

Health Education Model for Obesity: A Systematic Review

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Abstract Introduction: Obesity is a worldwide health problem. There are several ways to deal with obesity including surgery, pharmacotherapy, behavior modification, diet and increased physical activity. Physical activity, diet, and behavior modification can be changed through health education, either actively or passively. However, it is not yet clear what type of health education is effective for obese patients so that weight loss occurs, with the aim of dealing with obesity. **Objective:** This study aims to describe effective types of health education to deal with obesity. **Method:** This systematic review uses the Pubmed and Science direct search database with keywords: (*health education model for obesity*) OR (*health education model for obese*) OR (*health education model for overweight*). **Result:** There were 4 studies that used web-based program interventions, 3 studies that used health coaching studies as an intervention for weight loss in obesity and 3 studies that used education based on behavioral theory as an intervention. 7 studies found significant results from the treatment group on weight loss, increased physical activity, and diet. Only 3 studies had no significant results in weight loss between the treatment and control groups. All studies that used health education based on behavioral theory as an intervention have significant results compared to controls. **Conclusions:** health education based on behavioural theory has a positive influence on obese individuals. All studies that used this

method had significant outcomes when compared to control. However, the intervention must at least 6 months.

Keywords Health Education Model, Obesity, Weight Loss, Physical Activity, Behavioral Theory

1. Introduction

Obesity is a worldwide health problem. Obesity can increase the risk of chronic diseases such as cancer, type 2 diabetes, gallbladder disease and cardiovascular disease [1]. Each year, 2.8 million people die from obesity. 1.9 billion adults over the age of 18 were overweight in 2016. 650 million of them are obese [2]. In 2020, the National Health and Nutrition National Survey (NHANES) reported that 42.4% of adults in America were obese in 2017–2018. Ages 20–39 account for 40%, 40–59 for 44.8%, and 60 years and beyond for 42.8% [3]. According to the National Health Survey, in 2011-2012, it was found that 70% of adult men and 56% of adult women were obese and overweight, so obesity prevention programs became a priority in Australia [1]. According to data from Riskesdas 2018, the prevalence of obesity in Indonesia is 21.8%, when compared to Riskesdas data in 2013 the prevalence of obesity is 14.8%, while data in 2007 is

10.5% [4]. From these data, it can be seen a very significant increase in the prevalence of obesity. Obesity management is a priority not just in Australia, but also in Indonesia.

Obesity is caused by an imbalance in energy intake and energy expenditure. The accumulation of calories in obesity is caused due to lack of physical activity and increased food intake. The causes of obesity are complex, genetic, environmental, socioeconomic, psychological and physiological. The increase in calorie intake is not only caused by excessive food consumption but also because of the types of foods that are high in sugar, fat and sodium that are easily obtained and consumed [5]. In general, consuming foods high in sugar, soft drinks, alcohol and fat is associated with obesity and chronic diseases. Many literature studies identify that lack of physical activity, prolonged television viewing, short sleep duration, long work shifts, stress and obesogenic environment, smoking, and frequent use of vehicles for transportation are determinants of obesity. Another cause of obesity mostly in developing countries is due to malnutrition in early childhood which develops into obesity and metabolic diseases [6]. In general, low socioeconomic status, has a higher prevalence. The causes are multifactorial and not entirely clear. However, one of them is the lack of nutrition education and the surrounding social environment, as well as types and diets [7].

There are several ways to deal with obesity including surgery, pharmacotherapy, behavior modification, diet and increased physical activity. Physical activity, diet, and behavior modification can be changed through health education, either actively or passively. Health education is effective in increasing knowledge, attitude and practice regarding diet and physical activity in adolescents [25]. However, it is not yet clear what type of health education is effective for obese patients so that weight loss occurs, with the aim of dealing with obesity. There is still a lack of health education provided due to limited resources. Very little research discusses health education on obesity [24]. So from the background above, through this systematic review the author wants to get an effective type of health education to deal with obesity

2. Method

The research question is: 1. What is the type of health education model for obesity? 2. What is the ideal length of time for the intervention to be carried out using the health education model?

The strategy used to search for articles is PICO. P or population: *Obese* OR *Overweight*, I or intervention: health education model, C or comparison: none, O or Outcome: *Weight loss* OR *Physical activity* OR *Health Behaviour*. This systematic review uses the Pubmed and Science direct search database with keywords: (*health education model for obesity*) OR (*health education model for obese*) OR (*health education model for overweight*) after a search obtained 9669 articles. Then screening articles with filters: text availability "free full text", article type "randomized controlled trial", publication date "10 years", species "human", Age "adult: 19-44 years", article language "English". The screening of the article is presented in the form of a PRISMA diagram (Figure 1). Article notability is assessed or filtered from article inclusion and exclusion criteria. Inclusion criteria: 1). The article is a research article, 2). *Randomized controlled trial* research, 3) BMI sample ≥ 25 kg/m², 4) Adult age 18-60 years, 4). Research intervention only on obese samples, 5). Full and accessible article, 6). No duplication, 7) articles written in English. The exclusion criterion is any study that does not match the inclusion criteria

The author searches the electronic database for 1 week from March 1, 2023 to March 8, 2023 by entering keywords: (*health education model for obesity*) OR (*health education model for obese*) OR (*health education model for overweight*). Then the author uses article screening. Then the author explores the title and reads the abstract based on the search results obtained from keyword writing and article screening. The title of the research and abstract that match the inclusion criteria are followed by reading the full article. Articles that meet the inclusion criteria are collected in the form of tables and extracted data that include: the author name and year of publication, research title, research location, research objectives, type of research and research methods or design, and research results (Table 1).

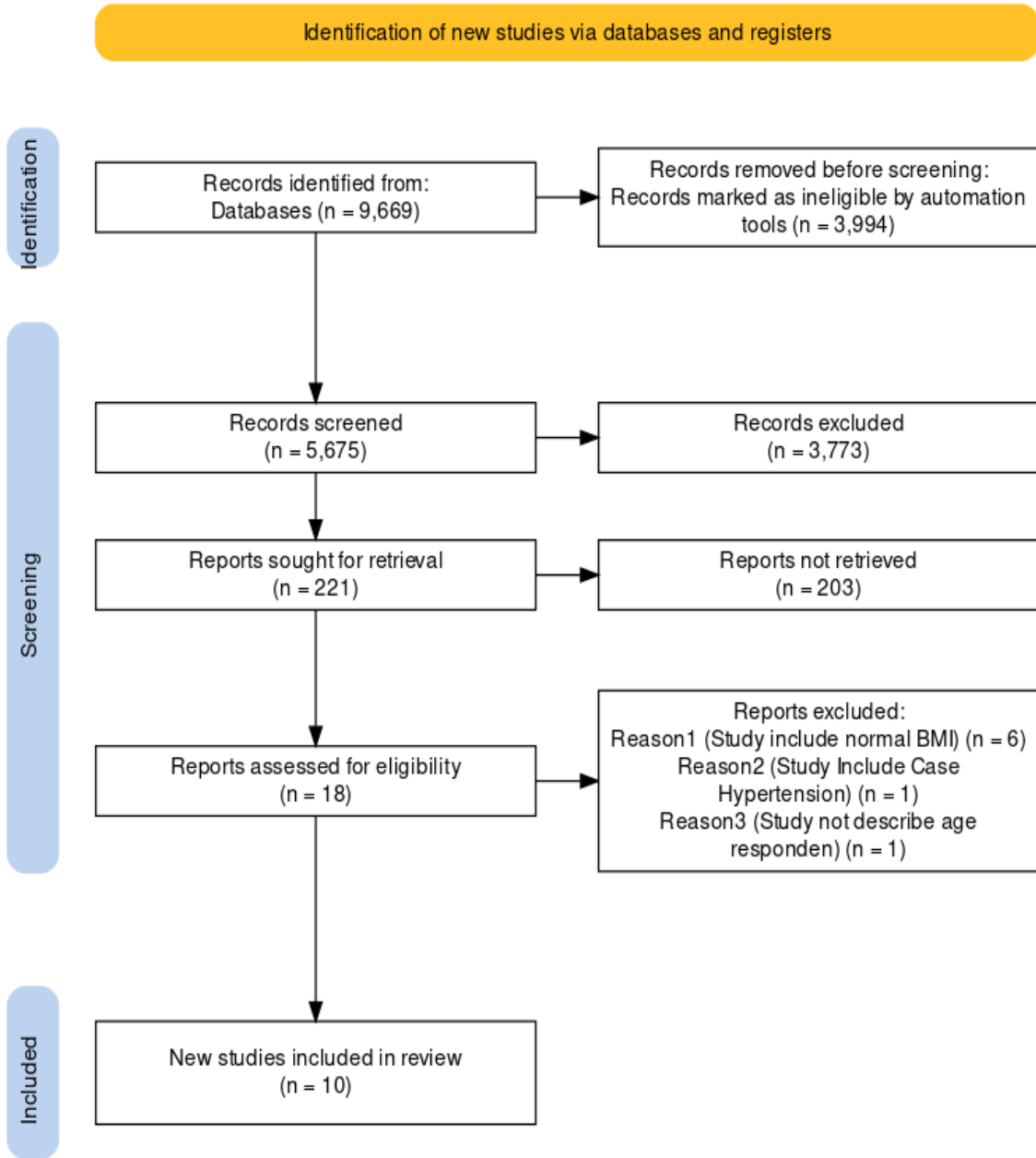


Figure 1. PRISMA Flow Diagram [23].

Table 1. Results of RCT on health education models

Author name and year	Article title (Research Location)	Purpose of the study	Research results
O'Brien et al 2014	Participants in an online weight loss program can improve diet quality during weight loss: a randomized controlled trial (New South Wales, Australia)	Comparing diet quality measured by Australian Recommended Food Score (ARFS) for 12 weeks between basic web-based, enhanced and waitlist weight loss programs To explain whether there was an association between weight loss and diet quality for 12 weeks (waitlist group: a control group that is not given to access the website, only advises to maintain daily diet and physical activity, and should not participate in weight loss programs; basic and enhanced groups: given freedom to access the website)	Significant weight loss occurred in basic and enhanced web-based programs compared to waitlist (control) (basic -2.2 ± 3.4 kg, enhanced -3.0 ± 4.0 kg, and control 0.4 ± 2.4 kg) The mean change in ARFS in the enhanced group was significantly greater than the control ($p = 0.03$) There are no significant changes from ARFS in the basic and enhanced groups, as well as basic and control Over 12 weeks ARFS was significantly associated with weight loss ($P < 0.05$)
Gillison et al, 2015	Processes of behavior change and weight loss in a theory-based weight loss intervention program: a test of the process model for lifestyle behavior Change (Southwest England)	To evaluate a <i>pilot trial</i> (the Waste the Waist Study) to lose weight and cardiovascular disease risk through behavior change To test the validity of the theoretical model (the Process Model for Lifestyle Behavior Change; PMLBC) underlying the intervention	The intervention at both 4 months and 12 months of intervention led to a significant reduction in body weight and an increase in fiber consumption, but not significantly decreased fat consumption and increased physical activity Successful interventions improve mediators of behavior change Increased self-efficacy and behavior change processes are associated with self-monitoring, coping planning and dietary changes at months 4 and 12 There was no association between motivation and social support with, or intervention with, increased physical activity
West et al, 2016	Do Individual Online Motivational Interviewing Chat Sessions Enhance Weight Loss in a Group Online Weight Control Program? (Arkansas Day Vermont, U.S.)	To compare a web-based online weight loss program with a weight loss program combined with motivational interviewing	Weight loss did not differ significantly between web-based weight loss programs, with weight loss programs combined with motivational interviewing at both 6 months ($p = 0.212$) and 18 months ($p = 0.883$)
Little et al, 2017	Randomized Controlled Trial and Economic analysis of An Internet-based weight management programme: POWeR+ (Positive Online Weight Reduction) (South of England)	To compare web-based interventions as controls and POWeR+F and POWeR+R on clinical effectiveness and cost (control: only receive information about healthy eating patterns such as eating fruits and vegetables; POWeR+R: 24 web-based intervention sessions over 6 months and patients can access the website to monitor their weight every week plus face-to-face sessions with nurses 7 times; POWeR+R: POWeR intervention plus remote nurse support via email and phone)	There was no significant difference between the three interventions for weight loss in either 6 months or 12 months of intervention About 20.8% in controls, 29.2% in POWeR+F and 32.4% in POWeR+R had a weight loss of $\geq 5\%$ For cost effectiveness, POWeR+R is most effective compared to other groups

Table 1. Continued

Ambrosini et al, 2018	Greater improvements in diet quality among overweight participants following a group-based commercial weight loss programme than those receiving support to lose weight in primary care (UK and Australia)	To compare differences between the CP (commercial weight loss programme) group and the SC (standard care programme) group on weight loss, total calories, total fat intake, saturated fat, total carbohydrate intake and increased protein and fibre intake at 6 and 12 months (CP Group: get free access to the Weight Watcher community and open group meetings for 12 months. Counseling on healthy eating and physical activity, counseling and free access to information about Health: The SC Group received counseling on healthy eating and increased physical activity by nurses for 12 months.	In the CP group more weight loss than the SC group after 6 months (3.3 kg, 95% CI: 2.2, 4.4) and 12 months (3.3 kg, 95% CI: 2.1, 4.5) In the CP group, there was an increase in the quality of a healthy diet compared to the SC group A greater increase in protein and fiber intake in the CP group likely led to more weight loss
De Freitas et al, 2020	The transtheoretical model is an effective weight management intervention: a randomized controlled trial (Brazil)	To compare health counseling interventions based on transtheoretical behavioral theory models with standard interventions in health care on weight management	97% of subjects in the intervention group reported the benefits of TTM intervention on positive changes in diet, biochemical markers, and anthropometry There was a difference between groups in weight loss of -1.4 kg (CI95%: - 2.5; - 0.3)
Johnson et al, 2018	Telemedicine-Based Health Coaching Is Effective for Inducing Weight Loss and Improving Metabolic Markers (US)	To explain the effect of health coaching with video conferencing (VC) and in person (IP) compared to controls that are standard therapy on body weight, HbA1c, and HOMA-Ir for 12 weeks of treatment (The control group: only got m-health devices in the form of smartwatches without health coaching, while VC and IP groups get m-health and health coaching from experts such as doctors, nutritionists and sports practitioners)	Weight loss occurred in the VC group (8.23 – 4.5 kg; 7.7%), IP (3.2 – 2.6 kg; 3.4%, control (2.9 – 3.9 kg; 3.3%) The number of Steps per day is more in the VC cohort than IP There were no differences in HbA1c, insulin and blood sugar outcomes in all groups The decline in HOMA-IR was only found in the VC group
Kempf et al, 2018	Telemedical coaching for weight loss in overweight employees: a three-armed randomized controlled trial (Germany)	To compare the long-term effects of Telemedical coaching (TMC) with short-term telemedical and telemonitoring on weight loss (TMC group will get telemonitoring tools (scales and pedometers) and then be given coaching every week in months 3-6, and every month in months 7-12, while the control group only gets telemonitoring tools without coaching	In all groups, they lost weight after 12 months

Table 1. Continued

Kohl et al, 2022	Effects of a Web-Based Weight Loss Program on the Healthy Eating Index-NVS in Adults with Overweight or Obesity and the Association with Dietary, Anthropometric and Cardiometabolic Variables: A Randomized Controlled Clinical Trial (Germany)	To evaluate the effect of two different web-based weight loss programs on diet quality as measured by the Healthy Eating Index-NVS (HEI-NVS) (The intervention group received an interactive web-based impairment program while the control group was non-interactive. The topics of the two groups are the same	HEI-NVS in the intervention group performed better with the control group from baseline to 6 months ($p = 0.003$) and up to month 12 ($p = 0.037$). However, improvements in diet quality were not associated with cardiovascular risk profiles
Boutelle et al, 2022	Effect of a Novel Intervention Targeting Appetitive Traits on Body Mass Index Among Adults With Overweight or Obesity A Randomized Clinical Trial (California, US)	To evaluate the efficacy of regulation of cues (ROC), ROC interventions combined with behavioral weight loss (BWL) (ROC+), BWL, and active comparator (AC) for 12 months of treatment and follow-up (ROC: The ROC group is a group based on behavioral susceptibility theory with psychological education, increasing satiety responsiveness (SR), decreasing food responsiveness (FR); BWL: a group who get a program to reduce calories 500-1000 kcal / day. Recommendations for behavior change with stimulus control, self-monitoring, goal setting, managing situations, diet, eating slowly, problem-solving, skills to prevent relapse, and skills to maintain weight; ROC+ : combination group of ROC and BWL ; AC: a group receiving psychological education programs on diet, stress management and social support	At the end of the treatment there was a decrease in body mass index in both ROC, ROC +, and BWL There was no decrease in body mass index in the AC group (1.58; 95% CI, 0.72 -2.45

3. Result

In accordance with the Prisma (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram, in the initial search using keywords, the author found 9669 articles then restricted using filters: text availability "free full text", article type "randomized controlled trial", publication date "10 years", species "human", Age "adult: 19-44 years", article language "English" obtained 221 articles. Then an article exploration was carried out and 18 articles were seen in accordance with the inclusion and exclusion criteria. Of the 18 articles, as many as 8 articles were excluded because they did not meet the inclusion criteria, namely 6 studies included studies on normal weight people, 1 study included hypertensive populations, and 1 study did not clearly explain the age of subjects. So there are 10 articles that will be analyzed and synthesized. Articles carried out synthesis and analysis are included in the table by entering the author's name and year of publication, article title, research location, research objectives, type of research and research method or design, and research results.

There were 4 studies [1,8,9,10] that used web-based program interventions, and other studies as many as 3 studies [11,12,13] used health coaching studies as an intervention for weight loss in obesity, thereby reducing the resulting risk. There were 3 studies [14,15,16] that use education based on behavioral theory as an intervention. Most studies provide treatment for 12 months or more, and only 1 study by Johnson et al [12] provides treatment for 12 weeks. 7 studies found significant results from the treatment group on weight loss, increased physical activity, and diet. Only 3 studies conducted by West et al [8], Little et al [9] and Kempf et al [13] had no significant results in weight loss between the treatment and control groups. A study conducted by West et al [8] found weight loss was not significantly different between web-based weight loss programs (web-based programs) with web-based weight loss programs combined with motivational interviewing, both at 6 months ($p = 0.212$) and 18 months ($p = 0.883$). The study conducted by Little et al [9] found no significant difference between the three interventions (control, POWeR + F, POWeR + R) for weight loss in both 6 months and 12 months of intervention. Although there was no difference between the three interventions, 32.4% of POWeR+F subjects managed to lose weight by $\geq 5\%$. A study conducted by Kempf et al [13] concluded that both telemonitoring with coaching and without coaching can lose weight in obese patients.

In this review, there was only 1 study by Boutelle et al [16] that followed up for 12 months after the intervention. The study tested the efficacy of regulation of cues (ROC) which is an intervention based on behavioral susceptibility theory combined with behavioral weight loss (BWL) and is then compared to standard psychological education. In this study, ROC and BWL significantly decreased body mass index, while standard psychological education could not

reduce body mass index. Another study by De Freitas et al [15] also used health counseling based on a behavioral theory model, namely the transtheoretical model compared to standard interventions (health counseling only) in health services, showing that health counseling based on the transtheoretical model is more effective in losing weight. Another study conducted by Gillison et al [14] using interventions based on theoretical models found that interventions can lose weight through behavior change compared to controls.

4. Discussion

From the results of the study above, the type of health education most often used as an intervention is a web-based *weight loss program*. The treatment time span is from 12 weeks to 12 months. A total of 4 studies used web-based interventions, but 2 studies conducted by Little et al [9] found no significant difference between treatment and control, although the treatment group with POWeR+ F obtained a larger number of samples (32.4%) who achieved weight loss $\geq 5\%$ after the intervention. Research by West et al [8], was found weight loss did not differ significantly between web-based weight loss programs and web-based weight loss programs combined with motivational interviewing. A systematic review and meta-analysis conducted by Neve et al [17] on the effectiveness of *web-based programs* concluded that the program can produce the same effect as lifestyle change interventions, but is still not effective for weight loss in obese patients. Jahangiry et al [18] who conducted a systematic review and meta-analysis also concluded that web-based weight loss program interventions are not effective in losing weight in obese patients, so further research needs to be done on these interventions.

Other studies, use health coaching as an intervention [11,12,13]. Of the three studies, only 1 study conducted by Kempf et al [13] did not show significant differences between the intervention and treatment groups in weight loss. The study compared telemedical coaching with tele-monitoring with weight loss. Telemedical coaching was given telemonitoring tools (scales and pedometers) then given coaching every week in months 3-6, and every month in months 7-12, while the control group only got telemonitoring tools without coaching. Health coaching is used to describe activities related to health practitioners such as nutritionists, behavioural counseling, and physical trainers who have expertise in intervening, especially in weight loss. A systematic review and meta-analysis conducted by Siczowska et al [19] who analyzed 38 studies, found that health coaching is not yet sufficient as a method for weight loss in obesity. The provision of health coaching must be trained, professional and consistent in providing education. The provision of education provided must be objective and use motivational / non-judgmental language [20].

The next intervention is health education based on behavioural theory [14,15,16]. All three interventions significantly lost weight through behavioural theory-based education. A study from Gillison et al [14] that used behavioural theory to reduce cardiovascular risk and weight loss, significantly lose weight and increase fibre consumption, increase self-efficacy and behaviour change processes were associated with self-monitoring activities, coping planning and dietary changes at months 4 and 12. De Freitas et al [15] who use interventions based on the Transtheoretical model (TTM) found that 97% of subjects in the intervention group reported benefiting from the TTM intervention on positive changes in diet, biochemical markers, and anthropometry. Behaviour change in TTM through 6 stages, namely precontemplation, contemplation, preparation, action, maintenance and termination. In the precontemplation stage, patients do not intend to take action yet likely due to a lack of information about the consequences of their behaviour. At this stage, patients are not ready for the health promotion given to them. In the contemplation stage, the patient begins to realize and begins to have intentions to change, although still considering the benefits of the change. In the preparation stage, patients usually intend to take action, by having an action plan such as taking health classes, consulting with doctors and buying books for self-healing. Action stage, the patient takes concrete action from changes in his behaviour over the past 6 months, for example reducing the number of cigarettes smoked, and limiting the number of calories by 20-25% to lose weight. Next is the maintenance stage, the patient maintains a recurrence of negative behaviour and becomes more confident with the actions he takes, which usually takes 6-5 years. The latter is the termination stage; the patient already has 100% confidence about the actions performed. There is a study that states that 20% of alcoholics and smokers have reached this stage [21].

Another study by Boutelle et al [16] evaluated the efficacy of regulation of cues (ROC) interventions, the ROC group is a group based on behavioral susceptibility theory with psychological education, increasing satiety responsiveness (SR), and decreasing food responsiveness (FR). The intervention was effective in reducing the body mass index of obese patients. Behavioral susceptibility theory (BST) hypothesizes the influence of genes on body weight, through biological mechanisms that control appetite. The BST explains how gene expression at body weight is more active in an obesogenic environment, in *patients who are highly responsive* to food cues, they tend to have more desire to eat in an *obesogenic* environment. Such patients are weaker in satiety responsiveness, so tend to eat a lot [22]. A home environment that applies a healthy menu can help obese patients control their appetite, so as to reduce the risk of weight gain [20]. Health education models based on behavioral theory are not only appropriate for obesity, but they can improve patients' compliance

behavior, promote the development of self-management behavior ability, and ultimately improve patient satisfaction in chronic hepatitis B [26]. Health education based on behavioral change theories helps improve patients' self-efficacy, capacity for self-management, and level of satisfaction while alleviating the symptoms of chronic heart failure [27].

This study's limitation is that it only used Pubmed and Science Direct as its search engines. To obtain more papers for analysis, broader and more comprehensive search techniques are required. Only adults between the ages of 18 and 60 were included in this study; therefore, more research on health education models for children and elderly with obesity is required. The government can implement appropriate legislation regarding obesity health education models, which will have a positive impact on public health. In order for behavioral changes to occur more rapidly among obese patients, it is necessary to build more effective health education models. A health education model based on behavioural theory can be a model used for the treatment of obesity, especially in adult subjects

5. Conclusions

Health education models for obese patients can be provided in several ways such as web-based weight loss programs, health coaching and behavior-based health education. In this review there were 4 studies using a web-based weight loss program, but there were 2 studies that found results that did not significantly differ between the treatment and control groups. Web-based weight loss programs have not been very effective in losing weight in obese patients. Likewise, with methods that use health coaching, from 3 studies that use health coaching, there is 1 study whose results do not show significant differences between the control group and the treatment group. Health practitioners who do health coaching must be professional who are trained and consistent in providing education. The delivery of information must be with language that provides motivation and does not stigmatize or judge obese patients. Health education models based on behavioural theory are quite good at having an impact on obese patients. It can be seen from all studies using this method, all gave significant results compared to controls. However, the intervention must be at least 6 months. Further studies need to be conducted that combine health coaching and web-based weight loss based on behavioral theory.

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Conflict of Interest

There is no conflict of interest.

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