The Role of Clinical Hypnotherapy on Quality of Life and Its Relationship with Heart Rate Variability and Serum Endorphin Levels in Solid Cancer Patients

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ABSTRACT:
Introduction:A solid cancer has a noticeable effect on both the physical and psychological health of patients, considerably reducing the quality of life. This then resulted in a decrease in heart rate variability (HRV) and lower serum endorphin levels. The physical symptoms of the disease itself, the adverse effects of treatment, and the psychological distress associated with the diagnosis and treatment process can all contribute to the development of profound emotional and social challenges.
Objectives: This review explore the efficacy of clinical hypnotherapy as a holistic psychological intervention by examining its effect on quality of life, HRV, and endorphin levels in solid cancer patients.
Methods: A comprehensive review of the literature was undertaken with the aim of evaluating the psychosocial and physiological effects of clinical hypnotherapy on solid cancer patients. The factors investigated included quality of life metrics, HRV as an indicator of autonomic function, and serum endorphin levels.
Results: Clinical hypnotherapy has been shown to offer significant benefits for solid cancer patients. It promotes relaxation, reducing stress, and potentially modulating biological markers associated with health, leading to better stress management and enhanced quality of life. Hypnotherapy interventions have a positive effect on HRV by modulating the autonomic balance and reducing sympathetic overactivity. In addition, empowering patients to take an active role in their pain management, which increases their sense of control and leads to greater emotional well-being, can help to increase endorphin levels and alleviate mood disturbances often seen in these patients.
Conclusions: Clinical hypnotherapy has emerged as a promising adjunctive treatment to improve quality life including various physiological and psychological outcomes in solid cancer patients by reducing pain and anxiety, enhancing physical functioning, increasing HRV, and potentially influencing endorphin levels.

1. Introduction

Solid cancer, commonly referred to as a solid tumor, is defined as an abnormal mass of tissue that does not typically contain cysts or liquid-filled areas. It can originate in a multitude of organs and tissues throughout the body. The majority of solid cancers originate from epithelial cells and are a significant contributor to global morbidity and mortality, accounting for over 85% of cancer-related deaths.[1] Among solid organs, cancers of the digestive system are responsible for over 40% of cancer-related deaths. In 2018, the four leading causes of cancer-related deaths worldwide were malignancies in the lung, colorectal, stomach, and liver.[2]

Patients with advanced solid cancer frequently present with a combination of moderate to severe symptoms, encompassing both physical and psychosocial impairments.[3] In particular, patients with solid cancer often report a reduction in quality of life, primarily due to the physical symptoms of the disease itself, the adverse effects of treatment, and the psychological distress associated with the diagnosis and treatment process.[4,5]

Solid cancer significantly impair the Quality of Life (QoL) of patients through various mechanisms. Pain is a common symptom in patients with solid cancers, affecting approximately 40% of those with advanced disease.[6]

The pain can be caused by the cancer itself, through its growth, invasion, and compression of surrounding tissues, or as a side effect of cancer treatments such as chemotherapy, radiotherapy, or surgery. In addition, the occurrence of depressive episodes is a significant predictor of diminished quality of life (QoL) in patients

with solid cancers. The prevalence of major depressive disorder in individuals with solid cancers is higher than in those with other chronic diseases.[6]

Complications in solid cancer patients, both physical and psychological, have the potential to affect the autonomic nervous system, which can be assessed through heart rate variability (HRV).[7-11] Heart rate variability, in a physiological sense, reflects the activation of the cardiovascular vasoconstrictor and vasodilatory centers in the brain and indicates the regularity of heartbeats. A greater regularity of heart rate corresponds with lower HRV, and vice versa, indicating a reduced ability of the autonomic nervous system to regulate stressors.[9]A review of existing epidemiological studies indicates that cancer patients display lower HRV than members of the general population.

Endorphin, an endogenous opioid, plays a significant role in cancer progression and pain.Studies have shown that patients afflicted with cancer often present with diminished levels of endorphins in their bodies. This phenomenon has been associated with the experience of chronic pain and the deterioration of quality of life.[12]

In consideration of the intricate interplay between chronic disease burden and the effects of chemotherapy, a holistic approach to care is necessary for patients with solid cancers. As part of a comprehensive palliative care approach aimed at improving the quality of life for solid cancer patients undergoing chemotherapy, hypnotherapy plays an integral role.[13] Furthermore, this approach may prove advantageous in the management of solid cancer patients.[14]

It is therefore presumed that clinical hypnotherapy will enhance quality of life, potentially via the psychoneuroimmunological (PNIE) pathway, which can be evaluated through assessments of HRV and endorphin levels.

2. Objectives

This review explore the efficacy of clinical hypnotherapy as a holistic psychological intervention by examining its effect onquality of life, HRV, and endorphin levels in solid cancer patients.

3. Methods

A comprehensive review of the literature was undertaken with the aim of evaluating the psychosocial and physiological effects of clinical hypnotherapy on solid tumour patients. The factors investigated includedquality of life metrics, heart rate variability (HRV) as an indicator of autonomic function, and serum endorphin levels.

4. Results

Quality of Life in Solid Cancer Patients

Definition of Quality of Life

According to the World Health Organization in 1947, quality of life is defined as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”. In 1995, this WHO definition evolved into “an individual's perception of his or her position in life in the context of the culture and value system in which he or she lives, and in relation to his or her goals, expectations, standards, and concerns”.[15]

There is now a new concept that can better define quality of life, called health-related quality of life (HR-QoL), which is “how well a person functions in life and how well he or she feels in terms of physical, psychological and social health”. Quality of life can therefore be seen as the interaction and balance between one's internal and external circumstances.[15]

Assessment Tools for Quality of Life In Solid Cancer Patients

Several studies have shown that patients with solid tumours have a poor quality of life, both in terms of physical health and general health. There is a decline in physical, vital and social functioning and a progressive increase in pain at all stages of solid cancer. [16]

In solid tumours, both the malignancy of the disease and the treatment of the malignancy have a significant impact on patients' quality of life, well-being and daily social functioning. Quality of life is determined by the severity of disease symptoms such as chronic cough, dyspnoea and chest pain. In addition, fatigue, weight loss, cachexia and weakness are common in patients with metastatic disease. Persistent symptoms impair physical functioning, while complex diagnosis and treatment affect psychological functioning. [16]

As a result, cancer and its treatment cause excruciating suffering for patients, both those who survive and those who die from the disease. Moreover, the effectiveness of cancer treatment depends not only on improving survival rates, but also on how well the treatment improves patients' overall well-being. Assessing

quality of life is therefore crucial in making treatment decisions, especially in advanced cancer where the main therapeutic goal is to improve patients' well-being. However, the value of quality of life measures depends on their accuracy in capturing key aspects of patients' quality of life, reliability, responsiveness and clinical relevance in relation to the benefits and costs involved.[17]

There are several tools available to assess quality of life, and the European Organisation for Research and Treatment of Cancer (EORTC) QLQ-C30 is a valid and reliable measure of quality of life in cancer patients. The EORTC QLQ-C30 questionnaire met all the necessary criteria for validity, reliability and sensitivity, making it a suitable method for assessing quality of life in cancer patients in various studies.[17]

The EORTC QLQ-C30 has been used internationally in more than 3000 studies as a common questionnaire for cancer patients. It has been translated and validated into over 50 languages.[18] The EORTC QLQ-C30 questionnaire has also been translated and validated into Indonesian for use in cancer studies in Indonesia. The EORTC QLQ-C30 consists of 30 items, including 5 functional scales (physical functioning, role functioning, emotional functioning, cognitive functioning, and social functioning), 3 symptom scales (fatigue, pain, and nausea or vomiting), 1 global health status or general quality of life scale, and 6 items for different symptoms (shortness of breath, insomnia, loss of appetite, constipation, diarrhoea, and impact of financial difficulties). This questionnaire was tested for validity and reliability in Indonesia in 2016 to see the quality of life in gynaecological patients with a value of r = 0.90, so it can be said that the EORTC QLQ C30 measuring instrument is valid with the Cronbach alpha coefficient value reliability test ($\alpha = 0.90$).[19]

Factors Influencing Quality of Life in Solid Cancer Patients

Pain is an almost inevitable reality for people dying of cancer. Cancer pain at the end of life (EOL) has gone from being one of the most neglected public health issues to being recognised as a global health priority. The World Health Organization (WHO) has developed policies and treatment strategies to help palliative cancer patients who experience pain. Although pain can be controlled by pharmacological or non-pharmacological methods in 85% to 95% of patients, inadequate pain relief is still a reported reality for many patients.[20]

Cancer pain is unique in that it can have multiple causes. In addition to the physical causes of pain caused by (1) tumours pressing on organs, nerves or bones, (2) cancer treatments such as surgery, chemotherapy or radiotherapy, (3) weakness, and (4) benign causes, cancer pain can also be triggered by non-physical experiences. For example, the importance of the spiritual aspect of pain is often overlooked in clinical assessment. Spiritual distress is recognised in physical and psychological symptoms, relationship distress and especially spiritual symptoms. Socio-cultural aspects, referring to the influence of the culture and society from which the patient comes, colour the 'expression' of the injury. Pain also needs to be addressed in terms of its impact on the patient's family and carers, making them an important part of any definition of pain. In fact, social issues, such as concerns about their loved ones, can often amplify the patient's experience of pain. These issues are important in any assessment of pain in palliative care patients, as concerns about leaving loved ones behind are often part of their thoughts about impending death. Similarly, a search for meaning, a search for purpose, or anger at God can also affect their pain. This concept is known as total pain.[21]

Heart Rate Variability in Solid Cancer Patients

Heart rate variability (HRV) assessment is an indirect approach to monitoring autonomic nervous system activity. Fluctuations in heart rate are the result of changes in sympathetic and parasympathetic activity. This quantitative approach to assessing HRV employs linear methods, including the time domain, which encompasses SDNN (standard deviation of normal-to-normal interval) in milliseconds (ms).[10]

SDNN is a widely used time-domain measure of heart rate variability (HRV) that reflects the overall variability in heart rate over a specified period, typically 24 hours. It quantifies the amount of variation in heartbeats, providing insights into autonomic nervous system function and cardiovascular health. A higher SDNN value indicates greater variability and is generally associated with better health outcomes, while lower values are linked to increased risk of cardiovascular events and mortality.[22]

Despite their disparate pathophysiologic mechanisms, recent studies have demonstrated a correlation between cancer and cardiovascular disorders, including heart rate variability (HRV).[23,24]Epidemiological studies have demonstrated that individuals diagnosed with cancer exhibit diminished levels of HRV in comparison to the general population.[23] Additionally, research has indicated that a decline in HRV may manifest even prior to a cancer diagnosis. Potential mechanisms that may elucidate the association between cancer and HRV include oxidative stress, systemic inflammation, and autonomic dysfunction.[25,26]

The precise mechanism by which cancer affects HRV remains unclear. However, several hypotheses have been put forth to provide an explanation for this relationship. Among the factors believed to contribute to the reduction in HRV in cancer patients are oxidative stress, systemic inflammation, and autonomic disorders. Research in Psychosomatic Medicine indicates that a cancer diagnosis itself may act as a stressor that affects HRV.[8,11]

A number of other studies have identified that specific cancers, such as those affecting the lungs and the breast, may impact autonomic function and result in a reduction in (HRV). Additionally, cancer treatments, including chemotherapy and radiotherapy, may also contribute to a decline in HRV. For instance, research published in the Journal of Cancer Prevention demonstrated that breast cancer patients who underwent chemotherapy exhibited lower HRV compared to cancer patients who had not undergone chemotherapy.[27]

Serum Endorphin Levels in Solid Cancer Patients

Endorphins are neuropeptides that play a role in the regulation of the body's response to pain and stress. A reduction in endorphin levels has been observed in cancer patients, which may be associated with the experience of chronic pain and a reduction in quality of life.[12]

A study conducted in 2021 investigated the relationship between endorphin levels and pain perception in cancer patients undergoing chemotherapy. The results showed that there was a negative correlation between endorphin levels and pain intensity. This study highlights the potential regulation of endorphins on pain response in solid cancer patients.[21]

Hypnotherapy

According to the Psychological Hypnotherapy Division of the American Psychological Association, the definition of hypnotherapy is a state of generally observable change in subjective experience (such as changes in sensation, perception, emotion, thought or behaviour) following the performance of a hypnotic induction. The definition of a hypnotherapy procedure is the performance of an induction followed by a series of suggestions. Currently, hypnotherapy is understood as a normal mental activity in which attention becomes more focused, critical judgement partially disappears and peripheral alertness decreases. The trance state is a function of the subject's mind, it cannot be created by physical force by an outside person. Hypnotherapists, however, can be instrumental in achieving this state, using uncritical, deep concentration to facilitate the acceptance of new thoughts and feelings, which then enhance therapeutic change. For the subject, hypnotherapy is characterised by feelings of unconsciousness and seemingly automatic movements.[28]

Clinical Hypnotherapy

The medical world has long recognised the placebo effect, whereby the client's positive belief in the method or medication they are undergoing helps the healing process because they truly believe in it, so healing does occur. Conversely, a negative belief in the medication process could potentially trigger the so-called nocebo effect, which works in the opposite direction.[29]

A psychologist called Irving Kirsch developed a specific socio-cognitive model of hypnosis, known as response set theory, which emphasises the importance of hope in treatment. In fact, Kirsch details the evidence that hypnosis itself has positive effects due to the positive expectations of the client/patient themselves.[29]

In general, hypnosis can be an important part of the medical process, which is divided into several parts: the first part is to open up the client's/patient's thinking about their condition, in other words, to create more positive expectations. This is important in helping a patient who is emotionally devastated by their condition and feels there is no hope of survival.[29] The second part, hypnosis, invites clients/patients to be more in control of their internal experiences and sensations, inviting them to be more 'masters of their own consciousness', whether physiological or psychological, making them more relaxed and at ease, or even managing their pain (pain management).[29]

The scope of hypnosis in pain management is widely used in pain management, childbirth and pre-operative anaesthesia without the use of drugs, just using trance states to manipulate pain.[29]

There are also times when a person is affected by chronic medical problems that do not go away, but when examined there is no evidence of a medical problem, this is known as psychosomatics, the sensation of physical pain manifested by emotions. In relation to psychosomatic illness, hypnotherapy offers an alternative to uncover and resolve the real cause in the subconscious mind that makes the psychosomatic illness appear.[29]

Hypnotherapy methods

The classification of stages in the hypnotherapy process, as understood by several hypnotherapy theories, is not identical, although there are actually similarities in the main stages of the hypnotherapy process. The most important in this process is the induction stage, which is expected after the therapy process can achieve the expected results. Below is a systematic description of the stages from pre hypnotherapy to post hypnotherapy.[28]

The sequence of hypnotherapy stages can be systematically arranged as follows:[28]

1. Pre-induction
   The pre-induction process prepares the hypnotherapist and subject for hypnotherapy. The hypnotherapist must know the subject's interests, knowledge, and psychological aspects. This can be done through conversation.
2. Induction
   The technique used depends on the variation of the therapist or hypnotherapist performing the induction. Induction methods can be broadly grouped into six basic elements, namely fascinatie, fixatie, verbal suggestive, hyperventilation, fractionate, and self-hypnose.
3. Depth Level Test
   This test determines how deeply the subject's consciousness has accessed the subconscious mind. Factors affecting depth include the subject's condition, understanding, time, environment and therapist expertise.
4. Post Hypnotic Suggestion
   A suggestion from hypnotherapy may become a new value, but it won't last unless it's in line with the subject's basic values. In hypnotherapy, post-hypnotic suggestion is key. Hypnotherapists must understand psychology to give correct suggestions after therapy.
5. Termination
   The termination stage ends hypnotherapy with positive suggestions to refresh and relax the subject before bringing them back to normal.
6. Post Hypnotic
   This is a state achieved at the end of the hypnotherapy process. It is hoped that the initial goal of hypnotherapy will be achieved.

Indications for hypnotherapy

The use of hypnotherapy in psychiatry, especially for psychotherapy purposes, must be based first on the knowledge of psychotherapy itself. Hypnotherapy can help psychotherapy, where hypnotherapy can accelerate the effect of psychotherapy so that the results are apparent.[28]

The disorders that can be treated with hypnotherapy are broadly divided into three categories:[28]

1. Psychosomatic disorders, which are disorders experienced in the form of psychological factors that affect physical conditions, so the symptoms that appear are physical symptoms.
2. Psychiatric disorders, which are disorders experienced in the form of psychological factors, whose symptoms appear in the psychological area.
3. Cases in other areas such as anaesthesia, labour pains, tooth extraction, obstipation or post-operative urinary retention.

Contraindications for hypnotherapy

The contraindications to hypnotherapy are as follows:[28]

1. Patients who is in a state that is not calm, noisy, restless. For example in acute psychosis.
2. Patients who does not understand what will be done, for example in dementia.
3. Patients with language limitations.
4. Patients who have difficulties with basic beliefs such as paranoid patients or who have control problems such as obsessive compulsive disorders.

Discussion

Hypnosis empowers patients to engage actively in their pain management, enhancing their sense of control and potentially leading to greater emotional well-being. This psychological aspect can further stimulate endorphin release as patients experience reduced anxiety and improved mood.[30]

Studies have shown that hypnosis can lead to significant reductions in pain perception among cancer patients. For instance, a systematic review highlighted that self-hypnosis techniques provided substantial pain relief, even in terminally ill patients.[31]A study involving hypno-relaxation techniques reported significant improvements in mood, reduction in anxiety and depression, and overall enhancement in quality of life for cancer patients undergoing treatment.[32]

Another review emphasized that hypnosis is not only effective in the management of procedural pain, but also in the relief of symptoms such as nausea, fatigue and emotional distress, all of which are common in cancer patients.[33]Specific studies also demonstrated that hypnotherapy could improve cognitive functioning and social interactions among breast cancer patients during treatment. These improvements were statistically significant, indicating the therapy's positive impact on daily living activities.[38,39]

Hypnosis primarily influences the autonomic nervous system (ANS), which consists of the sympathetic and parasympathetic branches. Research indicates that hypnosis tends to lower sympathetic activity and enhance parasympathetic tone. This shift is reflected in increased HRV, particularly through the high-frequency (HF) component, which is associated with parasympathetic activity mediated by the vagus nerve.[36]

During hypnosis, studies have shown significant reductions in heart rate and increases in both HF and low-frequency (LF) components of HRV, suggesting a more balanced autonomic state conducive to relaxation and recovery[37]

Breathing frequency also plays a critical role in HRV during hypnosis. Hypnosis often induces slower breathing rates, which can enhance respiratory sinus arrhythmia—a phenomenon where heart rate variability increases with controlled breathing. This effect further supports the parasympathetic activation associated with relaxation states induced by hypnosis.[37]The neurovisceral integration model postulates that efficacious self-regulatory mechanisms, as indicated by elevated cardiac vagal activity, are associated with these slower breathing patterns.[38]

Interestingly, the benefits of hypnosis on HRV may extend beyond the hypnotic state itself. Studies have observed that posthypnotic values of HRV can be higher than pre hypnotic levels, indicating a lasting effect on autonomic regulation even after the session has concluded. This phenomenon may be particularly beneficial for individuals experiencing stress-related conditions or autonomic imbalances.[38]

The modulation of HRV through hypnosis has potential therapeutic applications, especially in clinical settings. For instance, enhanced HRV is associated with better recovery outcomes in surgical patients who undergo clinical hypnosis, as it helps preserve vagal activity and mitigate stress responses post-surgery.[32] Moreover, the ability of hypnosis to improve HRV could be beneficial for managing conditions characterized by autonomic dysregulation such as anxiety disorders, chronic pain syndromes, and cardiovascular issues.[39]

Hypnosis has been shown to stimulate the release of endorphins, which are natural pain-relieving compounds produced by the body. These neuropeptides bind to opioid receptors in the brain, leading to analgesic effects and a reduction in the perception of pain.[32,33]Hypnosis can also induce a state of focused attention, which can help patients detach from painful stimuli and reduce anxiety associated with pain.The relaxation achieved during hypnosis may lower cortisol levels, which is known to correlate with increased endorphin production.[32]

Conclusion

Clinical hypnotherapy has emerged as a promising adjunctive treatment to improve quality life including various physiological and psychological outcomesin solid cancer patients by reducing pain and anxiety, enhancing physical functioning, increasing HRV, and potentially influencing endorphin levels.This exploration into the interplay between clinical hypnotherapy,quality of life, HRV, and endorphins level,underscores the potential for integrating psychological interventions into conventional cancer care to improve patient outcomes and support holistic healing processes.

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