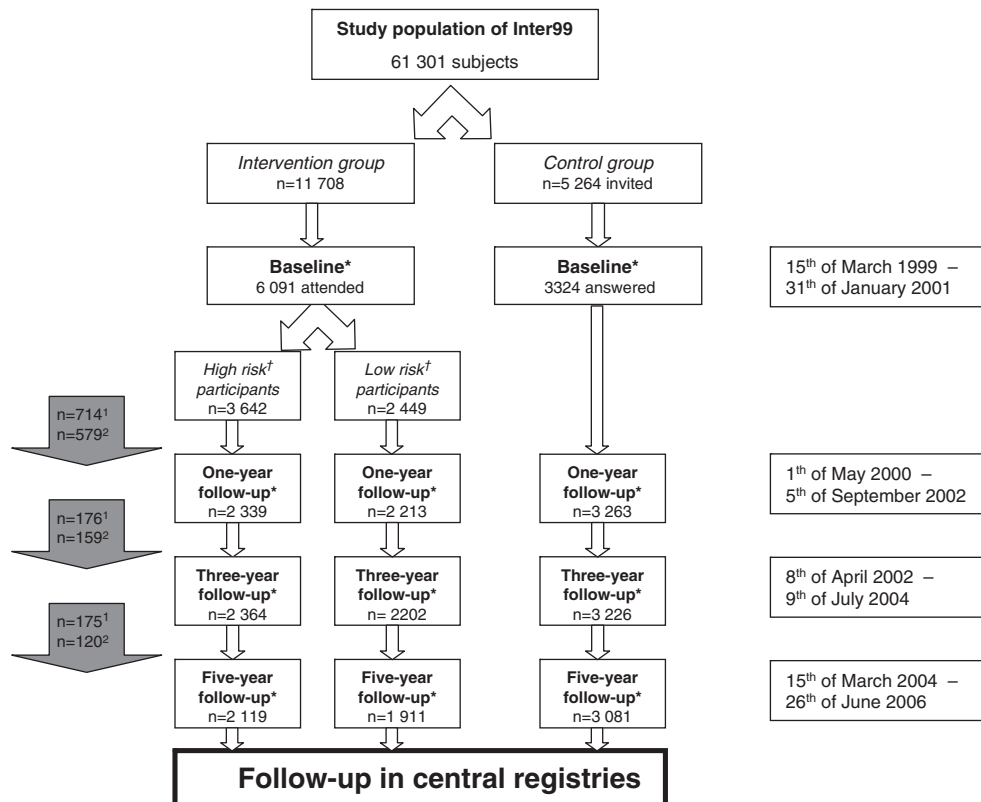
After one and three years, all participants in the intervention group categorised as high-risk individuals at the baseline examination were re-invited for a new risk assessment and individual lifestyle counselling. If they were still at high risk of IHD participants were again offered group counselling. Low-risk individuals in the intervention group were followed by questionnaires. All participants in the intervention group were re-invited after 5 years for a final risk assessment.

Individuals in the control group were sent a questionnaire at baseline and after 1, 3 and 5 years in order to assess lifestyle changes in the background population.

Variables

Dependent variable

Dietary intake was measured using a self-administered 48-item food frequency questionnaire (FFQ) including questions regarding the intake of fruit, vegetables, fish and fat. From this the Dietary Quality Score (DQS) was calculated. In short the DQS was developed as a crude index of the overall quality of the dietary habits. The score was based on questions regarding the intake of fruits, boiled vegetables, raw vegetables, vegetable- or vegetarian dishes,

Fig. 1. Flowchart of the Fig. 1 Inter99 study (1999-2006), Copenhagen, Denmark.