

CHAPTER 3

METHODOLOGY

The methodology is organized in the following sections: research design, population and sample, instrumentation, protection of human rights, data collection, and data analysis.

Research Design

An experimental pretest-posttest control group design was used to determine the effects of an individual-based intervention on the improvement of intention to perform eating behavior for weight control, eating behavior, and nutritional status among overweight children. Essentially, the differences between the effects on children who participated in an individual-based intervention and those who do not receive it will be examined. The research design for this intervention is shown in Figure 3-1.

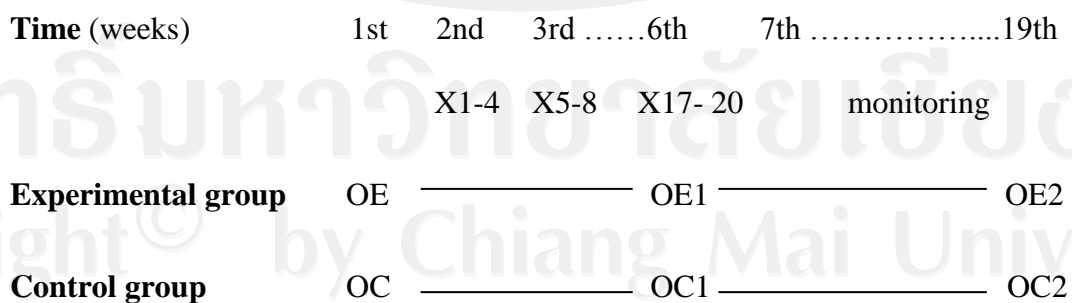


Figure 3-1. Research design

OE, OC refers to data collection before the intervention in the experimental group and the control group

OE1, OC1 refers to data collection after intervention in the experimental group and control group in the 6th week

OE2, OC2 refers to data collection after the intervention in the experimental group and control group at 18th week

X1-4 refers to an individual-based intervention section 1-4

X5-8 refers to an individual-based intervention section 5-8.

X17-20 refers to an individual-based intervention section 17-20

Population and Sample

The target population of this study was fifth grade students in the academic year 2011 among 16 elementary schools in urban area in Lampang province.

The sample of this study was 10-12 years old children, studied in elementary schools in urban areas in Lampang province.

Inclusion Criteria

Children who: 1) were 10-12 years old; 2) were in grade 5 at elementary schools in urban areas in Lampang province; 3) having BMI-for-age $> +1$ S.D. (according to 2007 WHO growth reference: BMI for age (Z-scores) 5 to 19

years (WHO, 2007); 4) were able to read and write in Thai; and 5) who agreed to participate in this study, 6) having parental agreement to participate in this study.

Exclusion Criteria

Children who had severe complications or current medical or psychiatric problems which made them unable to participate in this program such as heart disease.

Sample Size

The sample size was calculated using the formula of repeated measurement analysis with a significance level $\alpha = .05$ (probability of type 1 error) and a statistical power = .90 (1 - probability of type 2 error). The sample size formula is:

$$n = \frac{(Z_{\alpha} + Z_{\beta})^2 \times 2\sigma^2}{\delta^2}$$

n = estimated sample size

$Z_{\alpha} = 1.645$ for significant level at .05 (95% confidence desired)

$Z_{\beta} = 1.282$ (10% beta error, 90% power desired)

$\delta = \mu_1 - \mu_2$ (mean difference between experimental group and control group)

σ = standard deviation (will calculate by the formula of the effect size)

Effect size was calculated using the following formula suggested by Polit and Beck (2008: 603). In a two-group situation, the formula for the effect size is:

$$\gamma = \frac{\mu_1 - \mu_2}{\sigma}$$

$$\sigma = \frac{\mu_1 - \mu_2}{\gamma}$$

No similar study has been conducted in Thailand. Therefore, the researcher used data from the study of efficacy of intervention in overweight children (Wilfley et al., 2007), findings showed that the average effect sizes of was 0.54.

That is, assuming the sample size for estimated effect is:

$$n = \frac{(1.645 + 1.282)^2}{(0.55)^2} \times 2$$

$$n = 56$$

The sample size was 56 people. Approximately 20% of sample size was added to anticipate loss. According to the formula, the sample needed for this study would be approximately 68 people per group. Therefore, the total number of subjects needed in this study was 136 people.

Sampling Method

Simple random sampling by draw lots without replacement was used to select the participants from schools in Lampang province as follows: 1) the two schools were randomly sampled from 16 schools in an urban area to act as the experimental group and the control group; 2) Approximately 68 children in School A were drawn independently from eighty overweight students in fifth grade to the experimental group (receiving an individual-based intervention); 3) Approximately 68

children in School B were drawn independently from eighty-two overweight students in fifth grade to the control group (receiving nutritional education): 4) Finally, all of sample were not drop out. The 68 overweight children in experimental group and 68 overweight children in control group complete the study. The process of simple random sampling is illustrated in Figure 3-2.

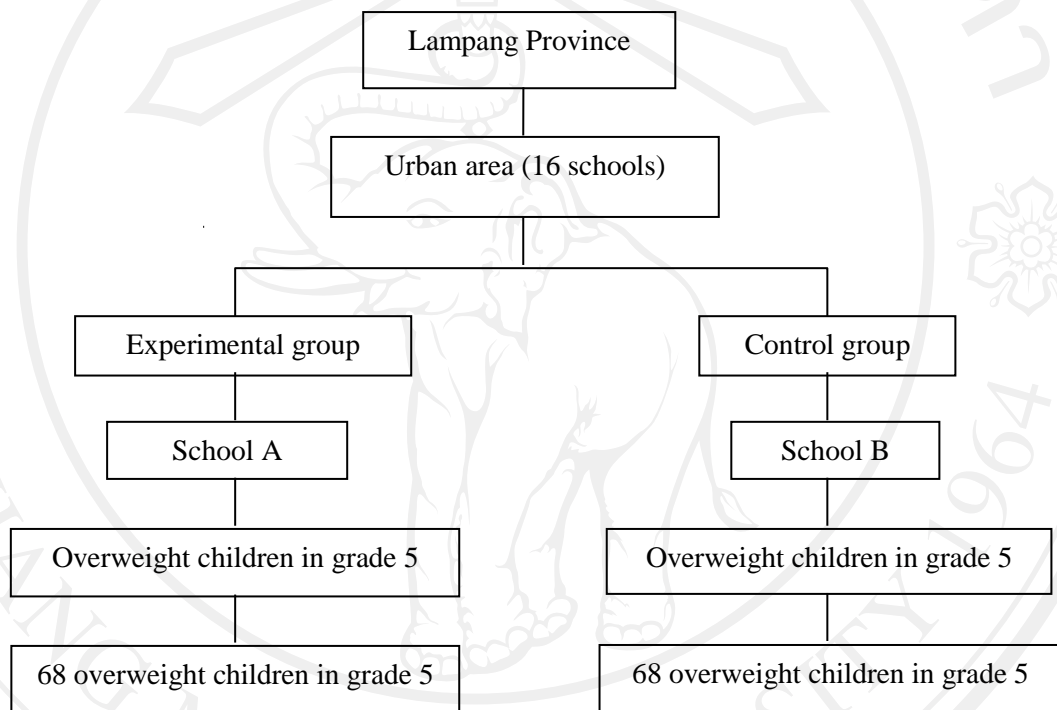


Figure 3-2. Simple random sampling process

Instruments

Six instruments were employed for data collection. Details of each instrument in this study are presented as follows:

Demographic Characteristics

This instrument was developed by the researcher. The questionnaire consisted of demographic data including parent(s)' and child's age, gender, religion, father's and mother's weight and height, father's and mother's education, father's and mother's occupation, family income, number of kinsfolk, number of family members and daily allowance. These data was used to describe characteristics of the sample.

Nutritional Assessment

Anthropometry was an indirect method of nutritional assessment that measured body composition. The following measurements were carried out on each participant:

Height was measured using a height-meter with microtoist details of 0.1 centimeters name "Portrod". One height-meter was used throughout the study. The children were asked to stand upright and barefoot on a horizontal platform with their heels together, stretching upward to the fullest extension. The back was as straight as possible against the vertical bar and the horizontal arm of the height meter was in contact with the student's head. The height was read in centimeters with details in millimeters.

Weight was measured using weight digital scale with increments of 0.1 kilograms named “Taylor”. One weight digital scale was used throughout the study. Children were required to stand barefoot on the accurate weighing scale. The instrument was calibrated daily by using a set of two kilogram weight for two times before measured children weight.

Nutritional assessment was calculated by the formula as follow:

$$\text{BMI} = \frac{\text{weight (kg)}}{[\text{height (m)}]^2}$$

In this study, the 2007 WHO growth reference BMI for age (Z-scores) 5 to 19 years (WHO, 2007) and “WHO Anthro Plus” program were used to assess nutritional status.

The Eating Behaviors for Weight Control Questionnaire (EBWC-Questionnaire)

The Thai version of the Eating Behaviors for Weight Control Questionnaire (EBWC-Questionnaire) was developed by Choyhirun (2006). The EBWC-Questionnaire was a self-reported questionnaire which consisted of 15 items, including three main components: 1) choosing type of food; 2) limiting the amount of food; and 3) method of eating, answered using 4-point likert scales (from 1 = never to 4 = always). There were seven positive statements, and eight negative statements. The score was reversed for negative statements. The total score ranged from 15 to 60. Higher scores (scores = 46-60) indicated good level of performing eating behaviors for weight control. Cronbach’s alpha coefficient was .83.

Intention to Perform Eating Behavior for Weight Control

The Thai version of the outcome evaluation subscale was developed by Choyhirun et al. (2006) to measure intention to perform or not perform eating behavior for weight control. The children were asked to check 16 items, including 4 main components: 1) global intention; 2) intention to choose type of food; 3) intention to limit amount of food; and 4) intention to perform methods of eating to control weight. The likert scale ranged from +2= 'definitely' to -2= 'definitely do not intend'.

The possible score ranged from -32 to 32. The reliability coefficient of this tool was .90.

Manual for an Individual-Based Intervention

An individual-based intervention was provided for children in experimental group. This instrument was developed by the researcher based on TPB. The intervention emphasized the modification of children's behaviors which included: attitude toward eating behaviors for weight control; subjective norms regarding eating behaviors for weight control; perceived behavioral control toward eating behaviors; and increased intention to perform eating behavior for weight control. Techniques included stimulus control, self awareness, cognitive restructuring, self-regulation, self-monitoring, and motivation. The children in the experimental group met the researcher individually every day. Each child was advised to follow the four modules of an individual-based intervention. The four modules of an individual-based intervention were presented as follows:

Module A: emphasis on modifying attitude toward eating behaviors for weight control. In this module the researcher used a cartoon animation, a computer game, a food game and a comic book about eating behavior to modify perceptions and attitudes on impact of overweight and eating healthy food. Then, the children were asked to fill out an activity book. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, they were asked to revise the module again before passing to Module B. At the end of each section, if overweight children could demonstrate good behavioral beliefs and could evaluate the outcome of their eating behavior for weight control, they can represent good attitudes toward eating behavior for weight control. In addition, they will be able to break the chain of events that lead them to eat unhealthy food.

Module B: emphasis on modifying subjective norms regarding eating behaviors for weight control. In this module the researcher used opinion from strongly influential individuals known to each child (such as father, mother, teacher and friend) to modify perception on social norms regarding eating behavior. The children wrote down the answer of each question in the activity book. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, the researcher asked them to revise it again before passing to Module C. At the end of each section, the children are expected to have positive subjective norms leading them to think about how to perform eating behaviors for weight control.

Module C: emphasis on modifying perceived behavioral control toward eating behaviors. In this module the researcher influenced overweight children by motivating them to reflect on their perceived ease or difficulty of performing each behavior. Each child was presented their own opinion in a situation about how they

would manage when they were in each situation in the activity book. The researcher checked the activity book, if the overweight children did not meet the evaluation criteria, the researcher asked them to revise it again before passing to Module D. At the end of each section, the children are expected to be able to improve their perceived behavioral control toward eating behaviors.

Module D: emphasis on setting goals to achieve their eating behavior for weight control. In this module the overweight children wrote in an activity book how, where, and when they will eat healthy food and avoid unhealthy food. The children were asked to make note of their plans and put them into action during the week. Thus, they recorded and also monitored themselves for next seven days according to their own plan. The activity book was checked by the researcher. If the overweight children did not meet the evaluation criteria, the researcher encouraged the child by granting additional rewards for them until they met the evaluation criteria. Thus, each child was assisted until they could pass the module. Therefore, by the end of the module it was expected that the children would have more intention to perform eating behavior for weight control.

The researcher conducted the intervention in each section. Each section was composed of two activities from two modules that take one hour per section. The intervention lasted five consecutive weeks. Each module was composed of a series of materials which examined: 1) the impact of being overweight; 2) the benefit of each group of the five food groups; 3) the benefits of the five food groups; 4) the benefit of eating three meals a day; 5) the benefit of eating ‘traffic light’ food items; 6) the benefit of the Thai Nutritional Flag; 7) the effects of eating a high-sugar diet; 8) the

effects of a eating a high-fat diet; 9) the effects of eating a high-sodium diet; 10) the benefits of food labeling.

Instrument for Research Implementation

Compact disc (C.D.). There were four cartoon animations using in this study as follow: 1) cartoon animation about impact of overweight was developed by Chotibang et al. (2008) name “Pa Ti But Karn Pi Chid Rok Ouan” (childhood obesity); 2) five food group’s cartoon animation was developed by the Nutrition division, Department of Health, Ministry of Public Health. This animation was aimed at increasing healthy eating behavior in children; 3) Thailand Nutrition Flag’s cartoon animation was developed by the Nutrition division, Department of Health, Ministry of Public Health; 4) cartoon animation presented food labeling was developed by the Nutrition division, Department of Health, Ministry of Public Health. All cartoon animation were used and tested in the same age of children at other school.

Computer game. There were three computer games using in this study. First, computer game about five food group which was developed by the Nutrition division, Department of Health, Ministry of Public Health. Second, computer game about Thailand Nutrition Flag which was developed by the Nutrition division, Department of Health, Ministry of Public Health. Third, computer game about low sugar/low fat/low salt diet which was developed by Faculty of Medicine Ramathibodi Hospital, Mahidol University. All computer game were used and tested in the same age of children at other school.

Activity book developed by the researcher. This book was used for overweight children to write down their own decision of each activity from each Module and record their dietary daily. The book content the 2007 WHO growth reference: BMI for age (Z-scores) 5 to 19 years (WHO, 2007) for each child to plot their weight/height. Moreover, this book's content included traffic light food items, Thailand, benefit of five food group, and Thailand Nutrition Flag. The readability and understandability of the activity book was evaluated by five experts.

Cartoon book named “Kin Por Dee Mai Mee Oun” (If eating enough, children won't be obesity). The cartoon book about eating three meals a day was developed by the Nutrition division, Department of Health, Ministry of Public Health.

Psychometric Testing

1. An Individual-Based Intervention

The contents of an individual-based intervention were approved by five experts. These experts were requested to review the content in the manual to clarify, and to prove its adequacy in terms of construct validity and appropriateness. Suggestions from experts were used to make revisions to the program. Content validity was determined by using ten children to evaluate the readability and understandability of the materials. The recommendations of children were used to make revisions during implementation.

2. The researcher and one research assistant were trained by an expert in child nutritional programs in the use of a role play demonstration employed during

this intervention. In addition, this intervention was tested on overweight children in other schools.

3. Two research assistants were trained to collect data with a weight/height measurement, demographic characteristics, EBWC-questionnaire, intention to perform eating behavior questionnaire. They have had a trail practice with the researcher before enduring the process.

4. Nutritional Assessment

In this study, height was measured using height-meter with microtoist increments of 0.1 centimeters. One height-meter was used throughout the study. Weight was measured using a bathroom scale with details of 0.1 kilograms. One bathroom scale was used throughout the study. The research calibrated the height-meter and the bathroom scale daily.

5. The Eating Behaviors for Weight Control Questionnaire (EBWC-Questionnaire)

In this study, The Thai version of EBWC-Questionnaire was developed by Choyhirun et al. (2006). This questionnaire was used to measure eating behavior. The internal consistency of this instrument was tested with 30 overweight children. A Cronbach's alpha coefficient was .83, indicating acceptable reliability.

6. Intention to Perform Eating Behavior for Weight Control

The Thai version of the Outcome Evaluation Subscale was developed by Choyhirun et al. (2006). The internal consistency of this instrument was tested using 30 overweight children. Cronbach's alpha coefficient was .90, indicating acceptable reliability.

Protection of Human Subject

Prior to the collection of data, approval for the proposed study was obtained from the Faculty of Nursing, Chiang Mai University. Permission was also obtained from the directors or principals of the elementary schools which were in the study sites. A letter describing the study, its purpose, methods, potential risks and benefits of participation and the protection of confidentiality was given to all eligible parents who met the criteria for inclusion in the study. The children who agreed to participate in this study were asked by the researcher to sign their assent and the parents signed the informed consent form as permission. They were also informed that participation in this study was voluntary and they have the right to decline answering questions or to withdraw from the study at any time. The names and addresses of participants were not attached to the data. Then, code were used instead their name. The control group received nutritional education after the intervention.

Data Collection Procedures

Prior to the implementation of the program, the researcher conducted the following steps to approach overweight children in the experimental and the control group. The study procedure flow chart is shown in Figure 3-3

1. The researcher submitted an official letter to the Faculty of Nursing, Chiang Mai University for permission to conduct the study and then took the permission letter to the directors of School A (experimental group) and School B (control group) in order to get permission to conduct research at their respective schools.

2. Samples were drawn independently from the total number of overweight students in fifth grade to become the experimental group (receiving an individual-based intervention) and the control group (receiving the nutritional education), approximately 68 children in each group.

3. Permission was obtained from the parents, who had to sign the informed consent form before their child could participate. The overweight children were also required to sign an assent form to participate in this study.

4. The researcher assessed the baseline assessment data of each child's weight/height, demographic characteristics, the intention to perform eating behavior for weight control, and the eating behaviors for weight control questionnaire from both groups.

Procedure for the Experimental Group

1. The researcher set appointment dates and times for the experimental group to participate in the program individually (1 hour/child).

2. As shown in Table 3-1 and Table 3-2, intervention was provided for the experimental group (as mentioned in the manual for an individual-based intervention) to improve intention to perform eating behavior for weight control, eating behavior, and nutritional status among overweight children.

At 1st week to 5th week, the intervention has 20 sections. The activities in each section (sections 1-20) were conducted by the researcher and research assistant beginning in the first week. The intervention has twenty sections. Each section has two activities from two modules that take one hour per section. The

intervention lasted five consecutive weeks, making it a total of 25 hours. Each section lasted one hour. There were ten topics in each module.

Each child met the researcher individually every day. The children in this group were given advice to follow through the four modules of an individual-based intervention. The researcher and research assistant provided all of the intervention contents to each child to modify their perception and attitude; to modify their perception of social pressure; to modify their perception of the ease of healthy eating, and to improve their ability to set goals or make plans and put them in to action.

Moreover, after each module was done, the children were asked to fill out the activity book. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, they will revise in this module again before passing to another Module. Furthermore, monitoring process, this make by visit at school for some consultation and the children were use the food consumption self report every day until evaluation. Each activity was conducted with each child by the researcher or research assistant. The researcher and research assistant were followed the intervention protocol. The intervention schedules were presented as followed:

First week:

- Day 1: section 1 (activity in Module A, B; activity are A1, B1)
- Day 2: section 2 (activity in Module C, D; activity are C1, D1)
- Day 3: Monitoring process
- Day 4: section 3 (activity in Module A, B; activity are A2, B2)
- Day 5: section 4 (activity in Module C, D; activity are C2, D2)

Second week: Day 1: section 1 (activity in Module A, B; activity are A3, B3)

Day 2: section 2 (activity in Module C, D; activity are C3, D3)

Day 3: Monitoring process

Day 4: section 3 (activity in Module A, B; activity are A4, B4)

Day 5: section 4 (activity in Module C, D; activity are C4, D4)

Third week: Day 1: section 1 (activity in Module A, B; activity are A5, B5)

Day 2: section 2 (activity in Module C, D; activity are C5, D5)

Day 3: Monitoring process

Day 4: section 3 (activity in Module A, B; activity are A6, B6)

Day 5: section 4 (activity in Module C, D; activity are C6, D6)

Fourth week: Day 1: section 1 (activity in Module A, B; activity are A7, B7)

Day 2: section 2 (activity in Module C, D; activity are C7, D7)

Day 3: Monitoring process

Day 4: section 3 (activity in Module A, B; activity are A8, B8)

Day 5: section 4 (activity in Module C, D; activity are C8, D8)

Fifth week: Day 1: section 1 (activity in Module A, B; activity are A9, B9)

Day 2: section 2 (activity in Module C, D; activity are C9, D9)

Day 3: Monitoring process

Day 4: section 3 (activity in Module A, B; activity are A10, B10)

Day 5: section 4 (activity in Module C, D; activity are C10, D10)

3. The monitoring process was started after section 1. The researcher visited the experimental group at school for consultation and the children used the dietary record every day.

4. The researcher assessed each child's weight/height, their intention to perform eating behavior for weight control, and their eating behaviors for weight control during the 6th and 18th weeks.

Table 3-1

An Individual-Based Intervention Plan

Week Day	1	2	3	4	5
Wk. 1	Section 1 A1B1	Section 2 C1D1	Monitor	Section 3 A2B2	Section 4 C2D2
Wk. 2	Section 5 A3B3	Section 6 C3D3		Section 7 A4B4	Section 8 C4D4
Wk. 3	Section 9 A5B5	Section 10 C5D5		Section 11 A6B6	Section 12 C6D6
Wk. 4	Section 13 A7B7	Section 14 C7D7		Section 15 A8B8	Section 16 C8D8
Wk. 5	Section 17 A9B9	Section 18 C9D9		Section 19 A10B10	Section 20 C10D10
Wk. 6	Posttest 1 / Self report				
Wk. 7	Self report				
Wk. 8	Self report				
.	Self report				
.	Self report				
Wk. 18	Posttest 2 / Self report /Evaluation				

Table 3-2

An Individual-Based Intervention Schedule and Content

Time	Section	Module	Content
Week 1/ Day 1	1	A1	The children were watched the cartoon animation about impact of overweight to modify perception and attitude on impact of overweight. Then, they were asked to fill out the activity book. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, they will revise in this module again before passing to Module B.
Week 1/ Day 1	1	B1	The children were written down the answer of question as what happen if my mother thinks I look overweight and should control weight in the activity book. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, the researcher will revise about risk of overweight to children again. Then, children will talk to their mother in this point. If their mother didn't perceive the researcher will talk with her again before passing to Module C.

Table 3-2 (continued)

Time	Section	Module	Content
Week 1/ Day 2	2	C1	The researcher gave a situation for each child. A situation is “I think that control weight was difficult/easy for me”. Each child was presented their own opinion in situation about how they manage when they were in each situation in the activity book. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, the researcher will revise about risk of overweight to children again before passing to Module D.
Week 1/ Day 2	2	D1	The overweight children were written down how, where, and when they will control weight in the activity book. The children were asked to keep hold of their plans and put them into action during the week. Thus, they will record and also monitor themselves for next seven days belongs to their plan. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, the researcher will encourage and set the reward for them through they met the evaluation criteria. Thus, they can pass to another Module.

Table 3-2 (continued)

Time	Section	Module	Content
Week 1/ Day 3			Monitoring
Week 1/ Day 4	3	A2	The children were watched the cartoon animation about five food groups to modify perception and attitude on benefit of each group in five food group. Then, they were asked to fill out the activity book. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, they will revise in this module again before passing to Module B.
Week 1/ Day 4	3	B2	The children were written down the answer of question as "If my father thinks that five food groups have many benefit, I should.... eat/not eat" in the activity book. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, the researcher will revise about benefit of five food group to children again. Then, children will talk to their father in this point. If their father didn't perceive the researcher will talk with him again before passing to Module C.

Table 3-2 (continued)

Time	Section	Module	Content
Week 1/ Day 5	4	C2	The researcher gave a situation for each child. A situation is “if I choose having five food groups... I can/cannot”. Each child was presented their own opinion in situation about how they manage when they were in each situation in the activity book. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, the researcher will revise about benefit of five food group to children again before passing to Module D.
Week 1/ Day 5	4	D2	The overweight children were written down how, where, and when they will eat each group of five food groups in the activity book. The children were asked to keep hold of their plans and put them into action during the week. Thus, they will record and also monitor themselves for next seven days belongs to their plan. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, the researcher will encourage and set the reward for them through they met the evaluation criteria. Thus, they can pass to another Module.

Table 3-2 (continued)

Time	Section	Module	Content
Week 5/ Day 5	20	C10	The researcher gave a situation for each child. A situation is “I think that eating sugar, fat sodium which met the recommendation of food labeling is...difficulty/easily”. Each child was presented their own opinion in situation about how they manage when they were in each situation in the activity book. If the overweight children didn't meet the evaluation criteria, the researcher will revise about benefit of food labeling to children again before passing to Module D.
Week 5/ Day 5	20	D10	The overweight children were written down how, where, and when they will eat to meet the recommendation of food labeling in the activity book. The children were asked to keep hold of their plans and put them into action during the week. They will record and also monitor themselves for next seven days belongs to their plan. The researcher checked the activity book, if the overweight children didn't meet the evaluation criteria, the researcher will encourage and set the reward for them through they met the evaluation criteria. Thus, they can pass to another Module.

Procedure for the Control Group

1. The control group received nutritional education from the curriculum at school during the 18th week of the intervention.
2. The researcher assessed each child's weight/height, the intention to perform eating behavior for weight control, and the eating behaviors for weight control in the 6th and 18th weeks.
3. The control group (waiting list) received an individual-based intervention after they had finished the intervention.

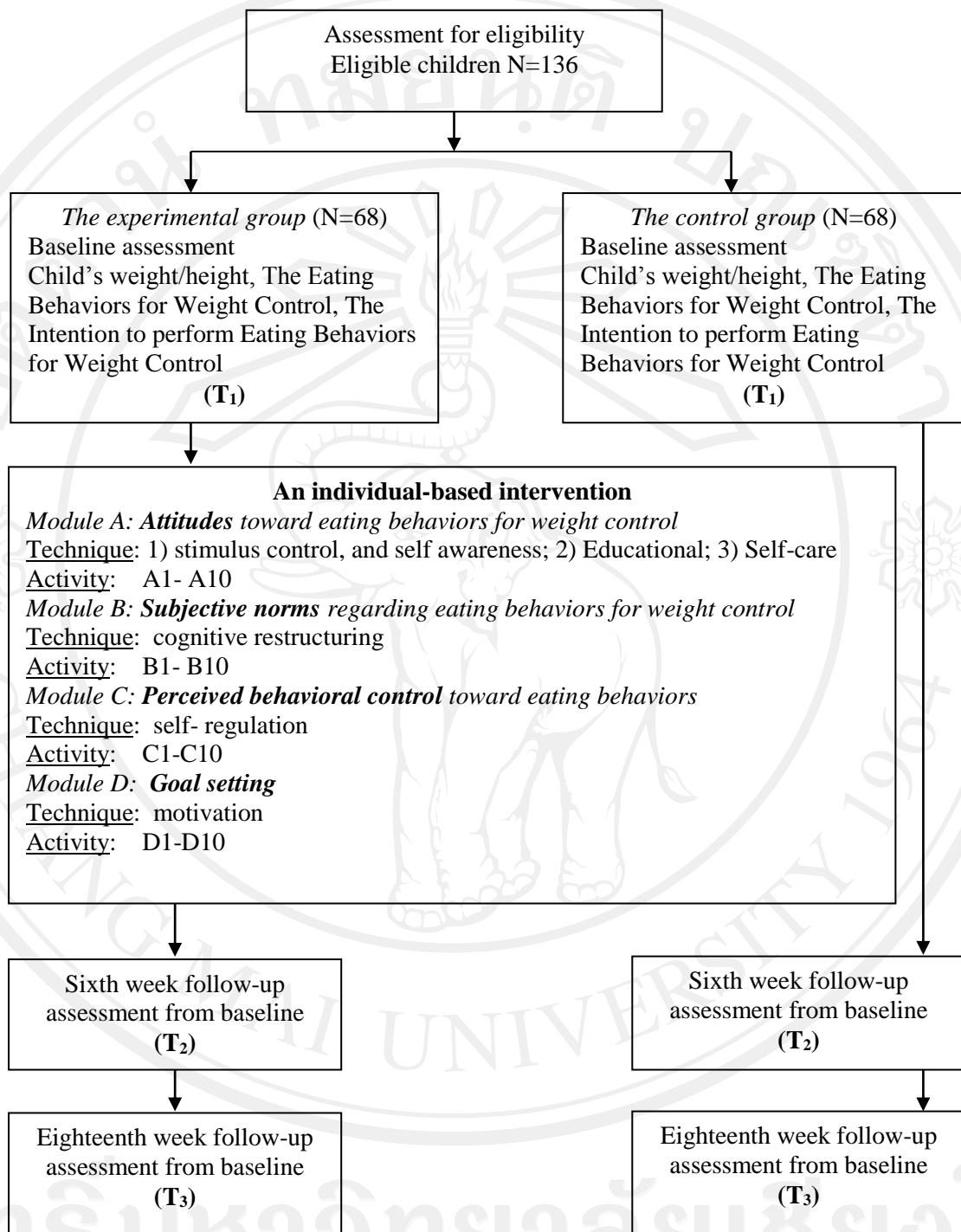


Figure 3-3. Study procedure flow chart

Data Analysis Procedures

Data analysis was performed using SPSS for Windows:

1. Descriptive statistics including frequency, percentage, mean, and standard deviation, were used to analyze demographic characteristics data, the intention to perform eating behavior for weight control, the eating behaviors for weight control, and BMI for age in this sample.

2. Comparison of the difference in the mean score of the intention to perform eating behavior for weight control, the eating behaviors for weight control, and nutritional status within and between experiment and control group at the baseline, six weeks from the baseline, and eighteen weeks from the baseline by using two-way repeated measure MANOVA. Prior to analysis, the assumption of multivariate normality distribution, the homogeneity of variances was tested. The result showed an interaction effect between two groups. Therefore, an independent t-test was used and the significance level for the statistics was set at 0.05.