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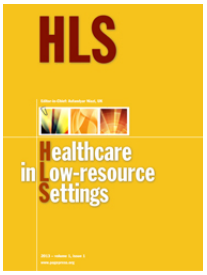

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The effects of dietary compliance counseling on calorie consumption in type 2 diabetes mellitus

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Abstract

Type 2 diabetes mellitus (T2DM) requires dietary compliance to manage elevated blood glucose levels. In calorie counseling, a client and counselor have conversations about calorie consumption problems related to type 2 diabetes. The study aimed to evaluate how calorie counseling affected T2DM patients' adherence to their diets. A quasi-experimental design was employed to randomly assign 40 T2DM patients to the intervention (n=20) or control (n=20) groups. Food logs were gathered prior to and following counseling, and analysis was done using independent T-tests. The findings revealed a post-intervention mean discrepancy in calorie consumption of 132.08 Kcal. The results of the T-test analysis, however, showed that there was no significant difference between the groups (P=0.26>0.05), suggesting that group-based calorie counseling had no appreciable impact on diabetes diet compliance. Confounding variables like age, education, employment status, and family support could have impacted these results. It is advised that future studies consider how family support and demographic factors might improve diet compliance in T2DM patients. This method can lead to more effective interventions for this population and a more thorough understanding of the variables influencing dietary adherence.

Introduction

Diabetes is a pandemic health problem, with an estimated prevalence increasing from 425 million people in 2017 to 629 million in 2045, making it a burden for health, social, and economic costs.[1] Type 2 diabetes mellitus (T2DM) is a chronic disease associated with increased blood sugar levels that affects many adults due to lifestyle changes.[2] Diet is one of the important pillars in managing treatments. Dietary management of T2DM is crucial for controlling blood glucose levels.[3,4] Successful diet management depends on T2DM patients' belief in their ability to carry out life, and adherence is related to the patient's motivation to recover.[5] T2DM is a chronic disease that will be lived with for a lifetime, making it challenging for individuals to know the type, amount, and schedule of a proper diet in everyday life.[6] Wrong perceptions of T2DM patients about diets, such as consuming small amounts, rarely eating fruit, lack of information about diabetes, non-compliance with the T2DM diet due to a lack of understanding of how to choose the right food, and not knowing calorie needs, are common.[7]

Medical nutritional therapy has been introduced to provide systematic guidelines based on evidence for controlling T2DM blood sugar levels.[8] Various method approaches, such as supportive education, diabetes education, family empowerment, and counseling, have been used in managing the diet of

T2DM, especially in controlling calorie consumption to control blood sugar levels.[9-12] Dietary compliance through lifestyle changes is key in controlling the patient's calorie consumption.[13] Counseling is an activity involving meetings and discussions between clients and counselors to solve problems.[14] Counselors provide support and encouragement to clients so that they gain confidence in solving the problems they are experiencing.[15] Research results found that out of 8 respondents (8.57%) who had a high level of compliance before counseling, this increased to 32 respondents (91.43%) after counseling.[16]

Research on counseling methods using a group dynamics approach is an important process for increasing efficacy and planning future treatments.[17] Calorie counseling employs the principles of group dynamics, which serve a therapeutic function. The process involves facilitating individuals to express their thoughts and feelings, fostering openness, mutual trust, and providing care and support to fellow counselees within the group.[18] The counseling approach in research has predominantly employed an individual approach, typically conducted between the counselor and the counselee in a clinic or hospital room.[19] The success of counseling hinges on fostering a strong relationship between the counselor and the T2DM patient, working as a team during the interaction process. Numerous research findings indicate that counseling with an individual approach in hospitals yields positive outcomes, particularly in enhancing compliance with diabetes diets.[20]

For instance, a study conducted in hospital polyclinics involved nutritional counseling for T2DM patients three times at weekly intervals. The intervention, which explained the type, amount, and timing of meals, resulted in an increase in compliance from 43.4% to 73.7%.[12] Previous research utilizing individual counseling methods also demonstrated an improvement in dietary compliance among T2DM patients.[21] However, these studies emphasized a hierarchical relationship between counselor and counselee, leading to reduced openness and individual expression.

In this study, a structured group counseling process employing the principles of group dynamics across four stages over one month aims to provide an open and dynamic counseling approach perspective between health workers and T2DM patients. The objective of this research was to assess the impact of calorie counseling on diet compliance in T2DM patients.

Materials and Methods

Research design

This research employed a quasi-experimental design with pre-test and post-test designs with control groups. The population in this study comprised T2DM patients who are members of the Prolanis program (the Prolanis program is a health program that helps people with chronic diseases get good and affordable care. It works by bringing together patients, health centers, and insurance, and it's

mainly run by local health services). The sample size in this study comprised 40 randomly selected participants divided into two groups: the intervention and control groups, each consisting of 20 respondents. The sample inclusion criteria consisted of individuals diagnosed with type 2 diabetes who possess the ability to read and write, are independent, express willingness to engage in all research procedures, and are covered by health insurance.

Materials used

The tools used in the research include food modeling (examples of food ingredients resembling real food), leaflets (a medium for providing knowledge to diabetes patients regarding DM disease), flipcharts (a media serving as a guideline at the homes of diabetes patients regarding a mutually agreed-upon diet menu during counseling), height measuring instruments, body weight meters, calculators, calorie calculation sheets, and computers.

The questionnaire employed in this study is a food record form designed to document food menus both before and after the intervention. The food record sheet comprises two sections: demographic data and columns for recording the consumed menu.[22] Demographic data include day/date, age, gender, weight, height, occupation, and education. The second section is a table that includes meal time, food name, processing method, household size, and food weight in grams. Data for both pre- and post-intervention assessments were recorded three times each in the first week before the intervention and the sixth week, specifically twice on weekdays and once on weekends.[23]

Data collection process

Data were collected in the first week through an explanation of the aims and objectives of the research, along with instructions on how to fill out the food record sheet provided to all respondents in both the control and intervention groups. Respondents were then instructed to independently complete the food record sheet based on the food consumed during the three recording times. In the second week, the control group underwent counseling about the principles of a diabetes diet and received leaflets to take home for independent study. Meanwhile, the counseling intervention group participated in four weekly meetings, each comprising four group dynamics process sessions.[24] These sessions were as follows: i) formation stage: this session involved getting to know each other, explaining the goals of diet management, introducing the three principles of a diabetes diet (type, amount, schedule), and motivating participants to actively engage during the counseling process; ii) transition stage: the second session focused on breaking the ice within the group through icebreaking activities, explaining the stages during the counseling process, and assessing the respondents' readiness to discuss; iii) activity implementation stage: the third session concentrated on identifying problems experienced by

respondents, prioritizing these problems, and discussing each problem to find solutions agreed upon by the respondents; iv) termination stage: the fourth session involved discussing the obstacles experienced during dieting and revisiting discussions to find viable solutions. In the sixth week, all respondents in both the control and intervention groups were requested to independently complete the food record sheet.

Data analysis

Data analysis was conducted using the Nutrisurvey computer program, which was employed to analyze the calorie content of food consumed by the respondents.[25] The results of the calorie consumption analysis represent the mean of three recordings in kilocalorie units (Kcal). To assess the impact of the counseling intervention on both the control and intervention groups, the independent t-test was utilized, with a significance level set at 95%. This statistical analysis aimed to determine any significant differences between the two groups.

Ethical considerations

It is worth noting that this research underwent thorough examination and obtained approval from the Health Research Ethics Committee at the Faculty of Medicine, Brawijaya University, Malang, with the reference number 024/EC/KEPK/S1-PSIK/2021.

Results

Based on the results presented in Table 1, it is evident that the majority of respondents are females, comprising 85% of the total. The majority of respondents fall into the late elderly age group (56-65 years). Domestic work constitutes the primary occupation for the majority of respondents, comprising 60% of the total. Additionally, the majority of respondents have received elementary school education as their highest level of education, accounting for 92.5% of the sample.

The findings revealed that adherence to the calorie consumption diet among respondents in the intervention group significantly increased from 1005.91 to 1137.99 calories after implementing calorie counseling. This corresponds to a calorie consumption rise of 132.08 calories. In contrast, the calorie consumption in the control group remained close to normal at 1053.95 calories. The post-test results indicated an increase of 52.80 calories from the pre-test results (Table 2). Analysis revealed no significant difference in calorie consumption between the intervention and control groups, as evidenced by the independent samples t-test (Alpha 0.26>0.05). Therefore, it can be concluded that there is no significant disparity in calorie consumption between the intervention and control groups.

Discussion

The findings indicated no significant difference between the intervention group and the control group regarding calorie consumption. This finding contrasts with the analysis of pre-test and post-test calorie consumption within each group, which suggested a significant difference. Hence, the study concluded that calorie counseling impacts adherence to a calorie-consumption diet. However, factors such as knowledge, education level, occupation, and family support do not appear to influence adherence to this diet.[26]

The factor hindering respondents from adhering to a diet based on caloric needs is knowledge. A robust understanding of the DM diet is crucial in shaping adherence behavior. This study's findings are corroborated by research indicating a relationship between knowledge and dietary adherence among individuals with diabetes.[21] These results underscore the importance of enhancing knowledge to bolster dietary adherence in diabetes management.[10] Additionally, education level contributes to noncompliance with the diabetes diet. Education is implicated in dietary non-compliance due to its role in shaping knowledge acquisition and information-seeking behavior. Individuals with lower education levels may be less proactive in seeking information, unaware of the significance of adhering to a diet to maintain their health conditions.[27] Moreover, the education level of individuals with diabetes influences their ability to comprehend acquired knowledge, thus impacting their adherence to dietary recommendations based on caloric needs.[28]

Age plays a crucial role in influencing an individual's capacity to receive and assimilate information. Research findings indicate a higher proportion of individuals in the late elderly age group (56-65 years) compared to the early elderly age group. The aging process introduces physical changes that can impact knowledge retention, as alterations in hearing, vision, and the nervous system may hinder the elderly's ability to acquire and retain information.[29] However, it's essential to recognize that knowledge acquisition isn't solely contingent on age. Additional factors such as education, environment, exercise, and life experiences also significantly influence an individual's knowledge, even among the elderly.[30-35] To enhance the knowledge of the elderly, it is imperative to tailor education and information initiatives to meet their specific needs.[36] Providing targeted and accessible educational resources can contribute to bridging the knowledge gap among the elderly population.[37]

Most of the respondents in this study, totaling 22 individuals (55%), were engaged in household work. This outcome is primarily attributed to the predominance of female respondents, leading to the majority being homemakers. Being a homemaker entails performing domestic duties, thereby not being formally employed. Research by Saghir *et al.* demonstrates that the majority of respondents, primarily homemakers, follow an inconsistent daily eating schedule.[28] Since homemaking activities are typically performed without fixed schedules and vary based on individual capabilities, meal

timings greatly differ among subjects.[38] This irregular eating pattern contributes to diabetes patients' calorie consumption not meeting their dietary requirements.

Dietary adherence is influenced by several factors, including education, environmental and social modifications, as well as increased interaction between health professionals, and patients.[39] Modifying environmental factors can be facilitated through social support from family members.[40] However, this study did not adopt a family approach as it solely focused on individuals with diabetes. Previous research findings indicate that the determinants impacting dietary adherence among individuals with diabetes include patient motivation and family support.[41] Further research underscores the significant role of the family in achieving successful dietary adherence,[42] emphasizing that family-related barriers can impede dietary compliance, particularly among individuals with limited dietary knowledge and awareness of diabetes.[43] Given the low level of knowledge and awareness regarding diet, the active involvement of family members can provide invaluable support in managing food for individuals with diabetes.

Conclusions

Counseling significantly improves dietary adherence in diabetes management through structured approaches and adequate resources. This study highlights the effectiveness of structured counseling, adherence to intervention durations, and group dynamics. Including a wide age range of predominantly elderly respondents strengthens the study. However, limitations include a brief post-intervention evaluation period and the exclusion of caregiver involvement, which may affect dietary adherence outcomes. Future research should consider factors like family support and participant characteristics.

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Table 1. Characteristics of respondents (n=40).

Characteristics	Frequency	Percentage
Age		
46-55 years	15	37.5
56-65 years	25	62.5
Gender		
Male	6	15
Female	34	85
Occupation		
Domestic workers	24	60
Entrepreneur	6	15
Farmer	10	25
Education		
Bachelor	1	2.5
Elementary school	37	92.5
No school	2	5

Table 2. Results of calorie diet compliance analysis.

Group	Pre-test	Post-test	P-value
	Average calorie consumption	Average calorie consumption	
Intervention	1005.91	1137.99	0.26
Control	1001.15	1053.95	