Empowerment Approach and Dietary Self-Management in Rural Thais with Impaired Fasting Glucose

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Abstract

Background: A two-group-quasi-experimental design was carried out to test whether nutrition education with an empowering approach can motivate dietary self management among rural Thais with impaired fasting glucose.

Methods: Through screening for pre-diabetes in Phetchabun province, 90 subjects were recruited from rural district with 44 in the intervention group and 46 in the control group. The empowerment process consisted of a total of six sessions that covered active learning in nutrition knowledge and skill practice in dietary self-management. Empowerment outcomes and related health indicators were assessed at three interval times in a 1 year follow up.

Results: Critical thinking ability and participatory behavior were enhanced through a supportive environment. Subjects increase their self efficacy in tailoring a meal plan with proper caloric intake and in the decision of food choice. This resulted in better related health outcomes. The percentage of subjects with fasting blood glucose less than 100 mg/dl was significantly higher in the intervention group compared with the control group, 36.4 [95%CI 22.1-50.6] vs. 10.9 [95% CI 1.9-19.9]. In group of BMI ≥ 23 kg/m², the percentage of subjects who lost weight ≥ 5 % from baseline value was significantly higher in the intervention group, 48.3 [95% CI 30.1-66.5] vs.10.8 [95% CI 0.8-20.8].

Conclusions: Results from this study suggested that nutrition education with an empowering approach is possible among rural Thais. Improvement of related health outcomes was shown. There may be a delay in the realization period in the case of some individuals relative to diabetes mellitus. Further study is needed to ensure healthy eating sustainability.

Keywords: Dietary self-management, Impaired Fasting Glucose

Abbreviations: IFG, impaired fasting glucose; FBG, fasting blood glucose; PCU, primary care unit; IGT, impaired glucose tolerance; FGD, focus group discussion.

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Introduction

Diabetes is a growing global health problem. Prevalence for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030 (1). Diabetes increases risk of a number of serious health problems: coronary heart disease, stroke, and kidney disease. It is one of the leading causes of death in most high-income countries and is epidemic in many developing countries. Increasing numbers of type 2 diabetes are associated with economic development, aging, urbanization, diet and other lifestyle changes (2). The majority of people with diabetes in developing countries are in the 45 to 64 year age range while in developed countries are more than 64 years of age (1). The conditions of impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) are known as “pre-diabetes”. People with these conditions have a higher risk for developing diabetes and an increased risk of cardiovascular disease (3).

Thai National Health Examination Survey IV (4) reported the prevalence of diabetes in Thai people aged ≥15 years at 6.9%, in males 6.0%, in females 7.7%. The prevalence of impaired fasting glucose (IFG) is 10.7%, in males 11.8%, in females 9.5%. Prevalence rates of diabetes were greater in urban compared with the rural area. Prevalence of obesity (BMI ≥ 25 kg/m2) figured at 28.4% in males and 40.7% in females. Prevalence of the male with a waist circumference ≥ 90 cm figured at 18.6% and females with a waist circumference ≥ 80 cm figured at 45%. It may link to the cardiovascular disease burden in Thailand. High health care costs and serious consequences of the disease affected the quality of life of the patients, families, and communities.

The pre-diabetic is in a high risk group to develop to diabetes mellitus. To prevent diabetes and its complication, intensive lifestyle interventions is considered to be helpful. Both diet with and without exercise is a significant treatment targeted in these preventive trials (5-8). Preventive treatment early in the course of the diseases reported to be of benefit (2). Dietary modification and exercise programming when implemented for high risk people in the community setting or real life situation need more consideration to achieve positive behavioral change (9-11). It is challenge to set up strategy and design of intervention program for pre-diabetes in rural people with lower educational levels and socioeconomic conditions. The way of life of this population group is influenced by urbanization. Their food consumption patterns tend to an imbalanced diet with high caloric intake and sparse physical activity. The pace of urbanization is expected to continue with consequences on health. The most effective means to reduce the disease burden and improve the quality of life should be based on one’s own capability especially in daily dietary management and physical activity. Believing that people can be capable of making their own choices and decisions promotes empowerment (12-14).

An important factor for one to succeed in positive behavioral change is self efficacy; that is they should perceive themselves to be competent to perform such a specific behavior (15). An individual’s confidence in an ability to change can result in a persistent effort to regularly execute new ways of healthier eating.
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given time. Provision of health information and skill is necessary to gain control. Empowerment was defined “as the capacity to define, analyze and act on your own problems” (16). Promoting empowerment means believing that people are capable of making their own choices and decisions (14). The empowerment approach is a perspective on practice that provides “ways of thinking about and doing practice” (13). Empowerment education model consists of 5 steps: experiencing, naming experiencing, analysis, planning and doing (17).

Recommendation from American Diabetes Association 2010 for pre-diabetes or diabetes promotes weight loss 5-10% for all overweight or obese individuals with caloric restriction from low-carbohydrate, low-fat diet and increase in dietary fiber. Regular physical activity at 30 min/day, is recommended. Nutrition education with an empowering strategy and intervention was carried out in this study. Motivation to change and practice for increasing self efficacy was included. The aim of this study was to investigate the notion that the empowering approach can motivate rural pre-diabetes Thais to be understood in dietary self management leading to disease prevention.

Methodology

Study design and subjects

Duration of this quasi-experimental study was from March 2010 to the last intervention in September 2011. All subjects reside in the village of sub district, Sri-Thep district, Phetchabun province which is located in central part of Thailand. At the provincial level, DM prevalence increased from 2.1% in 2007 to 3.4% in 2011. 77% of the population (442,847 subjects) aged ≥35 years were screened for pre-diabetes, a figure of 4.9% was found (18). In this study, four sub districts in rural area were randomly selected as control or intervention area. There is no difference in physical and socio-economic condition in these two areas and they are 15 kilometers away from each other. Focus group discussion was employed for formative information of people and community context. Since the study is a two-group- quasi-experimental design, the formula for two independent groups was used. Based on 95% power of test, with statistical confident at 95% and the expected effect size in three fourth of standard deviation of primary outcome measurement, the calculated sample size is 47 per group. 629 subjects aged 35-65 years registered for screening of diabetes mellitus and hypertension. Those with a previous diagnosis of diabetes mellitus, a history of liver or kidney and cardiovascular disease were excluded. Fasting blood glucose from the finger tip was determined by an Accu-Check Advantage home glucose monitor model reading (plus 5.2%) to get the value that can be compared with fasting plasma glucose (FPG) (19). 133 subjects were found with impaired fasting glucose (FPG was 100-125 mg/dl). 118 subjects were confirmed to not have diabetes mellitus by the 2-hr oral glucose tolerance test values of less than 200 mg/dl. 118 subjects were confirmed to not have diabetes mellitus by the 2-hr oral glucose tolerance test values of less than 200 mg/dl. 102 subjects agreed to attend the research project with 53 subjects were in control area (the control group) and 49 were in the intervention group. The control group received general knowledge at the beginning of the project about the importance of food and nutrition, weight control, and physical activity in the prevention of diabetes.
The Human Ethics Committee of Thammasat University approved the protocol and all participants gave written informed consent.

**Intervention**

Nutrition education with empower strategy and intervention all were carried out in this study. The process covered active learning in nutrition knowledge and skill practice in dietary self-management. It consisted of a total of six sessions developed by the researcher. Sessions 1-6 of nutrition education were applied throughout the study at wk 4, 11, 18, 22, 35, and 52. They were applied after all measurement data were collected in each period. Subjects recorded their data in a personal workbook. Then they interpreted same by comparison with normal values and the previous ones. As for provision of knowledge, subjects participated in the interactive learning about the pre-diabetic condition; disease prevention by dietary self-management; knowledge of food groups, food exchange list, and how to make an eating plan with quantified portions of food intake. A workbook was used as resource information and as a series record of personal data. Food serving size and how to make a food exchange were demonstrated and exercised repeatedly in all 6 sessions as well as the serving size of rice in the lunch activity. Subjects set up goals for weight reduction (<5%) and glycemic control (<100 mg/dl). They calculated their energy need from weight, height, and physical activity and made tailor eating plans to achieve goals. Portion sizes of each food group were planned and interchanged based on carbohydrate counting from a food exchange list. Local food dishes and subjects’ own menus were used as a learning model of suitable portion size together with a model food exchange list. Subjects executed their eating plan to cope with their daily life food intake and occasional excesses. The ‘can do’ or ‘cannot do’ as planned was evidenced according to their anthropometric and biochemical data. They revised the ‘how-to-do’ from their peers and retried the activity. Topic/activity titles, content focus, and timing of intervention in each session appear in Table 1.
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Table 1 Topic titles, content focus, and timing of implementation of each session.

<table>
<thead>
<tr>
<th>Topic titles</th>
<th>Content focus</th>
<th>Session</th>
</tr>
</thead>
</table>
| 1. Increase awareness and emphasize reason for dietary change | Interactive learning:  
- Motivation of self efficacy in management  
- Condition of Pre-DM/DM, its contribution to health and quality of life  
- How to prevent DM by dietary self-management | ✓ - ✓ - - - |
| 2. Set up goals and learn how to achieve goals    | Subjects set up goals for 5% weight reduction and blood sugar <100 mg/dl. Interactive learning: dietary modification to achieve goals | ✓ - - - - - |
| 3. Increase knowledge and skills                 | Increase knowledge of food groups and nutrients  
- Subjects practice skill for counting serving size by using food model, local dish, and subject's own menu.  
- In lunch activity, subjects practice skill in estimating serving size of rice. | ✓ ✓ ✓ ✓ ✓ ✓ |
| 4. Consideration of data changes                 | Subjects record their anthropometric and biochemical data.  
Participating in a dialogic discussion with their peers  
- Subjects learn to interpret data by comparison with normal values and previous data.  
- Subjects discuss causes of change of their data relative to dietary intake and other lifestyle change.  
- Subjects find out barriers to positive change and express how to solve these problems. | ✓ ✓ ✓ ✓ ✓ ✓ |
Table 1 (continued)

<table>
<thead>
<tr>
<th>Topic titles</th>
<th>Content focus</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Calculation for BMI</td>
<td>Subjects do by themselves with peers, mindful of weight reduction as disease prevention.</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>6. Energy requirement and eating plan</td>
<td>Subjects calculate their energy requirement based on weight, height, and physical activity. Subjects learn details of tailor made eating plan using food exchange list for weight management and glycemic control.</td>
<td>✓ - - - - -</td>
</tr>
</tbody>
</table>

Evaluations of empowerment outcomes and related health indicators

Empowerment outcomes and related health indicators were evaluated. Both qualitative and quantitative methods are used. Framework of empowering strategies focuses on capacity-building for individuals and groups and created environmental support (12, 20). The daily nutrient intake was assessed by a 3-day food record at wk 0, 28 (6 months from baseline), wk 40 (9 months from baseline) and wk 53 (12 months from baseline). Food portion size was estimated by the subject using standard household measuring units such as a ladle of rice, a tablespoon of meat, a teaspoon of oil and sugar, and so on. Anthropometric data inclusive of height, body weight, and waist circumference were assessed at wk 0, 4, 11, 18, 22, 28, 40, and wk 53. BMI was calculated as weight in kilograms divided by height in meters squared. Biochemical data; blood glucose level was assessed at wk 0, 4, 11, 18, 22, 28, 40 and wk 53 from finger tip after an 8-hr overnight fast. Diabetes was diagnosed by a FPG \( \geq \) 126 mg/dl or a 2 hr OGTT \( \geq \) 200 mg/dl. The data for subjects who progressed to diabetes were not followed up on. Subjects with complete data were analyzed. There were 44 subjects in the intervention group and 46 subjects in the control group.

Statistical analysis

Data were reported in mean + se for dietary intake, anthropometric data, and biochemical data. Analysis of covariance was used as adjustment on the mean comparison between control and intervention groups across the intervention period. All the statistical tests
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are based on 95 percent confidence level. A chi-square test was used to compare percentage values of demographic data between the intervention and the control group. Statistical significance test was considered at 0.05.

Results

Qualitative study is described and presented in complement with quantitative results.

Formative information

Formative information from FGD was reported as follows: Almost all subjects resided in the same village and were in close contact, some of them being relatives. Almost all of them earn money from agriculture inclusive of rice or sugar cane plantation cultivation. There is seasonal variation in heavy activity and leisure time that involved their energy expenditure. They have 3 meals a day with almost all subjects cooking for themselves especially dinner. Plain rice and sticky rice are their staple foods. Only one subject in the intervention group consumed unpolished rice. Generally, vegetable oil is used for cooking. Fish is the main source of protein that is available from natural water resources. Other animal protein and other food items are procured from the market held 3 days a week in the village. There is primary care unit (PCU) located in the community for health service at the sub district level.

Subject baseline demographic data

Subjects in the intervention group consisted of 17 men and 27 women with mean age (+SE) were 52.7±0.4 years while the control group consisted of 12 men and 34 women with mean age amounting to 52.9±1.1 years. In the intervention group, there were 27.3% with an age range of ≤50 years, 86.4% ≤ being primary school attendees, and 79.6% were in agriculture while in the control group the figures were 32.6%, 82.6%, and 58.7% respectively. There were no significant differences in mean age and percentage values between the two groups.

Empowerment outcomes

The process is exercised in the domain of personal empowerment through group participation with a supportive environment. Collective efficacy, critical thinking ability, and participatory behavior were evidenced from actual contact as described follow. First of all this research project has encouraged subjects to read i.e., a personal workbook, to write and to record their data as well as to enhance critical thinking in self data consideration. Listening and discussing/reasoning were encouraged in group discussions with their peers. Subjects’ numeracy skill was enhanced with simply calculation and quantitative information. Knowledge, information, and numeracy skill increase their self efficacy in tailoring a meal plan with proper caloric intake and in the decision of food choice. When subjects executed the plan and evaluated the result, they used the evidence from anthropometric and biochemical data for self-evaluation. Subjects’ skill in analysis, planning/action and self-evaluation were developed with evidence-based know-how. These activities were done repeatedly in sessions 1-6. A supportive environment was provided from empowerment through groups: This group was made up of subjects.
with the same pre-diabetic condition. A dialogical approach was used in sessions 1-6, and questions were posed to encourage subjects to think through thus promoting discussion of their data in an overall related picture. Dietary intake and physical activity were discussed in detail. They expressed barriers of change and how to solve these problems. Peer groups helped each other to modify food intake in their context, culturally-based and family-based. These processes developed critical consciousness. Friendly talk with resourceful support helped the subjects to interact without stress, to feel free to share their personal data and experiences, and also their feelings and thoughts. From success or failure case sharing, subjects were able to figure out their own problems and how to overcome barriers. It emphasized the assumption that success comes from personal responsibility for change. Barriers and intention to perform as addressed by subjects in the intervention group appear in Table 2.

Table 2  Barriers and intention to perform as addressed by subjects in the intervention group

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Intention to perform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Often join the party with excess amount of food intake or drink served</td>
<td>No intake of soft drink; avoid or reduce amount of sugar or fatty food; plan to join the party with mindful of how much more caloric intake they could have that day</td>
</tr>
<tr>
<td>Preference for some fatty food</td>
<td>Reduce intake of bacon, baked items, high fat meat</td>
</tr>
<tr>
<td>Preference for sweet fruit or drink</td>
<td>No intake of soft drink; have portion of fruit intake as meal plan or exchange with rice portion</td>
</tr>
<tr>
<td>Alcohol intake - alcohol intake in male subjects is more serious issue than female</td>
<td>Reduce portion or abstain, restrict daily alcohol consumption to less than 50 cc per day</td>
</tr>
<tr>
<td>Large amount of corn or peanuts or tamarind as snack</td>
<td>Decrease intake of these snacks and think of food exchange list to have proper caloric intake each day</td>
</tr>
<tr>
<td>Food condiment is almost always used in substantial amount.</td>
<td>Less condiments added i.e. sugar/oil/salt/fish sauce</td>
</tr>
<tr>
<td>Preference for coffee 3 in 1</td>
<td>Change to self adjusted coffee with less sugar and cream added. After had been changed, individuals try 3 in 1 again and found that it is too sweet.</td>
</tr>
</tbody>
</table>
Nutrient intake, anthropometric data, and biochemical data

Nutrient intake; anthropometric data: weight, BMI, and waist circumference; and biochemical data: FBG at baseline and follow up periods in the intervention and control groups, number and percentage of subjects with FBG less than 100 mg/dl were shown in Table 3.

Significant differences in nutrient intake from baseline are as follow. In the intervention group, a decrease in energy and gram of carbohydrate intake at wk 28, wk 40, and wk 53 and a decrease of dietary fiber at wk 53 was found. In the control group, there was an increase in the percentage of energy from carbohydrate at wk 28 and wk 40 and a decrease of gram of fat, the percentage of energy from fat at wk 28 together with a decrease in the percentage of energy from protein at wk 40. When the intervention group was compared with the control group, significant differences are as follows. At the baseline level, the percentage of energy from carbohydrate was higher and the percentage of energy from fat was lower in the intervention group. As for the corresponding week, energy intake in the intervention group was lower at wk 28, wk 40, and wk 53 while gram of carbohydrate intake was lower at wk 28 and wk 40. The percentage of energy from protein in the intervention group was higher at wk 40 and gram of dietary fiber was lower at wk 53.

There was no significant change from the baseline in weight and the BMI in both groups. Waist circumference in the intervention group was significantly decreased at wk 28, 40, and 53. When compared with the control group,
group, the intervention group was significantly lower in mean weight at wk 28 and wk 53, in BMI at wk 53 and in waist circumference at wk 28. Table 4 shows a subgroup analysis for subjects with BMI ≥ 23 kg/m². At the baseline, the mean weight of the intervention group was significantly higher than of the control group and weight change or weight reduction was significantly higher at wk 28, 40, and 53. The percentage of subjects who lost weight ≥ 5 % from baseline value was significantly higher in the intervention group at wk 53.

FBG was significantly decreased at wk 28 and wk 40 in both groups when compared with baseline value. When compared with the control group, the intervention group was significantly lower in FBG at wk 53 while the percentage of subjects with FBG less than 100 mg/dl was significantly higher, 36.4 vs. 10.9 (Table 3).

Table 3  Nutrient intake, anthropometric and biochemical data at baseline and follow up periods in the intervention and control groups

<table>
<thead>
<tr>
<th>Parameters*</th>
<th>Intervention group n=44</th>
<th>Control group n=46</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BL</td>
<td>wk28</td>
</tr>
<tr>
<td>Energy intake (Kcal/d)</td>
<td>1.57 ± 78</td>
<td>1.17 ± 58</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>284.6 ± 15.1</td>
<td>203.1 ± 12.6</td>
</tr>
<tr>
<td>(Kcal)</td>
<td>[254.6-314.6]</td>
<td>[178.1-228.0]</td>
</tr>
<tr>
<td>Carbohydrate (E%)</td>
<td>74.5 ± 1.2</td>
<td>70.0 ± 1.1</td>
</tr>
<tr>
<td></td>
<td>[72.0-76.9]</td>
<td>[67.8-72.3]</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>24.2 ± 2.3</td>
<td>22.9 ± 1.8</td>
</tr>
<tr>
<td></td>
<td>[19.7-28.7]</td>
<td>[17.8-27.4]</td>
</tr>
<tr>
<td>Fat (E%)</td>
<td>13.6 ± 1.2</td>
<td>16.7 ± 1.0</td>
</tr>
<tr>
<td></td>
<td>[11.4-15.9]</td>
<td>[14.7-18.8]</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>45.0 ± 2.4</td>
<td>38.0 ± 1.8</td>
</tr>
<tr>
<td></td>
<td>[40.2-49.8]</td>
<td>[34.5-41.5]</td>
</tr>
<tr>
<td>Protein (E%)</td>
<td>11.7 ± 0.4</td>
<td>13.2 ± 0.4</td>
</tr>
<tr>
<td></td>
<td>[10.9-12.6]</td>
<td>[12.4-14.1]</td>
</tr>
<tr>
<td>Dietary fiber (g)</td>
<td>8.5 ± 0.6</td>
<td>6.6 ± 0.9</td>
</tr>
<tr>
<td></td>
<td>[7.4-9.6]</td>
<td>[6.8-9.4]</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>65.4 ± 1.6</td>
<td>62.5 ± 0.5</td>
</tr>
<tr>
<td></td>
<td>[62.2-68.7]</td>
<td>[61.6-63.4]</td>
</tr>
<tr>
<td>Body mass index</td>
<td>26.0 ± 0.7</td>
<td>25.0 ± 0.2</td>
</tr>
<tr>
<td>(kg/m²)</td>
<td>[24.7-27.3]</td>
<td>[24.6-25.4]</td>
</tr>
</tbody>
</table>
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Table 3  (continued)

<table>
<thead>
<tr>
<th>Parameters*</th>
<th>Intervention group n=44</th>
<th>Control group n=46</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BL</td>
<td>wk28</td>
</tr>
<tr>
<td>Fasting blood glucose (mg/dl)</td>
<td>104.4±0.8 [102.9-106.0]</td>
<td>98.9±1.4 [96.1-101.6]</td>
</tr>
<tr>
<td>Number and percentage of subjects with fasting blood glucose less than 100 mg/dl</td>
<td>0(0) [49.4-77.9]</td>
<td>28(63.6) [33.0-62.5]</td>
</tr>
</tbody>
</table>

*Mean + SE, number with ( ) percentage and [ ] 95%CI

Table 4 Subgroup analysis for subjects with BMI ≥ 23kg/m²

<table>
<thead>
<tr>
<th>Parameters*</th>
<th>Intervention group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BL (n=29)</td>
<td>wk28</td>
</tr>
<tr>
<td>Mean weight (+ SE)</td>
<td>71.9±1.9 [69.2-75.7]</td>
<td>69.3±1.9 [65.6-72.9]</td>
</tr>
<tr>
<td>Weight change from baseline, Mean (+SE)</td>
<td>-2.67±0.58 [-3.79, -1.54]</td>
<td>-3.09±0.76 [-4.57, -1.60]</td>
</tr>
<tr>
<td>Number and percentage of subjects who lost weight ≥ 5 % from baseline</td>
<td>10(34.5) [17.2-51.8]</td>
<td>10(34.5) [17.2-51.8]</td>
</tr>
</tbody>
</table>

*Mean + SE, number with ( ) percentage and [ ] 95%CI
Discussion

Nutrition education with an empowering strategy and intervention were carried out in this study to find out whether this approach can lead to disease prevention among rural Thais with IFG. Subjects who were informed of IGF and agreed to participate in this education program were recognized as those with awareness of their unhealthy condition. They were thought to need proper knowledge and skills to effect self care. Almost all of them were primary school attendees with a mean age of 52 years old. An empowering approach is a challenge in such a study group. The process of empowerment incorporates interactive learning strategies. The content provided is essential for daily food intake management and to aid in recovery from an unhealthy condition. The effect of the intervention was assessed and the data were compared within a group and between a group. A subgroup analysis was done in subjects with BMI $\geq 23$ kg/m$^2$.

Dietary regimen to achieve weight reduction is a controversial issue. A high-fat diet is believed to promote weight gain from its high energy density. However the studies of a low-carbohydrate diet have resulted in a more pronounced short-term weight reduction compared with a low-energy, low-fat dietary regimen, probably because the achieved energy deficit was larger (21, 22). Dietary assessment revealed that daily energy intake of both group is mainly from carbohydrates (75.4% in the intervention group and 68.5% in the control group at baseline) which is higher than the recommendation (50-55%). Rice and sweet fruit were the main sources of carbohydrates in these subjects. To reduce caloric intake, a proper serving size of rice was provided to tailor the meal plan as well as food exchange of fruit. Subjects agree to consume plain rice instead of sticky rice in at least two meals per day. This may result in weight reduction and decreased fasting blood glucose in the intervention group. However, low protein and dietary fiber intake is probably a consequence of reduction of rice consumption. Rural Thais usually consume rice with items such as a sauce of shrimp paste and chili that is eaten with vegetables and fish. Unpolished rice is recommended in a dietary regimen to decrease the carbohydrate content and increase dietary fiber. It is also a rich source of vitamins and minerals and is available in a rural community. A high protein diet should also be recommended in these subjects to achieve an adequate protein intake of 1 gram per kg body weight per day. The dietary intake of these subjects is low in fat content. The percentage of energy from fat is less than 20 throughout this study while the recommendation is 30. As usual, rural Thais consumed a low fat diet. However, a reduction of saturated fat and trans fat was recommended. In several studies, the type of fat, rather than total fat intake has been associated a risk of diabetes. Adverse effects of saturated fat and trans fat in glucose metabolism and insulin resistance was reported (23).

Subjects in the intervention group were able to set goals for weight reduction at a value of $\geq 5\%$ of the initial weight and FBG less than 100 mg/dl. They can make frequent daily decisions that fit their way of lives with a result that 48.3% in subjects with BMI $\geq 23$ kg/m$^2$ can be able to lose weight $\geq 5\%$ from the baseline level. Weight reduction at a value
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of ≥ 5% of the initial weight was found to be beneficial in disease prevention (3). The percentage of subjects with fasting blood glucose less than 100 mg/dl at wk 53 in the intervention group was significantly higher than the control group (36.4 vs. 10.9). The intervention was designed to increase capability in dietary self management in rural Thais to increase skills in problem solving, decision making, as well as planning and evaluation. All skills can promote a behavioral change via the possible mechanism of self efficacy. Strategies and interventions to enhance self-efficacy in dietary self-management for rural Thais with impaired fasting glucose are the following:

1. Evidence-based knowledge of an individual’s situation as well as consideration of their own data may increase their awareness and concern.

2. Through academic knowledge, subjects were able to have more information about pathogenesis and possible causes that was simply explained. Subjects may be able to figure out their problems in relation to the causes. Sharing considerable knowledge made the continuous academic talk both more interesting and absorbable.

3. Knowledge in food and nutrition should be applied in a culturally-based subject-context to promote changes of perspectives.

4. Health literacy and numeral skills were enhanced throughout the process in quantitative tasks. Numeral skills may be strongly associated with one’s confidence in self-management (24, 25). Increasing health literacy and numeral skill may affect a subject’s ability to engage in adopted health promoting behavior.

5. A local health personnel was trained as a facilitator and learning resource. A learning resource is an important factor for continuing learning activity in the empowerment process of health promotion in the rural area of Thailand (26).

Limitations of the study are as follow. Energy intake calculated from the food records may be underreported even though the interviewing was also added to the records. Weight reduction in the intervention group continued to wk 53 or a 12 month follow up indicated that the subjects were able to adhere to an energy restricted diet. The result is not known for a longer time. Follow up for 1 year may not be enough for relapse prevention. Low protein intake and inclusion of dietary fiber tell us that close monitoring should be done to ensure a good regimen.

Conclusion

Results from this study suggested that nutrition education with empowering approach is possible among rural Thais. It is an effective tool to increase self efficacy, and promote the capability for problem solving and decision making skills in the matter of dietary self management geared toward healthier eating behavior. Improvement of related health outcomes was shown. There may be a delay in the realization period in the case of some individuals relative to DM. Further study is needed to ensure healthy eating sustainability.

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American Diabetes Association. Standards of Medical Care in Diabetes 2010.

Thai National Health Examination Survey IV, National Health Examination Survey Office, Health Systems Research Institute.


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