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Review

Effects of acupressure on chemotherapy-induced nausea and vomiting-a systematic review with meta-analyses and trial sequential analysis of randomized controlled trials

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ABSTRACT

Background: Acupressure has been used as an effective way in treating with stomach upset. However the efficacy of acupressure in preventing chemotherapy-induced nausea and vomiting is uncertain.
Objective: To assess the effectiveness of acupressure on three categories of chemotherapy-induced nausea and vomiting.
Data sources: Databases had been retrieved from inception through February 2016 for the randomized controlled trials in accordance with the inclusion criteria, including PubMed, Cochrane Central Register of Controlled Trials, Web of Science, EMBASE, Science Direct, CINAHL, China Biology Medicine, Chinese National Knowledge infrastructure, Wan Fang and Database for Chinese Technical Periodicals. Additional studies were identified through hand searches of bibliographies and Internet searches.
Design: Systematic review with meta-analyses and trial sequential analysis of randomized controlled trials.
Review methods: Two reviewers selected relevant eligible articles, critical appraisal of the methodological quality was conducted on the basis of using Cochrane Handbook. A standardized Excel form was used to extract information. Meta-analysis and trial sequential analysis was performed using software RevMan 5.3 and TSA 0.9.
Results: Twelve studies with 1419 patients were included. Only three studies were assessed as high quality, one study was evaluated as moderate, and eight studies were evaluated as poor. The meta-analysis showed that acupressure reduced the severity of acute (SMD = −0.18, 95% CI −0.31 to −0.05, $p < 0.01$) and delayed (SMD = −0.33, 95% CI −0.64 to −0.01, $p = 0.04$) nausea. However, there was no benefit effect on the incidence or frequency of vomiting. No definitive conclusions were drawn from the trial sequential analysis.
Conclusion: This systematic review suggested a protective effect of acupressure on chemotherapy-induced nausea and vomiting, while more well-designed clinical trials with larger sample size were needed to draw a definitive conclusion.

What is already known about the topic?

- Chemotherapy-induced nausea and vomiting is one of the most unbearable symptoms caused by chemotherapy.
- Acupressure has been thought as an effective way to relieve the upset of stomach.
- Multiple studies have shown different conclusions about the effect of acupressure.

What this paper adds

- Acupressure reduced the severity of acute and delayed nausea, but had no effect on the incidence or the frequency of vomiting.
- A definitive conclusion about the effect of acupressure on chemotherapy-induced nausea and vomiting cannot be drawn through trial sequential analysis.

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1. Introduction

Cancer has been part of the most important global health problems. There are various methods of tumor therapies, such as surgical resection, chemotherapy and radiotherapy. Among these approaches applied to anticancer treatment, chemotherapy is affecting patients' quality of life by causing some serious problems like nausea and vomiting, mouth ulcer, lack of appetite, constipation, and hair loss (Genc et al., 2013).

Nausea and vomiting are the most common and uncomfortable side effects brought by chemotherapeutics. Chemotherapy-induced nausea and vomiting consists of three major categories (Jordan et al., 2014). Symptoms occurring within 24 h after receiving chemotherapy are usually defined as acute nausea and vomiting. Delayed nausea and vomiting has been thought to occur at least 1 day to several days after receiving oncotherapy. Some patients may experience nausea and vomiting triggered by taste, sight or anxiety before the administration of chemotherapy, which is considered to be anticipatory nausea and vomiting. Chemotherapy-induced nausea and vomiting can cause a significant decreasing on quality of life and serious metabolic complications, such as hyponatremia, hypokalemia and metabolic acidosis (Taspinar and Sirin, 2010).

As mechanisms of chemotherapy-induced nausea and vomiting have become a more clearly recognize, these distress feelings, especially acute symptoms, have been effectively controlled by the use of advanced antiemetics such as 5-hydroxytriptamine-3 and neurokinin-1 receptor antagonists (Jordan et al., 2015). Though vomiting is fairly well controlled, nausea still remains a problem (Einhorn et al., 2017), and such insufferable symptoms may decrease the adherence to the treatment (Miller and Kearney, 2004). Acupoint stimulation has been recommended as a complementary intervention to prevent chemotherapy-induced nausea and vomiting by the National Institutes of Health Consensus Statement (NIH Consens Statement, 1997). According to the evidence practice guideline provided by the Oncology Nursing Society, acupoint stimulation was considered as a promising intervention for the management of chemotherapy-induced nausea and vomiting (Tipton et al., 2007). Acupressure has been used in alleviating nausea and vomiting in China for a long time. Based on meridian theory, the purpose of acupressure stimulation is to strengthen the energy flow (Qi), so that symptoms can be managed (Complementary and Alternative Medicine Editorial, 2002). Acupressure is easy to learn and can be performed by patients themselves easily. Since it is noninvasive, adverse reactions caused by insertion needles can be avoided (Lee and Frazier, 2011).

Some systematic reviews of acupressure have been published, and the authors recommended acupressure as a useful and convenient method in the management of many symptoms, such as pain, dyspnea, insomnia, fatigue, allergic disease, nausea and vomiting (Lee and Frazier, 2011; Song et al., 2015). A subgroup including 594 patients of a traditional meta-analysis published in 2006 got the conclusion that acupressure was effective for acute nausea severity, but not effective for acute vomiting, delayed nausea and vomiting (Ezzo et al., 2006). Conclusions from an well-designed meta-analysis are usually reckoned as "the best evidence". Traditional meta-analysis may carry with the potential problem of the inflation of Type I error (Brok et al., 2009; Wetterslev et al., 2008), and cause false positive or negative outcomes due to repeated significance testing (Kulinskaya and Wood, 2014). This leads to the question that 'the best evidence' may not be 'the abundant evidence'. Trial sequential analysis was recommended as a new method to avoid these problems (Kulinskaya and Wood, 2014). It is a methodology method to calculate the required information size and the sequential monitoring boundaries will be estimated to evaluate accumulate evidence.

The aim of this systematic review was to evaluate the effectiveness of acupressure as an additional intervention in chemotherapy-induced nausea and vomiting control. It also examined the sufficiency and conclusiveness of currently available evidence.

2. Methods

2.1. Search strategies

Relevant studies were searched in 6 English databases and 4 Chinese databases, including PubMed, Cochrane Central Register of Controlled Trials(CENTRAL),Web of Science, EMBASE, Science Direct, CINAHL, China Biology Medicine(CBM), Chinese National Knowledge infrastructure(CNKI), Wan Fang and Database for Chinese Technical Periodicals(VIP) from inception to February 2016 for RCTs in accordance with inclusion criteria. Additional studies were identified through hand searches of bibliographies and Internet searches. Two reviewers (J.M and X.Y.L) independently searched the article according to the systematic review protocol. Chinese subject heading terms and text words included: ("穴位按压" (acupressure) OR "穴位按摩" (acupressure) OR "指压" (Zhi Ya) OR "穴位疗法" (acupuncture therapy) OR "传统医学" (Chinese traditional medicine)) AND ("恶心" (nausea) OR "呕吐" (vomiting) OR "干呕" (emesis) OR "消化" (digestive tract) OR "胃肠" (gastrointestinal tract)) AND ("肿瘤" (cancer) OR "化疗" (chemotherapy) AND "随机" (random) OR "对照" (control) OR "安慰剂" (placebo) OR "临床试验" (clinical trial)). Search strategies for PubMed were shown in Table 1.

2.2. Inclusion and exclusion criteria

Randomized controlled trials were included if they met the following criteria: (1) Population: patients were diagnosed with cancer receiving chemotherapy through intravenous injection; (2) Intervention: acupressure was used with or without antiemetic medications; (3) Comparison: antiemetic medications or nursing care were conducted; (4) Outcomes: chemotherapy-induced nausea or vomiting, or both existed; (5) Language: English and Chinese.

Trials were excluded for four reasons: (1) The article was not acquired; (2) No available data; (3) Auricular therapy was used as the intervention; (4) For the repetition of the published literature, earlier one was chose.

2.3. Study selection

One review author (JM) screened titles and abstracts of the candidate studies for relevant articles independently. This was reviewed by another author (X.Y.L) independently. After full texts of these potentially relevant articles were obtained, studies were evaluated and selected by two reviewers (JM, X.Y.L) again independently according to the inclusion criteria. Disagreements were solved by consensus. The third reviewer (K.Y.L) was consulted for a final selection if the consensus were not reached.

2.4. Quality critical appraisal

Assessment of bias was conducted using Cochrane risk-of-bias tool (Higgins et al., 2011). Each included article was evaluated as 'high', 'low', or 'unclear' risk according to the bias tool with six criteria, which were random sequence generation, allocation concealment, blinding, incomplete data, outcome selective reporting, and others. High risk of bias was defined if any item was