

# Non-pharmacological Methods for Pain Management in Pediatric Oncology: Evidences in Literature

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*Métodos Não Farmacológicos para o Manejo da Dor em Oncologia Pediátrica: Evidências da Literatura*

Métodos no Farmacológicos para el Tratamiento del Dolor en Oncología Pediátrica: Evidencia de la Literatura

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## ABSTRACT

**Introduction:** Pain in children with malignant diseases is related to the disease itself or the diagnostic-therapeutic procedures. Regardless of the cause, the child must have its pain adequately treated. It is believed that adequate pain control occurs in 70% to 90% of the cases, when specific therapies for each patient are employed, including the combination of analgesics and non-pharmacological interventions. **Objective:** To identify the current non-pharmacological methods for pain management in pediatric oncology in the specialized literature. **Method:** Integrative literature review, with articles selected between 2008 and 2018 in the Virtual Health Library (VHL), PubMed, Web of Science, and Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases. 11 articles selected according to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were fully analyzed. **Results:** Three categories summarized the main findings: pain in pediatric oncology and the assessment instruments, benefits of complementary therapies for the management of pediatric cancer pain, and adverse effects of complementary therapies. **Conclusion:** Considering pain as a debilitating symptom for the pediatric population undergoing cancer treatment, evaluations made by health professionals must be trustworthy to its characteristics for proper management. Pain management is not limited to pharmacological therapies, some interventions proposed can complement the action of medications to minimize the pain and suffering experienced by these patients, in addition to avoiding the body's tolerance and overload, due to the excessive use of painkillers.

**Key words:** Pain Management; Complementary Therapies; Neoplasms; Child; Adolescent.

## RESUMO

**Introdução:** A dor em crianças com doenças malignas relaciona-se à própria doença ou aos procedimentos diagnóstico-terapêuticos. Independentemente da causa, a criança deve ter a sua dor adequadamente tratada. Acredita-se que o controle adequado da dor ocorra em 70% a 90% dos casos, quando se empregam terapias específicas, incluindo-se a combinação de analgésicos e intervenções não farmacológicas. **Objetivo:** Identificar na literatura especializada métodos não farmacológicos atuais para o manejo da dor em oncologia pediátrica. **Método:** Revisão integrativa da literatura, com artigos selecionados entre os anos de 2008 e 2018, nas bases de dados Biblioteca Virtual em Saúde (BVS), PubMed, *Web of Science* e *Cumulative Index to Nursing and Allied Health Literature* (CINAHL). Analisaram-se 11 artigos, selecionados com base nas recomendações do *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA). **Resultados:** Três categorias sintetizaram os principais resultados, a saber: dor em oncologia pediátrica e instrumentos de avaliação; benefícios das terapias complementares para o manejo da dor oncológica pediátrica; e efeitos adversos das terapias complementares. **Conclusão:** Considerando-se a dor como um sintoma debilitante para a população pediátrica em tratamento oncológico, é necessário que as avaliações feitas pelos profissionais da saúde sejam fidedignas às suas características para o manejo adequado. O manejo da dor não se limita apenas às terapias farmacológicas, algumas intervenções levantadas podem complementar a ação dos medicamentos para pacientes, com vistas a minimizar a dor e o sofrimento vivenciado por esses pacientes, além de evitar a tolerância e a sobrecarga do organismo, decorrente do uso excessivo de analgésicos.

**Palavras-chave:** Manejo da Dor; Terapias Complementares; Neoplasias; Criança; Adolescente.

## RESUMEN

**Introducción:** El dolor en niños con enfermedades malignas está relacionado con la enfermedad o con los procedimientos de diagnóstico y terapéuticos. Independentemente de la causa, el niño debe tener su dolor adecuadamente tratado. El control adecuado del dolor ocurre en 70% a 90% de los casos, cuando se emplean terapias específicas, incluida la combinación de analgésicos e intervenciones no farmacológicas. **Objetivo:** Identificar los métodos no farmacológicos actuales para el manejo del dolor en oncología pediátrica en la literatura especializada. **Método:** Revisión integral de la literatura, con artículos seleccionados entre los años 2008 y 2018, en las bases de datos de la Biblioteca Virtual en Salud (BVS), PubMed, *Web of Science* e Índice Acumulativo de Literatura de Enfermería y Salud Aliada (CINAHL). Se analizaron 11 artículos seleccionados según las recomendaciones del *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA). **Resultados:** Tres categorías resumieron los principales hallazgos de los estudios seleccionados: dolor en oncología pediátrica y instrumentos de evaluación, beneficios de las terapias complementarias para el tratamiento del dolor pediátrico por cáncer y los efectos adversos de las terapias complementarias. **Conclusión:** El dolor es un síntoma debilitante para la población pediátrica sometida a tratamiento oncológico, las evaluaciones realizadas por profesionales de la salud deben ser lo confiables para evaluar sus características para el manejo adecuado. El tratamiento del dolor no se limita a las terapias farmacológicas, algunas intervenciones pueden complementar la acción de los medicamentos, para minimizar el dolor y el sufrimiento experimentado por estos pacientes, además de evitar la tolerancia y la sobrecarga del cuerpo, como resultado del uso excesivo de analgésicos.

**Palabras clave:** Manejo del Dolor; Terapias Complementarias; Neoplasias; Niño; Adolescente.

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## INTRODUCTION

Children and adolescents cancer corresponds to 1% to 4% of all the malignant tumors in most of the populations, it encompasses the age-range from zero to 19 years old and consists in a set of diseases with its own characteristics regarding histopathology and clinical behavior<sup>1,2</sup>. In Brazil, cancer is the main cause of death by disease in children and adolescents, only accidents and violent deaths ranked higher<sup>2</sup>.

Regardless of the gradual increase of the number of children with cancer, substantial progress in neoplasms therapeutic that affected this population at the most have been observed as: leukemias, tumors of the nervous central system and lymphomas in that order<sup>2,3</sup>. It is believed that 70% to 80% of the children diagnosed with neoplasms early can be cured<sup>3</sup>. The increase of survival of pediatric cancer is associated to several factors as gender, age, location, extension and type of tumor. Furthermore, for a favorable prognosis, care to children and adolescents must be provided in dedicated health services with teams dully trained and counting with the participation of patients in well-designed prospective clinical trials<sup>2,3</sup>.

Until the end of the therapeutic planning, children and adolescents will live with the symptoms of the disease and its treatment, nausea, vomits and pain<sup>4</sup> are the most frequent. Even with the increasing progress of children and adolescents' cancer treatment, health teams face great challenges in caring for these patients. Among them, the evaluation and control of the pediatric oncologic pain that demand early diagnosis and proper intervention of an inter-disciplinary skilled team<sup>4-6</sup>. Pain occurs in 58% to 80% of the cases in adults admitted for cancer treatment. The prevalence of the pain occurs in 78% of the cases of children during the diagnosis, among 25% and 58% along the treatment and in until 90% in the terminal phase of the disease<sup>7</sup>.

The concept of pain defined by the International Association of the Study of Pain (IASP) states that it is a subjective, sensorial and emotional experience associated with a residual or potential damage<sup>8</sup>. This concept lasted for decades in the scientific literature until it was revised by Williams and Craig<sup>9</sup>. According to these authors, pain can be defined as a "distressing experience associated with actual or potential tissue damage with sensory, emotional, cognitive and social components"<sup>9</sup>. The innovation of this new proposal of an old concept is the interaction among all these factors mentioned in the formation of the experience of pain.

The child has the right of not feeling pain when means to avoid it exist<sup>10</sup>. Given this, further to ethical relevance of preserving the moral integrity of the individual, oncologic

pediatric nursing as part of the multi-professional team has the objective of preventing pain, promoting comfort and securing the quality of life in caring for children<sup>9</sup>.

Pain in children with malignant diseases is related to the disease itself, to the diagnostic procedures or to the treatment<sup>6</sup>. Regardless of the cause, the child should have its pain correctly treated<sup>6,7</sup>. It is believed that proper management occurs in 70% to 90% of the cases since specific individual therapies are applied and that the combination of analgesics with non-pharmacological interventions are in place<sup>7</sup>.

The goal of the interventions for pain management is the relief and control of the pain complaint, improvement of physical, psychic and social functioning translated by the quality of life. Further to the pharmacological approach with investigational drugs protocols for pain management in oncologic pediatrics it is desirable that complementary medicine interventions are utilized<sup>6</sup>. Non-pharmacological measures optimize the analgesic response, interfering in the reduction of the creation of the pain impulse, changing the processes of transmission and interpretation of the painful phenomenon and stimulating pain suppression system<sup>6,7</sup>.

Based in the explanation and evidences that prove that oncologic pediatric pain is multifactorial and that its management is more effective when focused interventions to its several components are involved, this integrative review was aimed to identify in the specialized literature current non-pharmacological methods for oncologic pediatric pain management.

## METHOD

Integrative literature review, whose research question was: What are the evidences available in the literature for pain management in pediatric patients with cancer? The following steps were followed to perform the review: elaboration of the problem (develop the research question, key-words and inclusion criteria); search strategy (relevant literature about the theme); data evaluation (extraction of relevant information from selected articles); data analysis and interpretation (process of data integration) and presentation of the review (synthesis to illustrate the process of combining the data)<sup>11,12</sup>.

Literature searches were made accessing the available databases in BVS – Virtual Health Library, PubMed, Web of Science and Cumulative Index to Nursing and Allied Health Literature (CINAHL), utilizing the descriptors (DeCS/MeSH) in English and Portuguese: "child", "adolescent", "pain", "neoplasms", "pain management", "complementary therapies". The following eligibility criteria were considered: articles in English and in

Portuguese which addressed non-pharmacological methods for oncological pain management of children and adolescents published from October 2008 to October 2018. Articles addressing pain management of adolescents together with young adults were excluded.

The choice of articles of interest for review was based in an instrument consisting of the following data: author (year) and area of knowledge, place of publication, method, sample, type of non-pharmacologic intervention for pain management, results/synthesis of evidences.

The selection and eligibility process of the studies followed the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)<sup>13</sup>. The search strategy was depicted in a flowchart with the procedures to select articles in databases and data extracted from the articles selected were portrayed in a summary table per categories, similarity of findings according to the last phase of the method guiding the review<sup>11,12</sup>.

## RESULTS

Initially, 38 articles were searched in the databases selected. Duplicate articles (n=5) were excluded, totaling 33 articles. After full reading, 22 were excluded for the following reasons: systematic reviews of the literature (n=3); articles that failed to present proposals of non-pharmacologic intervention for pain relief (n=5); articles not addressing pain management (n=6); articles addressing non-pharmacologic methods for pain relief in adult patients (n=5); articles addressing the standard of care of the professional of alternative medicine (n=2); article

addressing non-pharmacologic interventions in non-oncologic patients (n=1). The final sample consisted of 11 articles. The flowchart in Figure 1 shows the process of articles selection based in PRISMA<sup>13</sup> guidelines to present the summary of articles in reviews.

The final presentation of the results analyzed was structured in two stages. The first consisted in the characterization of the studies selected through a summary table (Table 1). The second addressed the synthesis of the converging results of the productions included as thematic categories according to the hypothesis of the integrative review<sup>10</sup>. The synthesis of the main findings of the studies selected led to the following categories: *the pain in pediatric oncology and the instruments of evaluation; benefits of complementary therapies for pain management of oncologic pediatric pain and adverse effects of complementary therapies*.

Table 1 contains information extracted from the productions selected for the review: authors and year of publication and main findings of the selected studies.

All the studies selected were published in English in international journals of the areas of nursing (n=3) and cancer in general (n=3) followed by pediatric (n=2) and medical (n=2), only one of them was published in alternative and complementary medicine journal (n=1). At least six of the study authors were associated with nursing schools or departments, in addition to oncological, hematological, pediatric and palliative care. Regarding the study's origin countries, five were conducted in the United States of America, two in Germany, one in Spain, one in Hawaii, one in Turkey and two of them did not report where they were carried out. The studies were conducted mostly in hospital admission units and

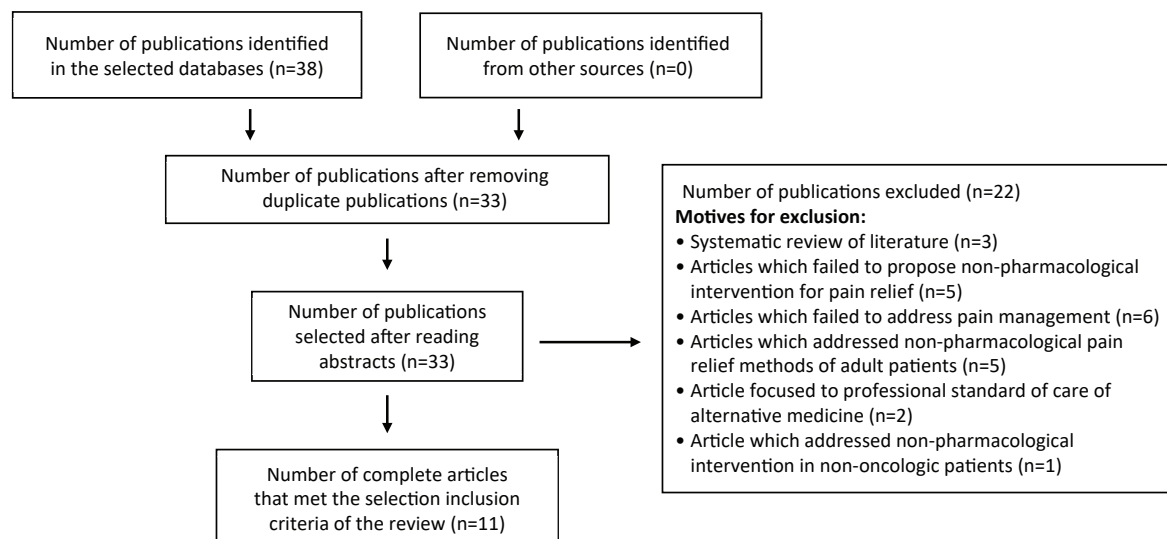


Figure 1. Flowchart of articles selection of. São Paulo, 2020

**Table 1.** Summary of the articles included in the integrative review. São Paulo, 2020

<b>Author/year</b>  <b>Main evidences</b>	<b>Pain during oncologic pediatric treatment</b>	<b>Tools to evaluate pain</b>	<b>Benefits of complementary therapies to cope with oncologic pediatric pain</b>	<b>Types of complementary therapies most used for pain management</b>	<b>Potential adverse events associated with complementary therapies</b>
Ahmed et al., 2014	Use of opioids and frequent and significant adverse events	Number of analgesic rescues administered and evaluation of the heartbeat	Reduction of the heart rate; significant reduction of analgesic doses administered for pain	Meditation, music-therapy, play therapy	Non-observed or unreported
Batalha e Mota, 2013	It is one of the main causes of the oncologic pediatric patient suffering and interferes with its quality of life	Visual Analog Scale and Brief Pain Inventory	Reduction of the pain intensity and its interference in the activities of the child (increase of the capacity of ambulation)	Massage	Non-observed or unreported
Casanova-Garcia et al., 2015	Neuropathic pain associated with childhood cancer because of chemotherapy	Exam and neuropathic pain and Visual Analog Scale	Improvement of the threshold and perception of neuropathic pain	Mirror therapy (treatment of the pain of the phantom limb)	Non-observed or unreported
Chokshi et al., 2017	Pain, as psychological and physical alteration, strongly associated with the oncologic pediatric patient	Memorial Symptom Assessment Scale	Control and improvement of the pain and other symptoms associated with it	Acupuncture	Bruises grade I and local bleeding. No other severe adverse event was noticed.
Çelebioğlu et al., 2015	Pain as physical symptom associated with other emotional symptoms as anxiety	Visual Analog Scale	Improvement of survival, hope and reduction of adverse effects of the conventional treatment	Therapeutic massage	Aggressiveness of some children; fear of the procedure
Madden et al., 2010	Pain as adverse effect of the oncologic treatment of the pediatric patient associated with other symptoms (weakness, sleep and mood disorders) and decline of the quality of life of the children and its parents	Inventory of the Quality of Life – module cancer formed by items evaluating pain, nausea, anxiety and other. In addition to the Faces Scale utilized to evaluate emotional responses to pain	Improvement of the pain and emotional symptoms	Therapy of creative arts; dance, music, arts, theater, yoga and poetry	Non-observed or unreported
Post-White et al., 2009	Pain as physical symptom causing emotional suffering	Vital pre and post session parameters (hear beat and respiratory frequency, blood pressure). Pain and nausea by the Visual Analog Scale Visual and pain by the Wong-Bakers Faces Pain Rating Scale	The children approved the technique, decrease of the heart rate and respiratory frequency; reduction of anxiety and stress; reduction of physical symptoms	Massotherapy	Non-observed or unreported
Sanchez et al., 2015	The study focus did not address pain and its characteristics, but the treatments most utilized	Not applicable	Reduction of the adverse effects of the conventional treatment, improvement of the quality of life and hope	Prayers, vitamin supplements and massage	Non-observed or unreported
Schütze et al., 2016	Utilization of complementary therapies for pain relief and other symptoms in patients in palliation	Not applicable	Strengthening of the immune system, improvement of the physical and mental inner strength, and support to cope with the disease	Teas, massage, music therapy, healers, homeopathy, Reiki among other	Non-observed or unreported

to be continued

Table 1. continuation

Author/year Main evidences	Pain during oncologic pediatric treatment	Tools to evaluate pain	Benefits of complementary therapies to cope with oncologic pediatric pain	Types of complementary therapies most used for pain management	Potential adverse events associated with complementary therapies
Thrane et al., 2017	Pain as a debilitating symptom compromising the quality of life of the patients, increasing the parents' suffering	Visual Analog Scale and Wong-Baker Pain Scale	Control and improvement of the pain and anxiety	Reiki	Non-observed or unreported
Wong et al., 2013	Pain, anxiety/stress and fatigue as result of the chemotherapy and other modalities of cancer treatment	Wong-Baker Faces Pain Rating Scale, thermometer of feeling and "my fatigue meter"	Reduction of pain, anguish and fatigue	Therapeutic touch	Non-observed or unreported

chemotherapy outpatient. The target-population consisted of children with cancer, their parents and caretakers, without specification of gender, and health professionals caring for this population.

Most of the studies included in the sample of the review (n=7), regarding the level of evidence of the 11 articles selected was classified as level 3 which addresses the evidences obtained from well-designed clinical trials without randomization with controlled and well-designed studies<sup>14</sup>. Some samples of these studies are still reduced, something common in studies in pediatric oncology.

Qualitative and quantitative studies were included in the sample. The integrative review allows the simultaneous analysis of findings of both types, waiving the separation of the studies according to its nature in the presentation or discussion of the findings<sup>10,11</sup>. The synthesis of the main findings taken from the selected studies gathered in categories according to the similarity of content is described below.

#### PAIN IN PEDIATRIC ONCOLOGY AND TOOLS OF EVALUATION

Whereas the intensive and frequently invasive treatments are essential for the prognosis, the complications of the therapy are significant and result in substantial physical symptoms and emotional suffering<sup>15-17</sup>.

It is estimated that more than 80% of children with cancer hospitalized have pain and nearly half of them claim their pain as intense. In children who are treated in outpatient, pain is present in nearly 35% of the cases<sup>18,19</sup>. In addition to pain, other symptoms can occur such as nausea, vomits, anxiety, fatigue, loss of appetite, weight loss, constipation or diarrhea, mucosa lesions, difficulty of deglutition, phobia, fear, uncertainty, irritability, weakness

or lack of energy, difficulty of concentration, sleep and mood disorders, numbness and tingling<sup>19-22</sup>.

Clinically, the painful experience in cancer varies according to its characteristics, they can be nociceptive, neuropathic, related to tumor growth, invasive procedures and due to adverse events caused by the pharmacologic treatment<sup>23</sup>. According to some authors, pain in children with cancer may be more associated with therapy (78% to 94%) than to the progression of cancer itself<sup>16,23</sup>.

Chemotherapeutic-related pain can be severe and disabling, compromising decisively the quality of life of the child, increasing the suffering the parents experienced<sup>15,18</sup>. Pain not always responds completely to the pharmacologic interventions; due to this, associate complementary therapies to relief pain and anxiety are alternatives that still have the benefit of avoiding the excess of sedation that may interfere in the child's ability to interact with the family and friends<sup>17</sup>.

The recognition of the pain from the scales of evaluation is of uttermost importance to minimize the suffering these patients face. There is no scale to evaluate pain that is specific and exclusive for the oncologic pediatric population. In most of the studies<sup>16,18,20,21,24-26</sup>, the main form to evaluate the child's pain was through the Visual Analog Scale and in two of them<sup>19,25</sup>, the Wong-Baker Pain Rating Scale. Other studies still used vital parameters as heart rate and respiratory frequency that can be pain indicators too<sup>20,25</sup>.

Various are the challenges while addressing pain in children, but the biggest is inherent to the difficulty in many cases for them to portray objectively what they feel. For some investigators<sup>21,25</sup>, children that already express themselves verbally or older than 5 years old can self-report

pain. Minors depend from their parents to evaluate and report the pain they feel<sup>25</sup>. Another study<sup>16</sup> indicated that as minors are unable to describe the quality of the pain, it may be inappropriately analyzed in this population. In one of the studies analyzed<sup>22</sup>, the pain was evaluated through the quantification of the anesthetic rescues administered and change of the heartbeat during the pain episode.

## BENEFITS OF COMPLEMENTARY THERAPIES FOR ONCOLOGIC PEDIATRIC PAIN MANAGEMENT

In the eleven studies investigated<sup>15-25</sup>, the non-pharmacological approaches brought benefits to cope with oncologic pediatric pain. When children are the target, parents are the main responsible for choosing the methods to alleviate pain, but the child's opinion should be respected as the aforementioned studies indicated.

The complementary treatment efficacy in controlling physical signs and symptoms was suggested when most of the studies<sup>15-19,20,22</sup> showed that it helped to control pain, diminishing the drug's adverse effects, controlling other symptoms than pain such as nausea and vomits, fatigue and tiredness. Consequently, increased the child's ability to ambulate and its levels of energy promoting the improvement of weight gain, sleep and mood patterns<sup>20,22</sup>. In a study selected<sup>22</sup>, there was a significant reduction of the analgesic doses administered for pain management, this represented less than 14% in the quantity of analgesic medication administered per day of treatment. Further to physical symptoms, these therapies were effective while attempting to strengthen the immune system and improve the child's liveliness, ensuring stability not only physical but mental, something of essence for disease coping, improving it<sup>24</sup>. Furthermore, improvements in the quality of life and hope for the children and their families were noticed<sup>17,21</sup>. Some children reported after complementary therapies: feeling of relaxation, improvement of the general condition, less pain and nausea, feeling of calmness, a "weight off their shoulders", free thoughts, feeling special, be in good mood and enjoy the moment. Most of the children reported benefits lasted several hours or for the rest of the day<sup>20</sup>.

## ADVERSE EFFECTS OF COMPLEMENTARY THERAPIES

Only two studies presented adverse events of complementary therapies. One of them<sup>23</sup> reported bleeding where the acupuncture was applied, in addition to bruises grade I. No severe adverse event was reported in the studies, such as late infections or intense bleeding in patients with or without thrombocytopenia, it is worth mentioning.

In one of the studies<sup>21</sup>, which specifically brought massage as pain relief method, some children were

adamant to the technique. The authors justified this attitude as the children's fear that the massage could precede some invasive procedure. One of the alternatives the authors indicated for the children to overcome fear was to request the parents' collaboration and presence during the application of the technique, which increased children's acceptance and comfort<sup>17,21,23</sup>.

## DISCUSSION

The publications reviewed emphasized the importance of complementary methods during the oncologic treatment of children and adolescents because of the necessity of alleviating symptoms related to the disease itself and to the treatment with chemotherapy, radiation, surgeries, medications, procedures among other.

The studies selected for this review showed considerable repercussions of pain over the quality of life of the children and their parents. It is known that treatment and chances of cure of childhood cancer progressed because of the quality of early detection methods and success of the treatments, however, with the intensification of invasive treatments, complications have increased as well as more physical and emotional suffering for these children<sup>7,26</sup>. According to the findings of this review, children's pain during oncologic treatment affects both theirs, their parents and their caretakers quality of life. Although the use of drugs to control pain shouldn't be underestimated, symptoms management should not be limited to pharmacologic therapies alone. Complementary therapies, therefore, are allies in the process of controlling this symptom as indicated in other reviews about oncologic pain in children<sup>26</sup>.

Seemingly, although the parents of children with cancer have as sole objective the cure of the disease, some studies<sup>17,24,25</sup> corroborated the findings of the literature indicating that the priority to the parents is their children's comfort and minimize the suffering the disease and its treatment<sup>7,8</sup> have caused. As much as the parents are available to do what is possible to promote their children well-being, they accept and pursue complementary therapies for pain and anxiety relief of the child. When asked about why these therapies are used, most of them said it was necessary to strengthen the immune system, reduce physical distress, improve the children's inner strength, ensure mental and physical stability and finally support the child in coping with the disease<sup>17,21</sup>.

Although parents are concerned in alleviating their children's pain symptoms during the antineoplastic treatment, it is difficult to evaluate the level of pain the child experiences, most of all in children under 3 years old. Studies show that parents report the evaluation of the pain their children are unable to communicate yet<sup>7,8</sup>. Older

children and adolescents are proven to be able to report the quality and intensity of the pain they feel and due to this, the reporting of this symptom should be encouraged whenever the patient's level of development ensures it is capable to express itself satisfactorily as it will know how to describe its experience with the pain<sup>6</sup>.

As formerly indicated, the studies analyzed highlight the importance of measuring and classifying pain correctly during the treatment and suggested alternative therapies for pain and anxiety management experienced during the treatment. Among non-pharmacological methods, body manipulative practices as massage, acupuncture for older children, energetic therapies as Reiki and biologic-based therapies as homeopathy.

While caring for oncologic pediatric patients with pain, it is important to consider that pain complaint the child itself reported is the golden-standard and best indicator for its evaluation. In the studies it was verified that in addition to the instruments of evaluation of pain utilized at most for its accurate assessment as the Visual Analog Scale and the Wong-Baker Pain Scale it is important to notice and consider other clinical signs and behavioral indicators of pain as the alterations of the heartbeat, respiratory frequency and blood pressure, nausea and vomits, fatigue, crying, irritability, sleep and food disorders among other symptoms that vary according to the child organism, type of treatment and drugs-related adverse events<sup>6</sup>.

Some typical clinical trial limitations were found in the studies included in this review, a few of the main difficulties encountered were: sample reduced size and patient's refusal in joining the study. Future studies able to overcome these difficulties are necessary, further to literature reviews with sophisticated methods as meta-analysis evaluating the results of the already published evidences in order to recommend possible interventions in caring for this population.

It deserves to be considered the lack of knowledge health professionals have about the efficacy of these therapies among the studies limitations, further to the approach in unfavorable moments to apply the techniques. One of the studies<sup>19</sup> revealed that the diagnosis phase is not the best moment to approach these patients to offer complementary therapies because children and their families are burdened and stressed which hampers the participation in studies of this nature.

## CONCLUSION

Since pain is one of the most frequent and debilitating symptoms for the patients and their parents, it is necessary that the health professionals' evaluations are trustworthy

and portray accurately its intensity, so the most proper treatment is established. However, quite often, pharmacologic treatments provided are not sufficient to reduce these symptoms and the pain effects persist, compromising the child's quality of life.

Although the use of drugs is not to be underestimated, pain management is not restricted to pharmacologic therapies alone. Further to the multi-disciplinary approach, alternative strategies have been gaining space in the treatment of children with cancer. Non-pharmacologic interventions as massage, music therapy, ludic therapies, dance, art, theater and poetry, yoga and acupuncture, Reiki, homeopathy and spirituality can be an important resource to minimize pain and suffering these patients lived, in addition to avoiding organism tolerance and overload due to the excessive use of analgesics.

The results of the studies summarized in this review are relevant for parents and health professionals using complementary therapies directly or indirectly to improve the quality of life of the children. This is important as well for nursing because it can help to guide care contributing to ameliorate children's pain and anxiety in oncologic treatment.

Because of the dimension of the problem and paucity of strong evidences, future well-designed studies with appropriate methodologies to include these patients and able to produce measures to be implemented in caring for these children are recommended to minimize their experience of pain and consequently, their parents'.

## CONTRIBUTIONS

Thaís Victor Paes and Fernanda Machado Silva-Rodrigues contributed for the study conception and/or design, collection, analysis and interpretation of the data, wording and critical review. Lívia Keismanas de Ávila contributed for the analysis and interpretation of the data, wording and critical review. All the authors approved the final version to be published.

## DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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