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Socioeconomic position and cardiovascular risk factors among people with screen-detected Type 2 DM: Six-year follow-up of the ADDITION-Denmark trial

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ABSTRACT

Aims: To examine whether socioeconomic position (SEP) was associated with change in cardiovascular risk factors and meeting treatment targets for cardiovascular risk factors among individuals with screen-detected Type 2 DM at six-year follow-up.

Methods: The study population was 1533 people with Type 2 DM identified from at stepwise diabetes screening programme in general practice during 2001–2006 in the ADDITION-Denmark study. The ADDITION-study was performed as a randomised trial but the two randomisation groups were analysed as one cohort in this study. Cardiovascular risk factors were measured at baseline and repeated at follow-up (mean: 5.9 [1.4] years). Information on SEP, redeemed antihypertensive and lipid-lowering treatment were obtained from Danish registers. Multivariate analyses were performed to estimate change in cardiovascular risk factors and difference in meeting treatment targets.

Results: The change in HbA_{1c}, cholesterol, blood pressure and BMI were virtually the same across educational level, income level, occupational status or cohabiting status. Overall, the ability to meet treatment targets for HbA_{1c}, cholesterol and blood pressure was not modified by SEP-group. A higher proportion of people with lower educational level or lower income level in the intensive care redeemed anti-hypertensive treatment compared to people with higher educational or income levels.

Conclusion: Screen-detection and early treatment onset did not introduce socioeconomic inequality in metabolic control in people with screen-detected Type 2 DM at six-year follow-up.

Abbreviations: ADDITION, Anglo-Danish-Dutch Study of Intensive Treatment in People with Screen-Detected Diabetes in Primary Care; SEP, socioeconomic position.

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1. Introduction

Type 2 DM is a chronic metabolic disease associated with high cardiovascular morbidity and mortality. Optimal disease-management leads to fewer complications [1] and requires change in lifestyle, regular medical control and daily intake of a number of medications. Thus, many elements of the management of diabetes depend on the patient and socioeconomic factors might play a role in successful control of the condition. Low socioeconomic position (SEP) is associated with failure to achieve metabolic control in some studies [2–6] and in increased risk of diabetic complications [2,6–9] while no relationship between SEP and cardiovascular risk factors was found in other studies [10–12].

Previous studies have examined the relationship between SEP and cardiovascular risk factors in populations with varying duration of the Type 2 DM [2–6,10–12]. We are not aware of studies examining the relationship between SEP and cardiovascular risk factors in screen-detected or newly diagnosed diabetes. There has been increasing awareness of early detection and treatment of Type 2 DM in recent years and it is unclear if SEP might play a role in modifying the benefits of early treatment. Our aim was to examine whether SEP is associated with change in cardiovascular risk factors and meeting treatment targets among individuals with screen-detected Type 2 DM during a follow-up period of six-years.

2. Design and study population

The study was based on the Danish arm of the ADDITION-Europe study [13,14], an international population-based screening and treatment study for Type 2 DM. In the Danish arm of the study, 163,189 individuals aged 40–69 years without known diabetes were invited to participate in a stepwise diabetes screening programme during 2001–2006. The screening procedure has been described in detail elsewhere [15]. People were invited to complete a mail-distributed self-administrated questionnaire including a validated risk chart containing questions about known predictors of Type 2 DM [16]. Subsequently those identified at high risk were invited to attend the stepwise screening programme in general practice which included blood glucose testing to diagnose diabetes as well as other cardiovascular and anthropometric measures. A total of 28,032 people attended the screening programme and 1533 individuals were diagnosed with Type 2 DM according to 1999 WHO criteria [17]. The study population was randomised at the general practice level to either routine care according to national treatment guidelines or to intensive multifactorial treatment including training of general practitioners (GP's) and practice nurses in target-driven management of blood glucose and cardiovascular risk factors. In this study the two randomisation groups was analysed together. 117 individuals died before the follow-up in 2009. A total of 1170 individuals (83% of those alive) attended a health assessment at follow-up and 107 people attended their GP and for 117 people not attending the assessment, the latest cardiovascular measurements were taken from general practice records.

2.1. Socioeconomic data

Information on SEP from the year before the screening invitation was collected from Statistics, Denmark [18]. We examined education, income, marital status and occupation as separate measures as they represent different facets of SEP [19]. SEP was assessed as the highest educational level attained, income, occupational status and marital status. Education was categorised according to Unesco's International Standard Classification of Education [20] and divided into three groups: low educational level: ≤10 years; middle educational level: >10 and ≤15 years; and high educational level: >15 years (reference group). Equivalence weighted income was compiled on the basis of the OECD-modified scale, where the first adult in the household was given the weight 1, the second adult the weight 0.5 and each child the weight 0.3 [21]. Income was divided into quintiles based on the entire invited background population and categorised into three groups: the 20% with the lowest income, the 60% with medium income and the 20% of the population with the highest income (reference group). Occupation was categorised into four groups: (1) employed (reference group), (2) unemployed, (3) people on social security or incapacity benefit and (4) retired people. Cohabiting was categorised into two groups: cohabitant (reference group) and single.

Information on date of birth, gender and death before follow-up was derived from the Danish Civil service register [22] and information on co-morbidities from the Danish National Hospital Register [23].

2.2. Outcome measures

HbA_{1c}, cholesterol, systolic and diastolic blood pressure, height and weight were measured at baseline and repeated at six-year assessment in five hospital clinics. Blood samples for HbA_{1c} and cholesterol values were mailed directly to a central laboratory for analysis and analysed on the day of arrival. Smoking status at baseline and six-year follow-up was obtained from self-report questionnaires. Information on redeemed anti-hypertensive and lipid-lowering medication was obtained from the Danish Register of Medicinal Product Statistics [24] during the period of 120 days before baseline and follow-up

The outcome was change in cardiovascular risk factors (HbA_{1c}, (mmol/mol (%)), cholesterol (mmol/l), blood pressure (mmHg), BMI and smoking status (current/former or never smoker)) from baseline to follow-up and the proportion of people meeting treatment targets; HbA_{1c} ≤53 mmol/mol (7.0%), cholesterol ≤5.0 mmol/l and blood pressure ≤140/90 mmHg. The proportion of people redeeming anti-hypertensive and lipid-lowering treatment was assessed according to treatment guidelines in the intensive treatment group. Participants were recommended to receive anti-hypertensive treatment if blood pressure were higher than 120/80 mmHg and lipid-lowering treatment if cholesterol level exceeded 5 mmol/l (4.5 mmol/l if cardiovascular disease was present) [13].