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CBT EFFECTIVENESS FOR REDUCING PTSD: A META-ANALYSIS STUDY

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PTSD, *CBT*, Efektivitas, Meta-analisis

***ABSTRACT*/ABSTRAK:**

Post-traumatic stress disorder (PTSD) affects individuals who have experienced or are currently experiencing a traumatic event. CBT (Cognitive Behavioral Therapy) is a non-drug intervention that can help reduce PTSD symptoms. Therefore, this study aimed to conduct meta-analysis and literature review of 14 research journals. It comprised a total of 898 participants, namely 441 in experimental and 457 in control groups. Using statistical analysis of Cohen's d effect size, the results showed a mean (M), standard deviation (SD), and sample size (N) that produced an effect size. Furthermore, it utilized a mixed-effect model with a Hedges'g of 1.18, CI = 0.283 to 2.093, and an Inconsistency value (I2) of 87.2%. This showed CBT had a significant effect on reducing PTSD.

PTSD terjadi pada individu yang telah mengalami atau saat ini sedang mengalami peristiwa traumatis. *CBT* adalah intervensi tanpa penggunaan obat yang dapat digunakan untuk mengurangi *PTSD*. Pembahasan yang bersifat konklusif seperti penelitian meta-analisis diperlukan untuk bisa menilai secara keseluruhan keberdampakan *CBT* terhadap *PTSD*. Penelitian dilakukan dengan menggunakan meta-analisis dengan tinjauan pustaka dari 14 jurnal penelitian, diakses dengan menggunakan sarana peramban *Google Chrome*. Rentang waktu rilis publikasi yang akan dianalisis adalah pada kurun waktu 10 tahun terakhir. Sebanyak 898 partisipan terdiri dari 441 kelompok eksperimental dan 457 kelompok kontrol. Data dianalisis dengan menggunakan analisis statistik ukuran efek Cohen's d, hasilnya adalah mean (M), *standard deviation* (SD), dan ukuran sampel (N) untuk menghasilkan ukuran efek menggunakan efek campuran dengan *Hedges'g* sebesar 1,18, CI = 0,283 hingga 2,093 dengan nilai ketidaksesuaian (*inconsistency value*/I2) = 87,2%. Ini berarti *CBT* memiliki efek yang besar dalam mengurangi *PTSD*.

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Trauma is among the factors that can significantly and negatively affect individuals' quality of life and the ability to function in society. This impact can manifest in various ways, namely academic failure, suicidal tendencies, love problems, decreased career performance, fatigue, and other physical illnesses (Garrido-Hernansaiz et al., 2023) . Therefore, trauma poses a crucial threat to individuals' psychological well-being.

From a psychopathology perspective, trauma can be explained by the concept of post-traumatic stress disorder (PTSD). PTSD is a debilitating condition associated with a reduced quality of life, as well as disrupted social functioning and career work, affecting individuals both personally and socially (Barlow, 2012).

PTSD is a mental disorder that appears after individuals experience a traumatic event that threatens life or physical integrity, such as a natural disaster, serious accident, sexual violence, or war (Knaevelsrud et al., 2010). According to DSM-5, the diagnostic criteria for PTSD include exposure to a traumatic event, the presence of intrusive symptoms such as flashbacks and nightmares, active avoidance of trauma triggers, negative changes in cognition and mood (e.g. excessive guilt, fear, or anger), as well as symptoms of increased arousal and reactivity (e.g. being easily startled, difficulty sleeping, or poor concentration) (Zbidat et al., 2020). These symptoms could persist for more than one month and cause significant impairment in social functioning, work, or other important areas of life.

Individuals experiencing PTSD are advised to receive appropriate treatment in order to reduce the impact and restore balance of daily functioning. Factors that increase the potential for PTSD include being female, having low IQ levels, experiencing traumatic experiences, and having a history of mental disorder (Sareen, 2014). Previous studies in West Java and West Sumatra involving 859 children and young adults found PTSD prevalence of 19.9% (Rahmadian et al., 2016). Another investigation on 30 motorbike accident survivors found that 43.3% experienced PTSD (Bahris et al., 2020). An effective treatment method for reducing PTSD is Cognitive Behavioral Therapy (CBT) (Bomyea & Lang, 2012). CBT combines cognitive and behavioral therapies, targeting changes in distorted thoughts and modifying affect to achieve long-term behavior change (Faradillah & Amriana, 2020).

CBT is based on empirical studies showing a strong relationship between cognitive, emotional, and behavioral processes (Butler et al., 2006). (Butler et al., 2006). In other words, it is a goal-oriented intervention that addresses how individuals think, feel and behave (Chen et al., 2014). This method also helps individuals become aware of thoughts and feelings, identify conditions and behaviors that influence affect, improve thought patterns, and change erroneous tendencies (Cully & Teten, 2008).

Several individuals with PTSD do not receive CBT treatment despite the extensive studies and proven validity of CBT over the years. This can be attributed to the existing gaps and shortcomings in CBT, requiring further development and specialization to meet individuals' needs.

In recent years, the modification and development of CBT have increased (Kazantzis et al., 2018). Various versions of CBT have been created, such as F-CBT (Trauma Focused) specifically designed for trauma-related issues, and I-CBT (Internet Delivered) which uses the internet and online media to provide treatment (Kirk et al., 2022).

Based on the preceding explanation, PTSD significantly affects individuals' quality of life, often negatively. CBT is one

treatment method for reducing PTSD symptoms. Studies have identified different variants and types of CBT, leading to potential differences in the effectiveness. Therefore, it is important to examine CBT effectiveness in reducing PTSD. This current study conducted meta-analysis of CBT intervention to investigate the effectiveness for PTSD.

STUDY METHOD

Literature Search Strategy

The literature analyzed in this study was sourced using the Google Chrome browser. Keywords such as "PTSD and CBT" and "The effectiveness of CBT in reducing PTSD" were used to find relevant literature. Furthermore, Google Scholar was used to narrow the search results to journal publications only. The search results included journals in various languages, which were automatically translated using a Chrome Extension, facilitating the sorting of relevant literature.

Inclusion Criteria

The criteria for selecting articles and publications to be analyzed included articles discussing PTSD and CBT, published after 2012, only journal publications, involving experimental studies with both control and treatment groups, and mentioning the number of participants (N), as well as Mean and standard deviation (SD). Moreover, determining the N, Mean, and SD is crucial for analyzing the effect size of a study.

Exclusion Criteria

The criteria for excluding articles and publications for analysis included articles that do not discuss PTSD and CBT, published before 2012, not published in journals, non-experimental studies, without control and treatment groups, and not mentioning the number of participants (N), Mean, and standard deviation (SD).

Data Extraction Process

An initial search was conducted using the keywords "CBT and PTSD," resulting in 24,500 journal entries. Thousands of these journals were further narrowed down by applying the predetermined inclusion and exclusion criteria. A total of 14 journals met all the criteria. The data to be analyzed focused on the effect size scores from each selected journal.

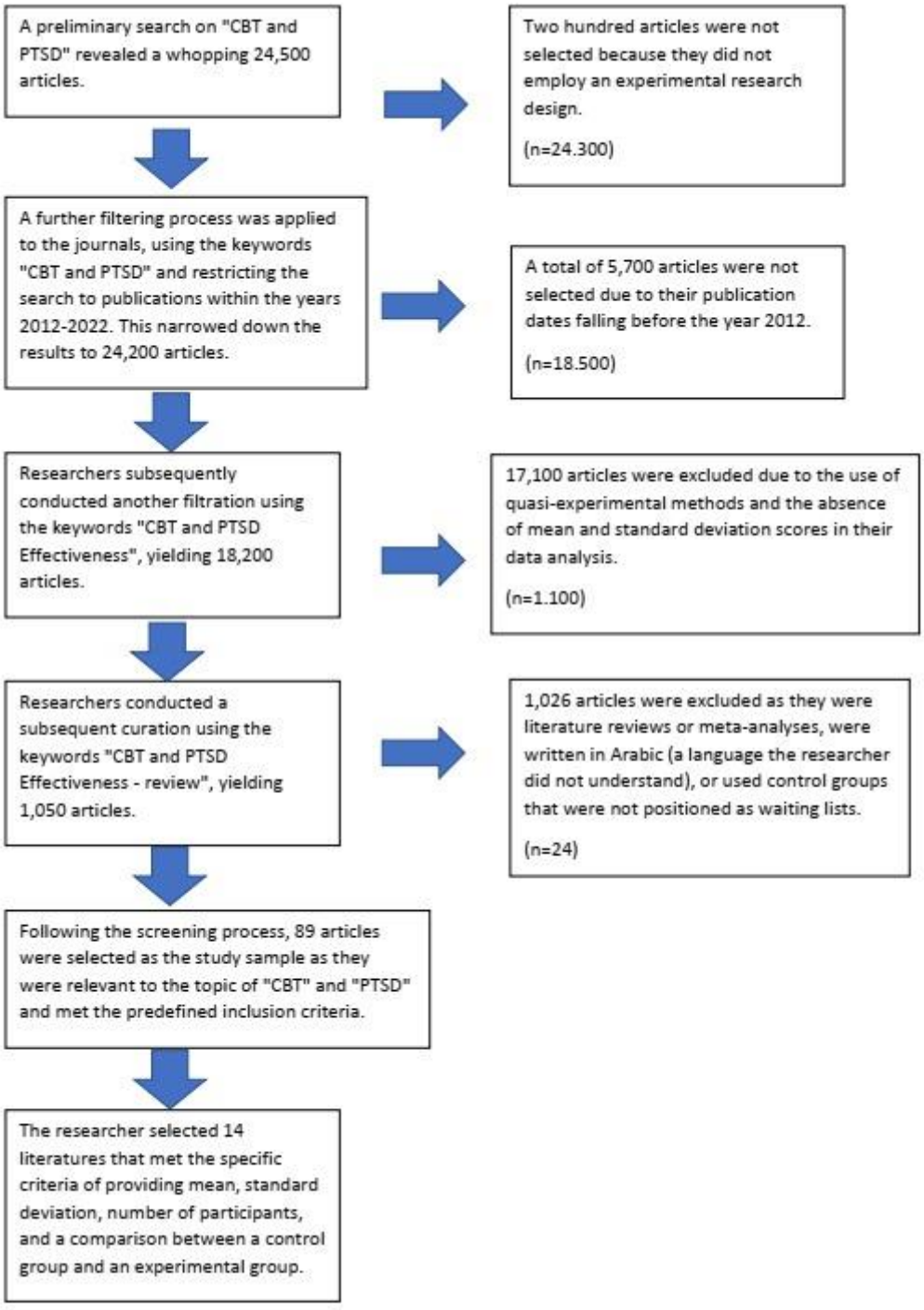

Figure 1. Literatures Search Result

Study Design

Meta-analysis method used is defined as research comparing the similarities and differences between the experimental and control groups of an intervention study, focusing on the mean and standard deviation (Lin et al., 2022). JAMOVI software version 2.3.12 was used to analyze data. The search for relevant literature followed the 2020 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) guidelines.

The first step of the PRISMA procedure was to identify relevant studies. A comprehensive literature search was conducted to identify all studies relevant to the research question about CBT effectiveness. The second step was study selection, where predetermined inclusion and exclusion criteria were used to select studies to be included in the systematic review.

The third step was data extraction, where relevant data from each selected journal, such as study characteristics, outcomes, and effect sizes, were extracted. The fourth step was data synthesis, which entailed combining data from selected journals to produce an estimate of the general effect of the intervention or exposure. The fifth step was reporting the results. This entailed presenting the results of the systematic review and meta-analysis in a transparent and comprehensive manner, using tables and following the PRISMA checklist.

Table 1. Selected Literature Collection

Num.	Researchers	Country	Participants Age	Scale	Intervention
1	(Zemestani et al., 2022)	Iraq	Women who were exposed to trauma from August 2019 to February 2020	(Posttraumatic Stress Disorder Checklist for DSM 5) PCL-5	TF-CBT (Conducted for 12 sessions with a total duration of 90 minutes for each, focuses on psychoeducation, relaxation, affective expression and modulation, cognitive coping, trauma processing and narration, in vivo mastery, conjoint sessions, and developing safety and future)
2	(Chen et al., 2014)	China	Middle school teenager	(Children Revised Impact of Event Scale 13) CRIES-13	*CBT* (Conducted for 6 weeks with a total of 6 sessions, and each lasting 1 hour)
3	(Dawson et al., 2018)	Indonesia	Boys and girls aged 7-14 years	(University of California Los Angeles Posttraumatic Stress Disorder Reaction Index) UCLA PTSD-RI	*CBT* (Conducted for 6 weeks with a total of 6 sessions, and each lasting 1 hour)
4	(Hoseinzadeh et al., 2021)	Iran	Pregnant women with trauma during childbirth	Traumatic Delivery questionnaire	*CBT* (Conducted for 6 weeks with a total of 6 sessions, and each lasting 1 hour)
5	(Kredlow et al., 2017)	United States	Aged 18 years and above with a history of mental disorders	CAPS (Clinician-Administered PTSD Scale)	*CBT* (Conducted for 6 weeks with a total of 6 sessions, and each lasting 1 hour)
6	(Nixon et al., 2012)	Australia	Children and adolescents aged 7-17 years	CAPS (Clinician-Administered PTSD Scale)	*CBT* (Conducted for 6 weeks with a total of 6 sessions, and each lasting 1 hour)

7	(Pityaratstian et al., 2015)	Thailand	Children aged 10 to 15 years	(University of California Los Angeles Posttraumatic Stress Disorder Reaction Index) UCLA PTSD-RI	*CBT* (Conducted for 6 weeks with a total of 6 sessions, and each lasting 1 hour)
8	(Kirk et al., 2022)	Canada	Students aged 18-35	CAPS (Clinician-Administered PTSD Scale)	*CBT*-MY (Conducted for 8 weeks with 1 hour meeting session holding each week and having content in the form of 56 unique daily MM exercises that focus on mindful breathing, progressive relaxation, and awareness of the body; (2) eight 20-minute videos *trauma-informed yoga*; and (3) 10 mindful breathing exercises)
9	(Stecker et al., 2014)	United States	Soldiers experiencing PTSD	(Posttraumatic Stress Disorder Checklist for DSM 5) PCL-5	B-CBT (Conducted for a total of 4 sessions with each lasting 1.5 hours. The focus of this CBT is on education about the stress experienced and rationalization of trauma based on providing exposure to conditions that lead to realistic cognition of trauma)
10	(Dunne et al., 2012)	Australia	Women with an age range of 20-49 years	PDS (Posttraumatic Diagnostic Scale)	TF-CBT (Conducted for 12 sessions with a total duration of 90 minutes for each, focusing on psychoeducation, relaxation, affective expression and modulation, cognitive coping, trauma processing and narration, in vivo mastery, conjoint sessions, and developing safety and the future)
11	(Wu et al., 2014)	Hong Kong	Adult female	HADS (Hospital Anxiety and Depression Scale)	B-CBT (Conducted for 4 sessions with a total duration of 1.5 hours for each. The focus of this CBT is on education about the stress experienced and rationalization of trauma based on providing exposure to conditions that lead to realistic cognition of trauma)
12	(Margolies et al., 2013a)	Iraq	Veteran of the Iraqi freedom fighters	PSS-SR (PTSD Symptom Scale – Self Report)	*CBT*-I (Conducted for 4 sessions with a total duration of 60 minutes for each, focusing on setting a sleep schedule, stimulus

					control, sleep quality, and cognitive reconstruction)
13	(Lin et al., 2022)	China	Hospital patients aged 18-60	(Post-traumatic Stress Disorder Checklist-Civilian) PCL-C	*CBT*(Conducted for 6 weeks with a total of 6 sessions, and each lasting 1 hour)
14	(Ivarsson et al., 2014)	Sweden	Swedish citizens with a minimum age of 18 years	PDS (Posttraumatic Diagnostic Scale)	I-CBT (Based on 8 modules given every week over a period of 8 weeks. The concept contains psychoeducation, training in coping skills, exposure, and cognitive reconstruction)

Data Analysis Method

This study aimed to investigate CBT effectiveness in treating PTSD. CBT effectiveness was measured by calculating Cohen's d effect size, which was categorized as small ($d \leq 0.2$), medium ($d \geq 0.2$ to ≤ 0.8), and large ($d \geq 0.8$). Furthermore, JAMOVI software version 2.3.12 was used to support this analysis.

The level of difference between studies (heterogeneity) was shown by the I2 value, with a higher I2 signifying greater heterogeneity. The possibility of publication bias (the tendency to publish positive results) was tested with Egger's regression value. Values below significance ($p < 0.05$) means a low possibility of publication bias.

STUDY RESULTS

All 14 selected journals were subjected to regression analysis. CBT effectiveness in reducing PTSD was assessed by examining the effect sizes of the control and experimental groups in each literature. The analysis produced statistical results with a mixed-effect model, showing a Hedges'g of 1.18, CI = 0.283 to 2.093 and an inconsistency value (I2) of 87.2%.

This study utilized secondary data from various journals. The participants included women and men aged 7-14 years, pregnant women who experienced trauma during childbirth, individuals aged 18 and above with a history of mental disorders, children and adolescents aged 7-17, children aged 10-15, students aged 18-35, soldiers with PTSD, women aged 20-49, veterans of the Iraqi freedom fighters, hospital patients aged 18-60, and Swedish citizens with the minimum age of 18.

Statistical processing used the mixed-effects model because meta-analysis included one moderator, namely the type or variation of CBT intervention. The effect sizes for each selected article are presented in Figures 2 and 3.

All the selected literature had sufficient effect sizes, with the majority falling into the medium category (Figure 2). Figure 3 shows that all journals tended to be consistent in providing conclusions about CBT effectiveness in reducing PTSD.

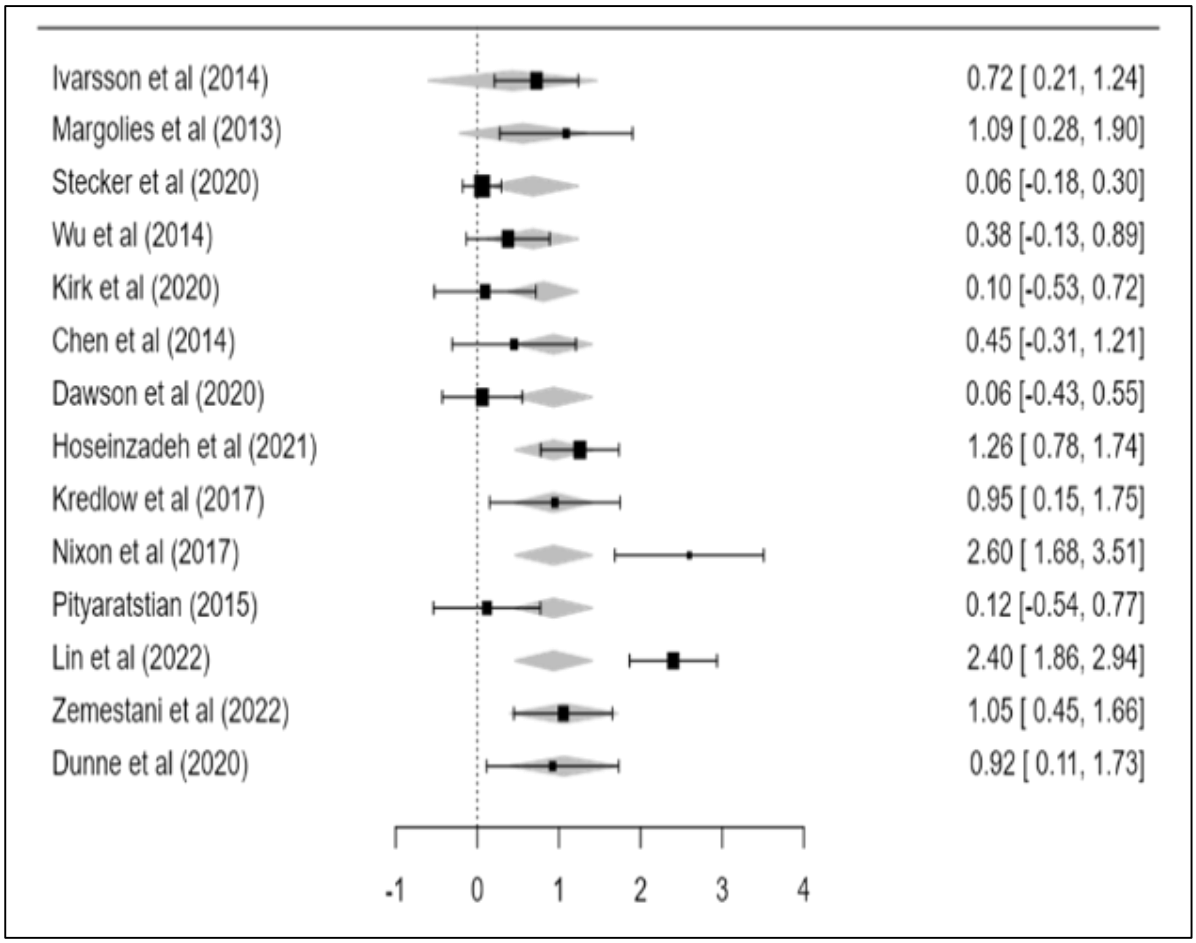

Figure 2. Forest Plot

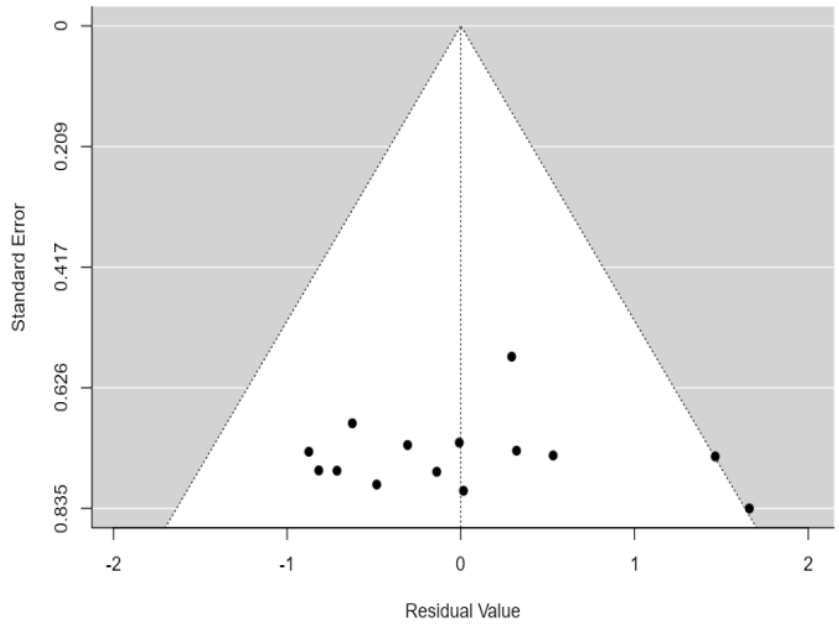

Figure 3. Funnel Plot

DISCUSSION

The results of this meta-analysis study, reviewing 14 literature journals, strengthened the hypothesis that CBT is significantly effective in reducing PTSD levels. This was proven quantitatively through statistical analysis using SPSS software, with a Hedges'g value of 1.18. This showed CBT effectively reduced PTSD in both females (Dunne et al., 2012) and males (Dawson et al., 2018).

CBT was found to be effective for various types of trauma. Meta-analysis included individuals who experienced postnatal care trauma (Hoseinzadeh et al., 2021) and trauma due to exposure to war environments (Zemestani et al., 2022). CBT can also be applied in military contexts, helping both veterans (Margolies et al., 2013a) and active-duty soldiers experiencing PTSD (Stecker et al., 2014).

The significance of CBT effect in this study was influenced by the type or variation of CBT used in each journal. Out of the 14 journals, 6 variations of CBT techniques were identified, namely general CBT, Trauma-Focused CBT, CBT-Mindfulness-Yoga, Brief CBT, Insomnia CBT, and Internet-Based CBT. Each method was examined for the effectiveness. Although the general effectiveness of CBT interventions was not significantly influenced by the specific variations and methods of CBT, meta-analysis found interesting results related to several of these variations.

Conventional CBT was conducted for over 12 to 20 sessions, each lasting about 30 to 60 minutes. Out of the 14 journals analyzed, 7 used conventional CBT methods. A total of 5 journals concluded that conventional CBT was highly effective in reducing PTSD levels. This could be attributed to the extensive use and development of conventional CBT by experts, resulting in improved quality and validity over time (Cully & Teten, 2008).

Another variation used was Trauma-Focused CBT (TF-CBT), specifically designed to reduce the symptoms of PTSD experienced in both adults and children (De Arellano et al., 2014). Out of the 14 journals analyzed, 2 used TF-CBT, and both consistently concluded that TF-CBT had considerable effectiveness in reducing PTSD levels. These results were in line with the objective of TF-CBT, targeting emotional regulation, the role of caregivers (in cases involving children), and coping capabilities.

Other methods included CBT for Insomnia (CBT-I) and Internet-Based CBT (I-CBT). CBT-I was designed to reduce the severity of insomnia, a common outcome PTSD (Margolies et al., 2013b). It has shown significant effectiveness in reducing PTSD by addressing insomnia symptoms, focusing on sleep restriction, control of sleep duration, sleep hygiene, and cognitive reconstruction (Okajima et al., 2011).

I-CBT is simply the use of internet access to deliver and provide CBT (Ivarsson et al., 2014). The results showed that I-CBT was highly effective in reducing PTSD levels. It is particularly useful when there is a physical/geographical distance between the expert and the subjects. However, I-CBT requires more initiative and independence from subjects for successful treatment, as subjects need to be proactive when using variations of I-CBT.

Meta-analysis found contradictory results with CBT-MY (Mindful and Yoga) while various forms of CBT had been shown to be effective in reducing PTSD. This ineffectiveness could be attributed to the broad scope of CBT-MY, combining CBT, mindfulness, and yoga. Although these methods aimed to improve positive self-perception and communication, the different practices can weaken the intensity between treatments.

Variation Brief-CBT (B-CBT) was considered less consistent in providing

effectiveness at reducing PTSD. B-CBT compresses the traditional 12 to 20 CBT sessions into just 4 to 8 sessions (Cully et al., 2020). B-CBT focuses on targeted cases, meaning the problems addressed are quite specific.

Another unique aspect of B-CBT is that it requires participants to persistently read additional references outside of intervention sessions related to the issues, and to complete assignments outside the session and support therapeutic development. The inconsistency in B-CBT effectiveness may be attributed to the small number of journals analyzed (only 2 out of 14) and the reduction in the duration and number of CBT sessions. This can minimize the intensity and comprehensiveness of CBT (Oldham et al., 2012).

CONCLUSIONS AND SUGGESTIONS

Conclusions

In conclusion, this study showed the implementation of CBT had a significant effect PTSD. This was proven by the large effect size scores from meta-analysis. The high heterogeneity among the 14 journals showed a wide variety of data.

CBT had been proven effective in reducing PTSD in various context. For example, in women who had experienced traumatic childbirth, CBT not only reduced the symptoms of trauma but also alleviated symptoms of baby blues. Similarly, it effectively reduced PTSD in post-war veterans, helping to reconstruct the meaning of traumatic events, reduce depressive symptoms, and alleviate insomnia.

Cognitive reconstruction techniques used correctly, specifically CBT, had been proven to significantly reduce PTSD, depression, and insomnia. CBT had several variations, each designed to address specific needs. Therefore, it was crucial to select the type of CBT with careful consideration.

Suggestions

The limitation of this study was the diversity of scales and measuring tools used in each analyzed journal, preventing from focusing on one or two specific tools. This variability could potentially influence the effect size scores. Therefore, future studies were recommended to focus on using a single measuring instrument to obtain more consistent results. It was also crucial to focus on one specific CBT method to better assess its true effectiveness since this current study included several types of CBT methods. As the number of CBT interventions and reports increased, meta-analysis could better clarify the effectiveness of each CBT type. This would allow comparisons of effectiveness using the same scale and explore the combination of trauma types and corresponding CBT methods.

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