

**META ANALYSIS: EFFICACY OF SHORT TERM WEIGHT-LOSS
MAINTENANCE WITH FINANCIAL INCENTIVES INTERVENTION**

Siti Fazzaura Putri Sarahdeaz¹, Ardesy Melizah Kurniati²,
Fiona Widiasari³, Karolin Adhisty⁴, Ari Martino⁵, Rifani Akbar Sulbahri⁶, Yuni Adinda Putri⁷
^{1,2,3,4}Faculty of Medicine Sriwijaya University, ⁵Faculty of Economics Bina Darma University,
^{6,7}Faculty of Economics Tridianti University
email: sarahdeaz.sfp@fk.unsri.ac.id

Abstract

Obesity has become a major etiology of the increase in non-communicable diseases. The use of financial incentives (FI) has greatly encouraged a healthy lifestyle. This intervention pattern is used to encourage healthy lifestyle behaviors aimed at preventing and managing chronic diseases. The novelty of this study is to examine the meta-analysis of the efficacy of maintaining short-term weight loss with financial incentive interventions. The aim of this study was to confirm differences in results between studies, this study was conducted to examine the overall effect of studies using FI interventions on weight loss programs. The method used is the PubMed Database to search for data. Data were drawn from studies reporting changes in the FI intervention with outcome changes in body weight. The results found that 4 studies with obesity were included. The combined results show that FI has a significant effect on changes in body weight. There was a significant difference in weight gain in the FI intervention group compared to the control group (SMD: -3.37; 95% CI). Statistical heterogeneity was found (I² = 99.92%, P = 0.00). Conclusion the results have not shown a beneficial effect of short-term FI for 3 months on weight loss in obese patients. However, statistical heterogeneity was found so that a subgroup analysis was needed.

Keyword: weight-loss; obesity; financial incentive.

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1. INTRODUCTION

Unwanted weight gain leads to obesity.(1) Obesity has been a major etiology of the increase in non-communicable diseases and considered a non-communicable disease.(2) Given the psychological and social stigmata that accompany overweight and obesity, those affected by this condition are also vulnerable to discrimination in their personal and work lives to depression.(3) These medical and psychological symptoms of obesity contribute to a large proportion of health care spending and generate additional economic costs through lost worker productivity, increased disability, and premature death.(4) Research has been carried out to prevent overweight through increasing understanding of the pathophysiology that leads to unwanted weight gain and maintenance of obesity conditions to increased efforts in lifestyle improvements.(5) This condition can reduce the adverse health consequences of obesity.(6)

Healthy lifestyle behaviors have been able to prevent and overcome various chronic diseases.(7) The behavior pattern of each individual characterizes the way individuals making a decision.(8) In recent years, financial incentives (FI), a behavioral economics principles, have been frequently used to promote healthier lives.(9) This pattern of intervention is used to encourage healthy lifestyle behaviors that target the prevention and management of chronic diseases.(10)

Many studies have demonstrated the long-term effect of FI in eliciting long-term behavior change.(11) Several studies have shown that long-term FI are ineffective in maintaining weight loss in people.(12) The body of knowledge in this area continues to grow as more research into the use of financial incentives to help people maintain their weight loss.

Several research have highlighted the short-term weight-loss effects of financial incentives.(13) It's worth looking into whether using FI to increase motivation for behavior change in this target population could be a cost-effective way to reduce the negative impact of lifestyle-related illness.(14) However, there are differences in results between studies. To confirm differences in results between studies, this study was conducted to examine the overall effect of studies using an FI intervention on weight loss programs.

2. METHOD

Data search strategy

The database used for library search is PubMed. There is no year limit on the search. The search was conducted on February 5, 2022. We identified relevant articles using the keywords: (incentive*) AND (weight loss OR weight OR obese* OR overweight).

Inclusion Criteria

The inclusion criteria applied to identify relevant studies for inclusion in this study were as follows: (1) RT; (2) the population is

overweight or obese patients; (3) the patient receives FI as an intervention; (4) the original study reporting changes in body weight and weight loss in lbs or kg. Article titles and abstracts were independently reviewed according to inclusion criteria. Any disagreements among researchers were resolved through discussion.

Exclusion Criteria

The exclusion criteria used were all studies that did not use English. If the

researcher does not get the full text, the study will be excluded.

Data extraction

Data collected on each article included year of publication, author, type of financial incentive, gender, country, age, and race. We evaluated articles that met the inclusion.

Statistical analysis

The I^2 statistic was used to determine heterogeneity. Heterogeneity was studied using both a random-effects model. STATA version 16 was used for all statistical analyses.

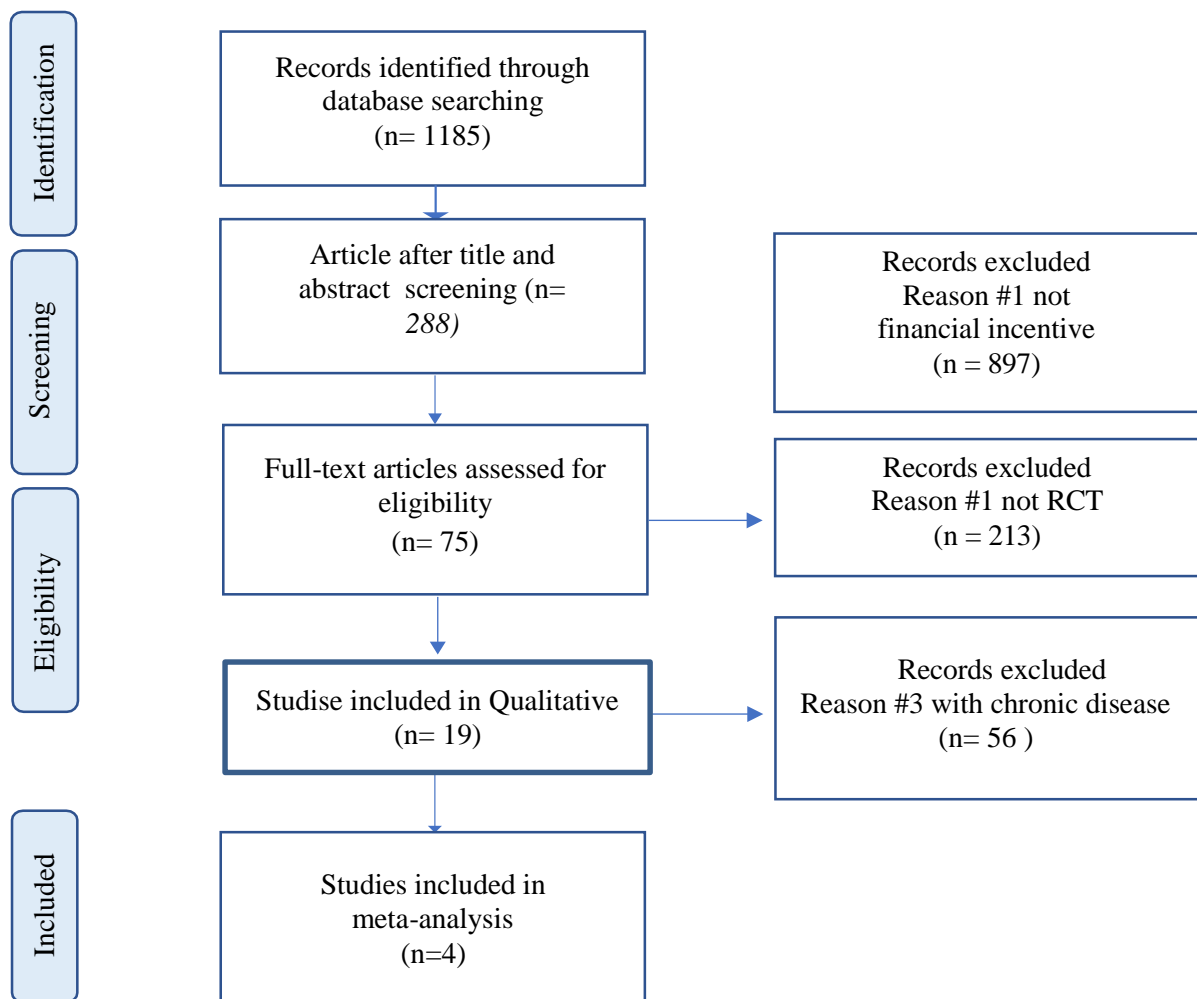


Figure 1. Selection process of included studies

3. RESULTS

In the initial search, 1,185 articles were identified for consideration in this meta-analysis. The reasons for study exclusion are identified in Figure 1.

The average change in weight loss is shown in Fig. 2. The overall effect of 4 eligible studies revealed that FI interventions have not

been able to reduce patient body weight. There was a significant difference in weight gain in the group that was given the FI intervention compared to the control group (SMD: -3.37; 95% CI). Statistical heterogeneity was found ($I^2 = 99.92\%$, $P = 0.00$). Therefore, we used a random effects model for the analysis.

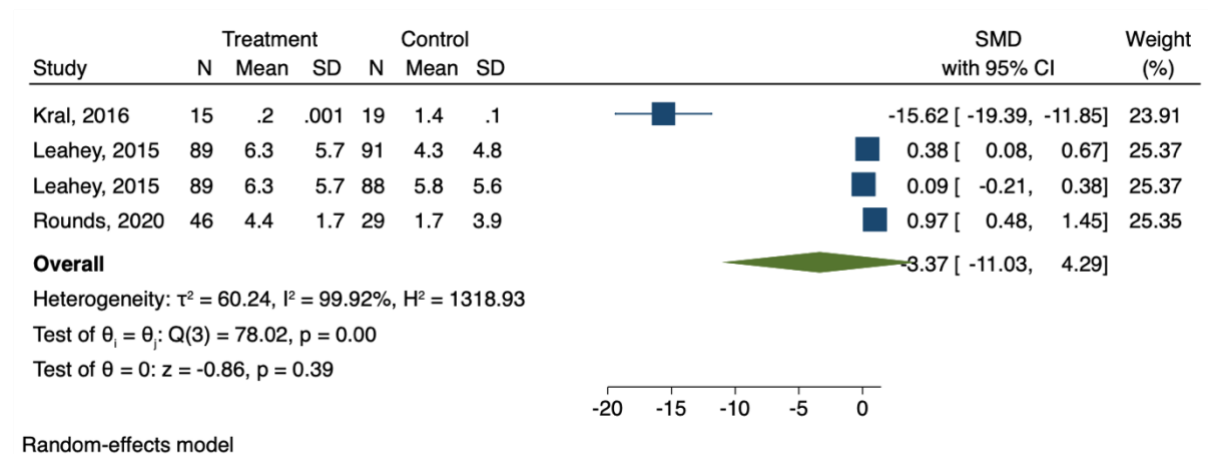


Figure 2. Forest plot of 3 months standardized mean differences (SMDs)

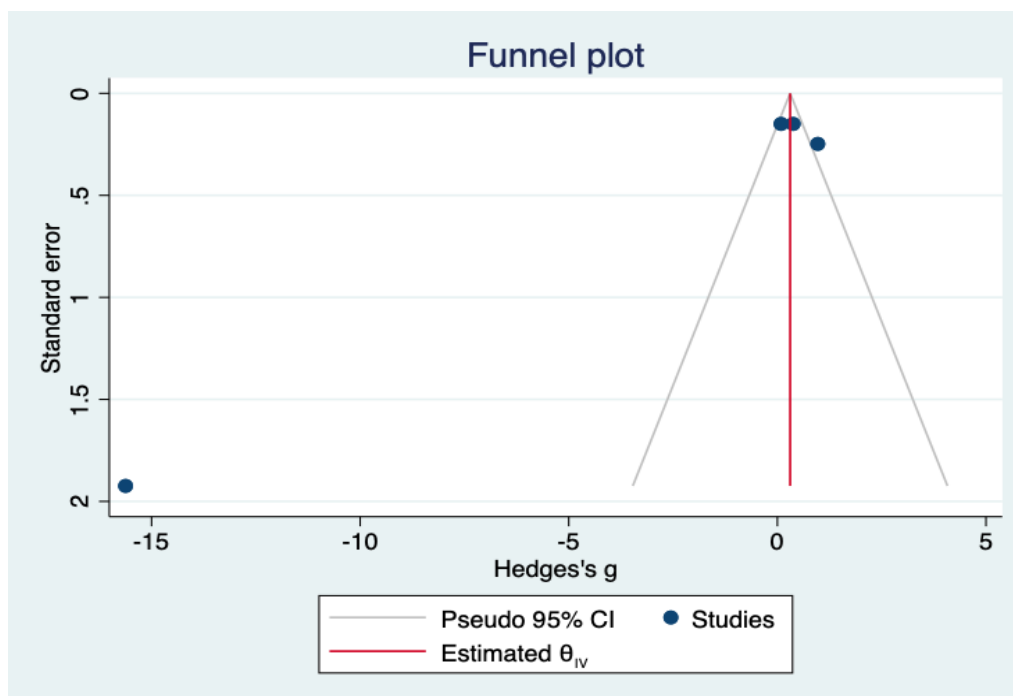


Figure 3. Funnel plot of 3 months standardized mean differences (SMDs)

Discussion

The group that received the financial incentive intervention experienced an increase in body weight because it received repeated motivational encouragement in only a period of 3 months. Motivation plays a role in dietary compliance.(15) Financial incentives in health promotion interventions have been proven to improve lifestyle-related behaviors such as healthy eating, smoking, alcohol use, and physical activity.(16) However, in this study the motivation given in the short term was not sufficient to increase patient adherence to dietary behavior.

High motivation that comes from external can trigger the emergence of dietary behavior because of the direction to be achieved.(17) High motivation for encouragement can be applied if a person consciously makes efforts to fulfill needs in a directed manner that is oriented to certain actions, which in this case is diet.(18)

Motivation is vital for encouraging people to work since motivation is the energy that propels people to attain their goals.(19) Goal-setting is influenced by both high and low motivation, which has an impact on the work's outcomes.(20) If the body can combine environmental and personal factors, then the person can form individual standards to achieve his goal, which is to have an ideal body.(21) Almost all studies in this study demonstrated weight loss in the FI motivated group, but the overall effect showed the opposite. (22) This can occur because of the

outlier data with the results of a fairly high increase in body weight. Although the overall heterogeneity of the data is still high. According to research, offering financial incentives has been demonstrated to have a favorable influence on weight loss most successfully in the first six months of a weight loss program. Weight loss is rarely sustained after incentives are eliminated, according to research.(10)

4. CONCLUSION

Financial incentive intervention for 3 months has not been able to show a beneficial effect on weight loss. There was a significant association between the short-term effects of FI and weight gain although heterogeneity was found between studies. Subgroup analysis is required to identify potential sources of heterogeneity. Further research can be carried out by linking the Long-term weight loss impact of financial incentive programs in obese individuals.

Research Limitations

The RCT design of the included trials limited the maintenance of weight loss and the weight loss results presented here. The interpretation of weight reduction was only evaluated for a limited period of time, namely three months. The most significant weakness of this study was the lack of an exact estimation of weight change in the untreated group. As a result, changes in body weight can only be compared to baseline body weight. Dietary patterns between the weight reduction phase and the follow-up period were not

reported in any of the trials reviewed. Because some of the evaluated subjects did not finish their organized weight reduction program, these results may not correctly reflect short-term weight loss maintenance in adherent subjects who completed their structured weight loss program.

Author Contributions

SS and AM conceived and designed the study. SS, AM, RAS, and YAP performed the data analysis and interpretation. SS, AMK, FW, and KA drafted the manuscript. All authors approved the final manuscript.

Conflict of Interest Statement

The authors state that there were no commercial or financial relationships that may be considered as a potential conflict of interest during the research.

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