Preventing Chronic Diseases in Middle-Income Countries: The Malaysia Diabetes Prevention Program

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Introduction and Background

- 90% of diabetes are Type 2
- Predicted number in 2030: 300 million!
- Long-term complications
- High prevalence in population changing from traditional to modern lifestyle
- Developing countries and disadvantaged community groups at highest risk
- Health promotion, early detection and effective treatment
Type 2 Diabetes in Malaysia

- Growing concern
- Prevalence in adults (age > 30): 14%
- Huge economic burden: RM 14.5 million per annum (approx. AUD 5 million)
- Malaysian National Institute of Health
- Prevention (primary, secondary and tertiary) and control of diabetes are urgent
Type 2 Diabetes in Malaysia

- Highest observed prevalence in Selangor
- Indians (11.5%) more prevalent than other races
- 10.7% of those with diabetes had hypertension, 22.8% had high cholesterol, 7.5% overweight and 11.3% obese
Evidence for lifestyle change in prevention:

The Finnish Diabetes Prevention Study (DPS; Tuomilehto, 2001):
- Lifestyle modification prevents type 2 diabetes

U.S. Diabetes Prevention Program (Knowler, 2002):
- Lifestyle modification even more effective than drug treatment in preventing type 2 diabetes
Main findings

• High-risk subjects (IGT)
• Experimental group with intensive counselling had a 58% lower risk in follow-up (mean 3.2 yrs) than control group
• Attainment of intervention objectives
  – Less than 30%E from fat
  – Less than 10%E from saturated fat
  – At least 15g/1,000 kcal of fiber
  – At least 30 min/day physical activity
  – At least 5% weight reduction
• None of those reaching 4-5 goals got T2D during the six-year follow-up

Where to from here?

- Will low-and-middle-income countries be able to implement similar trials?
- How does different cultural settings affect the implementation and delivery of prevention interventions?
- Will the efficacy of such interventions be comparable if implemented in a different setting and culture?
Collaborators

- Prof Brian Oldenburg (Monash Australia)
- A/Prof Shah Yasin (Monash Sunway)
- Prof Anuar Zaini (Monash Sunway)
- Dr Pilvikki Abstez (National Institute for Health & Welfare, Finland)
Aims

• To evaluate the transferability and feasibility of a Malaysian Diabetes Prevention Program
• To pilot test the implementation of DPP in real world settings in Malaysia
Objectives

• To develop and modify materials for the Malaysia DPP (e.g., culturally and linguistically appropriate)
• To evaluate the implementation process of the DPP
• To assess physiological and behavioural outcomes and compare with control patients
• To compare efficacy with other DPPs
Research Questions?

• Is it feasible to conduct DPP in a middle-income country like Malaysia?
• How do we adapt existing DPP materials so that they can be linguistically and culturally appropriate for Malaysian population?
• Will a Malaysia DPP be effective in modifying lifestyle behaviours in different cultural subgroups?
Study Design

• Randomised controlled trial
• Waiting list control vs lifestyle modification program
• Assessments:
  – Before and after the program for intervention group
  – Baseline and 3-month follow-up for controls
Procedure

- Identify eligible participants
- Recruitment from health care providers
- Randomisation
- Baseline assessment
- Group intervention
- Follow-up at 3 months
Participants

- Patients with elevated risk of developing T2DM (N = 100)
- Selection criteria:
  - Risk factors: overweight, family history, waist circumference
  - Diabetes risk assessment (e.g., FINDRISK)
How to choose your measures?

- Quantitative/Qualitative (match with hypotheses and analyses)
- Accuracy, practicality, specificity and sensitivity!
- Cultural and linguistic factors?
- Direct: BP, waist circumference, blood glucose
- Observable: Physical activity/diet
- Hidden/inferred: emotions, perceptions
Measures

• Diabetes Risk Test (At recruitment)
• Demographics: age, gender, ethnic group, education, marital status
• Physiological: fasting glucose level, weight, waist circumference, blood pressure
• Lifestyle: dietary intake (food diary), fat intake, fibre intake, physical activity
• Psychological: Diabetes risk perception
Selection Measure

- Diabetes Risk Score (Lindstrom & Tuomilehto, 2003)
- Age
- BMI
- Waist circumference
- Physical Activity
- Fruit and vegetables intake
- BP medication
- High blood glucose history
- Family history
Diabetes Risk Scores:

- **< 7**: small risk: approximately 1/100 develops type 2 diabetes during next ten years
- **7-11**: *slightly elevated risk*: approximately 1/25 develops type 2 diabetes during next ten years
- **12-14**: *moderate risk*: approximately 1/6 develops type 2 diabetes during next ten years
- **15-20**: *high risk*: approximately 1/3 develops type 2 diabetes during next ten years
- **More than 20**: *very high risk*: approximately 1/2 develop type 2 diabetes during next ten years
Physical Activity Schedule

Draw a line for each 10 minutes of physical activity during the week. Also tell how you have found yourself.

<table>
<thead>
<tr>
<th>Day</th>
<th>Walking, Biking, Swimming</th>
<th>Shoveling snow, Chopping wood, Beating rugs, Heavier garden work</th>
<th>Gymnastic exercises, weight lifting</th>
<th>Volley ball, Tennis, Other ball games</th>
<th>Nordic pole walking, Skiing, (Exercise) biking</th>
<th>Other</th>
<th>How do you find yourself?</th>
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Name: ___________________________________________  Group ID: _______________________
Eating habits
Evaluate and mark with a cross all your meals during the week. If you had snacks, tell also **what** they were.

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Self-reported questionnaire (exercise)

1. Considering a 7-day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time (write in each blank the appropriate number)
TIMES PER WEEK

a) STRENUOUS EXERCISE (HEART BEATS RAPIDLY)
(i.e. running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

b) MODERATE EXERCISE (NOT EXHAUSTING)
(i.e. fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

c) MILD EXERCISE (MINIMAL EFFORT)
(i.e. yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)
2. Considering a -day period (a week), during your leisure-time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

- OFTEN      SOMETIMES     NEVER/RARELY
Intervention Content

• Absetz et al., 2007
• Six, 2-hour group sessions over 8 months
• 5 key goals:
  – Less than 30% of total energy intake from fat
  – Less than 10% of total energy intake from saturated fat
  – At least 15g of fibre/1000kcal
  – At least 4 hours/week moderate physical activity
  – More than 5% weight reduction
Intervention Protocol

- **Session 1**
- Learning to know one another [ice-breaking, general introduction of facilitator, program overview]
- Rules for group work [establish ground rules, expectation and objectives]
- Discussion on current beliefs: How does life-style influence health?

- Introduction: Diabetes, risk factors, effects, prevention
- Reflective discussion and re-evaluation of beliefs
- Exercise: Dream – where do we want to be in 3 months
- Tools to make dream come true: goals, planning, homework [how to set achievable goals, be-goals versus do-goals]
- Homework assignments: food diary, PA schedules, examples of difficult and easy situations (identify barriers)
Intervention Protocol

- **Session 2**
- Returning food diaries
- Introduction: Prevention really works
- Evaluation of own behaviour: PA schedules, fat & fibre tests
- Discussion: own habits vs. preventive goals
- Role model stories: what contributes to success?
- Discussion: analysis & re-attribution of previous experiences
- Homework assignment: preparation for goal setting, PA and eating habit schedules
- Discussion: barriers for group work
Intervention Protocol

• **Session 3**
• Feedback from the PA schedule
• Introduction: health effects of PA
• Goal setting & planning:
  – WHAT: are the goals concrete, positive, attainable, developing?
  – Short-term WHERE, WHEN, HOW, EQUIPMENT
  – Feedback: difficult and easy situations
• Homework assignments: feedback and reinforcement, PA and eating habit schedules
• Possibilities for PA in local community
Intervention Protocol

- **Session 4**
- Food choices: feedback from food diaries
- Introduction: How to eat healthy
- Goal setting & planning:
  - WHAT: are the goals concrete, positive, attainable, developing?
  - Short-term WHERE, WHEN, HOW, EQUIPMENT
  - Feedback: difficult and easy situations
- Exercise: How to make favourites lighter
- Homework assignment: positive feedback in getting social support, PA and eating habit schedules
Intervention Protocol

- **Session 5**
- Discussion: evaluating and refining goals
- Discussion: routines – have they already changed? PA schedule, fat & fibre tests
- Intermediate goals
- Exercise: how to overcome barriers / use resources in maintaining behaviour change
- Discussion: future goals
- Discussion: Evaluation of the group work
Outcome measures: Implementation

• Cultural and linguistic appropriateness

• Participation
  – Completion rate
  – Attrition rate
  – Barriers of participation

• Implementation
  – Duration
  – Mode of delivery
  – Content
Outcome measures: health behaviours

• **Primary**
  – Intention, action planning
  – Physical activity
  – Diet
  – Risk perception

• **Secondary**
  – Waist circumference
  – Blood glucose
  – Weight
Expected Outcomes

- Feasibility and transferability of the program will be determined (e.g., to SA or other middle income countries in the region?)
- Modified set of intervention materials for Malaysia
- Differences between before and after the program for the intervention group
- More improved behavioural outcomes for intervention group than controls