Effectiveness of Cognitive Behavioral Therapy for Insomnia on Sleep Quality in Patients with Insomnia: A Meta-Analysis

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ABSTRACT

Background: The relationship between sleep quality and sleep quantity is very close and has a significant impact on a person's sleep needs. If someone does not get enough sleep, then this will have an impact on the quality of their sleep, and vice versa. Therefore, maintaining a good quality of sleep is very important to maintain a healthy body and improve quality of life. The aim of the study was to analyze the effect of cognitive behavior therapy for insomnia (CBT-I) on sleep quality in insomnia patients.

Subjects and Method: This study is a meta-analysis with PICO. Population: insomnia patients. Intervention: given cognitive behavior therapy for insomnia (CBT-I). Comparison: not given cognitive behavior therapy for insomnia (CBT-I). Outcome: sleep quality. The articles used in this study were obtained from five databases, namely PubMed, Embase, Web of Science, ScienceDirect, Google Scholar. The keywords used to search for articles use the medical subject heading (MeSH) term and the emtree of the keywords "Insomnia" AND "Cognitive Behavior Therapy for Insomnia" AND "Sleep Quality". The articles used were full text in English from 2013 to 2023. Articles were selected using the 2021 PRISMA flowchart and analyzed using the RevMan 5.3 application.

Results: A total of 10 randomized controlled trial study articles came from Iran, Canada, Spain, Texas, Korea, Kansas and the United States. The total sample size is 473 research subjects. Based on the analysis, insomnia patients who were given CBT-I therapy showed an average PSQI score of 1.88 units lower than those not given CBT-I (placebo), and the difference was statistically significant (SMD = -1.88; 95% CI = -2.55 to -1.22; p<0.001). Then insomnia patients who were given CBT-I showed an average PSQI score of 0.52 units lower than those given other insomnia therapies, and the difference was statistically significant (SMD= -0.52; 95% CI= -0.77 to -0.28; p <0.001) . Then when viewed as a whole, it shows that insomnia patients who are given CBT-I therapy on average have or show a PSQI score of 0.78 units lower than other therapies and without CBT-I therapy (placebo), and this difference is statistically significant (SMD= -0.78; 95% CI= -1.13 to -0.42; p < 0.001).

Conclusion: Cognitive behavior therapy for insomnia (CBT-I) can improve sleep quality in insomnia patients (decrease the PSQI score).

Keywords: insomnia, cognitive behavior therapy for insomnia, sleep quality.

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BACKGROUND

Sleep is a complex process and not just closing your eyes. Sleep serves as a time for the recovery process for the body and brain, and sleep is a natural need that must be fulfilled every day (Mawo et al., 2019). The National Sleep Foundation in 2021, states that adults aged 18-64 years need 7-9 hours of sleep per day, while those aged 65 years need 7-8 hours of sleep per day.

According to sleep is one of the basic needs that is very important and must be considered, but there are still many who ignore the importance of sleep. Meanwhile, adequate and quality sleep has an important role in maintaining a healthy body and improving the quality of immunity. Insomnia is one of the most common sleep disorders experienced by individuals, where individuals will have difficulty getting to sleep or maintaining adequate sleep (Hidaayah and Alif, 2016) According to Kline, (2014) sleep quality can be interpreted as a person's satisfaction with his sleep experience, including quantity, freshness upon awakening, and time of initiating and maintaining sleep. However, many people are not aware that they have sleep disturbances because they ignore the quality of their sleep. Therefore, sleeping and having good sleep quality is very important to maintain the health of our bodies and our quality of life (Morin et al., 2015).

The quality and quantity of sleep are interrelated and greatly affect the need for sleep. If the quantity of individual sleep is less than it should be, the quality of sleep will also have an effect, and vice versa (Teha et al., 2022).

Data shows that in the United States, 35.2% of adults report sleeping less than 7 hours per day, with the highest percentage occurring in Hawaii, which is around 43%. Meanwhile, residents of the Asian continent are ranked fourth with 37.5% reporting sleep disturbances. From statistical data regarding sleep disorders, chronic insomnia is experienced by adults around 10-30%. It is also estimated that between 30-48% of older adults or the elderly experience sleep disorders or insomnia, and women have a 40% higher risk of experiencing sleep disorders or insomnia than men (National Sleep Foundation, 2021) According to statistical data, the prevalence of insomnia or sleep disorders in Indonesia reaches 10%, which means that around 28 million of Indonesia's total population of 238 million experience sleep disorders or insomnia. This data indicates that there are still many insomniacs who have not been detected (Kurniawan et al., 2020) Based on the DSM-5 of 2013 world population data, around a third of early adult individuals often show symptoms of insomnia, with around 10% to 15% experiencing problems in doing so. daily activities and about 6% to 10% experience other symptoms that meet the criteria for a sleep disorder or insomnia (Hapsari and Kurniawan, 2019).

Sleep disorders or insomnia are not only common in young adults, but also in the elderly with a high incidence rate. According to available information, it was found that around 60% of elderly people in Indonesia reported experiencing sleep disturbances or insomnia. In the elderly, the quality of sleep at night tends to decrease compared to adults. As many as 22% of elderly people aged 70 year experience complaints of sleep disturbances, while 30% experience waking up at night. Insomnia tends to increase in the elderly because it is related to age and various causes or other diseases (Danirmala and Ariani, 2019). Insomnia can increase the risk of accidents when the driver is drowsy, increases the risk of chronic disease, obesity and depression, and causes the emergence of various new diseases (Walia and Mehra, 2016).

Treating insomnia in a timely manner is very important, as it can have a variety of

significant negative impacts in the short and long term. In dealing with insomnia, therapy should be focused on the primary diagnosis by considering that recovery from the primary diagnosis can affect recovery from insomnia as a secondary diagnosis. However, when insomnia occurs in combination with other conditions, the term "secondary" is changed to "comorbid", since identifying the exact cause is more difficult. Therefore, it is necessary to carry out proper identification and appropriate therapy to effectively treat insomnia and other conditions (Williams et al., 2013), because insomnia can occur to anyone regardless of gender, age, or social and economic background (Princess et al., 2021).

To overcome insomnia, there are several ways that can be done to avoid the effects of insomnia, namely by giving non-pharmacological therapy and pharmacological therapy (Cunnington et al., 2013). Forma et al., (2022), conducted a network meta-analysis study by comparing therapies for treating insomnia. Based on the results of the network meta-analysis, CBT-I showed the highest result or effect size compared to other therapies, in changing sleep onset latency in people with insomnia with an effect size of -5.79 (95% CI -16.26-5.2), then the second therapy is pharmacological therapy, namely eszopiclone with an effect size of -5.25 (95% CI -36.91-26.25), and the third therapy is a combination therapy between CBT-I and zolpidem with an effect size of -4.67 (95% CI -34.63-24.82). Of all the therapies performed, based on the above results it was found that CBT-I therapy was the most effective method of treating insomnia, and supports the recommendations from the American College of Physicians and American of Sleep Medicine (AASM) that CBT-I can be used as first-line therapy. in the treatment of insomnia, especially chronic insomnia. Aaron T. Beck developed the CBT-I

therapy method. CBT-I is a therapy method that aims to change deviant cognitive behavior in order to produce new, more adaptive and positive behaviors (McMain et al., 2015). CBT-I therapy is a combination of cognitive and behavioral therapy used to treat insomnia, especially chronic insomnia. Direct intervention is urgently needed to correct wrong mindsets and behaviors, as well as the relationship between the two, which can worsen the patient's condition (Cunnington et al., 2013).

Based on previous systematic review studies or meta-analyses that have looked at the effectiveness of CBT-I in adult participants with insomnia. However, in that study CBT-I only had the effect of CBT-I on sleep disturbances in measurements after 3, 6, and 12 months after therapy was given, and did not carry out direct examinations after being given therapy (van der Zweerde et al., 2019). The aim of this study was to analyze the effect of cognitive behavior therapy for insomnia (CBT-I) on sleep quality in insomnia patients.

SUBJECTS AND METHOD

1. Study Design
This research is a systematic review and meta-analysis. The search for article sources carried out by researchers relied on online article searches. Data collection was obtained from five databases namely PubMed, Embase, Web of Science, ScienceDirect, Google Scholar. The keywords used to search for articles use the medical subject heading (MeSH) term and the emtree of the keywords "Insomnia" AND "Cognitive Behavior Therapy for Insomnia" AND "Sleep Quality". This research analysis was carried out using the RevMan 5.3 application.

2. Steps of Meta-Analysis
Meta analysis was carried out in 5 steps as follows:

1) Formulate research questions in PICO format (Population, Intervention, Control/Comparisons, Outcomes).
2) Search for articles from various databases PubMed, Embase, Web of Science, ScienceDirect, Google Scholar.
3) Screening and conducting critical appraisal on primary studies with the Critical Appraisal Checklist for Randomized Controlled Trials from the Critical Appraisal Skills Program (CASP).
4) Perform data extraction and enter the effect size of each primary study into the RevMan 5.3 application.
5) Interpret the results of the research analysis and draw conclusions.

3. Inclusion Criteria

The inclusion criteria used were articles in full text with a randomized controlled trial study design, and published in English. The research subjects were patients who experienced symptoms or were diagnosed with insomnia, the relationship measure used was the Mean SD.

4. Exclusion Criteria

Exclusion criteria in this study were articles published other than English and articles published before 2013.

5. Operational Definition of Variables

Insomnia based on the Disgnostic and Statistical Manual of Mental Disorder (DSM) and or based on The International Statistical Classification of Diseases (ICD).

Quality of sleep is a state of sleep that a person undergoes to produce freshness and fitness when he wakes up.

CBT-I is a state of changing cognitive distortions that focus on sleep problems, to be able to produce a new, more adaptive behavior.

6. Study Instruments

The study instrument used in this study was the Critical Appraisal Checklist for Randomized Controlled Study from the Critical Appraisal Checklist Program (CASP).

7. Data Analysis

The collected articles were then processed using the Review Manager application (RevMan 5.3). Data processing is done by calculating the MeanSD. Forest plots and funnel plots are used to determine effect sizes and heterogeneity of data.

RESULTS

Search for articles in this study through databases that include PubMed, Embase, Web of Science, ScienceDirect, Google Scholar. The article review process can be seen in the search flow in figure 1. The initial search process yielded 181 results, after the process of deleting duplicate articles, 24 were obtained and 157 articles qualified for full text review. The final results obtained were 10 articles that met the criteria. Figure 2 shows a map of the distribution of research on the effect of cognitive behavioral therapy for insomnia (CBT-I) on sleep quality in insomnia patients. Based on 10 research articles obtained from 3 continents, namely 3 studies were obtained from the Asian continent, namely Iran and Korea. Then 2 studies were obtained from the European continent, namely Spain. And 5 studies were obtained from the Americas, namely Canada, the United States, Kansas, and Texas.

Table 1 shows the assessment of the quality of primary articles using CASP used in this study. Based on the results obtained, the total score of the 10 selected primary studies ranged from 9 articles obtaining a score of 11, and 1 article scoring 10. This indicates that the quality of all primary articles used in this study is worthy of meta-analysis.

Table 2 presents a summary of the source articles obtained from 10 primary articles using a randomized controlled trial study design used for meta-analysis on the effect of cognitive behavior therapy for

insomnia (CBT-I) on sleep quality in insomnia patients. The total sample is 473 samples. And in table 3 presents an article summary of the results obtained from the primary article that will be used for analysis.
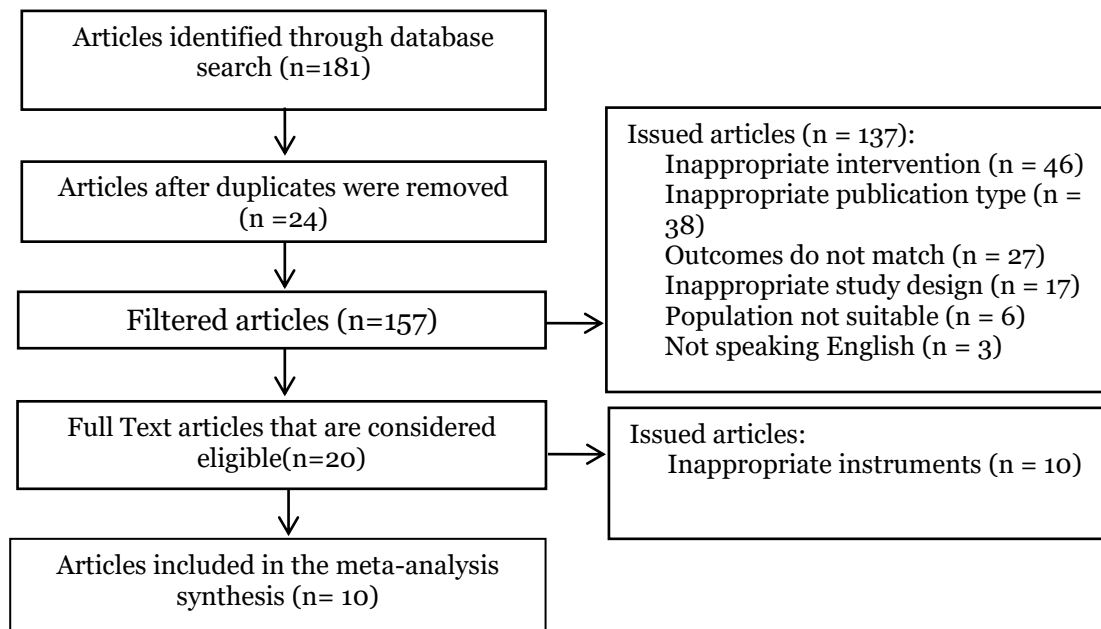
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┌─────────────────────────────────────┐
│ Articles identified through database │
│          search (n=181)              │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│ Articles after duplicates were removed│
│             (n =24)                  │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐       ┌──────────────────────────────────────┐
│       Filtered articles (n=157)      │─────▶ │ Issued articles (n = 137):           │
└─────────────────────────────────────┘       │   Inappropriate intervention (n = 46)│
                  │                            │   Inappropriate publication type (n =│
                  ▼                            │   38)                                │
┌─────────────────────────────────────┐       │   Outcomes do not match (n = 27)     │
│ Full Text articles that are considered│      │   Inappropriate study design (n = 17)│
│          eligible(n=20)              │       │   Population not suitable (n = 6)    │
└─────────────────────────────────────┘       │   Not speaking English (n = 3)       │
                  │          │                 └──────────────────────────────────────┘
                  ▼          └──────────────▶ ┌──────────────────────────────────────┐
┌─────────────────────────────────────┐       │ Issued articles:                     │
│ Articles included in the meta-analysis│      │   Inappropriate instruments (n = 10) │
│          synthesis (n= 10)           │       └──────────────────────────────────────┘
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Figure 1. PRISMA flowchart diagram of Cognitive Behavioral Therapy for Insomnia on Sleep Quality in Patients with Insomnia

Figure 2. Map of the distribution of research on the effect of cognitive behavior therapy for insomnia (CBT-I) on sleep quality

Figure 2 is a map of the distribution of research article locations. The articles con- tained in the review process are articles ori- ginating from 3 continents. The search

results obtained 10 articles with search locations around the world.

Tabel 1. Critical appraisal checklist for randomized controlled trial dari critical appraisal skills programme (CASP)

Author (Years)	Criteria of Questions											Total
	1	2	3	4	5	6	7	8	9	10	11	
Yarahmadi et al., (2021)	2	2	2	2	1	2	2	2	2	2	2	21
Tomfohr-Madsen et al., (2020)	2	2	2	2	2	2	2	2	2	2	2	22
Lami et al., (2018)	2	2	2	2	2	2	2	2	2	2	2	22
Taylor et al., (2014)	2	2	2	2	2	2	2	2	2	2	2	22
Kwan et al., (2022)	2	2	2	2	2	2	2	2	2	2	2	22
Siengsukon et al., (2020)	2	2	2	2	2	2	2	2	2	2	2	22
Kalmbach et al., (2020)	2	2	2	2	2	2	2	2	2	2	2	22
Moon et al., (2020)	2	2	2	2	2	2	2	2	2	2	2	22
Bramoweth et al., (2020)	2	2	2	2	2	2	2	2	2	2	2	22
Martínez et al., (2014)	2	2	2	2	2	2	2	2	2	2	2	22

Description of the question criteria:

1	=	Does the experiment clearly answer the clinical problem?
2	=	Is the provision of interventions to patients carried out by randomization?
3	=	Were all patients included in the study properly accounted for in the conclusions? Were all patients analyzed according to the randomized study groups?
4	=	Are the patients, health workers, and researchers blinded?
5	=	Were the study groups similar at the start of the study?
6	=	Outside of the intervention studied, were the study groups treated the same?
7	=	Is the effect of the intervention large enough?
8	=	How precise is the estimation of the effect of the intervention?
9	=	Do the benefits provided by the intervention outweigh the costs and disadvantages?
10	=	Are the results applicable to the practice context or local population?
11	=	Were all other clinically important outcomes considered in this article?

Description of the answer score:

2	=	Yes
1	=	Uncertain
0	=	No

Table 2. Table PICO summary of the article on the effect of cognitive behavior therapy for insomnia (CBT-I) on sleep quality in insomnia patients with a large sample (n=473)

Author (Year)	Country	Sample	P	I	C	O
Yarahmadi et al., (2021)	Iran	20	Insomnia patient	Given CBT-I therapy	Not given CBT-I therapy (placebo)	Not given CBT-I therapy (placebo)
Tomfohr-Madsen et al., (2020)	Canada	24	Post Concussion Persistent patients experience insomnia	Given CBT-I therapy	TAU (Treatment AS Usual)	TAU (Treatment AS Usual)

Author (Year)	Country	Sample	P	I	C	O
Lami et al., (2018)	Spanish	113	Fibromyalgia patients who experience insomnia	Given CBT-I therapy	UMC (Usual Medical Care)	UMC (Usual Medical Care)
Taylor et al., (2014)	Texas	34	Insomniac patient	Given CBT-I therapy	Waitlist Control (placebo)	Waitlist Control (placebo)
Kwan et al., (2022)	South Korea	17	Insomniac patient	Given CBT-I therapy	Neurofeedback	Neurofeedback
Siengsukon et al., (2020)	Kansas	30	Multiple Sclerosis patients who experience insomnia	Given CBT-I therapy	Brief education	Brief education
Kalmbach et al., (2020)	United States of America	91	Pregnant women who experience insomnia	Given CBT-I therapy	Sleep Education	sleep quality
Moon et al., (2020)	South Korea	22	Cancer patients who experience insomnia	Given CBT-I therapy	Cheonwangbosimdan Therapy	sleep quality
Bramoweth et al., (2020)	United States of America	63	Insomniac patient	Given CBT-I therapy	Insomniac patient	sleep quality
Martínez et al., (2014)	Spanish	59	Fibromyalgia patients who experience insomnia	Given CBT-I therapy	Fibromyalgia patients who experience insomnia	sleep quality

Table 3. Description of article studies in a meta-analysis of the effect of cognitive behavior therapy for insomnia (CBT-I) on sleep quality in insomnia patients

Intervention Group			Control Group		
Mean	SD	Total of Sample	Mean	SD	Total of Sample
9.64	2.43	10	17.23	3.58	10
11.19	2.39	12	13.10	2.23	12
13.19	4.31	38	13.08	5.33	41
3.31	2.47	17	7.62	2.57	17
5.5	3.85	8	8.67	1.94	9
6.4	2.6	10	7.9	1.8	10
6.61	2.99	46	9.29	4.12	45
7	4.47	11	10.5	3.72	11
6.8	3.5	32	8.4	4.3	31
11.33	4.03	30	13.48	2.88	29

Table 4. Data on standard mean deviation (SMD) and 95% confidence interval (95% CI) on the effect of cognitive behavior therapy for insomnia on sleep quality in insomnia patients (n=473)

Author (Year)	SMD	CI 95%	
		Lower Limit	Upper Limit
Yarahmadi *et al.,* (2021)	-2.38	-3.58	-1.17
Tomfohr-Madsen *et al.,* (2020)	-0.80	-1.64	0.04
Lami *et al.,* (2018)	0.02	-0.42	0.46
Taylor *et al.,* (2014)	-1.67	-2.46	-0.88
Kwan *et al.,* (2022)	-1.01	-2.03	0.02
Siengsukon *et al.,* (2020)	-0.64	-1.55	0.26
Kalmbach *et al.,* (2020)	-0.74	-1.16	-0.31
Moon *et al.,* (2020)	-0.82	-1.70	0.06
Bramoweth *et al.,* (2020)	-0.40	-0.90	0.10
Martínez *et al.,* (2014)	-0.60	-1.13	-0.08

1. Forest Plot
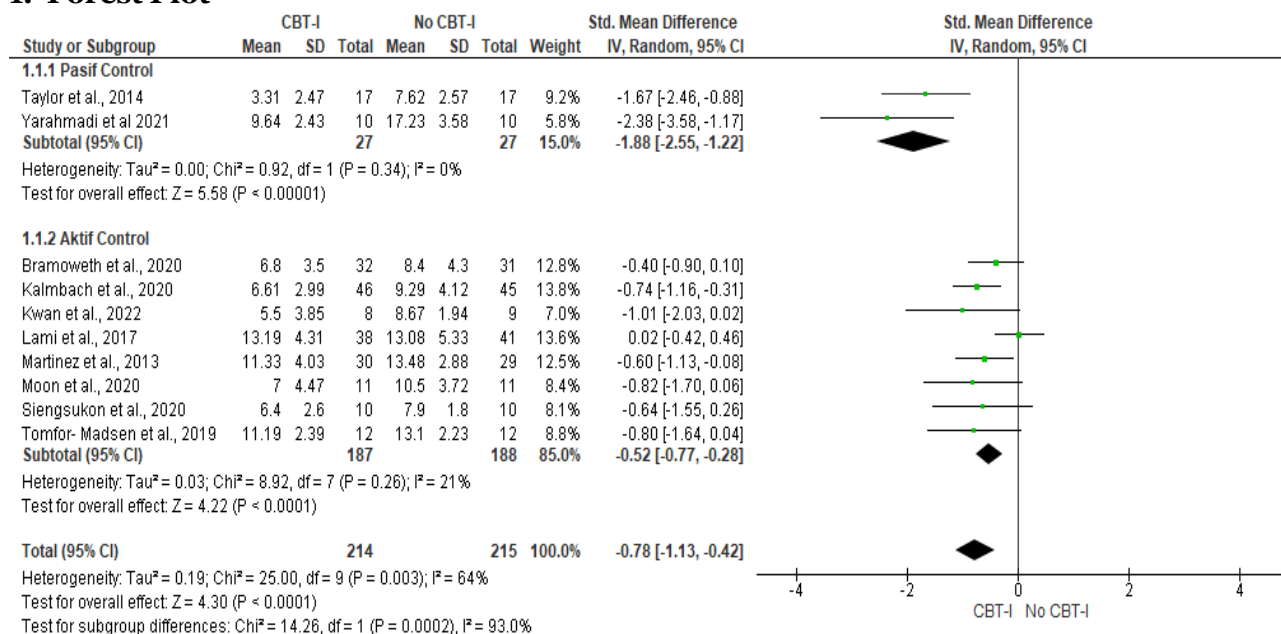
Figure 3. Forest plot of the effect of cognitive behavior therapy for insomnia on sleep quality in insomnia patients

Forest plot Figure 3 shows that cognitive behavior therapy for insomnia (CBT-I) can improve sleep quality in insomnia patients. Insomnia patients who were treated with CBT-I had an average PSQI score of 1.88 units lower than those not given CBT-I (placebo), and the difference was statistically significant (SMD= -1.88; 95% CI = -2.55 to -1.22;

p<0.001). Heterogeneity in passive control showed (I2= 0%; P=0.340). Thus the calculation of the average effect estimate is carried out using the fixed effect model approach.

Then insomnia patients who were given CBT-I showed an average PSQI score of 0.52 units lower than those given other insomnia

therapies, and the difference was statistically significant (SMD= -0.52; 95% CI= -0.77 to -0.28; p <0.001). Heterogeneity in active control showed (I²= 21%; p=0.260). Thus the calculation of the average effect estimate is carried out using the fixed effect model approach.

Then, when viewed as a whole, the forest plot in Figure 3 shows that insomnia patients who were given CBT-I therapy showed an average PSQI score of 0.78 units lower than other therapies and without CBT-I therapy (placebo), and this difference significantly statistically significant (SMD= -0.78; 95% CI= -1.13 to -0.42; p < 0.001). Heterogeneity in the total group (passive and active control) showed (I²= 64%; p= 0.003). Thus the calculation of the average effect estimate is carried out using the random effect model approach.

2. Funnel Plot
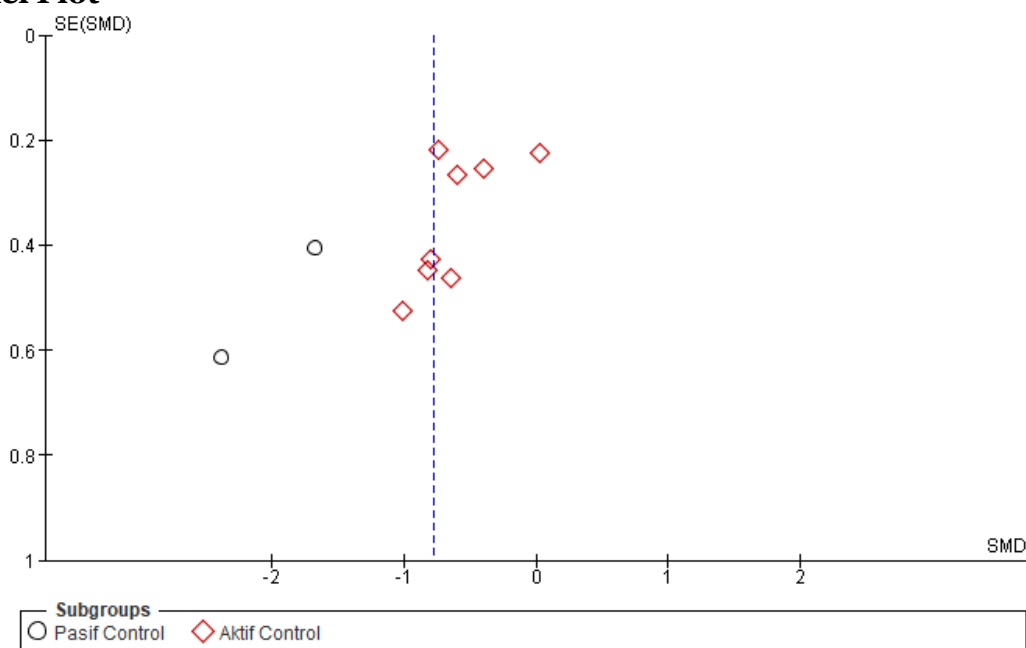
Figure 4. Cognitive behavior therapy funnel plot for insomnia (CBT-I) on sleep quality in insomnia patient

DISCUSSION

The funnel plot in Figure 4 shows the distribution of the asymmetric effect estimates. The distribution of effect estimates is mostly located to the right of the estimated average vertical line, thus indicating publication bias. Because the distribution of effect estimates is mostly located to the right of the average vertical line in the funnel plot as opposed to the average effect estimate in the forest plot which is located on the left, this publication bias tends to underestimate the true effect.

In a study with a systematic review design and meta-analysis with the topic of the effect of cognitive behavior therapy for insomnia (CBT-I) on sleep quality in insomnia patients. This study discusses the quality of sleep in patients who experience symptoms of insomnia and or are diagnosed with insomnia.

Based on an analysis of 10 primary studies, it was found that CBT-I was effective in improving sleep quality in insomnia patients. There were 2 primary studies that were not given CBT-I (placebo) therapy, and

it was found that insomnia patients who were given CBT-I therapy showed an average PSQI score of 1.88 units lower than those not given CBT-I (placebo), and this difference statistically significant (SMD= -1.88; 95% CI = -2.55 to -1.22; p < 0.001). Then there were 8 primary studies using other insomnia therapies called active controls, and it was found that insomnia patients who were given CBT-I showed an average PSQI score of 0.52 units lower than those given other insomnia therapies, and the difference was statistically significant (SMD = -0.52; 95% CI= -0.77 to -0.28).

And if you look at all 10 primary studies in total, it was found that insomnia patients who were given CBT-I showed an average PSQI score of 0.78 units lower than the two controls (passive and active controls), and the difference was statistically significant (SMD = -0.78; 95% CI= -1.13 to -0.42).

This is in line with research conducted by Taylor et al., (2014) which revealed that CBT-I can improve sleep quality in insomniacs, which can be seen from before CBT-I therapy (Mean=9.59; SD=3.34), then after CBT-I therapy it decreased significantly to (Mean=3.31; SD=2.47). Unlike the PSQI measurement in the control group, namely WLC (wait list control), obtained before all therapy was carried out in the control (Mean = 9.86; SD = 3.61), and after treatment in the control group or WLC (Mean = 7.62; SD = 2.57). So it was concluded in this study that CBT-I can be an effective option for treating insomnia in college students, so that it can improve sleep quality and daytime function and overall well-being.

The same study, conducted by Yarahmadi et al., (2021), regarding the effect of CBT-I in improving sleep quality and reducing the severity of insomnia, showed results that CBT-I was effective in improving sleep quality and can reduce the severity of insom-

nia. It can be seen from the results of his research on the CBT-I method before being treated (Mean = 17; SD = 4.66), and after being treated it showed a significant decrease (Mean = 9.64; SD = 2.43). Then compared with the control group, where the control group was insomnia patients were not given any therapy (placebo), and it can be seen that there were no significant changes in the control group (placebo) Mean = 16.53; SD=3.30 and a few weeks later it becomes Mean=17.23; SD=3.58.

The research results from the several articles above show that CBT-I therapy can improve sleep quality, because CBT-I consists of techniques that can effectively change an individual's mindset and behavior towards sleep. This therapy focuses on identifying psychological and environmental factors that interfere with sleep, and can provide a strategy to overcome sleep problems. There are several techniques commonly used in CBT-I, including sleep hygiene education, stimulus control therapy, sleep restriction therapy, relaxation therapy, and cognitive therapy. Through a combination of these screening techniques, individuals can eliminate negative thoughts about sleep and develop healthy sleep patterns, which in turn can improve sleep quality. This study is in line with research conducted by Yarahmadi et al., (2021), which showed that CBT-I can significantly improve sleep quality and reduce the severity of insomnia in patients with insomnia.

CBT-I also has advantages when compared to other therapies, one of which is that CBT-I therapy still has a longer effect even though therapy is not given, especially if you take part in the entire series of examination sessions it will provide maximum benefits compared to those who do not take part in the session as a whole. complete (Taylor et al., 2014).

Several other studies have also stated that CBT-I has a good effect and minimal side effects on improving sleep quality in insomnia patients. The limitations of this study are that there is a language bias because it only uses English-language articles, publication bias is shown in the funnel plot results on the asymmetric cognitive behavior therapy for insomnia (CBT-I) variable, and search bias because it only uses five databases, and this study also limited to a small population. The conclusion in this meta-analysis study was that insomnia patients who were given CBT-I showed an average PSQI score of 1.88 lower than those not given CBT-I, and the difference was statistically significant (SMD = -1.88; 95% CI = -2.55 to - 1.22; p<0.001). Likewise, insomnia patients who were given CBT-I showed an average PSQI score of 0.52 units lower than those given other insomnia therapies, and the difference was statistically significant (SMD= -0.52; 95% CI= -0.77 to -0.28; p<0.001). Then when viewed as a whole it shows that insomnia patients who are given CBT-I therapy show an average PSQI score of 0.78 units lower than other therapies and without CBT-I therapy (placebo), and the difference is statistically significant (SMD = -0.78; 95% CI= -1.13 to -0.42; p < 0.001). The results of this meta-analysis research can be used by policy makers or the government to increase the number of trained health workers, to provide adequate support and facilities, and to assist in providing information and education to the public regarding the importance of CBT-I therapy in improving quality of sleep. good, especially for insomnia patients.

AUTHORS CONTRIBUTION

Cynthia Octaviani is the principal researcher who selects topics, searches and collects articles, analyzes data and writes manuscripts. Hanung Prasetya and Bhisma Murti helped analyze the data and review research documents.

CONFLICT OF INTEREST
There is no conflict of interest in this study.

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