The Effectiveness of Digital Cognitive Behavioral Therapy in Improving Psychological Symptoms among Patients with Insomnia and Depression

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Abstract

Background: The most effective treatment for severe depression and sleeplessness is cognitive behavioural therapy (CBT). In order to make CBT more accessible, new digital approaches have been developed that combine technology tools such as emails, smartphone apps, or internet-guided treatment. **Aime:** To evaluate the effectiveness of digital cognitive behavioral therapy (DCBT) in improving psychological symptoms among patients with insomnia and depression. **Research Design**: Quasi experimental research design was utilized online. **Setting:** The participants were recruited from Outpatient Psychiatric Clinic in Zagazig hospital affiliated to Zagazig University, Egypt. **Subjects:** A total 300 patients voluntarily participated. **Tools:** Three tools were used; Structured Questionnaire, Pittsburgh Sleep Quality Index (PSQI) scale to assess patients' sleep status and Patient Health Questionnaire (PHQ) were used to assess mental health screening of patients. **Results**: 81% of studied patients had good sleep quality post Pittsburgh Sleep Quality Index 89% &82% respectively of them had decreased their insomnia & depression post cognitive behavioral therapy with highly statistically significant difference at p=<.001. **Conclusion:** DCBT seems to be effective in alleviating insomnia and depression; marked improvement of patients; that digital cognitive behavioral therapy (DCBT) was effective and had long-term benefits in patients with insomnia, depression and changes in sleep quality. **Recommendation:** Continued research and evaluation are needed to further investigate the effectiveness of DCBT in improving psychological symptoms among patients with insomnia and depression.

Keywords: Effectiveness, Digital Cognitive Behavioral Therapy, Insomnia and Depression.

Introduction

Cognitive Behavioral Therapy (CBT) refers to treatment approach that is founded on the premises that cognitive processes are implicated in the development and maintenance of psychopathology, especially emotional distress and impaired functioning. While those cognitive processes are likely to be present during the session and require the therapist to adapt the intervention to best assist the patient **(Ballesio et al., 2018)**.

Cognitive Behavioural Therapy (CBT) is one of several therapeutic approaches that is helpful for improving mental health and reducing stress, anxiety, and depression. It has a long history of treating these symptoms **(Chan et al., 2022).**

Digital Cognitive Behavioural Therapy for Insomnia (DCBT-I) is regarded as a successful treatment that can meet the needs of a broader patient base. As the name implies, DCBT-I address and enhance cognition and behaviour in relation to insomnia. Its components include relaxation, sleep restriction, teaching on good sleep hygiene, stimulus management, and cognitive therapy.

Cognitive therapy operates under the fundamental tenet that each person is fundamentally responsible for the development of their own psychological issues and symptoms, and that as a result, each person can alter their emotional state. This approach is predicated on the idea that behaviours, emotions, and cognitions all have a cause-and-effect relationship **(Zachariae, Lyby, Ritterband & O'Toole, 2019)**.

Insomnia is one of the most common sleeps and mental health disorders globally, affecting 6% to 10% of individuals. Anxiety and depression are comorbid mental health issues that are associated with insomnia. It is a difficult illness that lowers quality of life and increases the chance of getting other mental health issues. Anxiety and depression are common co-occurring mental disorders **(Lind, Rücker, Schneider & Kriston, 2018)**

Insomnia is the term for subjective unhappiness with the quantity or quality of sleep. Attention bias, abnormalities in end-organ function, and abnormalities in sensory and information processing all contribute to this psychophysiological illness. An inability to fall asleep, stay asleep, or wake up early are classic indicators of insomnia, which can be exceedingly unpleasant and impede basic cognitive activities like walking,

remembering, and making decisions **(Kokou-Kpolou, Megalakaki, Laimou, & Kousouri, 2020)**.

Daytime weariness, cognitive impairment, and mood problems are often associated with poor sleep quality, while insomnia is linked to physical and mental comorbidities such as melancholy, anxiety, and diabetes **(Morin & Carrier 2021)**. Additionally, it negatively affects happiness, productivity at work, and everyday learning. With these things in mind, sleeplessness can have an impact on one's quality of life **(Voysey, Barker, & Lazar, A., 2021 & Edinger et al., 2021)**.

European guidelines recommend cognitive-behavioral therapy for insomnia (CBT-I) as the first-line treatment, which has demonstrated large and enduring treatment effects. Still, most patients with insomnia do not receive CBT-I, most likely because dedicated care for such a large population in the usual one-to-one relationship between therapist and patient is not achievable **(Garland et al., 2018).**

Patients can obtain care anywhere, even in remote areas with little structural support, thanks to the availability of digital health programs at convenient times and places. Additionally, by eliminating protracted wait times in areas with a shortage of resources, these therapies can reach patients in early stages of the condition **(Voitsidis et al., 2020)**.

CBT-I was recommended as the first-line treatment for insomnia by the American College of Physicians, the actual dissemination of CBT-I remain challenging given the high cost of distribution and lack of professional therapists **(Hertenstein et al., 2019).**

Digital Cognitive Behavioral Therapy for Insomnia (DCBT) is a non-pharmacological treatment that consists of

multiple components, including cognitive therapy, stimulus control, sleep restriction, sleep hygiene, and relaxation **(Van Straten et al., 2018)**. It is recommended as the first-line therapy for patients with primary and comorbid insomnia **(Van der Zweerde, Bisdounis, Kyle, Lancee, & van Straten, 2019)**.

A prevalent form of sleep problem called insomnia is characterized by trouble sleeping and staying asleep. It is quite widespread worldwide and causes physical and mental discomfort during the day. Recent research indicates that more than 20% of persons in America suffer from symptoms of insomnia **(Kroenke, Spitzer, Williams, Monahan, & Löwe, 2017)**. Chronic insomnia can have a negative impact on a person's quality of life as well as their family's and societies financial situation **(Godzik, Crawford, Ryan, 2021)**. In addition, insomnia can be a risk factor for other chronic and mental health problems, including cardiovascular diseases, diabetes, anxiety and depression **(Fairburn & Patel, 2017).**

Insomnia and depression often co-occur. (CBT-I) seems to be effective and safe for mitigating insomnia and depression. However, the efficacy of digitally delivered CBT-I (DCBT-I) remains unclear **(Fang, Tu, Sheng, & Shao, 2019)**.

Significance of study:

Cognitive-behavioral therapy (CBT) has significant effects on improving sleep in insomnia patients. However, this study mainly focused on the effect of CBT for insomnia on sleep outcomes. Patients who had insomnia were frequently reported as experiencing depression, anxiety and daytime fatigue problems, including a decreased quality of life, which were also important factors **(Hall, Kellett, Berrios, Bains & Scott, 2019)**. Cognitive-

behavioral therapy (CBT) significantly improves sleep for individuals with insomnia. Nonetheless, the primary focus of these studies was how CBTI affected sleep-related outcomes. Importantly, patients with insomnia were often reported to have problems with depression, anxiety, and daytime fatigue, as well as a lower quality of life.

Cognitive behavioral therapy (CBT) represents one of the major treatment options for depressive disorders interventions. While newly developed digital CBT approaches hold important advantages due to higher accessibility, their relative effectiveness compared to traditional CBT remains unclear **(Kroenke, Spitzer, Williams, Monahan & Löwe, 2018)**. So we conduct this study to evaluate the effectiveness of digital cognitive behavioral therapy in improving psychological symptoms among patients with insomnia and depression.

Aim of the study:

This study aimed to evaluate the effectiveness of digital cognitive behavioral therapy (DCBT) in improving psychological symptoms among patients with insomnia and depression through:

1. Measure changes in psychological symptoms, including insomnia, and depression pre and post participating in the DCBT.

2. Explore changes in cognitive processes related to sleep.

3. Utilize standardized depression assessment tools by using Patient Health Questionnaire (PHQ) to quantify reductions in depression symptoms severity post DCBT compared to baseline levels.

4. Evaluate Sleep Quality: Use validated measures such as the Pittsburgh Sleep Quality Index (PSQI) to assess

improvements in sleep quality post completion of the DCBT.

Research hypothesis:

By implementing this intervention, mental health care providers can enhance the effectiveness of DCBT in improving psychological symptoms among patients with insomnia and depression.

Subjects and Method:

Design and Participants:

A quasi-experimental research design were conducted online in this study to establish the causality; the effect of independent variable on dependent variable **(Dutra and Dos Reis, 2016).** The independent variable which is digital cognitive behavioral therapy interventions on the dependent variables including psychological symptoms (insomnia and depression) of patients via a mobile app named Good Sleep quality for the period of three months starting from the beginning of June 2023 to the end of August 2023 Participants were recruited from Outpatient Psychiatric Clinic in Zagazig hospital affiliated to Zagazig University, Egypt. A total 300 patients voluntarily participated in the study by scanning the Quick Response or QR code of the questionnaire through the Chat mobile application and registered for the experiment. The inclusion criteria were as follows: Both male and female, aged from 30 and older years are included patients diagnosed with insomnia and depression, older than 3 years and exclusion criteria were patients diagnosed as severe psychiatric illness.

Tools of the study:

Tool I: Structured Questionnaire was adapted and modified from earlier published studies; the questionnaire was divided into two parts and consisted of close and open-ended questions. It involves the following:

Part A: Patients were given a socio-demographic questionnaire that included questions on their age, sex education level, type of family, and family income.

Part B: The patient's medical history, including information on hypnotic medication use, current health, the onset and duration of their insomnia, and any family history.

Tool II: Pittsburgh Sleep Quality Index (PSQI) scale adopted from **(Buysse, Reynolds, Monk, Berman & Kupfer, 1989 & Backhaus, Junghanns, Broocks, Riemann & Hohagen, 2002)**: Was used to assess participants' sleep status. The PSQI was originally designed to measure sleep quality in clinical populations. The use of the scale was then extended to people with insomnia & depression. It includes 19 questions, divided into seven dimensions: (1) sleep quality; (2) sleep time; (3) sleep duration; (4) sleep efficiency; (5) sleep disorders; (6) use of hypnotics; and (7) daytime dysfunction. Each dimension was scored from 0 to 3 and the scores were added to obtain the total PSQI score; a higher score indicated poorer subjective sleep quality. PSQI score ≥ 5 was used as the truncated value to determine sleep quality.

Tool III: The Patient Health Questionnaire (PHQ) was used to assess mental health screening of patients was adopted from (**Kroenke et al., 2018)** regarding depression. Self-administered version of the PRIME-MD diagnostic instrument for common mental disorders; The PHQ-9 involves nine items representing the criterion symptoms for major depressive disorder by the diagnostic and statistical manual of mental disorders, Fifth Edition (DSM-5). Participants were asked how

many times they had been bothered by each symptom over the past 2 weeks, with response choices of not at all, several days, more than half the days, and nearly every day, scored as 0, 1, 2, and 3, respectively. Participants studied patients were categorized into four groups according to their scores, mild (5–9), moderate (10–14) and severe depression scored (15 and more).

Insomnia was evaluated using The Arabic version of the Insomnia Severity Index (ISI). ISI to assess the insomnia depending on criteria by the International Classification of Sleep Disorders; The ISI has seven items to evaluate the perceived severity of sleep initiating difficulties, staying asleep, and early morning awakenings, satisfaction with current sleeping patterns, intervention on daily functioning, and noticeability of impairment attributed to the sleep problem, as well as the degree of distress or anxiety caused by sleep problems. The scores for symptoms severity insomnia were scored 8–14 for mild, 15–21 for moderate, and 22–28 for severe insomnia associated with significant daytime dysfunction. The translated ISI showed adequate reliability and validity among the Arab population. Cronbach's alpha coefficient was 0.84.

The Validity of the tools: reviewed for appropriated, legibility and comprehensive by jury consisted of 5 psychotic health nursing as well as psychotic medicine. The jury ascertained the content and face validity of tools. The reliability was conducted by Cronbach's alpha coefficient test which illustrated that each of tools Cronbach's alpha coefficient used and ranges from 0.87, 0.0, and 0.84).

Ethical Considerations:

Ethics approval was granted from the Scientific Research Ethical Committee of Faculty of Nursing, Zagazig University. The researchers were explained the purpose and procedures of the study to the studied patients included in the study. Consent was obtained from each subject online. In addition, the rights of withdrawal from the research were explained to each patient at any point before it was finished. Studied patients were assured that their identities and the data collected would be kept confidential; the online poll was completed anonymously.

Program development phases

Preparatory phase: Based on the information gathered by the study instruments, the researcher created the intervention. Additionally, our perspective on relevant recent, contemporary, national, and international literature experts in the psychiatric and mental health nursing department of the college of nursing revised and validated the content of this intervention.

Development and implementation phase:

General objective:

Treatment with digital cognitive behavioural therapy was administered to the intervention group. Treatment included cognitive therapy, stimulus control, relaxation training, sleep instruction, and sleep restriction.

Intervention based on digital cognitive behavioral therapy

The comparison of baseline and post intervention differences in terms of depression, insomnia, as well as sleep efficiency, total sleep time, and sleep quality are the main objectives.

We conducted core courses on Chat once a day for the three-week (DCBTI) program. The first month for sessions covered sleep hygiene education, including symptoms of

insomnia, treatment options, how to assess sleep condition and choose tasks, sleep restriction, stimulation control, regular exercise, relaxation training, and control intake. The second months for sessions covered cognitive reconstruction, correct thinking about sleeping medication, and mind relaxation. The third month for sessions covered these topics. The system kept track of each participant's login history every day after the initial login. The punch-in status and video playback progress were also recorded by the system. Their bedtime, the time they fell asleep, and the number of times they woke up during the night, the wake-up time, and any daytime naps were all noted in their daily sleep diary. This approach combines various therapeutic techniques, such as stress inoculation training, assertiveness training, exposure therapy to assist individuals in altering their negative thought patterns and ensuing behaviors.

Statistical Analysis:

The collected data were coded, revised, categorized, tabulated and analyzed using statistical package for social science (SPSS version 22). Accordingly, the following statistical tests were used: numbers and percentage, mean and standard deviation. Chi-square test x^2 were used to test the relation among studied qualitative variables, t-test was used for correlation analysis, proportion probability of error (p-value). The significance of the results when P<0.001 is highly significance, significance at P<0.05 and insignificance at P > 0.0.

Results:

Table (1) shows that mean age of studied patients were 43.25 ± 11.04 years and 74.7% of them were female. As regard of educational level 42.7 % of them had university educational level, 86.3% of them were working. 86.7% of studied patients were living in nuclear family, 68.3% of studied patients their family income was insufficient.

Table (2) shows that, 59.7% of them were had hypnotic medication history. 68.3% of studied patients had first onset of insomnia, regarding insomnia duration one third of them had from one to three years duration of insomnia. Moreover, 65.3% of studied patients had history in family.

Table (3) shows that 22.7% & 19% of the studied patients had sleep quality and sleep daytime respectively; pre intervention of Pittsburgh Sleep Quality Index (PSQI) scale compared to 77.3% & 81% of them post intervention. Regarding sleep duration and sleep efficiency the findings noticed that the 86.3% & 87% of studied patients post intervention. As regards sleeping disorders and daytime dysfunction 4.3% &3.3% of studied patients had decreased the sleeping disorders at the daytime dysfunction post intervention.

Figure (1) illustrated that, 87% of studied patients had poor sleep quality pre intervention and 19% of them scored good sleep quality pre intervention of Pittsburgh Sleep Quality Index. While 81% of them had scored good at post Pittsburgh sleep quality index, with highly statistically significant difference at p=.001.

Figure (2) highlighted a marked improvement in total studied patients' insomnia post digital cognitive behavioral therapy, 89% of studied patients had mild insomnia post intervention, 7% of them had moderate insomnia post intervention and 3.3% of them had severe insomnia at post digital cognitive behavioral therapy, with highly statistically significant difference at p=.001.

Figure (3) illustrates that, more than three quarters (79%) of studied patients had

severe depression at precognitive behavioral therapy intervention. While most of them (82%) had mild depression at post cognitive behavioral therapy intervention at p <.001.

Table (4) shows that the mean depression total score among studied patients was 42.62±2.5 at post digital cognitive behavioral therapy intervention. The mean 65.43±4.23 was for insomnia at post digital cognitive behavioral therapy intervention, with highly statistically significant difference at p=<.001

Table (1): Distribution of studied patients according to their socio-demographic characteristics

Items	No. (n=300)	%
Age mean (SD)/years:	43.25 ± 11.04	
Sex :		
Male	76	25.3
Female	224	74.7
Level of education:		
Basic education	34	11.3
Secondary school	120	40.0
University education	125	42.7
Postgraduate education	21	6.0
Working		
Yes	259	86.3
No	41	13.7
Family history		
Nuclear	260	86.7
Extended	40	13.3
Family income		
Sufficient	95	31.7
Insufficient	205	68.3

Table (2): Number and percentage distribution of patients according to family history

| Items	No. (n=300)	%
Hypnotic medication history		
- Yes	179	59.7
- No	121	40.3
Current history		
- Yes	224	74.7
- No	76	25.3
First onset of insomnia		
- Yes	205	68.3
- No	95	31.7
Insomnia duration		
- < one month	37	12.3
- 1-6 months	76	25.3
- 6-12 months	87	29.0
- 1-3 years	100	33.4
Family history		
- Yes	196	65.3
- No	104	34.7

Table (3): Effect of Pittsburgh Sleep Quality Index (PSQI) scale on patients

Items	Pre (n=300)				Post (n=300)				X^2	p-value
	Yes		No		Yes		No			
	No.	%	No.	%	No.	%	No.	%		
Sleep quality	68	22.7	232	77.3	249	83.0	51	17.0	51.809	<0.001**
Sleep daytime	57	19.0	243	81.0	257	85.7	43	14.0	21.678	<0.001**
Sleep duration	48	16.0	252	84.0	259	86.3	41	13.7	18.457	0.031*
Sleep efficiency	37	12.3	263	87.7	261	87.0	39	13.0	30.801	<0.001**
Sleep disorders	273	91.0	27	9.0	37	12.3	263	87.7	41.322	<0.001**
Use hypnotic	257	85.7	43	14.3	13	4.3	287	95.7	56.45	<0.001**
Day time dysfunction	270	90	30	10	10	3.3	290	90.7	72.421	<0.001**
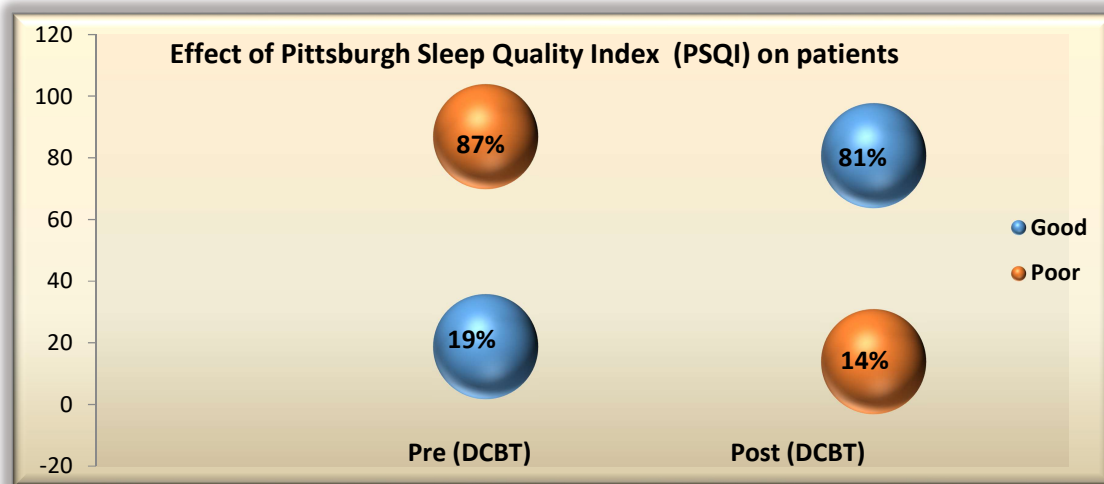
Figure (1): The total Effect of Pittsburgh Sleep Quality Index (PSQI) scale on patients (n=300)
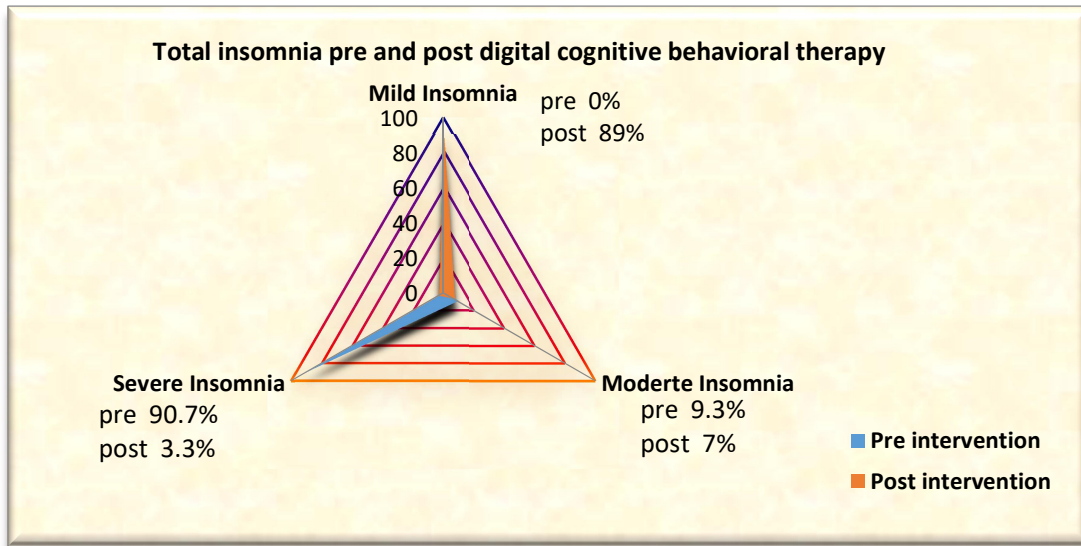
Figure (2): Distribution of studied patients according to their total insomnia pre and post digital cognitive behavioral therapy intervention (n=300)
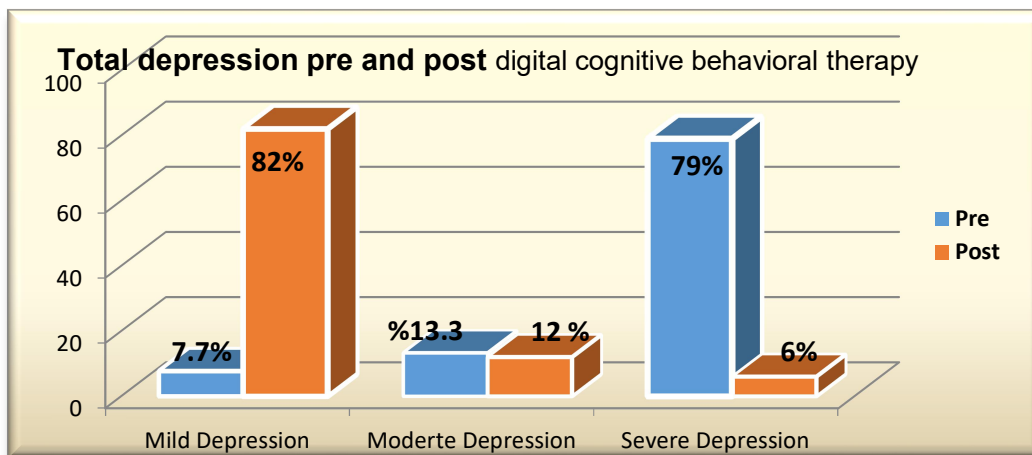
Figure (3): Distribution of studied patients according to their total depression pre and post digital cognitive behavioral therapy (DCBT) (n=300)

Table (4): Mean and standard deviation of sleep quality regarding subscales of digital cognitive behavioral therapy for patient's pre and post intervention

Items	Total Sleep quality		Pearson Correlation	
	Mean	**SD**	**t-test**	**P**
Depression				
Pre	29.13	5.4	18.37	<.001**
Post	42.62	2.5		
Insomnia				
Pre	16.34	1.35	16.30	<.001**
Post	65.43	4.23		

Discussion:

Digital Cognitive Behavior Therapy (DCBT) is an internet based approached, that allows the individuals to communicate with their health team at any time. It costly less and more accessible compared to traditional methods as face-to-face cognitive behavior therapy. The implementation of cognitive behavior therapy in this study is an effective in alleviating insomnia and depression and largely supports our hypotheses and is in accordance with previous studies that investigated the effects of DCBT-I on clinical and sleep-related outcomes **(Molloy & Anderson, 2022).**

In addition to improving insomnia, this method can teach individuals with insomnia how to take care of themselves if their symptoms return. The results of this study cleared that positive impact of digital cognitive behavioral therapy intervention improved the insomnia and provides large effects of the intervention on insomnia, severity and symptoms of depression **(Wogan et al., 2021)**.

As regards characteristics of the studied patients the present study revealed that, the mean age was 43.25±1.04 years. Also, nearly to three quarters of them were female, and less than half of them had a secondary level of education. The study finding was agreement with research study about "Effectiveness of Digital cognitive behavior therapy for the treatment of insomnia: spillover effects of DCBT" by **(Li, et al., 2022),** who found that the mean age of studied subjects was 40.56±1.79 years and many of them were female. As regards level of education the study finding was in an agreement with **(van der Zweerde et al., 2020)** who studied "Internet-delivered cognitive behavioral therapy for insomnia: Tailoring cognitive behavioral therapy for insomnia for patients

with chronic insomnia", found that most studied patients were postgraduate.

According to patients working the result of the current study shows that, more than two thirds of the studied patients had insufficient family income. This result was like the results of a study by **(Luik, van der Zweerde, van Straten & Lancee, 2019)** entitled "Digital delivery of cognitive behavioral therapy for Insomnia" found that, two thirds of the studied subjects were employed and financially uncompensated.

In terms of family history, most patients belonged to nuclear families. The results showed that over half of the patients had previously used hypnotic medication, two thirds had experienced the onset of insomnia for the first time, and roughly one third had experienced the condition for one to three years. This consistent with **(Schuffelen et al., 2023),** who studied "The clinical effects of digital cognitive behavioral therapy for insomnia" in Germany who mentioned the majority of participant uses sleep medication and psychotropic medications.

Additionally, this finding also, congruent with the study by **(Liang et al., 2022)** who studied "Digital cognitive behavior therapy for insomnia improving sleep quality" in Netherlands and concluded that, more than half of participant were living in nuclear family and complain from recurrent insomnia and feeling distress during bedtime. From the researcher point of view, nuclear type of families is different from population to another and indicators for various characteristics which involve the nutritional status, the geographical location, and environment in many societies.

Other study done by **(Xing et al., 2020)** about **"**Effects of cognitive behavioral therapy in chronic insomnia" found that the 81.9% of patients receiving digital cognitive behavioral therapy were responded and the

treatment was effective for comorbid disorders in comparison with medication and relief the anxiety, depression and somatic symptoms. Additionally, increase stabilizing and somnolence during the day, most likely because of the hypersomnia symptoms that would result from using sleep medicine. One explanation that could exist, according to researchers, is that chronic hypnotic usage could result in medication resistance.

In contrast to most of the patients who had sleep quality and sleep daytime following intervention, the current study found that less than one quarter of the patients had these characteristics prior to the Pittsburgh Sleep Quality Index intervention.

This corresponds with (**Benz et al., 2020**) who conducted a thorough online study on "The efficacy of cognitive and behaviour therapies for insomnia on daytime symptoms: a systematic review and network meta-analysis" and reported that participants felt their sleep quality had improved after the intervention, and that the study's effects on daytime sleepiness and mental health had also been positively observed.

The results of the current study reveal that, the majority of the studied patients had post-intervention sleep duration and efficiency, as well as daytime sleep. This is in line with the findings of (**Edinger et al., 2021**), who examined "Behavioural and psychological treatments for chronic insomnia disorder in adults" which discovered that significant between-group effects on dysfunctional beliefs about sleep were supported by improvements in sleep continuity and efficiency during the dCBT intervention. These results generally corroborate our theories and are consistent with other research examining the impact of dCBT-I on clinical and sleep-related outcomes.

Other study was corresponded well by (**Horsch, Lancee, Beun, Neerincx &**

Brinkman, 2017) studied entitled "Adherence to technology-mediated insomnia treatment" and found that dCBT is highly effective across different clinical groups of participants. Also, using dCBT treatment may affects and explained by high treatment satisfaction and strong adherence rates, which were comparatively high with 88.14%.

In terms of sleeping difficulties, many of the patients in the study claimed that, following the Pittsburgh Sleep Quality Index intervention, their daytime dysfunction and hypnotic use decreased or disappeared.

In fact (**Hertenstein et al., 2022**) studied entitled "Cognitive behavioral therapy for insomnia in patients with mental disorders and comorbid insomnia" and mentioned that there was improvement in symptoms of sleeping disorders, time dysfunction and depression, compared to before intervention, which underscores the potential of insomnia interventions in the treatment of emotion-regulation disorders. On other hand, (**Goitom & Schredl, 2020**) found that no differences for dream recall frequency and nightmare frequency which led to sleep disorders, these findings may reflect true effects and could be due to frequency difference were already low at baseline compared to other subjects with insomnia and other sleep disorders.

Regarding total insomnia, the current study showed that improve in insomnia among studied patients post digital cognitive behavioral therapy (dCBT) intervention with highly statistically significant difference per/ post intervention. These findings were like (**Schuffelen et al., 2023**) reported that there was significant difference before and after application of the dCBT intervention regarding the psychological problem as insomnia and depression. Moreover, similar study by (**Luik & Espie**, **2022**) who studied "Digital CBT for insomnia; Cognitive behavioral therapy for insomnia (CBT)

Across the life span: Guidelines and clinical protocols for health professionals" who mentioned that low-intensity, digital sleep intervention improved clinical outcomes in addition to usual care in people with insomnia, many of whom suffer with at least one comorbid mental disorder or physical illness.

As demonstrated by the current study, at the time of the precognitive behavioural therapy intervention, over 75% of the patients under investigation suffered from severe depression. Although most of them experienced minor depression following cognitive behavioural therapy, this outcome is consistent with **(Christensen et al., 2017),** studied entitled "Effectiveness of an online insomnia program for prevention of depressive episodes" and found that more than three quarters of individuals with insomnia complained of negative mood or subclinical depression and insomnia is a predictor of the onset of depressive disorder. Also, these findings are accordance with **(Seyffert et al., 2018),** who studied "Internet-delivered cognitive behavioral therapy to treat insomnia" reported that reducing subclinical depression reported by those with insomnia through sleep therapy may also have a potential preventive impact on the incidence of major.

The mean depression score of the patients under study was 42.62±2.5 following digital cognitive behavioural treatment. After receiving digital cognitive behavioural therapy, the mean score for insomnia was 65.43±4.23, showing a highly significant statistical difference at p. These results were confirmed by (**Liang et al., 2022**), who found that cognitive behavioural therapy improved depression and sleeping disorders such as insomnia. They also recommended that research on insomnia would benefit from filling in these gaps to increase the empirical

evidence supporting the efficacy of cognitive behavioural therapy.

Conclusion:

Based to the findings of the current study it was concluded that: Marked improvement of patients; that digital cognitive behavioral therapy (DCBT) was effective and had long-term benefits in patients with insomnia and depression; DCBT-I is associated with sustained improvement in sleep quality. These positive findings provide clinical evidence that DCBT -I contribute to meaningful sleep improvements. Given the unstable durability of DCBT at 3-month, the design, implementation, and delivery of DCBT in the practice setting warrant further investigation.

Based on the research paper provided, here are some recommendations:

- Integration into Mental Health Care Services: As a potential therapy option for patients with co-occurring depression and sleeplessness, mental health care providers ought to consider incorporating Digital Cognitive Behavioral Therapy (DCBT) into their offerings.

- Education and Training: To properly apply DCBT interventions, mental health practitioners should get education and training in this area.

- Customized Treatment Plans: Physicians want to create individualized treatment programs that consider the unique requirements and preferences of every patient.

- Monitoring and Follow-Up: An integral part of DCBT therapies is routine monitoring and follow-up. Throughout the course of treatment, clinicians should monitor their patients' progress, making necessary adjustments to interventions and offering continued support to ensure long-term adherence and success.

- Collaboration and Interdisciplinary Care: To treat patients with comorbid insomnia and depression with complete care, collaboration

between mental health specialists, primary care physicians, and other pertinent healthcare providers is essential.

- Research and assessment: Continued research and assessment are needed to better study the effectiveness of DCBT in alleviating psychological symptoms among patients with insomnia and depression.

- Patient Education and Empowerment: Empowering patients with knowledge and skills to manage their symptoms is a key part of DCBT therapies.

- By putting these suggestions into practice, mental health professionals can improve the way that DCBT helps patients with depression and sleeplessness with their psychological symptoms, which will ultimately lead to better mental health outcomes and a higher quality of life.

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