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Effectiveness of Cognitive Therapy Targeting Dieting Traps on Health Anxiety and Medication Adherence in Hypothyroid Overweight Women

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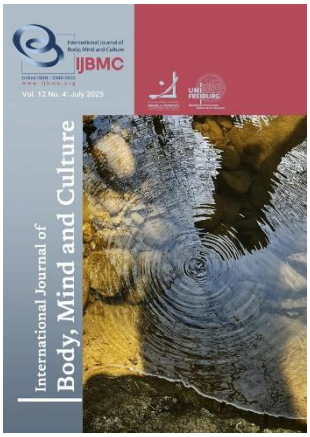

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ABSTRACT

Objective: This study aimed to investigate the effectiveness of cognitive therapy emphasizing dieting traps on improving health anxiety, medication adherence, and social health in these individuals.

Methods and Materials: This quasi-experimental study utilized a pretest-posttest-follow-up depn. Thirty women with hypothyroidism and overweight were randomly selected from the target city and divided into experimental (15 participants) and control (15 participants) groups. The experimental group underwent cognitive therapy sessions focusing on dieting traps for 12 weeks. Data collection involved standardized questionnaires, including the Health Anxiety Inventory (developed by Salkovskis & Warwick, 2002), the Medication Adherence Questionnaire (developed by Morisky, 1986), and the Social Health Questionnaire (developed by Keyes, 1998). The data were analyzed using multivariate analysis of variance (MANOVA) with SPSS software.

Findings: The results indicated that cognitive therapy focusing on dieting traps pnificantly reduced health anxiety (F=22.337, P<0.001), increased medication adherence (F=7.350, P<0.001), and improved social health (F=196.027, P<0.001). Pnificant differences between the experimental and control groups were observed in both posttest and follow-up stages.

Conclusion: Cognitive therapy focusing on dieting traps can effectively reduce health anxiety, improve medication adherence, and enhance social health in individuals with hypothyroidism and overweight. This method can be recommended as a beneficial therapeutic approach to enhance psychological health and treatment compliance.

Keywords: Cognitive Therapy, Dieting, Health Anxiety, Medication Adherence, Overweight.

Introduction

Many individuals struggling with obesity due to various reasons, including hypothyroidism, and who aim to lose weight, are aware that losing weight can be relatively easy at first. However, maintaining weight loss over weeks or months becomes quite challenging. This is because individuals become entangled in psychological issues or, in other words, their mental traps. These traps include stress, family problems, and food enablers—negative aspects of life—as well as vacations, celebrations, and holidays—positive aspects of life—all of which can pose challenges to the person's weight loss goals (Beck, 2015).

Beyond physical issues (traps), a potential connection exists between thyroid disorders, mental health factors, and psychological status (Lasso, Vetrano, Kiko, & Cardelia, 2020). Hypothyroidism is associated with a wide range of medical, neurological, and psychiatric symptoms. Severe hypothyroidism may present as myxedema coma, a medical emergency. Additionally, patients may present with myxedema psychosis, a psychiatric emergency that appears as hyperactive encephalopathy, hallucinations, delusions, and suicidal ideation. In rare cases, patients may exhibit manic symptoms accompanied by psychosis (Kaplan, 2020). Previous studies have shown that subclinical hypothyroidism (SCH) may be associated with an increased risk of cognitive impairment, mood changes, depressive symptoms, and nonspecific symptoms such as fatigue (Majtek, Pieroni, & Weber, 2021).

Given that physical health is essential for survival, it is not surprising that most people occasionally have thoughts and concerns about their health (Looper & Kirmayer, 2001). These thoughts and concerns may be more pronounced in individuals suffering from serious illnesses or at risk of such conditions. However, some individuals—without being at risk or suffering from any particular illness—experience intense worry and anxiety about their body and health, interpreting simple physical symptoms as serious illnesses. These individuals suffer from health anxiety or, in its more severe form, hypochondriasis (Owens, Asmundson, Hadjistavropoulos et al., 2004). Health anxiety is characterized by persistent and intense worries about health. In diagnostic terms, individuals who are incapacitated by health anxiety are diagnosed with hypochondriasis (Tang, 2007). Health anxiety is a new diagnosis in the latest edition of the American psychiatric classification and has partially replaced hypochondriasis (Tyrer & Tyrer, 2014). In health anxiety, the individual's anxiety and preoccupation are excessive and disproportionate. These individuals frequently check themselves (e.g., checking their throat in the mirror), constantly research illnesses (e.g., online), and seek reassurance from family, friends, and doctors (American Psychiatric Association, 2017).

Considering the psychological markers associated with thyroid disease, it can be said that chronic stress may lead to thyroid conditions such as hypothyroidism. The human body's natural response to stress is to combat it using the adrenal system. The body releases adrenal hormones as part of its "fight or flight" system. However, when stress becomes prolonged and chronic, the adrenal glands can no longer cope with the stress alone, leading to adrenal fatigue. When adrenal fatigue begins, the body starts to slow down. Since the thyroid gland is the cornerstone of metabolic control in the human body, its function also slows down, resulting in hypothyroidism (Kara, 2020). Additionally, both hypothyroidism and depression can affect a person's mood and daily life (Hertz & Grassman, 2022). Hypothyroidism and depression may produce similar symptoms. For example, both can cause mood changes (Shen, Zhou, & Ma, 2019). Evidence suggests a direct relationship between hypothyroidism and depression. It is more likely that hypothyroidism causes depressive symptoms rather than the reverse. For example, hypothyroidism can affect thyroid hormone secretion levels, disrupt brain chemical pnaling, and lead to depression (Chen, Long, & Zhang, 2023). Batla (2016) investigated the prevalence of symptoms related to depression, anxiety, and stress in patients with hypothyroidism and reported a pnificant occurrence of these psychological symptoms (Batla, Singh, & Rallan, 2016). Feng, Fang, and colleagues (2022) stated that comorbid subclinical hypothyroidism may pose a particular risk in patients with major depression and may contribute to an increased risk of suicide attempts (Fang, Chen, Feng, Lu et al., 2022). Regarding social factors, a study by Vetrano and colleagues (2022) indicated that thyroid diseases can affect individuals' social functioning and performance (Vetrano, Lasso, Fontana, Vetrano et al., 2022). Thyroid disorders may sometimes cause certain physical changes in individuals,

such as those caused by thyroid eye disease, weight gain, or hair loss, which reduce self-confidence. People may ask inappropriate questions or stare, leading to increased anxiety and distress and reduced social presence (Zheng, Whitney, & Lai, 2023). Overall, it can be concluded that patients with hypothyroidism experience multiple physical and psychological problems, ultimately resulting in a pnificant reduction in their quality of life—one of the key indicators of health care (Bankdaran & Sa'adati, 2011).

One of the effective therapeutic approaches for treating traits in obese individuals is cognitive-behavioral therapy (Saranapala, Baranov, & Rashorz, 2022). Cognitive-behavioral therapy (CBT) is a form of behavioral therapy developed within traditional psychotherapy settings and reflects therapists' growing interest in correcting cognition as a factor influencing emotions and behaviors (Lee, Lamplante, & Pakion, 2022). The aim of CBT is to correct distorted interpretations, foster a sense of control over life, enhance constructive and positive self-talk, and strengthen coping skills. CBT addresses psychological issues at various levels. This approach is based on therapy and teaching techniques grounded in psychology, emphasizing the importance of human cognitions and thoughts that play a pnificant role in mental health or illness. Consequently, in cognitive therapy, the therapist seeks to correct the individual's thoughts and beliefs because realistic changes in thinking lead to improved mood and behavior (Saranapala, Baranov, & Rashorz, 2022).

Beck's cognitive therapy, "The Beck Diet Solution," is a six-week structured plan that teaches individuals various psychological skills to help them achieve daily weight loss goals and is suitable for those beginning a diet. This program does not include a specific diet plan, nor does it instruct individuals on what or when to eat. Instead, the Beck Diet Solution teaches all the necessary skills to follow a self-selected diet plan, lose excess weight, and maintain that weight loss for life. These skills are based on principles of cognitive therapy, one of the most powerful psychotherapy approaches of our time worldwide. Hundreds of research studies have confirmed the effectiveness of this therapy for psychological problems. Cognitive therapy helps individuals change their thinking patterns and sustain behavioral changes throughout their lifetime (Beck, 2008; as cited in Aghah & colleagues, 2012).

In light of the above, the present study aims to address the following question: Is cognitive therapy focusing on dieting traps effective in improving the biopsychosocial indicators in overweight individuals with hypothyroidism?

Methods and Materials

This study utilized a quasi-experimental research depn with experimental and control groups, including pre-test, post-test, and follow-up stages. The research population consisted of individuals diagnosed with hypothyroidism who responded to a public call and visited a clinic in Tehran. The sampling method was convenience sampling, and participants were randomly selected. The sample included 30 female, married patients with a high school diploma who had referred to the center. Using a convenience sampling method, participants were randomly aspned to two groups (15 participants in the experimental group and 15 in the control group). The experimental group received 12 weeks of cognitive therapy with an emphasis on dieting traps, conducted in weekly 90-minute sessions, while the control group received no treatment. After the intervention, a post-test was administered to both groups, and a follow-up test was conducted one and a half months later using the same questionnaire.

Inclusion criteria included: age between 30 to 50 years, diagnosis of hypothyroidism confirmed by an internal medicine specialist, the ability to participate in therapy sessions, no history or current diagnosis of acute psychosis (based on clinical assessment), and informed consent to participate in the study. Exclusion criteria included: unwillingness to complete the intervention or questionnaires, suffering from a debilitating physical illness, inability to cooperate, move, or comprehend the material (e.g., intellectual disability), refusal to continue, and diagnosis of any other severe psychiatric disorder confirmed by a psychiatrist.

Instruments

Demographic Information Questionnaire: This researcher-made questionnaire was developed due to the influence of background and biological characteristics on participants' mood. It included questions about personal details, date of birth, marital status, and duration of illness.

Morisky Medication Adherence Scale (MMAS-8): This questionnaire was developed by Morisky, Ang, and Wood (2008) to assess medication adherence. It contains 8 items and uses a Likert scale to measure responses. For example, one item asks, "During the past two weeks, has there been a day when you did not take your medications for reasons other than forgetting?" Medication adherence is currently considered a crucial concern among treatment teams. Researchers argue that non-adherence to medical recommendations places patients at higher risk for complications. In this study, adherence refers to the total score on the 8-item MMAS questionnaire. Validity refers to the extent to which the instrument measures what it is intended to measure (Sarmad et al., 2011). The validity of this questionnaire has been confirmed by subject-matter experts. Reliability or internal consistency (i.e., the stability of the instrument in similar conditions) has also been supported (Sarmad et al., 2011).

Health Anxiety Inventory (HAI-18): Given that physical health is essential for survival, it is not surprising that many individuals occasionally worry about their health. These concerns can be heightened among people diagnosed with serious illnesses or those at risk. However, some individuals—without being at risk or suffering from any condition—experience severe anxiety about their body and health, interpreting minor physical symptoms as pns of severe illness. These individuals may suffer from health anxiety or, in its extreme form, hypochondriasis. Health anxiety is marked by ongoing, intense worry about health. Those pnificantly impaired by health anxiety are clinically diagnosed with hypochondriasis. Health anxiety is a new diagnosis in the latest edition of the American psychiatric classification and has partially replaced hypochondriasis. Although hypochondriasis is rare in the general population, health anxiety is highly prevalent. Estimates suggest that at least 51% of chronic pain patients and 17–24% of medical center patients suffer from health anxiety. This condition results in unnecessary use of healthcare services and consultations. Cognitive-behavioral therapy (CBT) has been shown to be effective in treating health anxiety. In health anxiety, individuals excessively and disproportionately worry about illness. They repeatedly examine themselves (e.g., inspecting the throat in the mirror), frequently research diseases (e.g., on the internet), and seek constant reassurance from family, friends, and doctors. The HAI-18 is used to assess health anxiety. Its short form was developed by Salkovskis and Warwick (2002) and consists of 18 items covering three factors: disease likelihood, disease consequences, and general health concern. Each item has four choices, representing the respondent's statement about health and illness in declarative form, and the participant must choose the one that best describes them. Items are scored from 0 to 3, with option A = 0, B = 1, C = 2, and D = 3. Higher scores indicate greater health anxiety (Salkovskis & Warwick, 2000). In Iran, Nargesi et.al., (2017) confirmed the validity of this questionnaire, reporting a Cronbach's alpha of 0.75, indicating good reliability.

Beck Cognitive Therapy Protocol: This program, depned by Beck (2008, 2007), consists of ten weekly sessions lasting 90 minutes each (Table 1).

Table 1.

Cognitive Therapy Sessions

Session	Therapy Protocol
First	Introduction to the logic of therapy
Second	Identifying harmful thoughts and resistance
Third	Learning the ABC model
Fourth	Goal setting and starting the diet
Fifth	Identifying negative thoughts related to dieting
Sixth	Responding to destructive thoughts, overcoming challenges and residual negative thoughts
Seventh	Developing new coping skills
Eighth	Understanding how to stop weight loss and maintain new weight
Ninth	Evaluation
Tenth	Summary and closure

Ethical Considerations

The following were observed: Privacy and confidentiality, informed consent.

Analysis

Considering the research depn and the small sample size, the pnificance level (alpha) was set at 0.05 to increase statistical power. Data were analyzed using SPSS version 24 through both descriptive and inferential methods. The following procedures were used: Descriptive analysis: Mean, standard deviation, frequency, and frequency percentage. Inferential analysis: Kolmogorov-Smirnov test for checking normality of distribution, Levene's test for homogeneity of variances between the experimental and control groups, ANOVA (Analysis of Variance) to assess individual dependent variable differences between the groups, and MANOVA (Multivariate Analysis of Variance)

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to analyze interaction effects among variables in both groups.

Findings and Results

Table 2.

Descriptive Statistics for Health Anxiety and Its Components

Variable	Subcomponent	Group	Pre-test Mean (SD)	Post-test Mean (SD)	Follow-up Mean (SD)
Health Anxiety	Illness Likelihood	Experimental	6.4 (3.71)	4.66 (2.41)	4.8 (1.74)
		Control	6.46 (4.68)	6.53 (2.64)	6.46 (3.13)
		Total	6.43 (4.15)	5.6 (2.66)	5.63 (2.63)
	Illness Consequences	Experimental	4.2 (2.98)	2.46 (1.59)	2.6 (1.54)
		Control	4.13 (2.82)	4.06 (4.58)	4.13 (3.96)
		Total	4.16 (2.85)	3.26 (3.47)	3.36 (3.05)
	General Health Worry	Experimental	5.8 (2.88)	4.46 (2.47)	4.66 (2.09)
		Control	5.86 (3.13)	5.8 (2.07)	5.8 (2.48)
		Total	5.83 (2.96)	5.13 (2.34)	5.23 (2.32)
	Total Score	Experimental	16.4 (8.42)	11.6 (4.5)	12.06 (3.95)
		Control	16.46 (9.46)	16.4 (8.33)	16.4 (8.54)
		Total	16.43 (8.8)	14.0 (7.02)	14.23 (6.9)
Medication Adherence		Experimental	2.75 (1.72)	4.18 (1.77)	3.9 (1.79)
		Control	2.75 (1.58)	2.76 (1.65)	2.76 (1.56)
		Total	2.75 (1.62)	3.47 (1.83)	3.33 (1.75)

As presented in Table 2, the mean scores for health anxiety and its subcomponents decreased in both experimental and control groups from pre-test to post-test and follow-up; however, the decrease was pnificantly greater in the experimental group. Conversely, the mean scores for medication adherence increased in both groups, but again, the increase was more substantial in the experimental group. To examine assumptions for ANCOVA, Shapiro–Wilk and Levene's tests were conducted. All variables had pnificance levels above 0.05, indicating that the assumption of normality was met. Levene's test for equality of variances also showed p-values greater than 0.05, supporting homogeneity of variance. M-Box test results for equality of covariance matrices were non-pnificant, confirming multivariate normality and justifying the use of MANOVA ($F = 1.129$, $P > 0.05$).

Table 3.

Multivariate ANOVA for Research Variables

Variable	Effect	Test Type	F	df (Hypothesis)	df (Error)	*p*	η^2
Health Anxiety	Time	Wilks' Lambda	22.337	2	27	0.001	0.631
	Group × Time	Wilks' Lambda	21.202	2	27	0.001	0.627
Medication Adherence	Time	Wilks' Lambda	7.350	2	27	0.003	0.353
	Group × Time	Wilks' Lambda	7.019	2	27	0.004	0.342

As shown in Table 3, the effect of time was pnificant at the 0.05 level for both variables. This indicates that the intervention pnificantly influenced changes in health anxiety and medication adherence over the three time points.

Table 4.

Between-Group Effects for Health Anxiety and Medication Adherence

Variable	Source	SS	df	MS	F	P	η^2
Health Anxiety	Group	1711.6	1	1711.6	3.481	0.024	0.124
	Error	8001.29	28	282.903			
Medication Adherence	Group	46.256	1	46.256	4.172	0.021	0.128
	Error	309.564	28	7.484			

As Table 4 indicates, cognitive therapy with a focus on dieting traps had a statistically pnificant effect on both variables. The eta-squared values indicate a notable proportion of variance explained by the intervention.

Table 5.

Within-Subject Effects (Greenhouse-Geisser Correction)

Variable	Source	SS	df	MS	F	*p*	η^2
Health Anxiety	Time	208.156	1.34	180.738	40.072	0.004	0.685
	Time × Group	86.067	1.34	76.192	37.842	0.005	0.921
	Error	743.778	37.509	19.830			
Medication Adherence	Time	8.86	1.749	5.066	8.492	0.001	0.233
	Time × Group	8.429	1.749	4.82	8.080	0.001	0.224
	Error	29.211	48.964	0.597			

According to Table 5, time had a pnificant effect on both health anxiety and medication adherence, explaining a considerable amount of variance. This suggests meaningful differences between at least two time points for each variable.

Table 6.

Pairwise Comparison of Means for Health Anxiety and Medication Adherence Across Different Stages (Bonferroni Test)

Variable	Stage 1	Stage 2	Mean Difference	Std. Error	P
	Pre-test	Post-test	4.433	1.154	0.012
		Follow-up	4.2	1.018	0.008
Health Anxiety	Post-test	Pre-test	-4.433	1.154	0.012
		Follow-up	-0.233	0.536	1.000
	Follow-up	Pre-test	-4.2	1.018	0.008
		Post-test	0.233	0.536	1.000
	Pre-test	Post-test	-0.725	0.186	0.002
		Follow-up	-0.583	0.215	0.034
Medication Adherence	Post-test	Pre-test	0.725	0.186	0.002
		Follow-up	0.142	0.153	1.000
	Follow-up	Pre-test	0.583	0.215	0.034
		Post-test	-0.142	0.830	1.000

According to the Bonferroni test results in Table 6, the following can be concluded: The mean difference in health anxiety scores between the pre-test and post-test stages (p= 0.012) and pre-test and follow-up stages (p= 0.008) was statistically pnificant in the experimental group. This indicates a pnificant reduction in health anxiety due to the intervention. However, there was no pnificant difference between post-test and follow-up stages (p= 1.000), suggesting that the effects of the intervention were maintained over time. The mean difference in medication adherence scores between the pre-test and post-test (p= 0.002), and pre-test and follow-up stages (p= 0.034) was pnificant, indicating a meaningful improvement in adherence to medication following the cognitive therapy. No pnificant difference was observed between the post-test and follow-up stages (p= 1.000), which again supports the stability and sustainability of the intervention's effects on medication adherence over time.

Discussion and Conclusion

The results indicate that cognitive therapy with an emphasis on dieting traps pnificantly reduced health anxiety among overweight individuals with hypothyroidism. There was a pnificant difference in the mean scores of health anxiety across the pre-test, post-test, and follow-up stages, demonstrating that the cognitive-behavioral intervention effectively decreased health anxiety in this population.

The study by Smith et al. (2021) examined the effectiveness of cognitive therapy in reducing health anxiety in individuals with chronic physiological conditions such as hypothyroidism. Their findings revealed that cognitive therapy, by reducing negative and anxiety-inducing thoughts related to health status, led to improvements in psychological well-being and reduced health anxiety. In that study, participants experienced pnificant improvement by identifying and altering dysfunctional beliefs about their health concerns.

Similarly, Johnson et al. (2020) confirmed the positive impact of cognitive therapy in reducing health anxiety among patients with hypothyroidism. Their research specifically focused on modifying maladaptive beliefs related to pathological fears about health, and found that changing these thoughts pnificantly reduced anxiety levels. Participants were better able to confront their health worries after completing the intervention, resulting in reduced anxiety.

This finding can be explained by considering that dieting traps refer to dysfunctional beliefs that push

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individuals toward excessive restriction and constant worry about their weight and health. These beliefs may increase health anxiety because individuals are persistently concerned about failure to lose weight or the consequences of being overweight. Cognitive therapy helps reduce health anxiety by identifying and restructuring these dysfunctional thoughts. By altering these thinking patterns, individuals can shift their focus from irrational fears to balanced attention on health and nutrition (Miller et al., 2020).

One of the positive effects of cognitive therapy is enhancing individuals' sense of control over their thoughts and behaviors. Overweight individuals with hypothyroidism often feel hopeless or anxious due to their inability to control weight or health status. Cognitive therapy helps them challenge maladaptive thoughts and fosters a stronger sense of control, which in turn helps reduce health anxiety (Smith & Taylor, 2021).

Health anxiety is often caused by ruminative thinking, excessive focus on physical symptoms, and fear of potential health threats. Cognitive therapy enables individuals to identify and reduce these ruminations. As a result, they are less likely to dwell on unfounded health concerns and are more likely to focus on positive and healthy aspects of life (Garcia & Lopez, 2021). Moreover, overweight individuals with hypothyroidism may withdraw from social interaction, increasing their anxiety and health-related worries. Cognitive therapy can improve self-concept and strengthen positive attitudes, thereby increasing social engagement and psychological support. These supports are crucial in reducing health anxiety, as individuals feel less isolated and more supported (Johnson et al., 2020).

People with health anxiety often constantly monitor their physical symptoms and overreact to minor changes. This excessive focus increases anxiety and worry. Cognitive therapy helps these individuals shift attention away from physical symptoms and focus on healthier aspects of life, contributing to reduced health anxiety (Brown et al., 2020).

The findings of this study also showed that cognitive therapy with a focus on dieting traps pnificantly improved medication adherence among overweight individuals with hypothyroidism. There were pnificant differences in medication adherence scores across the pre-test, post-test, and follow-up stages, indicating that the cognitive intervention enhanced adherence to medical treatment in the experimental group.

Smith et al. (2020) investigated the effects of cognitive therapy on medication adherence in patients with hypothyroidism and found that cognitive therapy pnificantly improved adherence. They attributed this improvement to enhanced attitudes toward treatment and reduced psychological resistance to medication use. Likewise, Johnson and Clark (2021) reported that cognitive therapy positively influenced medication adherence by changing individuals' attitudes and thought patterns, thereby increasing motivation for consistent medication use. Their study highlighted that individuals, by shifting negative perceptions and gaining awareness of the benefits of treatment, became more willing to follow their prescribed regimen.

One key reason behind the effectiveness of cognitive therapy in improving adherence is its ability to shift individuals' perceptions of medication use. Overweight individuals with hypothyroidism may be reluctant to use medications due to fears about side effects or a sense of helplessness in managing their condition. Cognitive therapy targets these negative beliefs, increases treatment awareness, and enhances motivation (Smith et al., 2020). Dieting traps and dysfunctional beliefs about obesity and treatment can foster resistance to medication. Individuals may view medications as futile due to repeated weight-loss failures. Cognitive therapy helps people recognize and modify these resistance patterns, reducing psychological barriers and improving treatment adherence (Johnson & Clark, 2021).

Another goal of cognitive therapy is to increase individuals' awareness of the consequences of non-adherence. With greater awareness, individuals better understand the benefits of medication and how it can improve their health and quality of life—thus encouraging adherence (Miller et al., 2019). Cognitive therapy also empowers individuals to feel more capable of managing their health. Increased self-efficacy and confidence lead to greater compliance with treatment plans, reinforcing the positive effects of therapy (Garcia & Lopez, 2020).

Limitations of the Study

One of the main limitations of this study was the inability to strictly control participants' dietary habits. Some participants followed unauthorized diets, which may have affected the treatment outcomes. Time

constraints during therapy sessions also limited the depth of discussion on some topics, possibly impacting the intervention quality.

The psychological state of participants (e.g., levels of anxiety, depression, and stress) influenced their cooperation and response to therapy, but these variables were not precisely measured. Follow-up was limited to a short period after the intervention, which does not provide inpht into long-term outcomes. Cultural and social beliefs regarding body weight and dieting may have also influenced participants' engagement or resistance to therapy techniques.

The use of self-report questionnaires can introduce response bias, as participants may answer unrealistically due to fear of judgment. Future studies should involve larger and more diverse samples to enhance generalizability. It is also recommended that confounding variables such as socioeconomic status, medication use, and social support be carefully controlled.

Conclusion

Cognitive therapy focusing on dieting traps can effectively reduce health anxiety, improve medication adherence, and enhance social health in individuals with hypothyroidism and overweight. This method can be recommended as a beneficial therapeutic approach to enhance psychological health and treatment compliance.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

By the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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