

# The effectiveness of group dietary counselling among non insulin dependent diabetes mellitus (NIDDM) patients in resettlement scheme areas in Malaysia

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A study was undertaken in FELDA (Federal Land Development Authority) resettlement scheme areas in Pahang, Malaysia, to determine the effectiveness of group dietary counselling in motivating diabetic patients to achieve good dietary habits, and weight and diabetes control. Sixty-one non-insulin dependent diabetes mellitus (NIDDM) patients were randomly assigned to either the experimental or control group. The experimental group received six sessions of group dietary counselling over 5 months and the control group received mass media diabetes-educational program during the same period. The one hour group dietary counselling sessions discussed general knowledge of diabetes, food groups for meal planning, the importance of dietary fibre-rich foods, types of fat in food, exercise and weight control. The experimental group met monthly with a dietitian as a counsellor. Effectiveness was assessed by improvement in food choice, and decline in percentage glycated haemoglobin (total HbA1) or body mass index (BMI). Measurements were made at a baseline visit, every two months during the six month program, and six months afterwards. Patients in the experimental group improved their food choices, resulting in a healthier diet high in unrefined carbohydrates and dietary fibre rich foods, and low in fat. There were significant reductions of their percentage total HbA1 levels and BMI following the counselling sessions, which decreased further six months after the program compared with patients in the control group. Thus group dietary counselling is effective in motivating NIDDM patients to achieve better food choice, and related weight and glycaemic control in a Malaysian setting.

**Key words:** Non-insulin dependant diabetes mellitus, Malaysia, Pahang, diabetes education, group dietary counselling, Malay, Chinese, Indian, glycaemic control, HbA1, weight, BMI

## Introduction

Malaysia is a developing country of 13 states located within the latitude 0° to 7°N and longitude 100° to 119.5°E. It consists of Peninsular Malaysia in the west, and Sabah and Sarawak on the Island of Borneo, and has a tropical climate. The community consists of 3 major ethnic groups- 62% Bumiputera, 29% Chinese and 8% Indian (Department of Statistics, Malaysia). Socio-economic development in Malaysia has resulted in significant changes in lifestyles of its communities. This has caused a high prevalence of non-communicable diseases in Malaysia, particularly diabetes mellitus. Prevalence of diabetes mellitus varies amongst ethnic groups with 16% among Indian's and 4.7% among Malays<sup>1</sup>. The prevalence among Malays has been associated with development of socioeconomic status with 2.8%, 6.7% and 8.2% in traditional villages, FELDA (Federal Land Development Authority) resettlement scheme areas and urban areas respectively<sup>2</sup>. There are limited data on the prevalence of diabetes mellitus among Chinese in Malaysia.

Preferred food advice for diabetic patients has been a controversial issue for many years. Those with diabetes need an understanding of diet to maintain reasonable weight and body composition, reduce blood glucose and lipid levels, and delay the chronic complications of diabetes<sup>3</sup>. The usual nutrition education techniques used in Malaysia, particularly in outpatient diabetic clinics, are either individual or group dietary counselling conducted by a dietitian. However, most dietitians are located at

the general and main district hospitals. Thus, diabetic patients in rural areas, particularly in traditional villages and FELDA resettlement areas are not exposed to formal nutrition education programs or dietary counselling from dietitians.

Group nutrition counselling is a process intended to help patients to develop and keep good eating habits<sup>4</sup>. Although each diabetic patient has different personal characteristics and lifestyles, group counselling can allow peer interaction and support to learn and motivate. The present study aimed to assess whether group dietary counselling for diabetic patients in Malaysian rural resettlement areas could help them improve daily food intake and attain reasonable weight and blood glucose levels.

## Methods

### Setting and subjects

The study was located in the FELDA village of Sungai Koyan and the control group was in another resettlement area, FELDA Tersang to reduce the possibility of mutual contamination by the experimental group. Both FELDA resettlement areas are located in Raub, Pahang State and lacked either a dietary counselling or nutrition education program. They represent a federal government land development scheme to help impoverished communities,

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particularly the middle aged. FELDA Sungai Koyan was developed in 1972 whereas, FELDA Tersang was developed in 1979. Families were given a plot of land for planting palm oil trees to provide income. Infrastructure, such as houses, roads, electricity and piped water are provided. The average monthly income of settlers in FELDA Sg. Koyan is \$1506 (Malaysian dollar) and FELDA Tersang is \$489. Both FELDA areas have a community health centre with a doctor, dentist and nurses. FELDA Sg. Koyan Health Centre is under the supervision of the Kuala Lipis Health Office, and FELDA Tersang Health Centre is under the Raub Health Office.

Patients were chosen randomly from a list of NIDDM patients at each community health centre. Sixty-one patients of Sg. Koyan Health Centre and 16 patients of Tersang Health Centre consented to participate in the study. There were 36 males and 25 females in the experimental group and 5 males and 11 females in the control group. The mean age was 52±7 years and 42±9 years old, respectively. The mean number of years with diagnosed diabetes was 6±6 in the experimental group and 4±4 years in the control group.

### Measures

A sociodemographic questionnaire was administered at baseline. Pattern of food intake, anthropometry and metabolic control were assessed at baseline, every two months during the program, and six months afterwards. Food intake was assessed by a combination of the techniques of 24-hour dietary recall and food frequency questionnaire<sup>6</sup>. Three day's food intake was recalled, covering 2 weekdays and 1 weekend day. The intake of foods high in refined and unrefined carbohydrate, fat and cholesterol were checked by the food frequency questionnaire<sup>6</sup>. Food intake data were converted into macronutrients using the Malaysian Food Composition Tables<sup>7</sup>. Weights and heights were measured using SECA spring balance and a microtoise, respectively. BMI was calculated using Quetelets index, where a value equal or greater than 25kg/m<sup>2</sup> was considered overweight<sup>5</sup>. Blood samples were obtained from patients to measure total HbA1 levels using microcolorimetric method.

### The intervention program

Patients in the experimental group were divided into 6 smaller groups of 10 members of similar range of BMI. Each group met monthly for six sessions of group counselling with the dietitian as a counsellor. Discussions centred on the topics shown in Table 1. Patients in the control group received conventional medical treatment from a doctor at the community health centre. During the study, a series of pamphlets on dietary management of diabetes were provided, they viewed a video on low fat cooking methods, and attended a talk by a dietitian.

**Table 1.** The outline of topics given during group counselling.

Month	Session	Topics
1	1	Definition and symptoms of diabetes
1	2	Food groups and meal planning; body mass index
2	3	Snacking, roles of dietary fibre and exercise in diabetes management
3	4	Dietary fats and cholesterol
4	5	Individual meal planning
5	6	Complications of diabetes

### Dietary recommendation

Patients in both experimental and control groups were taught how to select either a 1500 kcal or 1800 kcal diet low in fat and high in unrefined carbohydrate, with avoidance of large meals depending on their current intake and BMI status. The diet recommended consisted of 55-60% of energy from carbohydrate, 25-30% from fat and 10-20% from protein<sup>8</sup>.

### Statistical analysis

The data were analysed using procedures from the SAS statistical package<sup>9</sup>. The paired t-test was used to determine the difference between pre and post-intervention measurements. Statistical significance was assessed at a level of less than 0.05. All results are expressed as means ± standard error (SE).

### Results

#### Body mass index (BMI)

Table 3 demonstrates that patients in both groups were overweight at baseline visit. Patients in the experimental group lowered their BMI as a result of the counselling program ( $p < 0.05$ ) and this persisted six months after the program. There was no difference in BMI of patients in the control group at any time.

**Table 2.** Changes of food intake following the intervention program.

	Experimental group	Control group
<b>Energy (Kcal)</b>		
Pre intervention	1349 ± 52 (n=55)	1839 ± 48 (n=16)
Post intervention (at 6 months)	1529 ± 34* (n=55)	1820 ± 52 (n=13)
6 months after intervention	1966 ± 53* (n=56)	2040 ± 37* (n=16)
<b>Percentage of CHO</b>		
Pre intervention	48 ± 1.7 (n=55)	48 ± 1.9 (n=16)
Post intervention (at 6 months)	50 ± 1.1* (n=55)	50 ± 1.4* (n=13)
6 months after intervention	55 ± 0.5* (n=56)	53 ± 1.1* (n=16)
<b>Percentage of fat</b>		
Pre intervention	28 ± 1.5 (n=55)	33 ± 1.8 (n=16)
Post intervention (at 6 months)	24 ± 0.8* (n=55)	31 ± 2.2 (n=13)
6 months after intervention	29 ± 0.4* (n=56)	30 ± 1.0 (n=16)

\*  $p < 0.05$ ; significantly different compared to the baseline data. CHO; carbohydrate.

**Table 3.** Changes of BMI (kg/m<sup>2</sup>) following the intervention program.

	Experimental group	Control group
Pre intervention	29.4 ± 0.6 (n=61)	29.9 ± 1.3 (n=16)
Post intervention (at 6 months)	27.3 ± 0.4* (n=58)	29.4 ± 1.3 (n=13)
6 months after intervention	26.0 ± 0.3* (n=57)	28.5 ± 1.1 (n=15)

\*  $p < 0.05$ ; significantly different compared to pre intervention

#### Glycated haemoglobin (total HbA1)

Following the program, patients in the experimental groups showed significant reductions in total HbA1 with a further decrease six months after the program (Table 4) compared to patients in the control group.

**Table 4.** Changes of HbA1(%) following the intervention program.

	Experimental group	Control group
Pre intervention	7.5 ± 0.3 (n=61)	9.5 ± 0.4 (n=16)
Post intervention (at 6 months)	7.2 ± 0.2* (n=58)	9.9 ± 0.8 (n=13)
6 months after intervention	6.0 ± 0.2* (n=57)	9.0 ± 0.5 (n=15)

\*  $p < 0.05$ ; significantly different compared to pre intervention.

### Pattern of food intake

At baseline, the main energy intake in both groups was high in refined carbohydrate and saturated fat (Table 2). Both groups increased their energy intake after the program. Patients in the experimental group increased the percentage of energy consumed daily from complex (unrefined) carbohydrate. In particular, the foods with increased consumption were brown rice and wholemeal bread or biscuits and with decreased consumption, sweet cakes and table sugar. Intakes were higher in dietary fibre and lower in saturated fat following the counselling sessions and six months after the program in the experimental group. At the higher energy intake, patients in the control group continued to consume foods high in refined carbohydrate and fat.

### Discussion

Participation in group dietary counselling significantly helped the diabetic patients to change their dietary habits and reduce body mass index and percentage glycated haemoglobin not withstanding the management complexity of dietary counselling in this study<sup>4</sup>. The findings are consistent with other studies<sup>10-12</sup>. Black NIDDM patients in rural areas of Alabama decreased their BMI and HbA1c following a group diabetes education program<sup>10</sup>. Warren-Boulton *et al.*<sup>11</sup> found a significant decline in HbA1c following group intervention conducted among adolescents and young adults. Older NIDDM patients whose spouses participate in group educational program show a significant improvement in HbA1c and weight<sup>12</sup>.

Group counselling assists patients in changing food choice, according to social-psychological research, facilitated by a group decision process<sup>13</sup>. The dietitian, as counsellor, presents information, provides encouragement and support as patients slowly make changes in their daily eating habits. Group members are aware that others have similar problems, and this is helpful to individuals that might not do as well in individual counselling<sup>14</sup>. Members practice the new behaviour they learn in a group before trying it in daily life. Positive verbal reinforcement is given by the dietitian and group members to those who lose weight or have improved blood glucose readings, with encouragement to maintain the good results<sup>15</sup>.

Energy intake and expenditure should be modified in diabetic patients to maintain normal weight or promote weight loss in overweight patients. Patients in the experimental group increased their energy intake with high unrefined carbohydrates (and were also encouraged to increase energy expenditure by exercise). A reduced energy intake can indeed reduce blood glucose levels<sup>16,17</sup>. Patients in the experimental group without reduced energy intake experienced a reduction in BMI indicating body fat loss, and a decline in percentage total HbA1c levels as an indicator of prevailing blood glucose level reduction. Body fat reduction improves the primary problem in NIDDM patients, namely insulin

resistance, by enhancing muscle glucose uptake and reducing hepatic glucose output<sup>18</sup>. Patients in the experimental group maintained a higher percentage of carbohydrate intake by lowering their fat consumption. Conversely, a carbohydrate intake of 55% to 60% of total energy helps reduce fat intake. Cooking method preferences changed to one lower in fat such as baked, grilled, steamed and greater use of soups. More fish, chicken without skin, lean meat, and low fat milk were chosen. Further, dietary fibre intake from fresh green vegetables and fruits increased. High-carbohydrate diets rich in dietary fibre have been shown to reduce blood glucose levels<sup>19</sup>.

Patients in the experimental group were also encouraged to be physically active by walking briskly and engaging in other aerobic exercises. They were introduced to light aerobic exercise during the third session of counselling. Previous studies have shown that exercise decreases plasma glucose in NIDDM patients<sup>20</sup> possibly related to an increase insulin sensitivity in muscle and other tissues<sup>21</sup>.

There were no changes in BMI or percentage total HbA1c in the control group. They had limited interaction with dietitian or doctor. Further, there was no arranged peer interaction or support among them. Although an appropriate diet may be recommended, body fat and blood glucose may fluctuate because the expected outcomes of dietary modification may be affected by such factors as age, lifestyle, other medical conditions, and ability to adhere.

There were possible biases in this study due to attrition, refusal to give blood samples and incomplete dietary recall. Six patients did not complete the study. Two died of myocardial infarction, one suffered from a stroke, and 3 patients were lost during follow up. Nevertheless, the findings encourage the further use of available, practical, low cost method of diabetes care which group counselling provides.

### Conclusion

Communities which are transitional between developing and socio-economically advanced lifestyles, can, by being physically active and even increasing energy intake with less fat (< 30% energy) decrease body fatness (have lower BMI as an indicator of lower body fatness) and less hyperglycaemia (lower percentage total HbA1c) in those with NIDDM as a result of participation in group dietary counselling.

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Kajian ini dilakukan di kawasan-kawasan rancangan penempatan semula FELDA (Lembaga Pembangunan Tanah Persekutuan) di Pahang, Malaysia untuk menentukan keberkesanan kaunseling kelompok dalam menggerakkan pesakit diabetes mencapai tabiat pemakanan, dan pengawalan berat badan dan diabetes yang baik. Enam puluh satu orang pesakit tidak bersandar insulin (NIDDM) dibahagikan secara rawak kepada kumpulan eksperimen dan kumpulan kawalan. Kumpulan eksperimen menerima 6 sesi kaunseling kelompok pemakanan dan kumpulan kawalan menerima program pendidikan diabetes melalui media massa pada waktu yang sama. Satu jam kaunseling kelompok pemakanan membincangkan mengenai pengetahuan am diabetes, kumpulan makanan untuk perancangan makanan, kepentingan serat dan senaman, pengawalan berat badan, dan jenis lemak di dalam makanan. Kumpulan eksperimen bertemu sebulan sekali dengan dietitian sebagai kaunselor. Keberkesanan ditentukan dengan memeriksa perubahan pemilihan makanan dan penurunan paras hemoglobin terglikasi (HbA1c total) dan indeks jisim tubuh (BMI). Pengukuran-pengukuran dilakukan ketika lawatan asas, setiap dua bulan dan 6 bulan selepas program. Pesakit-pesakit di dalam kumpulan eksperimen mengubah pemilihan makanan kepada diet yang sihat dan seimbang yang mengandungi banyak karbohidrat kompleks dan serat, dan kurang lemak. Ini menyebabkan penurunan paras HbA1c total dan BMI yang jelas sepanjang sesi-sesi kaunseling, dan ia menurun seterusnya pada 6 bulan selepas program, berbanding dengan pesakit-pesakit di dalam kumpulan kawalan. Penemuan-penemuan ini menunjukkan kaunseling kelompok pemakanan berkesan dalam menggerakkan pesakit NIDDM mencapai pemilihan makanan, pengawalan berat badan dan diabetes yang baik.

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## 馬來西亞新安居的非胰島素依賴性糖尿病人 (NIDDM) 對膳食勸導的效果

### 摘要

作者在馬來西亞 Pahang 國家土地發展當局 (FELDA) 研究了新安居的糖尿病人，測定集體膳食勸導對促進糖尿病人的良好飲食習慣，控制糖尿病和體重的效果。該研究選用 61 位非胰島素依賴性糖尿病人 (NIDDM) 為對象，隨機分成實驗組和對照組，實驗組在 5 個月內接收 6 個單元的集體膳食勸導，而對照組則在同一時期內接收糖尿病教育計劃。六次為時一小時的集體膳食勸導為：討論糖尿病的一般知識，為膳食計劃提供食物種類，富含纖維食物的重要性，食物中脂肪的類型，體育鍛煉和控制體重。實驗組每月與營養師 (勸導者) 進行見面一次，用食物選擇的改善，糖化血紅蛋白 (HbA1) 百分數的下降或體重指數 (BMI) 進行評估。所有病人試驗前測定一次，試驗的首六個月每兩個月測定一次，後六個月只測定一次。結果顯示，實驗組病人食物選擇改善，膳食中非精制的碳水化合物和纖維素增加，低脂肪，在勸導後病人的總 HbA1 百分數和 BMI 明顯減少，與對照組比較，六個月後有進一步下降。因此作者得出結論，在馬來西亞，集體勸導可促使 NIDDM 病人選擇較好的食物，獲得較好的體重控制和較低的糖化血紅蛋白水平。

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