THE EFFECTS OF ACUPRESSURE ON CHEMOTHERAPY-RELATED SIDE EFFECTS IN CANCER PATIENTS

By

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Abstract

Purpose: To develop evidence-based best practice recommendations for nursing and other healthcare providers to aid in alleviating side effects from chemotherapy in cancer patients.

Background: Many cancer patients endure the grueling experience of chemotherapy. Each session leaves them with debilitating side effects like nausea and vomiting, constipation, fatigue, and sleep disturbance. Acupressure techniques have been found to alleviate these side effects when performed routinely.

Approach to Practice: The best practice recommendations are based on a literature review conducted through a search on PubMed and CINAHL with the following keywords: *acupressure, cancer,* and *chemotherapy*. The articles included in this search were published between 2014 and 2020. Eight articles were included in the literature review portion of this thesis.

Outcomes: The proposed best practice recommendations are for nurses and other healthcare providers to reference when identifying potential candidates that would benefit from acupressure techniques and practices.

Conclusions: As more research on acupressure is conducted and published, the guidelines can be more intricately defined and healthcare providers working to address the side effects of chemotherapy in cancer patients can feel more confident in referring patients to acupressure interventions.

CHAPTER ONE

Introduction

Statement of Purpose

The purpose of this thesis is to develop evidence-based best practice recommendations for nurses and other health providers, for the treatment of chemotherapy-related side effects in cancer patients. The best practice recommendations presented in this thesis are supported by evidence-based research and integrative health practices in symptom management. The importance and relevance of acupressure, with respect to nursing, will be discussed followed by a literature review of current evidence-based practice and research. Following this review of literature, the evidence-based best practice recommendations for cancer patients undergoing chemotherapy will be presented and their impact on the nursing profession will be discussed.

Background

Cancer is one of the leading causes of death globally. The number of new cases of cancer is 439.2 per 100,00 men and women per year, based on 2011-2015 cases; (National Cancer Institute, 2018). Cancer mortality, the number of cancer deaths, is 163.5 per 100,000 men and women per year, based on 2011-2015 cases; (National Cancer Institute, 2018). Cancer mortality is higher among men than women 196.8 vs 139.6 per 100,000 men and women (National Cancer Institute, 2018). Mortality is also highest in African American men (239.9 per 100,000) and lowest in Asian/Pacific Islander women (88.3 per 100,000). In 2016, there were an estimated 15.5 million cancer survivors in the United States and this number is expected to increase to 20.3 million by 2026. One of the most staggering statistics is that around 38.4% of men and women will be diagnosed with cancer at some point in their lifetime (based on 2013-2015 data). The number of new cancer cases per year is expected to rise to 23.6 million by 2030 (National Cancer

Institute, 2018). It is estimated that there will be approximately 1.8 million new cancer cases and 606,520 cancer deaths in the U.S. in 2020 (American Cancer Society, 2021a).

Cancer is a devastating disease that takes the lives of hundreds of thousands of Americans each year. Cancer is a collection of genetic diseases that is caused by genetic mutations in cells that arise from random errors that occur as cells divide or result from damage to DNA caused by environmental exposures such as chemicals in tobacco or radiation from the ultraviolet rays from the sun (National Cancer Institute, 2015b). These mutations change the genes that control the way cells function, particularly how they grow and divide. The mutated cells begin to grow and divide uncontrollably, spreading to other parts of the body.

The human body is composed of trillions of cells and these cells grow and divide to form new cells when the body needs them; cells also need to be replaced when they become too old or get damaged. Cells become cancerous when abnormal cells, the cells that should not survive, proliferate, and invade surrounding cells. Cancer is named after the organ or type of tissue it originates from and there are more than 100 types of cancer. The five main categories of cancer are carcinoma, sarcoma, melanoma, lymphoma, and leukemia (National Cancer Institute, 2015b). Carcinomas are formed from epithelial cells, the cells that cover the inside and outside of the body; sarcomas form in bone and soft tissues like muscle, fat, blood vessels, and lymph vessels; melanomas arise in melanocytes, the cells that produce pigment in the skin; lymphomas form in lymphocytes, white blood cells that fight against pathogens in the body; leukemia forms from blood-forming tissue in the bone marrow and causes abnormal white blood cells to build-up in the blood (National Cancer Institute, 2015b). Some cancer form tumors, which are masses of tissue. There are two types of tumors: malignant and benign. Malignant tumors invade and spread to other parts of the body while benign tumors do not (National Cancer Institute, 2015b).

Cancer treatment varies depending on the type of cancer and how advanced it is. Currently, there are eight different treatments available: surgery, radiation therapy, chemotherapy, immunotherapy, targeted therapy, hormone therapy, stem cell transplant, and precision medicine (National Cancer Institute, 2015a). Some patients require only a single treatment option; however, most individuals will receive a combination of treatments, the most common being surgery with chemotherapy and/or radiation. The treatment this paper will focus on is chemotherapy. Chemotherapy is a type of cancer treatment that uses drugs to kill cancer cells. (National Cancer Institute, 2015a). It works by stopping or slowing the growth of growing and quickly dividing cancerous cells. This type of treatment can be used to cure cancer, reduce the chances that the cancer will return, ease cancer symptoms, and to shrink tumors that are causing pain as well as other problems. Chemotherapy can "reduce the size of tumors, destroy cancer cells that may remain after treatment with surgery or radiation therapy, help other treatments work better, and kill cancer cells that have returned or spread to other parts of the body" (National Cancer Institute, 2015a, para. 5). Although chemotherapy kills fast-growing cancer cells, it also kills or slows the growth of healthy, quickly dividing cells because it is non-selective and kills all quickly dividing and growing cells. Some common examples of non-targeted cells are the cells that line the mouth and intestines as well as those that cause your hair to grow. When these cells are damaged by the chemotherapy, patients may experience side effects such as mouth sores, nausea, and hair loss. These side effects typically end after treatment is over. There are many more side effects caused by chemotherapy and this paper will focus on four specific side effects: lack of sleep, nausea and vomiting, constipation, and fatigue.

Chemotherapy is administered through a thin needle that is placed in a vein on the hand or arm. It can also be given through catheters or ports, and even with a pump. The length of

treatment depends on the type of cancer, how advanced it is, and the purpose of the treatment. Patients receive it in cycles, which is a period of chemotherapy followed by a period of rest. Every patient responds to the treatment differently. Various tests are performed throughout the treatment process to determine the effectiveness. Such tests include blood tests and various scans such as MRI, CT, or PET scans.

Clinical Significance

Chemotherapy works by targeting fast-growing and dividing cells using powerful drugs. These drugs are non-specific and kill all fast-growing cells, including normal, healthy cells. The side effects chemotherapy patients experience are caused by the damage done to these healthy cells. Some of the most common normal cells that are damaged by the treatment include: hair follicles, blood-forming cells in bone marrow, and the cells that line the mouth, digestive system, and reproductive system. Physicians try to prescribe chemotherapy levels that are high enough to be effective in treating the cancer, but low enough to keep the side effects at a minimum.

Each patient reacts differently to the treatment; they can have various amounts and types of side effects. Many side effects typically disappear shortly after treatment is over, however, some may take months or years to go away completely, known as late effects (American Cancer Society, 2021b). Some chemotherapy drugs can cause long-term side effects such as heart or nerve damage or fertility problems, however, many patients have no long-term problems after treatment (American Cancer Society, 2021b). While side effects can be unpleasant, they must be weighed against the need to kill the cancerous cells (American Cancer Society, 2021b). Chemotherapy can cause a variety of side effects depending on the cells that are damaged. Some of the most common side effects include: hair loss, anemia, nausea and vomiting, fatigue,

appetite changes, easy bruising and bleeding, constipation, diarrhea, mouth sores, pain, fertility problems, and mood changes (American Cancer Society, 2021b).

Overview of Common Chemotherapy Side Effects

For the purpose of this paper, the four most common side effects of chemotherapy treatment will be discussed which are nausea and vomiting, constipation, fatigue, and sleep disturbance. Managing side effects and improving patient outcomes are major parts of nursing care.

Nausea and vomiting are also very common side effects from chemotherapy treatment. Between 40 - 80% of patients experience nausea and/or vomiting during the course of their treatment (Eghbali et al., 2016). There are three types of categories used to describe these side effects: acute, delayed and predictable. The severity of the symptoms depends on the type of medication and the patient. Some patients experience mild symptoms while others can experience constant symptoms for days. These symptoms can have a negative impact on these patients' lives. Excessive nausea and vomiting can also cause serious metabolic side effects such as hypokalemia. A low serum potassium level can cause muscle cramps, muscle spasms, digestive issues, heart palpitations, dysrhythmias, and difficulty breathing. The standard treatment for nausea and vomiting is serotonin receptors antagonist of corticosteroids and metoclopramide. Although these medications help reduce these symptoms, they also cause side effects such as hypotension, constipation, headache, dry mouth, diarrhea, and vertigo. Due to these extra side effects, patients prefer to use non-pharmacological methods to relieve their symptoms (Eghbali et al., 2016).

The next common side effect of chemotherapy is constipation. Constipation can cause both physical symptoms, such as intestinal obstruction, as well as psychological symptoms, such

as stress and anxiety (Shin & Park, 2018). Although constipation is typically caused by anticancer drugs due to decreased peristalsis, it can also be due to decreased fiber and liquid intake, decreased physical activity, and other medications such as antiemetics and antacids. Constipation can be treated by increasing fiber and fluid intake, and increasing physical activity. These interventions take time to produce positive effects and do not always work due to low compliance. Pharmacological interventions are typically used such as laxatives, however, these medications can affect the absorption of other medications or even worsen the constipation due to a reduction in intestinal reaction, change in the intestinal mucous membrane, and weakening of the muscle.

Fatigue is one of the most common side effects of chemotherapy. It is defined as "an unusual, constant, subjective sense of tiredness which cannot be improved after resting" (Khanghah et al., 2019). Fatigue can negatively affect a patient because it disrupts their daily routines, activities, relationships, and quality of life. It is often under-diagnosed and left untreated which further affects the patient (Khanghah et al., 2019).

Up to 93% of patients undergoing chemotherapy frequently report having sleep disturbances. They complain of having trouble falling asleep, staying asleep, and waking up too early. Sleep disturbance can exacerbate other cancer-related symptoms such as fatigue, pain, and anxiety. It can also be detrimental to the patients' mental health, causing significant psychological distress and impairing functional status. All these problems impair patient outcomes and further reduce the quality of life of cancer patients (Liu et al., 2020). Sleep disturbance is associated with "exacerbated disease-specific symptoms, reduced quality of life, impaired daily functioning, and poor clinical outcomes (Kuo et al., 2018, p. 1).

Acupressure

Acupressure is an ancient form of massage and common practice of treatment derived from Traditional Chinese Medicine. The purpose of the treatment is to "encourage the movement of *qi* ("life energy") through the 14 channels (meridians) inside the body" (Rogel Cancer Center). The Chinese Medicine theory states that "the constant flow of *qi* through these channels is essential for a person to keep their health" (Rogel Cancer Center). When these channels become blocked and the energy cannot flow, the body is unable to maintain balance and overall health diminishes; this is described as an imbalance between *Yin* and *Yang*. According to Traditional Chinese Medicine, when there is an imbalance between *Yin* and *Yang*, there is dysfunction between organ systems. Acupressure reestablishes a balance between *Yin* and *Yang*. According to Zhang (2015), meridians are the channels that connect the viscera, body surface and other parts of the body, promoting the circulation of *qi* and blood, and the meridians are connected with the ears. Auricular points refer to acupoints distributed on the auricle, and auricular acupressure (AA) is a subdiscipline of acupuncture and moxibustion of TCM, which can stimulate the meridians by applying pressure to an acupoint, thus influencing the release of neurotransmitters that transmit signals along neurons, regulating the function of endocrine and viscera, eventually reducing symptoms of discomfort and curing some diseases (Lin, 2019).

There are several forms of acupressure and they are classified based on their origin, method and technique. The three main types include Shiatsu, auricular, and tapas. Shiatsu originated in China, but it is known as "Japanese acupressure" due to its popularity in Japan. Shiatsu acupressure consists of pressure that is applied to specific acupoints on the body using the thumb, elbow, or knee. Auricular acupressure (AA) works by stimulating specific points on the external part of the ear. The acupressure specialist locates specific acupoints to stimulate to cause the desired effects and places vaccaria seeds on the acupoints with an adhesive tape or

bandage to stimulate the points gently with continuous pressure. The external ear has multiple acupoints that target various body systems making it an ideal place for acupressure therapy. Auricular acupressure can treat multiple side effects in a simple, non-invasive way, while also reducing the risk of polypharmacy (Tsao & Creedy, 2019). The last type is Tapas Acupressure Technique (TAT). It is also known as "power therapy" and involves tapping or holding specific acupoints while using mental imagery to connect the mind and body and alleviate maladies (Mehta et al., 2016). Research has shown that acupressure has helped cancer patients undergoing chemotherapy reduce their side effects. These side effects include nausea, vomiting, pain, fatigue, sleep, and constipation.

Acupressure is similar to its close relative acupuncture. They both stimulate the same acupoints of the body to produce desired effects, however, acupressure uses pressure to stimulate the acupoints while acupuncture uses a thin needle. Acupressure is the safer alternative to acupuncture because it is non-invasive and does not produce additional side effects.

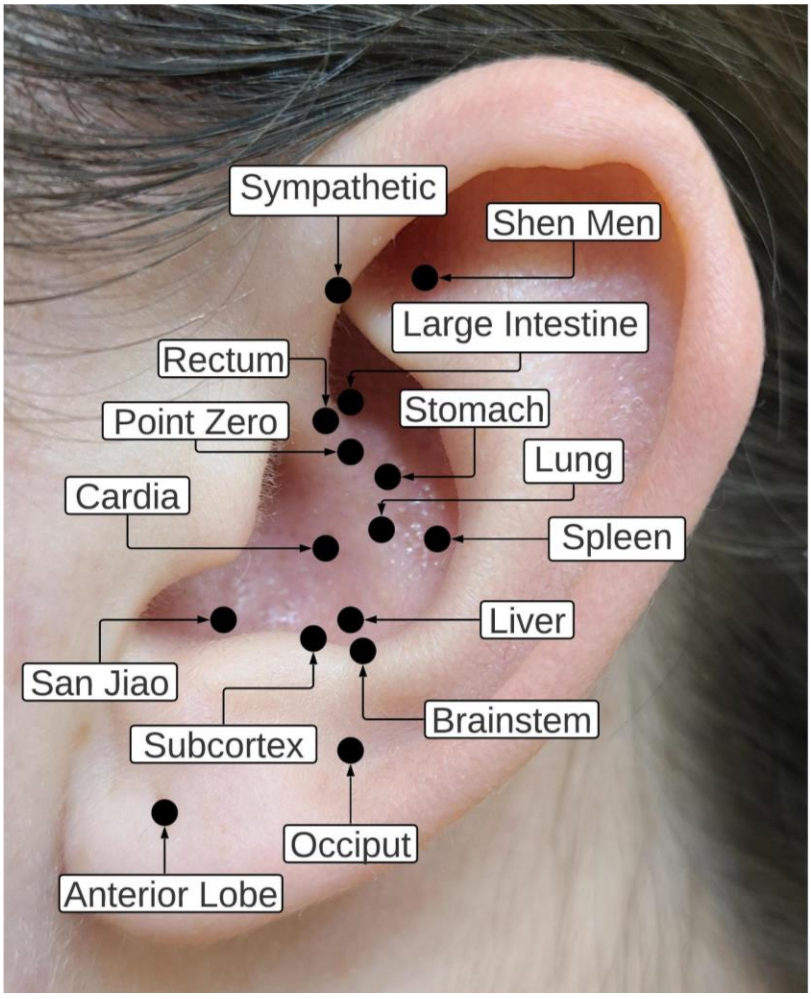
Acupoints

The acupoints used to treat nausea and vomiting are Point Zero, Stomach, Brainstem, Shen Men, Cardia, and Subcortex. According to Li et al. (2016), the purpose of auricular acupoints therapy, through stimulating certain auricular acupoints, "is to activate the meridians and collateral on the whole body and to regulate the function of the internal organs, *qi*, and blood to relieve the gastrointestinal side effects (Li et al., 2016). Point Zero and Subcortex are the auricular acupoints that encourage the stomach energy to flow downward making them good choices for nausea and vomiting ("Point zero," 2021). The Stomach acupoint works by balancing the stomach *qi* and promoting an antiemetic function (Li et al., 2016). The Brainstem acupoint stimulates the vagus nerve (Li et al., 2016). Shen Men has an antiemetic effect and works by

stimulating the autonomic nerve to relieve nausea and vomiting caused by the excitation of the vagus nerve (Li et al., 2016). Cardia works by stimulating the vagus nerve, thereby enhancing gastrointestinal motility and accelerating gastric emptying (National Library of Medicine [NLM], NCT03120325). The location of the acupoints for nausea and vomiting are illustrated in Figure 1.

Figure 1

Auricular Acupoints



Note. Photo by author, 2021.

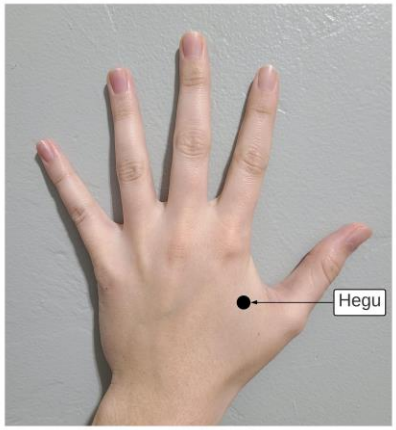
For constipation**,** auricular acupressure is used at the Large Intestine, Rectum, San Jiao, Spleen, Lung, Sympathetic, and Subcortex acupoints (Shin and Park, 2018). These points work

together to relieve constipation by increasing intestinal peristalsis, producing, and distributing body fluids to moisten the intestine, increasing blood flow, and regulating functions of the gastrointestinal system (Shin and Park, 2018). The acupoints for constipation are illustrated in Figure 1.

For fatigue, manual acupressure is used at the Hegu, Zusanli, and Sanyinjiao acupoints, which have been shown to tonify *qi* and eliminate fatigue (Khanghah, 2019). The Zusanli acupoint works by increasing the available energy of *qi* and blood, strengthening the body's defense against pathogens, and eliminating fatigue (Jia, 2020). Hegu works by increasing blood flow and stimulating endorphins, which are proteins that are natural pain relievers (Johannes, 2013). The Sanyinjiao acupoint nourishes the spleen to help revive weakness of the organ, which helps cool the body, and increase energy (Pollock, 2017). Auricular acupressure at the Shen Men, Subcortex, Liver, and Spleen acupoints can also help relieve physical fatigue (Lin, 2019). The Shen Men acupoints can tranquilize the mind and relieve fatigue, while stimulating the Subcortex acupoint can produce a calm and analgesic effect by modulating the excitement of autonomic nervous center and the inhibition process of the cerebral cortex and subcortex (Lin, 2019). The Liver and Spleen acupoints can disperse stagnated liver *qi* to promote bile flow, regulate *qi* activity, strengthen the spleen, and harmonize the stomach; it can also improve immune function (Lin, 2019). The combination of these acupoints can maintain the balance of *qi* and blood, strengthen the body's resistance to pathogens, improve organic immune function, tranquilize the mind, and relieve fatigue (Lin, 2019). The auricular acupoints for fatigue are illustrated in Figure 1 and the manual acupoints are illustrated in Figures 2, 3, and 4.

Figure 2

Manual Acupoint: Hegu



Note. Photo by author, 2021.

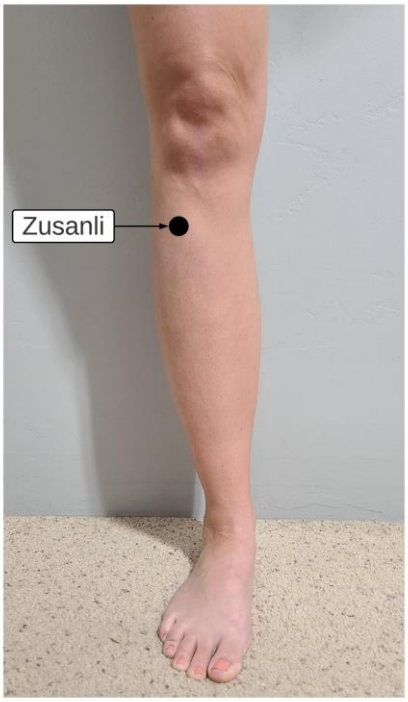
Figure 3

Manual Acupoint: Sanyinjiao

Note. Photo by author, 2021.

Figure 4

Manual Acupoint: Zusanli



Note. Photo by author, 2021.

For sleep disturbance, auricular acupressure is used at the Shen Men, Cardia, Anterior Lobe, and Occiput acupoints (Yoon & Park, 2019). Anatomically, the ear is connected to a branch of the vagus nerve. The Shen Men and Cardia acupoints have been shown to be effective for sleep and anxiety by calming the mind and relaxing the body; the Occiput and Anterior Lobe acupoints have been shown to be effective for sleep by stabilizing the autonomic nervous system and expanding the heart (Bang & Park, 2020). The acupoints for sleep disturbance is illustrated in Figure 1. A comprehensive list of each acupoint, the required type of acupressure, the targeted side effect, and the mechanism of action is located in Table 1.

Table 1

Acupoints and Their Purpose

Acupoint	Type of Acupressure	Side Effect	Mechanism
Point Zero	Auricular	Nausea & Vomiting	Encourages the stomach energy to flow downward ("Point zero," 2021).
Stomach	Auricular	Nausea & Vomiting	Balances the stomach *qi* and promotes an antiemetic function (Li et al., 2016).
Brainstem	Auricular	Nausea & Vomiting	Stimulates the vagus nerve to prevent nausea (Li et al., 2016).
Shen Men	Auricular	Nausea & Vomiting	Stimulates the autonomic nerve to relieve nausea and vomiting caused by the excitation of the vagus nerve (Li et al., 2016).
		Sleep disturbance	Calms the mind and relaxes the body (Bang & Park, 2020).
		Fatigue	Tranquilizes the mind and relieves fatigue (Lin, 2019).
Cardia	Auricular	Nausea & Vomiting	Stimulates the vagus nerve, thereby enhancing gastrointestinal motility and accelerating gastric

			emptying (NLM, NCT03120325).
		Sleep disturbance	Calms the mind and relaxes the body (Bang & Park, 2020).
Subcortex	Auricular	Nausea & Vomiting	Encourages the stomach energy to flow downward (“Point zero,” 2021).
		Fatigue	Produces a calm and analgesic effect by modulating the excitement of autonomic nervous center and the inhibition process of the cerebral cortex and subcortex (Lin, 2019).
		Constipation	Increases intestinal peristalsis, produces and distributes body fluids to moisten the intestine, increases blood flow, and regulates functions of the gastrointestinal system (Shin and Park, 2018).
Anterior lobe	Auricular	Sleep disturbance	Stabilizes the autonomic nervous system and expands the heart (Bang & Park, 2020).
Occiput	Auricular	Sleep disturbance	Stabilizes the autonomic nervous system and expands

			the heart (Bang & Park, 2020).
Hegu	Manual	Fatigue	Increases blood flow and stimulates endorphins, which are proteins that are natural pain relievers (Johannes, 2013).
Zusanli (ST36)	Manual	Fatigue	Increases the available energy of *qi* and blood, strengthening the body's defense against pathogens, and eliminating fatigue (Jia, 2020).
Sanyinjiao	Manual	Fatigue	Nourishes the spleen to help revive weakness of the organ, which helps cool the body, and increase energy (Pollock, 2017).
Liver	Auricular	Fatigue	Disperses stagnated liver *qi* to promote bile flow, regulates *qi* activity, strengthens the spleen and harmonizes the stomach; it can also improve immune function (Lin, 2019).
Spleen	Auricular	Fatigue	Disperses stagnated liver *qi* to promote bile flow, regulates *qi* activity, strengthen the spleen and harmonize the stomach; it can also improve immune function (Lin, 2019).

		Constipation	Increases intestinal peristalsis, produces and distributes body fluids to moisten the intestine, increases blood flow, and regulates functions of the gastrointestinal system (Shin and Park, 2018).
Large Intestine, Rectum, San Jiao, Lung, and Sympathetic	Auricular	Constipation	These points work together to relieve constipation by increasing intestinal peristalsis, producing and distributing body fluids to moisten the intestine, increasing blood flow, and regulating functions of the gastrointestinal system (Shin and Park, 2018).

Relevance to Nursing

The topic of this paper is relevant to nursing because nurses directly care for patients undergoing chemotherapy and they witness the detrimental effects of their treatment. This form of treatment is considered a clinical and comprehensive nursing intervention and has been recognized by the Federal Nursing Council as being "within the professional prowess of nurses" (Eghbali et al., 2016). Nurses can be trained in acupressure therapy in the oncology department. Acupressure therapy is non-pharmacological, non-invasive, cost effective and simple to learn. It does not require any additional supplies other than hands and ear seeds depending on the type of acupressure being performed (Khanghah et al., 2019). Nurses can be provided with a visual aid

such as a diagram of the body indicating where to locate an acupoint based on the side-effect being targeted. Acupressure is a type of touch therapy and touch is a powerful tool, especially in nursing. It can reduce anxiety and promote healing. The nurses can also teach their patients how to perform the treatment on themselves which reduces the need to visit their primary oncology care provider. Using acupressure can improve the quality of care, reduce side effects from invasive treatments such as chemotherapy, and increase patient satisfaction.

Summary

Cancer is one of the most common diseases in the world. Most treatment involves several sessions of intensive chemotherapy which causes many debilitating side effects such as fatigue, nausea and vomiting, constipation, and sleep disturbance. These side effects can also cause more problems for the patients if left untreated for a prolonged period of time. Acupressure is a type of integrative therapy that reduces or eliminates the unwanted side effects of chemotherapy treatment, without the use of additional medications. It is a safe, cost effective, and beneficial form of treatment for cancer patients undergoing chemotherapy.

CHAPTER TWO

Literature Review

Introduction

Chapter two will address a compilation of eight scientific literature articles representing the current findings regarding the practice of acupressure to relieve chemotherapy side effects on cancer patients undergoing chemotherapy. To guide the literature review, the PICOT question used was: “In cancer patients, how effective is acupressure therapy, compared to no therapy and other treatment options, in alleviating chemotherapy side effects?”. The initial search for literature for this thesis began through the PubMed and CINAHL databases between the years 2014 and 2020. The filter “nursing journals” was used on PubMed and “any author is a nurse” was used on CINAHL. The search included peer-reviewed journals and the keywords used during the literature selection process included “acupressure”, “chemotherapy”, “cancer”, and “side effects”. One systematic review and seven primary research articles were included in this review based on their ability to represent the current understanding of acupressure techniques for cancer patients undergoing chemotherapy. Articles discussing how acupressure effects nausea and vomiting, constipation, fatigue, and sleep disturbance were included in the review. Articles focused on acupuncture were excluded from the review. All the studies were either level I or II evidence. Literature contributing to this review was utilized in supporting the proposed best practice recommendations presented in chapter three.

Acupressure for Chemotherapy

The side effects of chemotherapy greatly affect the quality of life of cancer patients. The purpose of this literature review is to investigate the effectiveness of acupressure therapy on reducing the side effects of chemotherapy. This literature review will examine four of the most

common side effects of chemotherapy: nausea and vomiting, constipation, fatigue, and sleep disturbance. An increasing number of patients are seeking ways to relieve their symptoms without the use of drugs. Drugs can be very expensive, addictive, and cause many adverse effects. Acupressure is a form of complementary and alternative medicine that involves applying pressure to various points on the body, resulting in a reduction of symptoms and pain (Khanghah et al., 2019). Acupressure is beneficial because it is noninvasive, simple to perform, cost effective, and requires minimal equipment (Khanghah et al., 2019). Although acupressure has been proven to be effective in many ways, there is still a lack of practice in the clinical setting.

Literature Review Results

Effect of Auricular Acupressure on Nausea and Vomiting [x1]

The purpose of the crossover clinical trial by Eghbali et al. (2016) was to determine if auricular acupressure can relieve nausea and vomiting in breast cancer patients undergoing chemotherapy. Researchers recruited 48 breast cancer patients who were undergoing chemotherapy at two hospitals located in Iran (Eghbali et al., 2016). The participants were between the ages of 32 and 65 with the majority being married and housewives (Eghbali et al., 2016). Patients were recruited if they were older than 18, undergoing chemotherapy treatment, not taking antiemetics, and had not received any form of acupressure within three months prior to the study (Eghbali et al., 2016). After agreeing to participate in the study, participants were randomly assigned to either the experimental or control group, with 24 in each group, using a stratified randomized block design (Eghbali et al., 2016). The experimental group received standard drug treatment as well as auricular acupressure using vaccaria seeds in five auricular acupoints: the Brainstem, Stomach, Cardia, Shen Men, and Point Zero (Eghbali et al., 2016). The researchers instructed the participants in this group to gently press each point for three minutes at

least three times a day for five days after their first course of chemotherapy (Eghbali et al., 2016). During those five days, the participants filled out a Morrow questionnaire about their level of nausea and vomiting (Eghbali et al., 2016). Then, the experimental and control groups switched after the second cycle of chemotherapy (Eghbali et al., 2016). Data was collected using a two-part questionnaire; the first part gathered demographic and chemotherapy-related data and the second part evaluated nausea and vomiting (Eghbali et al., 2016). A seven-degree Likert scale was used in this questionnaire, where zero indicates “none” and six indicates “unbearable” (Eghbali et al., 2016).

The researchers found that both the intensity and frequency of acute and delayed phases of nausea and vomiting in the experimental group were significantly lower ($p < 0.001$) than the control group (Eghbali et al., 2016). This indicates that auricular acupressure has a positive influence on chemotherapy-related nausea and vomiting. Inferential and descriptive statistics were used to analyze the data (Eghbali et al., 2016). The use of a control group and randomization strengthen the credibility of the results; however, some limitations of the study are the small sample size, lack of cancer diversity, and short experimental duration. The design of this study designates it as Level II evidence.

Effect of Auricular Acupressure on Constipation [x1]

The randomized controlled study by Shin & Park (2018) examines the effects of auricular acupressure in breast cancer patients undergoing chemotherapy who are experiencing constipation. A total of 52 participants completed the study with 26 participants in each group; researchers used G*Power, a power analysis tool, to determine the sample size with an effect size of 0.8 (Shin & Park, 2018). Patients who agreed to participate in the study were randomized into two groups of equal size using a random sequence of numbers generated by a computer

(Shin & Park, 2018). The participants were patients with breast cancer stages one through three, who received chemotherapy at E General Hospital in Seoul, South Korea (Shin & Park, 2018). Patients were recruited if they were over the age of 19, experienced constipation after chemotherapy, received a score of more than four points on the CAS, were free of lesions in the intestine, did not have abdominal operations within six months of the initiation of the study, and did not wear a hearing aid (Shin & Park, 2018). The experimental group received auricular acupressure therapy, where vaccaria seeds were applied to seven acupoints on one ear: Large Intestine, Spleen, Lung, Rectum, Subcortex, Sympathetic, and San Jiao, for six weeks (Shin & Park, 2018). The control group did not receive any form of intervention and continued to have their usual care. The researchers hypothesized that the experimental group would score lower on CAS and PAC-QOL, and higher on the BSF scale than the control group (Shin & Park, 2018). Data was collected using the Constipation Assessment Scale (CAS), Patient Assessment of Constipation-Quality of Life (PAC-QOL), and Bristol Stool Form (BSF) scale (Shin & Park, 2018). The CAS is used to measure the severity of constipation with a score ranging from zero to 16; the severity increases as the score increases (Shin & Park, 2018). The PAC-QOL scale is used to measure how constipation affects daily life with a score ranging from zero to five; the lower the score, the better the quality of life (Shin & Park, 2018). Lastly, the BSF scale is used to measure the form of the stool with a score ranging from one to seven points; a score of one to two indicates constipation, three to four indicates normal stool, and five to seven indicates diarrhea (Shin & Park, 2018).

The researchers found that the experimental group scores were significantly lower ($p < 0.001$) on the CAS and PAC-QOL and significantly higher on the BSF scale ($p = 0.003$) than the control group (Shin & Park, 2018). This indicates that auricular acupressure has a positive

influence on constipation, stool-form, and quality of life. Strengths of this study are the use of random sampling, a power analysis, good internal consistency of measurement instruments, and the confirmation of the placement of vaccaria seeds by acupressure experts. Limitations of the research are the small sample size, lack of ethnic diversity, and lack of cancer variety. The design of this study designates it as Level II evidence.

Effects of Auricular and Manual Acupressure on Fatigue [x3]

By using a randomized controlled trial design, the study by Khanghah et al. (2019) aims to evaluate the effects of acupressure on fatigue in cancer patients who underwent chemotherapy. The researchers purposely recruited and screened cancer patients who underwent chemotherapy in the hematology ward of Razi Referral Center in Rasht, Northern Iran using the convenience sampling method (Khanghah et al., 2019). A total of 90 participants completed the study; they were randomly assigned to either the intervention group, placebo group, or the control group, with 30 participants in each group (Khanghah et al., 2019). Researchers used power analysis to determine sample size with an effect size of 0.84 (Khanghah et al., 2019). Participants were recruited if they had any cancer of second stage or higher, were at least 25 years old, did not have ulcers in pressure points, and had a moderate or higher level of fatigue (Khanghah et al., 2019). Most participants were male, married, with elementary level education and gastrointestinal cancer (Khanghah et al., 2019). The intervention group received acupressure therapy by a certified acupressure practitioner at three acupoints: the Zusanli, Sanyinjiao, and Hegu (Khanghah et al., 2019). Pressure was applied and gradually increased at these points for two minutes after a session of chemotherapy was initiated and when it ended (Khanghah et al., 2019). The placebo group received sham acupressure where pressure was applied one and a half centimeters from the true acupoints, locations where no acupoints related to fatigue exist (Khanghah et al., 2019). The

control group did not receive any intervention or additional treatment. Data was collected using two standard questionnaires, including the Visual Analogue Scale (VAS), as well as demographic data (Khanghah et al., 2019). The VAS measures the severity of fatigue on a scale from zero to 10, where zero indicates no fatigue and 10 indicates maximum fatigue (Khanghah et al., 2019). In all groups, the severity of fatigue was recorded before, during, and after chemotherapy (Khanghah et al., 2019).

This study found that the intervention group scored significantly lower on the VAS ($p = 0.028$) than the control group after chemotherapy (Khanghah et al., 2019). The researchers concluded that acupressure is effective in reducing fatigue in patients undergoing chemotherapy (Khanghah et al., 2019). The strengths of the study are the randomized controlled design, the use of power analysis, and the variety of cancers included. Some limitations of the study include the use of VAS to measure fatigue, due to the large number of factors that could influence scores, and the small sample size. The design of this study designates it as Level II evidence.

The experimental pilot study by Tang et al. (2014) investigated the effects of acupressure therapy on fatigue in patients undergoing chemotherapy for lung cancer treatment. Patients were recruited from pulmonary wards at a medical center in northern Taiwan from July 2008 to August 2010. To participate in the study, the patients had to meet the following inclusion criteria: they must be receiving conventional chemotherapy, not have an infection, no injury or ulcers around the acupoints, not taking antidepressants or suffering from a psychiatric disorder, over the age of 18, never participated in acupressure therapy nor any fatigue-related intervention, and willing to learn acupressure and apply it at home (Tang et al., 2014). A total of 57 patients participated in the study and were randomly assigned to one of three groups by flipping a coin twice. If the coin landed on heads twice, they were assigned to the acupressure with essential oils group (Group A)

(n = 17); if the coin landed on two different sides, they were assigned to the acupressure only group (Group B) (n = 24); if the coin landed on tails twice, they were assigned to the sham acupressure group (Group C) (n = 16) (Tang et al., 2014). For groups A and B, the acupoints that were targeted were Hegu (LI4), which is associated with channels of the large intestine; Zusanli (ST36), which is associated with the stomach; and Sanyinjiao (SP6), which is associated with the three Ying channels of the spleen, liver, and kidneys. For group C, the sham acupoints that were used were the first metacarpal head, the patella, and the inner ankle (Tang et al., 2014). Each participant received acupressure once every morning for five months, with each acupoint pressed for one minute; each participant spent a total of six minutes performing acupressure on themselves because acupoints are symmetrically distributed on both sides of the body. The participants were instructed on how to self-administer acupressure from one of two RAs who were nursing graduate students trained in acupoint identification and acupressure skills by qualified TCM practitioners (Tang et al., 2014). During the teaching process, participants were given a researcher-designed handbook, which included an acupoint map and acupressure methods; their learning effectiveness was later tested by having them repeat what they were taught. Along with the experimental acupressure therapy, group A also received a five percent essential oil compound that consisted of fir needle, Scotch pine, tea tree, sandalwood, peppermint, and cinnamon leaf, which has been proved to be effective in reducing fatigue and improving immunity by the Therapeutic Goods Administration of Australia (Tang et al., 2014). Essential oils stimulate endogenous endorphins in the body when they enter the body through breathing or bathing. These endorphins “release stress, enhance balance between the endocrine and nervous systems, and lower tension” (Tang et al., 2014). To determine the effects of the acupressure therapy intervention, researchers measured fatigue, functional status, anxiety, depression, and sleep quality before the first session of chemotherapy

was initiated (T0), on the first day of their third session (T1), and on the first day of their sixth session (T2). Fatigue was measured using the Tang Fatigue Rating Scale (TFRS), functional status was measured using the Eastern Cooperative Oncology Group Performance Status Rating (ECOG-PSR), anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS), and sleep quality was measuring using the Pittsburgh Sleep Quality Index (PSQI) (Tang et al., 2014).

The researchers found that participants in groups A and B showed a decrease in fatigue related to daily living activities and increased functional status, but also significantly improved sleep quality, than those in group C (Tang et al., 2014). Groups A and B had lower HADS scores, however, these differences were not significant. After controlling for baseline outcome values, age, and adherence to acupressure, participants in group A had significantly less fatigue in daily living activities and better sleep quality than group C at T1 and T2. Participants in groups A and B had better functional status than group C at T1 (Tang et al., 2014). The results of this study suggest that acupressure with or without the use of essential oils can help reduce cancer-related fatigue, improve sleep quality, and increase activity levels in patients undergoing chemotherapy.

This study had several limitations. The first limitation was the small sample size of 57 participants, which made it more difficult to detect the effectiveness of the acupressure intervention. The second limitation was the lack of generalizability due to only focusing on lung cancer patients receiving chemotherapy. Future studies need to involve different types of cancer and different types of cancer treatments. The third limitation was the short data collection window; data was only collected 30 minutes after acupressure was done, therefore, the duration of the response is unknown. Lastly, researchers failed to maintain a double-blind study because

participants could have guessed which group they were in based on the use of essential oils; in future studies, researchers should include a fourth group, which would receive sham acupressure with essential oils. Although this study had several limitations, it also had strengths such as the use of randomization and follow-ups for adherence. In addition, future research is needed to determine the effects of various factors such as duration of intervention, the type of pressure technique, and the number of acupoints. The design of this study designates it as Level II evidence.

The randomized controlled trial by Lin et al. (2019) evaluated the effect of auricular acupressure (AA) on cancer-related fatigue (CRF), sleep disturbance and anxiety in lung cancer patients undergoing chemotherapy. Patients were recruited from the Departments of Respiration at a general teaching hospital in Suzhou, China (Lin et al., 2019). To participate in the study, the patients had to meet the following inclusion criteria: must be between the age of 18 and 75, receiving chemotherapy, met CRF diagnostic standards, skin is intact at acupoints, never participated in AA before, not cognitively impaired, and were willing to participate in the study (Lin et al., 2019). A total of 100 patients participated in the study and were randomly assigned to one of three groups using computer-generated numbers. Participants in group A (n=34) received AA using vaccaria seeds, group B (n=32) received AA using magnetic beads, and group C (n=34) received routine care (Lin et al., 2019). Groups A and B received AA at five acupoints: the Lung, Shen Men, Subcortex, Liver, and Spleen (Lin et al., 2019). The skin was prepared with 75% alcohol and a piece of tape was placed over the vaccaria seeds on the selected acupoint. The vaccaria seeds were pressed until the patient reported a slight pain, then pressure was continued for 20 to 30 seconds; this was repeated for each acupoint four to six times per session, five sessions per day (Lin et al., 2019). The tape was replaced every three days. The patients in

groups A and B were taught how to self-administer AA on the first day of hospitalization for chemotherapy and were provided with handouts such as acupoint maps and AA methods; their effectiveness of teaching was evaluated using the teach-back method/demonstration (Lin et al., 2019). After discharge, regular telephone follow-up and home visits were made to patients in all three groups to enhance adherence. The study was completed after all patients received three rounds of chemotherapy. CRF was measured using the Cancer Fatigue Scale; the higher the score, the more serious the level of fatigue (Lin et al., 2019). The Pittsburgh Sleep Quality Index (PSQI) was used to measure sleep quality and quantity and the Self-rating Anxiety Scale (SAS) was used to measure the extent of anxiety (Lin et al., 2019).

The researchers found that AA, particularly AA using the seeds, had a statistically significant effect on reducing physical CRF in lung cancer patients undergoing chemotherapy (Lin et al., 2019). Compared with the control group, group C, the outcome scores of fatigue in group A ($p=0.01$) were significantly lower than that of group B ($p=0.04$) (Lin et al., 2019). Sleep quality in groups A ($p=0.01$) and B ($p=<0.01$) also statistically improved compared to group C ($p=0.11$) (Lin et al., 2019). They also found that only AA using vaccaria seeds can alleviate anxiety. AA using vaccaria seeds showed a larger effect on reducing physical fatigue than AA using magnetic beads (Lin et al., 2019). There were no adverse events associated with AA throughout the entire intervention. The results of this study suggest that auricular acupressure with either vaccaria seeds or magnetic beads can help reduce cancer-related fatigue, improve sleep quality, and decrease anxiety in patients undergoing chemotherapy.

This study had a few limitations. The first limitation was that researchers did not include follow-up assessments beyond nine weeks postbaseline; therefore, the long-term effects of this intervention are unknown. The second limitation was the randomization technique; the control

group should have had sham acupressure for the effective patient blinding because of patients' willingness to receive it. The third limitation was the small sample size of 100 participants, which made it more difficult to determine the effectiveness of the intervention. The study also had several strengths including randomization, a control group, and the comparison of two different forms of auricular acupressure application. For future research, researchers should explore the long-term effects of auricular acupressure and determine if there is a difference between using vaccaria seeds versus magnetic beads when trying to alleviate other chemotherapy-induced side effects.

Effects of Auricular Acupressure and Manual Acupressure on Sleep Disturbance [x2]

With this single-blind randomized controlled study, Yoon & Park (2019) sought to investigate the effects of auricular acupressure therapy on sleep quality in patients with breast cancer who received chemotherapy. Although 72 participants were recruited, a total of 41 participants completed the study due to not meeting inclusion criteria and dropping out of the study (Yoon & Park, 2019). Participants were between the ages of 19 and 65 with breast cancer who underwent chemotherapy, received a score of eight or more on the Insomnia Severity Index (ISI), and were not taking sleeping pills or antidepressant drugs from Ewha Womans University Hospital in Seoul, South Korea (Yoon & Park, 2019). The participants were randomly assigned to either the experimental or control group using stratified, block randomization; the experimental group had 20 and the control had 21 participants (Yoon & Park, 2019). The experimental group received auricular acupressure, where vaccaria seeds were placed in four acupoints on one ear: the Cardia, Occiput, Anterior Lobe, and Shen Men, while the control group had the seeds placed in four acupoints on the Helix, acupoints not used to treat sleep disturbances, to maintain single blindness (Yoon & Park, 2019). The instruments used in this

study were blood tests, Fitbit trackers, and the Korean version of the Pittsburgh Sleep Quality Index (PSQI-K) (Yoon & Park, 2019). The PSQI-K assessed sleep quality and quantity using patient responses to 19 questions that addressed seven topics: sleep disturbance, subjective sleep quality, use of sleep medication, sleep duration, habitual sleep efficiency, sleep latency, and daytime dysfunction (Yoon & Park, 2019). The Fitbit trackers were worn at the time of admission, then removed after 24 hours, and were used to assess sleep quality and quantity after the intervention; they measured total sleep time, sleep efficiency, sleep latency, and the number of awakenings during sleep (Yoon & Park, 2019). The blood tests measured IL-6, TNF-alpha, cortisol, and C-reactive protein (CRP) values to further analyze sleep quality (Yoon & Park, 2019).

After the collected data was statistically analyzed using SPSS WIN 23.0, the researchers found that the quality of sleep was statistically significant between the experimental and control groups ($p = 0.048$) and that there was a significant difference in IL-6 ($p = 0.002$) and TNF-alpha ($p = 0.029$) values (Yoon & Park, 2019). The researchers also found no significant differences in total sleep time, efficiency, latency, or number of awakenings during sleep as well as no significant differences in cortisol and CRP values (Yoon & Park, 2019). Although the findings indicate auricular acupressure does not increase the amount of sleep, it does indicate improvement of sleep quality. Aspects of the study that enhance its credibility are the randomized controlled design, and the use of valid and reliable instruments for data collection and analysis. Conversely, some weaknesses of the study are the high attrition rate, small sample size, lack of ethnic diversity, and lack of cancer variety. The design of this study designates it as Level II evidence.

The systematic review by Liu et al. (2020) analyzed and synthesized current evidence for the effects of somatic acupoint stimulation (SAS) on cancer-related sleep disturbance in adults with cancer. Researchers used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist to determine the requirements and systematic process for the review (Liu et al., 2020). A total of nine databases and four clinical trial registries were used to identify potential articles and registered trials from their inception to July of 2019 (Liu et al., 2020). The methodological quality of the included studies and their extracted data was independently appraised by two authors. The included studies could not be subjected to meta-analysis due to the variations in SAS intervention protocols and outcome measurement instruments. All studies were randomized controlled trials and the participants were adult patients with cancer reporting sleep disturbances regardless of types or stages of cancer or previous cancer treatments (Liu et al., 2020). The interventions used were manual acupuncture or manual acupressure on specific acupoints and the interventions were performed or taught by acupuncture practitioners, Chinese medicine practitioners, or other healthcare providers (Liu et al., 2020). The control groups received routine treatment or sham SAS. The primary outcomes were cancer-related sleep disturbance and sleep quality measured by any validated tool and self-reported hours of sleep and sleep efficiency, determined by the ration of the total sleep time to the time spent in bed (Liu et al., 2020). The secondary outcomes were quality of life, satisfaction with SAS, safety of SAS, including any adverse events, such as dizziness and local bleeding, the number of participants dropping out due to adverse events, and the cost-effectiveness of SAS (Liu et al., 2020).

A total of seven studies were chosen, with a combined total of 906 cancer patients (Liu et al., 2020). The SAS protocols varied across the trials without an optimal evidence-based standard

intervention protocol to manage cancer-related sleep disturbance. The Sanyinjiao (SP6) acupoint was the most commonly used acupoint (Liu et al., 2020). Manual acupuncture typically lasted 15–30 min and was performed once a day or once a week for one to five weeks, whereas self-administered acupressure typically lasted one to three minutes per point and was performed once a day, such as before going to bed, for one to five months (Liu et al., 2020).

The results of the review indicate that SAS could potentially relieve cancer-related sleep disturbance and improve quality of life. Some mild adverse effects were reported in three of the included studies, however, none of them conducted a causality analysis to explain the association between the reported adverse events and the intervention. This systematic review showed that SAS is a useful modality for relieving cancer-related sleep disturbance, however, research evidence has not been fully conclusive due to the limited number of existing clinical studies with relatively small sample size and suboptimal methodological quality. Future research is needed with larger sample sizes and higher quality methodology. The design of this study designates it as Level I evidence.

Effect of Auricular Acupressure for Multiple Side Effects [x1]

The quasi-randomized controlled trial by Tsao & Creedy (2019) examines the effects of auricular acupressure in women with ovarian cancer undergoing chemotherapy. A total of 65 patients participated in the study with 31 in the control group and 34 in the intervention group; researchers calculated the sample size of a minimum of 58 participants, assuming a 20% drop-out rate, to give 80% power and an alpha of 0.05 level to detect any difference between groups and based it on a 1.5-point difference between baseline and post-treatment insomnia as measured by the Pittsburgh Sleep Quality Index (PSQI) using preliminary results from a previous study they completed (Tsao & Creedy, 2019). The participants were patients with ovarian cancer

stages one through three, who received chemotherapy at a publicly-funded hospital in southern Taiwan (Tsao & Creedy, 2019). Patients were recruited if they were at least 18 years old, receiving chemotherapy as treatment for ovarian cancer, had no history of sleep, neurologic, or psychiatric disorders, could communicate independently, and willing to comply with study-related procedures (Tsao & Creedy, 2019). Patients with evidence of metastases at the time of diagnosis, cognitive impairment, or allergy to the tape used to affix the auricular acupressure seeds on the outer ear were excluded from the study (Tsao & Creedy, 2019). The control group received routine nursing care while the experimental group received auricular acupressure therapy, where vaccaria seeds were applied to four acupoints on the ear: Shen Men, Subcortex, Endocrine, and Cardia, three times a day for three minutes each time, for six weeks (Tsao & Creedy, 2019). Each acupoint targets a different symptom; the "Shen Men (TF4)" point is considered the primary point for pain reduction, however, it also alleviates apprehension, fear anxiety, and helps regulate the sympathetic nervous system; the "Subcortex (AT4)" point represents the whole diencephalon and is the highest level of the supra-spinal gate control system, however, it can also be used for most pain disorders and reduce neurasthenia such as headache, dizziness, fatigue, insomnia and poor concentration; the "Endocrine (CO18)" point achieves appropriate homeostatic levels of endocrine hormones, and has anti-allergic and anti-inflammatory effects; the "Cardia (CO15)" point can have a depressing and immediate effect on cardiac function (Tsao & Creedy, 2019). Data was collected at four time points using the M. D. Anderson Symptom Inventory (MDASI) (Tsao & Creedy, 2019). The MDASI contains 13 symptom items (i.e. pain, fatigue, nausea, sleep disturbance, distress, shortness of breath, trouble remembering, loss of appetite, drowsiness, dry mouth, sadness, vomiting, and tingling), and 6 interference items (i.e., general activity, mood, work, relations with others, walking, and

enjoyment of life) (Tsao & Creedy, 2019). All items are rated on a zero-to-ten numerical scale, with zero meaning “not present” and ten meaning “as bad as you can imagine” (Tsao & Creedy, 2019).

The researchers found that the experimental group experienced reduced side effects such as disturbed sleep ($t = -11.99$; $p < 0.001$, Eta Squared = 0.69), fatigue ($t = -2.57$; $p < 0.01$, Eta Squared = 0.10), and lack of appetite ($t = -2.37$; $p = 0.024$, Eta Squared = 0.08) (Tsao & Creedy, 2019). This indicates that auricular acupressure can reduce side effects of chemotherapy in patients with ovarian cancer. Strengths of this study are the use of random sampling, a power analysis, consistency of treatment, and the confirmation of the placement of vaccaria seeds by trained nurses. Limitations of the research are the small sample size, lack of ethnic diversity, and lack of cancer variety. The design of this study designates it as Level II evidence.

Conclusion

This literature review examined the effects of acupressure therapy on chemotherapy side effects. The findings show that using acupressure, either on its own or in addition to standard treatments, can help relieve constipation, improve sleep quality, decrease fatigue, and reduce nausea and vomiting. There was no evidence of acupressure worsening symptoms or causing significant adverse reactions.

Further research is needed to investigate the long-term effects of acupressure on chemotherapy side effects. The studies’ interventions were no longer than five months. In addition, researchers need to evaluate the effectiveness of acupressure on a wider variety of cancers and ethnicities. These studies only used participants from Korea, China, Taiwan, and Iran. The expansion of ethnicities will determine if there are any ethnic limitations to this form of alternative therapy. Lastly, this form of therapy needs to be evaluated in patients under 18 years

of age. Acupressure is an easy and safe way to implement therapeutic techniques and non-pharmacological interventions into nursing practice. Nurses strive to treat symptoms and relieve pain with the minimal pharmacological intervention. It is also very cost effective due to minimal need for materials. Given the relative safety as well as significant physical and mental benefits that have been established, healthcare providers should encourage cancer patients undergoing chemotherapy to try acupressure therapy as a form of complementary and alternative medicine to treat a wide range of chemotherapy-related side effects.

CHAPTER THREE

Best Practice Recommendations

Introduction

The purpose of this thesis was to develop evidence-based best practice recommendations for nurses and other healthcare providers to use as treatment for cancer patients experiencing chemotherapy-related side effects. These recommendations are presented in Table 2, along with the levels of evidence to each supporting article. Each intervention is based on the type of acupressure required for each chemotherapy side effect being targeted.

The literature review in the previous chapter provided specific evidence supporting the use of acupressure to address various common side effects experienced by patients undergoing chemotherapy treatment. The healthcare provider providing the acupressure therapy must be certified to conduct the sessions and ensure the practice is safe and effective. The framework for implementation of these recommendations is described as the six principles of integrative nursing. Principle five is integral to nursing practice in the administration of therapeutics including acupressure. The six principles of integrative nursing are illustrated in Figure 5.

Figure 5

The Six Principles of Integrative Nursing

Note. Adapted from *Integrative Nursing* (2nd ed.), by M. Koithan, 2018, Oxford University Press. Copyright 2018 by Mary Koithan.

The fifth principle of integrative nursing describes how nursing interventions are structured to begin with the most noninvasive treatments, such as those with the fewest side effects or greatest potential to alter the body, mind, and spirit of the recipient. It outlines a tiered approach to symptom management that is informed by evidence and progresses from least to most invasive. Every integrative nursing intervention falls into at least one of five tiers. Tier 1 is described as self-care with minimal healthcare provider interaction. Tier 2 is mostly self-care, but it might require some healthcare provider interaction. Tier 3 calls for some healthcare provider interaction. Tier 4 has limited evidence and requires healthcare provider interaction. Tier 5 requires healthcare provider interaction. If there is a lack of response to an intervention in the first tier, interventions move systematically down the ladder until the desired response is achieved (Kreitzer, Koithan, Cutshall & VanGetson, 2018). Table 2 outlines how the type of symptoms a patient experiences indicates which tier they fall into and thus which interventions are indicated. Acupressure can fall into one or multiple tiers depending on the chemotherapy-related symptom.

Table 2

Side Effect Symptom Descriptions for Indication of Acupressure Intervention

Side Effect	Tier	Symptoms	Citation
Nausea & Vomiting	2 & 3	For tier 2: ● Increase in heart rate ● Increase in perspiration ● Mild-moderate nausea ● Mild anxiety ● Decreased willingness to participate in activities For tier 3: ● Moderate nausea	Cutshall, S. & VanGetson, L. (2018). Integrative Nursing Management of Nausea. In M. J. Kreitzer & M. Koithan (Eds.), *Integrative nursing*. Oxford University Press. https://doi.org/10.109

		● Moderate anxiety ● Decreased ability to maintain nutritional status	3/med/9780190851040.003.0014
Constipation	3	● Moderate abdominal pain ● Nausea ● Abdominal distention ● Urge but inability to pass stool ● Dyssynergic defecation ● Hypoactive bowel sounds ● Fatigue	Lacasse, C. & Mueller, K. (2018). Integrative Nursing Management of Intestinal Disturbances. In M. J. Kreitzer & M. Koithan (Eds.), *Integrative nursing*. Oxford University Press. https://doi.org/10.1093/med/9780190851040.003.0017
Fatigue	3	● Mood disturbances ● Moderate fatigue (rating 4-6 on 1-10 fatigue scale) ● Decreased motivation or interest in usual activities ● Muscle weakness ● Difficulty concentrating ● drowsiness/ daytime somnolence ● Cognitive impairment (mild) ● Report of one to two unrelieved symptoms rated at moderate level	Drake, D. (2018). Integrative Nursing Management of Fatigue. In M . J. Kreitzer & M. Koithan (Eds.), *Integrative nursing*. Oxford University Press. https://doi.org/10.1093/med/9780190851040.003.0019
Sleep Disturbance	3	● Mood disturbances ● Difficulty occurs despite adequate opportunity for sleep ● Decreased motivation or interest in usual activities	Cuellar, N. (2018). Integrative Nursing Management of Sleep. In M. J. Kreitzer & M. Koithan (Eds.), *Integrative nursing*. Oxford University

			Press. https://doi.org/10.1093/med/9780190851040.003.0015

Patient Assessment and Contraindications

To determine whether a patient qualifies for acupressure treatment, the nurse must first assess the patient for their symptoms. To assess nausea and vomiting and constipation, the acronym "OLDCARTS" can be used to systematically assess the physiological components of the side effects; the acronym "OLDCARTS" stands for onset, location, duration, characteristics, aggravating factors, relieving factors, treatment, and severity (Kreitzer, Koithan, Cutshall & VanGetson, 2018). To assess fatigue, the nurse can use several assessment tools, such as the Fatigue Severity Scale, Fatigue Assessment Inventory, or the Piper Fatigue Scale (Kreitzer, Koithan & Drake, 2018). To assess sleep disturbance, the nurse can use the "BEARS" instrument; the acronym "BEARS" stands for bedtimes problems, excessive sleepiness, awakenings, regularity of sleep, and sleep-disordered breathing (Kreitzer, Koithan & Cuellar, 2018).

Most patients qualify for this treatment, however, there are a few circumstances where deep tissue work such as manual acupressure may need to be avoided. According to Dr. Wheeler, acupressure is contraindicated for patients with spinal cord injuries, rheumatoid arthritis, a bone disease that could be made worse by physical manipulation, varicose veins, if they are pregnant (certain points may induce contractions), if the treatment is applied in an area of the body that contains a cancerous tumor, or if the cancer has spread to the bones (Wheeler, 2019).

After evaluating the patient and determining whether the patient is an appropriate candidate for acupressure treatment, the nurse can use the following best practice

recommendations based on the type of side effect being targeted. Table 3 outlines which type of acupressure technique is recommended for each side effect, which acupoints are stimulated, how to perform each technique, and how long the intervention must be performed to be effective.

Table 3

Best Practice Recommendations for Acupressure for Chemotherapy

Recommendation	Rationale	References	Level of Evidence
Cancer patients undergoing chemotherapy are good candidates for acupressure therapy	Acupressure is non-invasive, self-managing, and inexpensive.	Tsao, Y. & Creedy, D.K. (2019). Auricular acupressure: reducing side effects of chemotherapy in women with ovarian cancer. *Support Care Cancer, 2*7, 4155–4163. https://doi.org/10.1007/s00520-019-04682-8	Level II
	Auricular therapy is a safe and easy-to apply intervention that can be used in clinical practice, especially since few side effects have been reported while some study participants reported no side effects at all.	Yoon, H. G. & Park, H. (2019). The effect of auricular acupressure on sleep in breast cancer patients undergoing chemotherapy: A single-blind, randomized controlled trial. *Applied Nursing Research*, (48), 45-51. https://doi.org/10.1016/j.apnr.2019.05.009	Level II
Auricular acupressure can be used for nausea and vomiting	The researchers found that both the intensity and frequency of	Eghbali, M., Yekaninejad, M. S., Varaei, S., Jalalinia,	Level II

	acute and delayed phases of nausea and vomiting in the experimental group were significantly lower ($p < 0.001$) than the control group.	S. F., Samimi, M. A., & Sa'atchi, K. (2016). The effect of auricular acupressure on nausea and vomiting caused by chemotherapy among breast cancer patients. *Complementary Therapies in Clinical Practice*, (24), 189-194. https://doi.org/10.1016/j.ctcp.2016.06.006	
	Apply ear seeds to Point Zero, Stomach, Brainstem, Shen Men, Cardia, and Subcortex acupoints on one ear 30 minutes before the first session of chemotherapy. Apply gentle pressure to each acupoint for three minutes three times per day (in the morning, at noon, and in the evening). Remove the ear seeds after five days and apply new seeds to the same acupoints on the other ear. Continue to alternate ears until chemotherapy treatment is completed.	Eghbali, M., Yekaninejad, M. S., Varaei, S., Jalalinia, S. F., Samimi, M. A., & Sa'atchi, K. (2016). The effect of auricular acupressure on nausea and vomiting caused by chemotherapy among breast cancer patients. *Complementary Therapies in Clinical Practice*, (24), 189-194. https://doi.org/10.1016/j.ctcp.2016.06.006	Level II
Auricular acupressure can be used for constipation	The researchers found that the experimental group scores were significantly lower (p	Shin, J. & Park, H. (2018). Effects of auricular acupressure on constipation in	Level II

	< 0.001) on the CAS and PAC-QOL and significantly higher on the BSF scale (p = 0.003) than the control group. This indicates that auricular acupressure has a positive influence on constipation, stool-form, and quality of life.	patients with breast cancer receiving chemotherapy: A randomized control trial. *Western Journal of Nursing Research*, 40(1), 67-83. https://doi.org/10.1177/0193945916680362	
	Apply ear seeds to Large Intestine, Rectum, San Jiao, Spleen, Lung, Sympathetic, and Subcortex acupoints on one ear 30 minutes before the first session of chemotherapy. Apply gentle pressure to each acupoint for one minute, three times per day (in the morning, at noon, and in the evening). Remove ear seeds after five days and apply new seeds to the same acupoints on the other ear. Continue to alternate ears until chemotherapy treatment is completed.	Shin, J. & Park, H. (2018). Effects of auricular acupressure on constipation in patients with breast cancer receiving chemotherapy: A randomized control trial. *Western Journal of Nursing Research*, 40(1), 67-83. https://doi.org/10.1177/0193945916680362	Level II
Either manual or auricular acupressure can be used for physical fatigue	The researchers found that auricular acupressure, particularly using	Lin, L., Zhang, Y., Qian, H. Y., Xu, J. L., Xie, C. Y., Dong, B., & Tian, L. (2019).	Level II

	vaccaria seeds, had a statistically significant effect on reducing physical chemotherapy-related fatigue in lung cancer patients undergoing chemotherapy. Compared with the control group, group C, the outcome scores of fatigue in group A (p=0.01) were significantly lower than that of group B (p=0.04).	Auricular acupressure for cancer-related fatigue during lung cancer chemotherapy: a randomized trial. *BMJ Supportive & Palliative Care*, (0), 1-8. https://doi.org/10.1136/bmjspcare-2019-001937	
	The researchers found that participants in groups A and B showed a decrease in fatigue related to daily living activities and increased functional status, but also significantly improved sleep quality, than those in group C. For group A at T1, the adjusted PSQI score changed significantly less than that of group C by 3.00 (p = 0.048) and for group B at T2, the mean PSQI changed significantly less than that of group C by 2.25 (p = 0.040).	Tang, W. R., Chen, W. J., Yu, C. T., Chang, Y. C., Chen, C. M., Wang, C. H., & Yang, S. H. (2014). Effects of acupressure on fatigue of lung cancer patients undergoing chemotherapy: an experimental pilot study. *Complementary Therapies in Medicine*, (*22*), 581-591. https://doi.org/10.1016/j.ctim.2014.05.006	Level II
	This study found that the intervention group scored significantly	Khanghah, A. G., Rizi, M. S., Nabi, B. N., Adib, M., & Leili,	Level II

	lower on the VAS (p = 0.028) than the control group after chemotherapy. The researchers concluded that acupressure is effective in reducing fatigue in patients undergoing chemotherapy.	E. K. (2019). Effects of acupressure on fatigue in patients with cancer who underwent chemotherapy. *Journal of Acupuncture and Meridian Studies*, 12(4), 103-110. https://doi.org/10.1016/j.jams.2019.07.003	
	The researchers found that the experimental group experienced reduced side effects such as fatigue (t = -2.57; p < 0.01, Eta Squared = 0.10).	Tsao, Y. & Creedy, D. K. (2019). Auricular acupressure: reducing side effects of chemotherapy in women with ovarian cancer. *Supportive Care in Cancer*, *27*(11), 4155-4163. https://doi.org/10.1007/s00520-019-04682-8	Level II
	For manual acupressure, apply gentle pressure with fingers to Hegu, Zusanli, and Sanyinjiao for two minutes immediately after the start and end of each session of chemotherapy treatment. Apply pressure to each acupoint on both sides of the body/symmetrically, gradually increasing	Khanghah, A. G., Rizi, M. S., Nabi, B. N., Adib, M., & Leili, E. K. (2019). Effects of acupressure on fatigue in patients with cancer who underwent chemotherapy. *Journal of Acupuncture and Meridian Studies*, 12(4), 103-110. https://doi.org/10.1016/j.jams.2019.07.003	Level II

	the pressure until the sensation of soreness is experienced.		
	For auricular acupressure, apply ear seeds to Shen Men, Subcortex, Liver, and Spleen acupoints on one ear 30 minutes before the first session of chemotherapy. Apply gentle pressure to each acupoint for 30 seconds five times per day (in the morning, after each meal, and before bedtime). Remove the ear seeds after three days and apply new seeds on the same acupoints on the other ear. Continue to alternate ears until chemotherapy treatment is completed.	Lin, L., Zhang, Y., Qian, H. Y., Xu, J. L., Xie, C. Y., Dong, B., & Tian, L. (2019). Auricular acupressure for cancer-related fatigue during lung cancer chemotherapy: a randomized trial. *BMJ Supportive & Palliative Care*, (0), 1-8. https://doi.org/10.1136/bmjspcare-2019-001937	Level II
Auricular acupressure can be used for sleep disturbance	Auricular therapy using vaccaria seeds effectively reduced cytokine levels and improvements in sleep quality were similar to those acquired using auricular acupuncture.	Yoon, H. G. & Park, H. (2019). The effect of auricular acupressure on sleep in breast cancer patients undergoing chemotherapy: A single-blind, randomized controlled trial. *Applied Nursing Research*, (48), 45-51.	Level II

		https://doi.org/10.1016/j.apnr.2019.05.009	
	The researchers found that the experimental group experienced reduced side effects such as disturbed sleep ($t = -11.99$; $p < 0.001$, Eta Squared = 0.69).	Tsao, Y. & Creedy, D. K. (2019). Auricular acupressure: reducing side effects of chemotherapy in women with ovarian cancer. *Supportive Care in Cancer*, *27*(11), 4155-4163. https://doi.org/10.1007/s00520-019-04682-8	Level II
	Apply ear seeds to Shen Men, Cardia, Anterior Lobe, and Occiput acupoints on one ear 30 minutes before chemotherapy treatment. Apply gentle pressure to each point for one minute before going to bed. Remove ear seeds after six days and apply new seeds on the same acupoints on the other ear. Continue to alternate ears until chemotherapy treatment is completed.	Yoon, H. G. & Park, H. (2019). The effect of auricular acupressure on sleep in breast cancer patients undergoing chemotherapy: A single-blind, randomized controlled trial. *Applied Nursing Research*, (48), 45-51. https://doi.org/10.1016/j.apnr.2019.05.009	Level II

Summary of Best Practice Recommendations

The recommendations presented in this thesis have the potential to significantly impact cancer patients as well as nurses. These recommendations provide a way for nurses in oncology to recommend acupressure therapy to patients undergoing chemotherapy treatment to help them alleviate their troubling side effects. Partnering their practice with these recommendations allows a nurse to have a greater impact on his or her patients. The recommendations addressed the type of acupressure technique, the length of the intervention, the acupoints to use, and how to perform it, for each side effect being targeted. The logistics of these recommendations will be discussed in chapter four, where an evidence-based practice protocol will be presented.

CHAPTER FOUR

Implementation and Evaluation

Introduction

For the implementation and evaluation of the proposed interventions, the Plan, Do, Study, Act (PDSA) model will be used. This model involves a four-step process, including Planning, Doing, Studying, and Acting. The PDSA model will be used to implement the educational presentation and educational handout on acupressure for chemotherapy-related side effects. The final stage of the cycle involves evaluating the implementations to confirm the plan is effective. An educational class on acupressure for chemotherapy-related side effects and the informational handout for healthcare providers and patients are the two interventions that will be implemented.

Implementation

Educational Session on Acupressure for Chemotherapy-Related Side Effects

The information will be presented to nurses and other healthcare providers on an adult oncology unit during a staff meeting. They will be taught how to accurately perform both auricular and manual acupressure. By the end of the teaching session, they will be able to demonstrate how to use the informational handout, apply acupressure, and identify the location of all 18 acupoints.

Informational Handout for Healthcare Providers and Patients

The nurses, healthcare providers, and patients will be provided with an informational handout. They will receive a handout that includes the following information: what acupressure is, how acupressure works, the risks and benefit of the treatment, exclusion criteria for patients, diagrams of the acupoints, and a table that lists each side effect, the type of acupressure required to target that side effect, the required acupoints, the duration and frequency of the treatment, and

the replacement cycle. The handout also states that patients should contact their provider if they experience any serious adverse effects during the course of the acupressure treatment. The information handout can be found in Appendix A.

Plan, Do, Study, Act (PDSA) Model

This model was chosen because it enables stakeholders to see if the proposed change will succeed. This process of change is safer and less disruptive for patients and staff. It provides the opportunity to test out a proposed improvement on a small scale before implementing it across a wider area (Little et al., 2020).

Plan

The "Plan" phase is when the change to be implemented is created. This is when the objective is defined, questions are asked, and predictions for the outcomes are created. During this phase, the timeline for the implementation will be created, a budget will be established, and all the required resources will be gathered.

Do

The "Do" phase is when the proposed change is tested and the plan is carried out. During this phase, nurses and other healthcare providers will be trained on how to perform acupressure on their patients on one oncology unit in the selected facility. After three months, data and feedback will be gathered from the healthcare providers and patients in the form of a survey.

Study

The "Study" phase is when the implemented change is evaluated. During this phase, outcomes will be measured based on data that was collected before and after the change was implemented. An analysis of the data will be completed and compared to the predictions/ outcomes. If the outcomes are met, the cycle will continue onto the "Act" phase. If these

outcomes are not met, the teaching strategy will be reevaluated, and a new plan will be developed. This phase also includes reflecting on the impact of the change and determining what was learned.

Act

The "Act" phase is when the change is fully implemented and a decision on whether the change can be implemented across a wider area is made. During this phase, the plan will be fully implemented, requiring all healthcare providers caring for patients receiving chemotherapy on all the oncology units at the facility to attend the acupressure training session.

Evaluation

The implementation of the proposed interventions will be assessed in two ways. The first implementation evaluation will be with a survey for the patients who received the acupressure treatment. The other will be for the healthcare providers performing the treatment and educating the patients how to perform it themselves. This is done to determine how effective this treatment is and whether any adverse effects occurred during the treatment.

Strengths, Limitations and Recommendations for Future Research

This thesis is strong in review of articles and strength in levels of research included. The articles range from randomized controlled trials to meta-analysis. All articles conclude that acupressure is an effective treatment for chemotherapy-related side effects in patients undergoing chemotherapy for cancer treatment. The best practice recommendations proposed in this thesis are supported by eight articles from the literature review, another strength of this thesis.

There are limitations to this thesis. The first limitation is the lack of research on children receiving acupressure treatment. Another limitation of this thesis project is the limited available research on acupressure for chemotherapy side effects. There are limited randomized controlled

trials and even fewer meta-analyses on this topic, hence the limited variety of levels of evidence included in this thesis's literature review.

More research needs to be documented on acupressure treatment in cancer patients. It is advisable to conduct studies on more side effects, types of cancer, and age groups. A greater number of randomized controlled trials and meta-analyses need to be conducted to further support the efficacy of acupressure. Finally, studies focusing on the implementation and maintenance of acupressure training sessions would be helpful in the development of effective and accurate acupressure treatment protocols.

Summary

This thesis developed evidence-based best practice recommendations for nurses and other healthcare providers when referring cancer patients experiencing chemotherapy-related side effects to acupressure treatment. The best practice recommendations presented in this thesis are supported by evidence-based research. Acupressure treatment has the capability to change the lives of many patients battling cancer. Acupressure has the advantage of being non-invasive, self-managing, and inexpensive to apply. Conducting acupressure is within the scope of nursing practice following some Traditional Chinese Medicine training and appears to be a promising approach to help cancer patients experiencing debilitating side effects. As the research base continues to expand, there is hope for a greater interest in implementing effective and safe acupressure interventions in the community of individuals affected by chemotherapy-related side effects. Nurses are in the ideal position to interact with this population because they are the ones administering chemotherapy and monitoring patients both during and after each treatment. Being educated and aware of evidence-based practices is the first step in providing comprehensive care for patients. Learning about the benefits of acupressure for chemotherapy-related side effects is

one way that nurses and other healthcare providers can make a positive impact on the lives of cancer patients.

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APPENDIX

Informational Handout for Healthcare Providers and Patients

Acupressure for Chemotherapy-Related Side Effects

(Acupressure, n.d.)

(Yin Yang, n.d.)

(Cancer Patient, n.d.)

Acupressure

Acupressure is an ancient form of massage and common practice of treatment derived from Traditional Chinese Medicine. The purpose of the treatment is to "encourage the movement of *qi* ("life energy") through the 14 channels (meridians) inside the body" (Rogel Cancer Center). The Chinese Medicine theory states that "the constant flow of *qi* through these channels is essential for a person to keep their health" (Rogel Cancer Center). When these channels become blocked and the energy cannot flow, the body is unable to maintain balance and overall health diminishes; this is described as an imbalance between *Yin* and *Yang*. According to Traditional Chinese Medicine, when there is an imbalance between *Yin* and *Yang,* there is dysfunction between organ systems. Although there are several forms of acupressure techniques, only manual and auricular acupressure are required to alleviate the most comon chemotherapy-related side effects. Manual acupressure refers to acupoint stimulatation with fingers, while auricular acupressure uses vaccaria seeds or beads to stimulate acupoints on the ear.

How It Works

Acupressure reestablishes a balance between *Yin* and *Yang*. According to Zhang (2015), meridians are the channels that connect various parts of the body, promoting the circulation of *qi* and blood. Auricular acupressure (AA) works by stimulating specific points on the external part of the ear. The acupressure specialist locates specific acupoints to stimulate to cause the desired effects and places vaccaria seeds or beads on the acupoints with an adhesive tape or bandage to stimulate the points gently with continuous pressure. The external ear has multiple acupoints that target various body systems making it an ideal place for acupressure therapy. Manual acupressure works the same way, but using other parts of the body.

Benefits

Research has shown that acupressure has helped cancer patients undergoing chemotherapy reduce their side effects. These side effects include nausea, vomiting, constipation, fatigue, and sleep disturbance. Acupressure is also non-invasive, non-pharmacological, cost-effective, easy to learn and perform, and can treat multiple side effects.

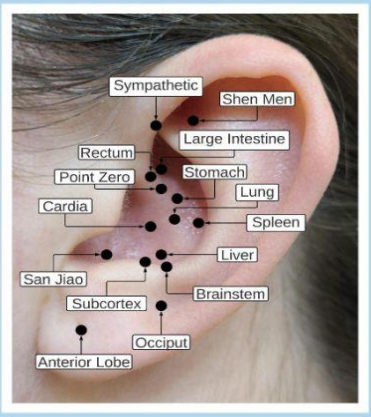
Risks

After an acupressure session, some patients may feel soreness or develop bruises at the stimulated acupoints. They may also feel temporarily lightheaded. Pressure should be gentle over fragile or sensitive areas to reduce the risk of injury.

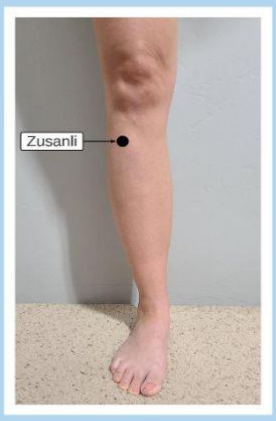
Exclusion Criteria

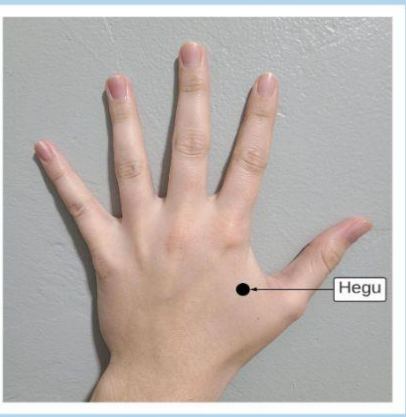
Most patients qualify for this treatment, however, there are a few circumstances where deep tissue work such as manual acupressure may need to be avoided. According to Dr. Wheeler, acupressure is contraindicated for patients with spinal cord injuries, rheumatoid arthritis, a bone disease that could be made worse by physical manipulation, varicose veins, pregnant women, if the treatment is applied in an area of the body that contains a cancerous tumor, or if the cancer has spread to the bones (Wheeler, 2019). Patients with low platelet counts, bleeding disorders, or those on anticoagulant therapy should not use this treatment. Patients without access to required acupoints do not qualify for this treatment.

Location of Acupoints



Auricular Acupressure





Manual Acupressure

How to Perform Acupressure

Every side effect requires a specific type of acupressure, acupoints, duration and frequency of stimulation, and replacement cycle. The table below illustrates what you need to know to perform acupressure effectively. For auricular acupressure, clean the skin with 75% alcohol, locate the acupoint, and apply the vaccaria seed or bead with the adhesive bandage using slight pressure. When it is time for replacement, remove the original seed or bead, and apply a new one to the other ear; switch ears between replacement cycles. For manual acupressure, locate the acupoint and apply gentle pressure for the required duration; perform this for both sides of the body. Contact your healthcare provider if you experience any serious adverse effects.

Side Effect	Type of Acupressure	Acupoints	Duration	Frequency	Replacement
Nausea & Vomiting	Auricular	Point Zero Stomach Brainstem Shen Men Cardia Subcortex	3 minutes per acupoint	3 times a day	After 5 days
Constipation	Auricular	Large Intestine Rectum San Jiao Spleen Lung Sympathetic Subcortex	1 minute per acupoint	3 times a day	After 5 days
Fatigue	Manual **or** Auricular	Hegu Zusanli Sanyinjiao **vs** Shen Men Subcortex Liver Spleen	2 minutes per acupoint **vs** 30 seconds per acupoint	Immediately after the start and end of each chemo session **vs** 5 times a day	N/A **vs** After 3 days
Sleep Disturbance	Auricular	Shen Men Cardia Anterior Lobe Occiput	1 minute per acupoint	Once before going to bed	After 6 days

Image Sources: Acupressure, n.d. (https://www.subpng.com/png-14gq74/); Yin Yang, n.d. (https://www.subpng.com/png-8xspzs/); Cancer Patient, n.d. (https://www.subpng.com/png-qn5lhw/)