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COMPARISON OF THE EFFECTIVENESS OF YOGA INTERVENTIONS TO REDUCE *FATIGUE* , ANXIETY, AND PAIN IN CHILDREN: A SYSTEMATIC REVIEW

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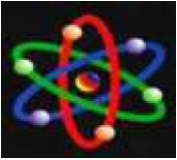
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Abstract

Background: Fatigue , anxiety, and pain have a negative impact on a child's physical, mental health, sleep, and overall well-being, and can affect daily activities. The potential of yoga as a method of relaxation and meditation requires scientific evaluation of its effectiveness through systematic reviews. Objective : This systematic review aims to examine the effectiveness of yoga physical activity interventions on fatigue , anxiety and pain in children and adolescents. Method : This literature search used several online databases including Cochrane, Embase, EBSCO, Sage Journals, Science Direct, and Clinical Key. Based on a literature search, 10 articles reviewed were published in 2013. Results : eight out of ten articles stated that there was a significant effect of yoga intervention on reducing fatigue , anxiety and pain. One study said there was no significant difference in anxiety and one study showed that fatigue did not decrease after yoga intervention. Conclusion : overall the article shows that yoga is useful and effective for children and adolescents to overcome fatigue , anxiety and pain

Keywords: Children, Fatigue, Anxiety, Pain, Teenagers, Yoga



INTRODUCTION

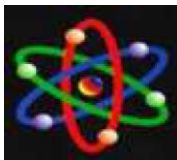
Fatigue, anxiety, and pain can affect daily activities. Has a negative impact on children's physical, mental health, sleep, and overall well-being (Sommer, Grothus, Claus, Stahlschmidt, & Wager, 2023; Serafimova, Ascough, Parslow, Crawley, 2022). Fatigue is very common in children with chronic pain and can have a negative impact on health (Sommer, Grothus, Claus, Stahlschmidt, & Wager, 2023). Symptoms of anxiety can also include difficulty sleeping, headaches, or stomach aches (CDC, 2023). Pain is a common symptom associated with chronic fatigue syndrome and has a major impact on a child's well-being (Serafimova, Ascough, Parslow, Crawley, 2022). Identifying and treating these symptoms early is critical to preventing long-term negative impacts on children's physical and mental health (CDC, 2023). The results of a study conducted by Pelangi and Allenidekania (2021) show that children with symptoms of cancer and depression experience higher levels of fatigue, so nurses need to assess the fatigue and depression felt by children in order to carry out appropriate nursing interventions to reduce fatigue. According to the National Comprehensive Cancer Network (NCCN) (2021) regarding cancer-related fatigue, one of the interventions that can be done to overcome fatigue is yoga physical activity. Research conducted by Nidhi, Padmalatha, Nagarathna, and Amritanshu (2012) stated that a twelve-week yoga program for adolescents with PCOS significantly reduced anxiety symptoms. Iyengar yoga can be an effective treatment for pediatric chronic pain (Kempert, 2020). Yoga is a mind and body exercise program that provides physiological effects in the form of physical poses, breathing, and meditation originating from ancient Indian philosophy (Diorio et al., 2016; Yagli et al., 2015). Yoga benefits children who experience fatigue because it provides gentle, restorative poses and mindful breathing that can help

manage fatigue, anxiety, and pain and improve children's overall well-being (Serafimova, Ascough, Parslow, Crawley, 2022; CDC, 2023). practice includes relaxation techniques such as deep breathing and meditation which can help children with fatigue feel more relaxed and comfortable (Bullard, 2021). When the body relaxes, the parasympathetic nervous system (PNS) becomes active. The PNS is responsible for the body's relaxation response and helps regulate various functions such as digestion, heart rate, breathing, and overall relaxation (Waxenbaum, Reddy, & Varacallo, 2023; Begum, 2022). One activity that can activate the parasympathetic nervous system is yoga. Based on the explanation above, yoga physical activity interventions have been applied in several conditions to reduce cancer-related fatigue, anxiety and pain. However, there is no complete review of yoga physical activity in reducing cancer-related fatigue, anxiety and pain in children. Based on this description, the author conducted a systematic review to identify the effectiveness of yoga on cancer-related fatigue, anxiety and pain in children and adolescents.

RESEARCH METHODS

This article was written using a systematic search through online databases including Cochrane, Embase, EBSCO, Sage Journals, Science Direct, and Clinical Key and used the PICO framework with the keywords Yoga AND Children OR Adolescents OR Pediatric AND Fatigue AND Anxiety AND Pain. The search for this article was adjusted to design selection, namely quasi experiment, mixed methods, one-group repeated-measures design, pilot feasibility study, clinical trial pilot study, and RCT using quantitative results. The inclusion criteria in searching for this article were children aged 6-18 years, articles with yoga physical activity





interventions, publications above 2013 in English, and full text . Meanwhile, the exclusion criteria are children or teenagers with disabilities, non-open access articles , and qualitative research. Then the articles are selected by reading the entire content and at the final stage the quality of the article is assessed or a critical appraisal is carried out using the JBI (The Joanna Briggs Institute) formula. There were 19,423 articles identified from six electronic databases. Next, the articles were screened again based on inclusion and exclusion criteria, resulting in 68 articles. Then the full text articles obtained were selected by reading the title , key words and abstract. After reading as a

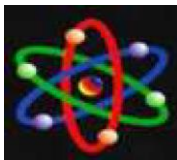
whole, 20 articles were obtained that met the researcher's wishes. In the final selection, the researcher read carefully, analyzed and assessed suitability, thus obtaining 14 selected articles.

Selected articles underwent data extraction using the author's name, year of publication, research objectives, sample, design and research results. This literature review consisted of 9 quantitative articles and 1 mixed method article with results taken from quantitative research. Each article was identified in its entirety and results were summarized and extracted into tables.

RESULTS AND DISCUSSION

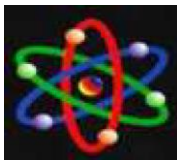
Author, Year of Publication, and Country of Research Place	Objective	Research methods	Research result
(Fukuhara, O'Haver, Proudfoot, Spies, & Kuo., 2020) United States of America	To find out whether yoga can reduce anxiety and pain in children with cancer who are being treated and reduce anxiety in parents/child companions.	Research design : Quasy Experiment Sample : 15 children and 15 parents/child companions Intervention method : yoga is given in one session lasting 3 months with a duration of 20-60 minutes.	<ul style="list-style-type: none"> - The change in pain scores after one yoga session was statistically significant for children with p value = 0.045. Meanwhile, for anxiety in children, the research results were not statistically significant before and after yoga (STAIC State p value = 0.584 and STAIC Trait p value = 0.130). - The study results showed that there was a reduction in pain in children and adolescents after yoga intervention. Anxiety in children remains relatively stable after yoga.
(Govardhan et al., 2019) India	To establish the feasibility and therapeutic effects of yoga in children with brain tumors	Research design : Randomized Control Trial (RCT) Sample : 20 children Intervention method : yoga is given with a duration of 1 hour for 3 sessions a week for 4 weeks.	<ul style="list-style-type: none"> - There was a significant difference in yoga intervention in reducing fatigue (p value = 0.007). - Yoga is suitable for use in children with cancer who are receiving intensive chemotherapy and radiotherapy, thus supporting its therapeutic benefits.
(Hogstrom et al., 2021) Sweden	To evaluate the effects of dance and yoga interventions on abdominal pain in girls.	Research design : Randomized Control Trial (RCT) Sample : 121 girls. Intervention method : the intervention group participated in dance and yoga for 60	<ul style="list-style-type: none"> - Girls aged 9 to 13 years with FAPD (Functional Abdominal Pain Disorder) who were given dance and yoga interventions showed a decrease in pain (p value = 0.002). - The study results showed that





Author, Year of Publication, and Country of Research Place	Objective	Research methods	Research result
(Hooke et al., 2015) United States of America	To determine whether child and adolescent cancer survivors have lower levels of fatigue, improved balance, improved sleep quality, and less psychological distress compared to baseline measurements.	minutes 2 times a week for 8 months. The control group received standard care. Research design : One-group repeated-measures design Sample : 13 children Intervention method : yoga is given for 45 minutes in 2 sessions a week for 6 weeks.	dance and yoga provided significantly greater reductions in pain than standard interventions. After the yoga program, children experienced a significant decrease in anxiety scores (<i>p value</i> = 0.04), while adolescents showed a tendency to decrease anxiety (<i>p value</i> = 0.10). Fatigue scores remained stable after yoga intervention.
(Moody et al., 2017) United States of America	To see the effect of yoga on acute pain with Sickle Cell Disease (SCD) Vaso-Occlusive Crisis (VOC) in children.	Research design : Randomized Controlled Trial (RCT) Sample : 70 children Intervention method : yoga is carried out for 30 minutes during 5 days (Monday to Sunday) of hospitalization	- Compared with the control group, children who did yoga experienced a decrease in the average pain score which was significantly greater after one yoga session (<i>p value</i> = 0.029). - The study results concluded that yoga is an acceptable, feasible, and beneficial intervention for hospitalized children with VOC.
(Shreve, Scott, McNeill, & Washburn, 2020) United States of America	To explore the impact of 10 minutes of yoga on anxiety in third and fourth grade students.	Research design : Quasy Experiment Sample : 71 children Intervention method : yoga is done for 10 minutes 5 days a week, for 8 weeks.	- On average, participants experienced a significant decrease in anxiety scores after completing the yoga program (<i>p value</i> < 0.05) - Study results show that yoga done for at least 10 minutes a day can have a significant impact on reducing anxiety in children .
(Parajuli, Pradhan, & Bapat., 2022) India	To assess the effect of yoga on cognitive function and anxiety in school children	Research design : Randomized Control Trial (RCT) Sample : 89 children Intervention method : yoga is given for 60 minutes, 4 days a week for 2 months.	- There was a significant decrease in STAIC-T scores (<i>p value</i> = 0.025) after yoga intervention compared to scores before intervention. - The research findings concluded that yoga can reduce the anxiety of students with low academic achievement and is more effective than physical exercise.
(Kadyan et al., 2022) India	To evaluate the effects of yoga in reducing pain, fatigue, and improving quality of life in children undergoing chemotherapy.	Research design : Pilot Feasibility Study Sample : 40 children Intervention method : yoga is given for 45 minutes, 7 times a week for 3 months.	- There was a significant decrease in fatigue scores measured by FACIT during the 3 month yoga intervention period in children undergoing chemotherapy (<i>p</i> < 0.01). Pain scores gradually decreased with online yoga practice (<i>p value</i> < 0.01). - The study results report that online yoga intervention is feasible and effective for





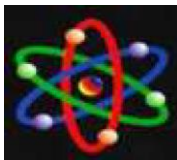
Author, Year of Publication, and Country of Research Place	Objective	Research methods	Research result
(Diorio et al., 2016) Canada	To determine the development of yoga programs and approaches to monitoring appropriate yoga sessions for hospitalized children receiving intensive chemotherapy or Hematopoietic Stem Cell Transplantation (HSCT).	Research design : Clinical Trial Pilot study Sample : 11 children Intervention method : yoga is given for a duration of 15-45 minutes from Monday to Friday. Do at least 3 yoga sessions every week for 3 consecutive weeks.	children with cancer. The results show that yoga is feasible and can be done in children and has no side effects. The mean standard deviation for reported day 21 PedsQL general \pm fatigue scores was 55.6 \pm 15.5.
(Evans et al., 2017) United States of America	To assess the feasibility, safety, and efficacy of an Iyengar Yoga intervention to reduce fatigue.	Research design : Mixed Methods Sample : 9 children (5 qualitative samples and 4 quantitative samples). Intervention method : yoga is given for 1.5 hours per session. Yoga was done for 8 weeks.	Results showed that there was a significant improvement in general and emotional manifestations of fatigue after yoga. Studies recommend doing yoga to overcome fatigue (p value < 0.05).

Table 1. The results used in this systematic review were ten articles spanning 2015-2022

Based on the search for journal articles that had been carried out, 10 articles were found. The research results of this article are about the effectiveness of yoga to reduce *fatigue*, anxiety and pain in children and adolescents. The results of research conducted by Govardhan (2019) show that yoga has a positive effect on reducing fatigue. There were no bad incidents that occurred during yoga practice. Yoga is suitable for children with brain tumors. In line with a study conducted by Kadyan (2022) that yoga shows feasibility and effectiveness in reducing fatigue scores in children undergoing chemotherapy. Yoga was well tolerated and accepted throughout the study. This study confirms the feasibility of yoga in the treatment of childhood cancer. Yoga as a non-pharmacological intervention is appropriate in clinical care for adolescents with cancer who experience fatigue. Yoga is a cost-effective, effective, and accessible activity for teens with persistent fatigue. Other benefits include improving physical and

mental health, providing a balance between exertion and relaxation, and providing modifications for all adolescent patients with cancer-related fatigue (Evans, 2017). In contrast to Hooke's (2017) research, even though the yoga intervention was proven to be feasible, fatigue in children and adolescents did not decrease after the yoga intervention. Parajuli, Pradhan, and Bapat (2022) stated that yoga is effective in reducing anxiety in school children. Experimental studies assessing changes in anxiety following yoga activities have proven significant. Reducing anxiety is expected to result in better cognitive function and academic performance in school children with poor academic performance. A non-pharmacological intervention combining dance and yoga that focuses on pleasure in a social environment can be an effective therapy compared to standard health services to reduce pain in girls (Hogstrom et al., 2021). In line with Moody et al (2017) providing evidence that yoga is an acceptable and feasible intervention for





children hospitalized with SCD VOC. Yoga may provide immediate benefits for pain in this population. Most of this research shows that yoga is effective and safe in reducing fatigue, anxiety and pain in children and adolescents. This encourages further education and training for nurses regarding the techniques, benefits and application of yoga in the management of child welfare. Yoga's positive impact also encourages collaboration and funding for follow-up studies involving larger populations and different research designs. Limitations in this study include the small sample size, which limits data analysis and study results. The quality of the yoga sessions, the skill of the instructor, and the compliance of children and adolescents with the intervention may vary and thus influence the results of the study.

CONCLUSION

Yoga is a cost-effective activity and can be learned through school programs, community-based classes, and instructional videos. Eight out of ten studies stated that there was a significant effect of yoga intervention on reducing fatigue, anxiety and pain. One study said there was no significant difference in anxiety and one study showed that fatigue did not decrease after yoga intervention. However, yoga has been proven to be feasible and safe to apply both to children with cancer and to children with FAPD, VOC, as well as school children who experience anxiety about academic grades.

RECOMMENDATION

The recommendation in this systematic review is that more research is needed regarding yoga in treating fatigue,

anxiety and pain in children and adolescents. Future studies should consider the intensity and duration of yoga interventions to reduce participant burden

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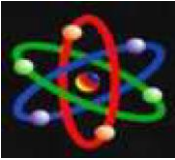
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