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Efficacy of Nei-Guan (P6) Acupoint stimulation in reducing postoperative nausea and vomiting

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Abstract

Background: Despite advancements in antiemetic therapies, postoperative nausea and vomiting (PONV) continues to be a common complication after surgery. Conventional pharmacologic treatments are often only partially effective and can be associated with adverse side effects. This has led to increased interest in nonpharmacological approaches such as P6 acupoint stimulation, a method rooted in traditional Chinese medicine.

Methods: A literature review was conducted, focusing on studies that evaluated various forms of P6 acupoint stimulation for treating and/or preventing PONV, including acupressure, wristbands, and transcutaneous electrical stimulation. The common mechanism underlying the efficacy of these nonpharmacologic interventions involves using physical methods to alter levels of endorphins and serotonin, while restoring the qi flow. This article reviews the efficacy of various physical methods for P6 acupoint stimulation in reducing PONV.

Results: Evidence from multiple studies in the peer-reviewed literature indicates that P6 acupoint stimulation can reduce the incidence of PONV with minimal adverse effects. While some clinical trials have reported outcomes comparable to those of traditional antiemetic drugs, inconsistencies in study design have led to controversy regarding its clinical effectiveness. Given the noninvasive and cost-effective nature of these simple physical techniques supports their usefulness, either alone or combined with conventional antiemetic therapies is supported.

Conclusions: P6 acupoint stimulation is a complementary nonpharmacologic approach to the management of PONV which can offer benefits to patients at high risk of PONV. However, further sham (placebo) controlled studies are needed to establish its efficacy alone and in combination with traditional antiemetic drugs to determine its optimal role in clinical practice.

Keywords: P6 acupoint; Acupressure; Postoperative nausea and vomiting; Nonpharmacological therapy; Traditional Chinese medicine; Electrostimulation; Antiemetic therapy

Introduction

Postoperative nausea and vomiting (PONV) remain a significant challenge despite many recent advances in antiemetic medications. Consequently, non-pharmacological approaches like Nei-Guan P6 (pericardium point 6) acupoint stimulation have gained increased attention in clinical practice. Nei-Guan P6 acupressure, a traditional Chinese medicine technique involving

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physical pressure applied at the P6 acupoint on the medial side of the wrist rather than via needles. This technique, has shown promise for PONV prevention with minimal side effects [1]. Acupressure has been used in traditional Chinese medicine for over 3,000 years, applies the same principles as acupuncture but relies on physical touch rather than needle insertion. Studies suggest that the effects of P6 acupressure are comparable to those of P6 acupuncture, with various forms such as finger pressure, wristbands with a plastic sphere (Sea-Band), or transcutaneous electro-stimulation yielding similar outcomes [2]. P6 stimulation, has been reported to influence energy flow (qi or bioenergy) via meridians, and may exert its antiemetic effect by modulating neurotransmitter release (e.g., endorphins, serotonin) within the central nervous system (CNS) [3].

The proposed mechanism of action of acupoint stimulation is related to the release of β-endorphin from the hypothalamus into the cerebrospinal fluid, while modulating serotonin transmission through serotonergic and norepinephrinergic pathways. Signal transduction occurs via Aβ and Aδ afferent sensory fibers, which transmit impulses to the spinal dorsal horn. Given the antiemetic properties of β-endorphins, this neurobiological basis supports the potential efficacy of P6 stimulation [4]. Among the 365 classical acupoints, P6 is specifically targeted to alleviate nausea and vomiting by enhancing qi flow through various methods, including transcutaneous acupoint electrical stimulation (TAES) with Reliefband (Neurowave Medical, Chicago, IL), P6 acupoint injections, a combination of acupuncture and acupressure, acustimulation with devices such as Sea-Band (Sea-Band, Newport, RI) or Acuband (Acuband, Inc, Little Silver, NJ), and simply physical or electrical acupressure. Acupressure wristbands, available in elastic and other designs with a protruding plastic button or electrical stimulation, offer a noninvasive and cost-effective solution with minimal adverse effects [5].

PONV is a complication after surgery that affects 20% to 40% of all surgical patients, with incidence rates rising to 80% in women undergoing high-risk surgical procedures (e.g., laparoscopic surgery) [6]. The mechanism of acupressure in PONV management involves the stimulation of afferent nerve fibers, which transmit impulses to the spinal cord, triggering endorphin release and blocking signals from the chemoreceptor trigger zone (CTZ). Additionally, impulses to the periaqueductal gray area in the midbrain stimulate the release of enkephalins, which modulate serotonin and norepinephrine levels in the spinal cord. Furthermore, acustimulation promotes the secretion of β-endorphins and adrenocorticotropic hormone from the pituitary gland into the bloodstream and cerebrospinal fluid. These processes restore energy flow and help regulate upper gastrointestinal function, thereby reducing PONV symptoms when used either alone or in combination with antiemetic medications [7].

Laparoscopic procedures

In laparoscopic surgery, alternative therapies targeting the P6 acupoint, including pressure, electroacupuncture (EA), TAES, and capsicum plaster, have shown varying efficacy in reducing PONV. Agarwal et al. [8] and Sadighha et al. [9] found that acupressure at the P6 point, applied 30 minutes before induction and removed 6 hours postoperatively, significantly reduced PONV and the need for rescue medication in laparoscopic cholecystectomy patients. These findings were comparable to standard antiemetic treatments [8,9]. White et al. [10] reported that using a Pressure Right device applied at the P6 acupoint, as part of a multimodal antiemetic strategy, significantly decreased the incidence of vomiting. Similarly, Harmon et al. [11] demonstrated that applying Sea-Bands immediately before induction of anesthesia reduced PONV from 42% to 19% in a placebo-controlled double-blind study. However, subsequent studies by Samad et al. [12] and Yilmaz et al. [13] found no significant benefit to acupoint stimulation, and Naik et al. [14] reported that the antiemetic drug palonosetron was more effective.

EA has shown significant benefits perioperatively. Arnberger et al. [15] and Lee et al. [16] observed reduced PONV incidence in patients receiving EA compared to a control group. Ho et al. [17] found electroacupuncture to be as effective as prochlorperazine in preventing emesis, whereas TEAS was less effective. Sharma et al. [18] demonstrated that P6 acupuncture is comparable to ondansetron in preventing PONV following laparoscopic cholecystectomy. The importance of timing has been highlighted by Zárate et al. [19] Khan et al. [20] and Liu et al. [21] reported that electroacupuncture significantly reduces the incidence of PONV when applied either preoperatively or intraoperatively. The effect of timing was demonstrated after comparing patient outcomes based on the initiation point of stimulation; these studies consistently found that earlier or continuous application of electroacupuncture, beginning prior to anesthesia induction or maintained throughout surgery, was associated with greater reductions in PONV compared to delayed or no stimulation [19-21]. However, some studies [22-25] found that while TEAS reduced nausea, it did not significantly affect vomiting, and other studies reported only transient antiemetic effects [22-25]. Capsicum plaster at P6 demonstrated some efficacy by reducing nausea but not vomiting or the need for antiemetic drugs [26].

Pediatric

The effectiveness of P6 acupoint stimulation in managing PONV among pediatric patients is influenced by the procedure, timing, and targeted symptoms. Shin et al. [27] found acupuncture at P6 to be cost-effective in preventing emesis after pediatric tonsillectomy compared to antiemetic therapy. Liodden et al. [28,29] observed that acupuncture followed by Sea-Band acupressure reduced retching and vomiting

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in younger children undergoing pediatric tonsillectomy or adenoidectomy, though a placebo-controlled study by the same group also reported no significant benefit. In pediatric hernia repair, circumcision, and orchidopexy, Butkovic et al. [30] noted that preoperative laser acupuncture reduced vomiting in the early postoperative period, though long-term benefits were not observed. Wang et al. [31] demonstrated P6 acupuncture's efficacy in reducing nausea and vomiting in the PACU after strabismus surgery, but later in the recovery process PONV rates remained unchanged. TEAS showed comparable efficacy to ondansetron in tonsillectomy with fewer side effects and higher parental satisfaction. [32] Conversely, Schwager et al. [33] found that TEAS was ineffective in reducing vomiting during circumcision or herniotomy/orchidopexy.

Acupressure results are mixed, with Pouy et al. [34] finding that acupressure applied by a finger at P6 alleviated PONV after tonsillectomy. In contrast, Lewis et al. [35] reported no benefit from Sea-Band wristbands in preventing PONV after strabismus surgery. Rusy et al. [36] reported that while electroacupuncture reduced nausea, it did not impact vomiting or the need for antiemetics following tonsillectomy.

General surgery

P6 acupoint stimulation techniques have been investigated for their potential to reduce PONV after general surgery. For instance, Barsoum et al. [37] reported reduced nausea severity with bilateral P6 acupressure bands, though the reduction in vomiting was not statistically significant. Hofman et al. [38] and Fan et al. [39] observed reduced PONV intensity and incidence in high-risk and short-stay surgery patients, respectively, with timing playing a crucial role. A study by Ebrahim et al. [40] found that P6 acupressure is as effective as ondansetron and metoclopramide in preventing PONV after strabismus surgery. Electroacupuncture [41] and TEAS [42-45] significantly reduced PONV in middle ear, thyroidectomy, plastic, and laparoscopic surgeries, with improved outcomes when combined with pharmacologic antiemetic treatments [41-45]. Capsicum plaster at P6 was effective in reducing PONV severity and antiemetic use, showing comparable results to ondansetron after thyroid and middle ear surgeries [46].

Systematic reviews and meta-analyses further support the efficacy of P6-based therapies [47-49]. Stoicea et al. [4] and Cheong et al. [48] reported significant reductions in early PONV symptoms and enhanced recovery, while Lee et al. [49] confirmed effectiveness in reducing nausea, vomiting, and rescue antiemetic needs, comparable to antiemetic drugs. However, some studies found no significant benefit in some surgical procedures, such as Agarwal et al. [50] who observed no effect in patients undergoing endoscopic urological procedures, and Ferrara-Love et al. [51] in patients undergoing orthopedic and general procedures during the early postoperative period.

Neurosurgery

P6 acupoint stimulation in neurosurgical patients undergoing craniotomy, yielded mixed results. Acupressure using Sea-Bands at P6 did not significantly reduce PONV in randomized controlled trials [52-54]. In contrast, TEAS at P6 demonstrated greater efficacy. Xu et al. found a significant reduction in the 24-hour cumulative PONV incidence in infratentorial craniotomy patients when TEAS was used in combination with antiemetic drugs, though rescue antiemetic use remained similar [55]. Wang et al. observed a reduced PONV prevalence with TEAS at the right P6 acupoint combined with ondansetron in supratentorial craniotomy patients [56]. Additionally, Tu et al. [57] reported that TEAS reduced vomiting during the initial 2-6 hours postoperative period and provided pain relief in the 6-24 hours period, highlighting its broader benefits.

Cardiovascular

The effectiveness of P6 acupoint stimulation in cardiac surgery and related conditions remains uncertain. Klein et al. [58] found that bilateral acupressure wristbands at P6 did not significantly reduce PONV incidence or affect pain scores, analgesic use, or antiemetic needs in a randomized, double-blind trial involving 152 adults undergoing cardiac surgery. A subgroup analysis suggested a possible, though statistically insignificant, benefit in female patients [58].

Dental

The effectiveness of P6 acupoint therapies in dental procedures varies. Somri et al. [59] demonstrated that bilateral P6 acupuncture combined with ondansetron significantly reduced postoperative emetic episodes after discharge in pediatric dental patients under general anesthesia, though it provided no significant benefit in the immediate post-anesthesia care unit (PACU). Zotelli et al. [60] reported that unilateral P6 acupuncture significantly reduced nausea during maxillary impression-taking, as measured by the Gagging Severity Index/Gagging Prevention Index (GSI/GPI), compared to a sham group. The gag reflex and nausea & vomiting are closely linked through shared neural pathways and physiological mechanisms, although they are distinct responses. Another study by Eachempati et al. [61] yielded inconclusive results on acupuncture's effectiveness in managing the gag reflex during dental treatment.

Breast surgery

P6-targeted therapies show varying effectiveness in managing PONV following breast surgery. Gan et al. [62] demonstrated that bilateral electro-acupoint stimulation significantly reduced nausea at two hours post-surgery,

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with trends toward reduced vomiting and pain after major breast procedures. Said et al. [63] reported that Sea-Band acupressure significantly reduced chemotherapy-induced nausea, vomiting episodes, and antiemetic use in breast cancer patients. TEAS also showed promise, with Zhang et al. [64] reporting improved recovery times and reduced postoperative pain in ambulatory breast surgery. Kim et al. [65] also found significantly reduced nausea but not vomiting after minor breast procedures. However, acupuncture results were inconsistent. Streitberger et al. [66] found no significant reduction in overall PONV incidence or rescue antiemetic use, though vomiting was decreased. Fujii Y. [67] noted acupuncture's enhanced effectiveness when combined with pharmacological treatments such as anti-serotonin drugs and dexamethasone.

Cesarean section

P6 acupoint stimulation demonstrates mixed results in cesarean sections. Direkvand-Moghadam et al. [68] and Harmon et al. [69] reported acupressure effects comparable to intravenous metoclopramide when applied before spinal anesthesia and maintained for 6 hours. El-Deeb et al. [70] found that electrical acupoint stimulation at P6 effectively reduced nausea and vomiting during surgery and the early postoperative period. Ahn et al. [71] highlighted Korean hand acupressure, including P6, as beneficial in reducing opioid-induced emetic symptoms and pain. Similarly, Wani et al. [72] found it more effective than ondansetron in managing drug-induced nausea and vomiting during cesarean sections. However, TEAS yielded inconclusive results, as Habib et al. [73] reported no significant reduction in PONV after preoperative TEAS. Other studies [74-77] found limited or no significant benefits of P6 acupressure or acupuncture; however, some improvements in the management of emetic symptoms were noted in patients with a history of PONV and following epidural morphine [74-77].

Gynecological surgery

P6 acupoint interventions exhibit varying effectiveness in reducing PONV after gynecological surgical procedures. Acupressure studies, such as those by Alkaissi et al. [78] and Turgut et al. [79] reported significant reductions in PONV and antiemetic use, particularly with bilateral Sea-Bands or wristbands worn during and after surgery. Reliefbands also reduced nausea severity and antiemetic needs when used perioperatively [80-82]. However, some studies [83,84] found no significant reduction in emetic symptoms after hysterectomy surgery.

Acupuncture has shown promise, with Albooghobeish et al. [85] reporting superior efficacy over metoclopramide for nausea reduction after laparoscopy. Dundee et al. [86,87] also observed significant reductions in PONV after minor gynecological surgeries. While preoperative electroacupuncture improved recovery and reduced pain, its effects on PONV were inconsistent [88]. Conversely, some studies reported no significant benefits of acupuncture or electroacupuncture after hysterectomy procedures [89,90].

TEAS has demonstrated beneficial effects in managing PONV by reducing vomiting and antiemetic use [91-93]. Oh and Kim [94] identified greater efficacy of TENS-based relief bands compared to simple acupressure wristbands. El-Bandrawy et al. [95] reported TEAS to be superior to acupressure and standard antiemetics in hysterectomy patients. Additionally, simple subcutaneous injections with glucose or droperidol at the P6 acupoint significantly reduced nausea and vomiting, performing comparably or better than antiemetic drugs alone [96,97].

Pregnancy

Studies of P6 acupoint therapy for pregnancy-related nausea and vomiting have yielded mixed results. Habek et al. [98] reported a 90% success rate with acupuncture compared to 64% with acupressure, while Shin et al. [99] found acupressure significantly reduced nausea and vomiting. Norheim et al. [100] and Werntoft et al. [101] also observed a notable decrease in the duration of emetic symptoms and sustained relief with acupressure wristbands compared to placebo.

Jamigorn et al. [102] reported comparable efficacy between P6 acupressure and vitamin B6 for the relief of nausea and vomiting in early pregnancy. However, Saberi et al. [103] found ginger to be more effective for mild-to-moderate pregnancy-related nausea. Conversely, reviews by Matthews et al. [104,105] and Boelig et al. [106] indicated insufficient evidence to support acupuncture's superiority over placebo. Heazell et al. [107] reported no significant impact of P6 acupressure on unexpected hospitalizations, and Sinha et al. [108] found acupressure wristbands ineffective in reducing labor-induced nausea and vomiting.

Oncological surgery

Research on P6 acupressure for PONV in oncological surgery patients suggests limited benefits compared to standard antiemetic drug therapy. Hsiung et al. [109] found that while acupressure at P6 and ST36 acupoints reduced postoperative pain and accelerated gastrointestinal recovery in gastric cancer patients undergoing subtotal gastrectomy, it did not significantly decrease the incidence of PONV. These findings suggest that although acupressure can facilitate postoperative recovery, its beneficial role in PONV management remains inconclusive in this surgical population.

Miscellaneous non-surgical related nausea and vomiting

Chemotherapy-induced nausea and vomiting (CINV)

P6 acupoint interventions, including acupuncture and

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acupressure, have demonstrated varying effectiveness in managing nausea and vomiting across diverse conditions like CINV. Despite advancements in antiemetic therapies, chemotherapy-induced nausea and vomiting (CINV) remains a significant challenge, with nausea significantly affecting patients' quality of life. Studies report significant benefits of P6 acupressure in reducing CINV. For example, Taspinar et al. [110] and Genç et al. [111] found that acupressure significantly reduced nausea, vomiting, and anxiety in gynecologic and breast cancer patients, with sustained improvements post-chemotherapy. Suh et al. [112] also reported enhanced efficacy when acupressure was combined with counseling for delayed CINV in breast cancer patients. Acupressure bands have also shown benefits in radiation therapy and leukemia, reporting reduced nausea and vomiting compared to standard antiemetics [113,114]. However, some studies [115,116] reported no significant differences in nausea, vomiting, or quality of life between active and sham acupressure bands in breast cancer patients. Additionally, studies in pediatric oncology and radiotherapy patients showed no advantage of P6 acupoint stimulation over placebo [117,118].

Complementing these findings, acupuncture has also demonstrated effectiveness, particularly in delaying CINV. Rithirangsriroj et al. [119] found P6 acupuncture to be more effective than ondansetron in preventing delayed emesis in gynecologic cancer patients. Li et al. [120] further confirmed reductions in nausea and vomiting severity, along with improved nutritional status, with acupuncture over sham treatments. Capodice et al. [121] and Wang et al. [122] highlighted acupuncture's safety and efficacy as a complementary treatment for chemotherapy-related emetic symptoms.

Others

Zhang et al. [123] reported that combining acupuncture with standard care significantly reduced nausea scores and improved patient satisfaction in an emergency department. Similarly, Chang et al. [124] found that acupuncture combined with relaxation therapy effectively alleviated nausea in human immunodeficiency virus (HIV) patients undergoing highly active antiretroviral therapy (HAART). Acupressure using Sea-Bands has also shown benefits in reducing nausea in patients with acute vertigo [125]. The application of Sea-Bands at the onset of an acute migraine attack was observed to significantly reduce nausea intensity in patients [126]. These findings are not surprising, as acupressure needs to be used prophylactically.

The efficacy of P6 acupoint stimulation for postoperative nausea and vomiting (PONV), and nausea and vomiting secondary to other therapies or diseases is shown in table 1.

Table 1: Clinical studies characteristics on the efficacy of P6 acupoint stimulation for postoperative nausea and vomiting (PONV), and nausea and vomiting secondary to other therapies or diseases.

Author/Year	Sample Size	Study Design	Procedure	Treatment Method	Comparison	Findings/Outcomes
Agarwal et al. 2002 [8]	150	Double-blinded RCT	Laparoscopic cholecystectomy	Acupressure wristbands worn before anesthesia induction and removed 6 hours postoperatively.	Sham intervention	Significant reduction in PONV and rescue medication use; as effective as ondansetron.
Sadighha et al. 2008 [9]	156	RCT	Laparoscopic cholecystectomy	Acupressure wristbands worn before anesthesia induction until clearance from recovery.	Metoclopramide & sham	P6 acupressure significantly reduced PONV at 2 and 6-hours post-surgery compared to controls.
Sharma et al. 2007 [18]	60	RCT	Laparoscopic cholecystectomy	Acupuncture applied 5 min and/or ondansetron applied 10 min before anesthesia induction.	Ondansetron 4mg IV	P6 acupuncture was equivalent to ondansetron in preventing PONV.
Zarate et al. 2001 [19]	22	Double-blinded RCT	Laparoscopic cholecystectomy	TEAS with Reliefband device worn for 9 hours after surgery.	Sham-controlled	TEAS reduced nausea but not vomiting after laparoscopic cholecystectomy.
Liu et al. 2008 [21]	96	RCT	Laparoscopic cholecystectomy	TEAS applied for 30-60 min before anesthesia induction until the end of procedure.	Sham	TEAS significantly reduced PONV severity and incidence over 24 h.
Kim et al. 2015 [26]	120	Double-blinded RCT	Laparoscopic cholecystectomy	Capsicum plaster at P6 applied before anesthesia induction and removed after 8 hours postoperatively.	Placebo	Capsicum plaster significantly reduced nausea but had limited effect on vomiting.

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White et al. 2012 [10]	100	RCT	Laparoscopic procedures	Acupressure wristbands were worn 30 to 60 min before anesthesia induction and removed 72 hours postoperatively.	Sham devices	P6 acupressure significantly reduced vomiting but did not improve time to normal activities.
Harmon et al. 1999 [11]	104	RCT	Laparoscopic procedures	Sea-Band acupressure wristbands worn before anesthesia induction and removed after 20 minutes.	Sham intervention	Sea-Band reduced PONV incidence significantly in laparoscopy patients.
Arnberger et al. 2007 [15]	220	Double-blinded RCT	Laparoscopic procedures	Electroacupuncture targeting the median nerve versus control targeting the ulnar nerve.	Sham stimulation	Significant reduction in PONV incidence compared to control.
Ho et al. 1990 [17]	100	RCT	Laparoscopic procedures	Electroacupuncture group, TENS group, and prochlorperazine 5 mg group	Prochlorperazine 5 mg IV	Comparable effectiveness to prochlorperazine in preventing emesis
Khan et al. 2004 [20]	42	RCT	Laparoscopic procedures	TEAS using TOF-Watch worn 60 to 90 min during procedure.	Placebo	TEAS significantly reduced 24-hour PONV incidence and need for rescue anti-emetics.
Coloma et al. 2002 [44]	268	Double blinded RCT	Laparoscopic procedures	Saline with Reliefband group and Ondansetron (4 mg IV) with Reliefband group	Ondansetron and sham band	Combination group had a significantly higher complete response rate than acustimulation group. Fewer emetic events in the combination group.
Liodden et al. 2011 [28]	154	RCT	Pediatric tonsillectomy and/ or adenoidectomy	Acupuncture during anesthesia and acupressure wristbands for 24h postoperatively	Dexamethasone as antiemetic.	Acustimulation significantly reduced postoperative vomiting/retching. The effect was more pronounced in girls and children aged 1-3 years.
Butkovic et al. 2005 [30]	120	RCT	Pediatric hernia repair, circumcision, or orchidopexy	Laser acupuncture and saline infusion group	Metoclopramide 0.1 mg/kg IV and sham laser group; sham laser and saline infusion group	Laser acupuncture significantly reduced PONV compared to the control group. No significant difference between laser acupuncture and metoclopramide, suggesting both are equally effective in preventing PONV.
Wang et al. 2002 [31]	187	RCT	Pediatric surgery	Bilateral acupoint injections and IV saline group	Droperidol + sham acupuncture Sham point injections + IV saline Sham acupuncture and IV saline	Acupoint injections significantly reduced early PONV compared to sham groups and required less rescue ondansetron. No significant difference between P6 acupoint and droperidol in PONV prevention. No significant difference in late PONV among groups.

Kabalak et al. 2005 [32]	90	RCT	Pediatric tonsillectomy	TEAS (20 Hz) for 5 minutes group and Ondansetron 0.15 mg/kg group	Ondansetron 0.15 mg/kg IV	TEAS and Ondansetron significantly reduced the incidence of postoperative vomiting compared to the control group, but Ondansetron group had more side effects.
Lee et al. 2013 [16]	178	RCT	Postoperative patients	Electroacupuncture on P6 pre- and post-operatively.	Non-acupuncture control group	Pre-operative electroacupuncture significantly reduced the incidence and severity of PONV compared to post-operative treatment and control.
Hsiung et al. 2015 [109]	60	RCT	Subtotal gastrectomy	Acupressure at P6 and ST36 acupoints	Standard postoperative care	Acupressure significantly reduced postoperative pain and time to first flatus but had no significant effect on PONV or time to first defecation.
Hofmann et al. 2017 [38]	110	RCT	Ambulatory surgery	Acupressure bead patch	Sham patch	Acupressure significantly reduced PONV in all postoperative phases.
Fan et al. 1997 [39]	200	Double blinded RCT	Ambulatory surgery	Acupressure bead bands	Sham bead placement	Acupressure significantly reduced the incidence of PONV.
Wang et al, 2010 [56]	80	RCT	Supratentorial craniotomy	TEAS before anesthesia induction.	Sham	TEAS combined with ondansetron reduced PONV incidence after craniotomy.
Ebrahim Soltani et al. 2011 [40]	200	RCT	Strabismus surgery	Acupressure wristbands worn for 30 min before anesthesia induction and removed 6 hours postoperatively.	Sham	P6 acupressure significantly reduced PONV incidence, comparable to ondansetron and metoclopramide.
Amir et al. 2007 [41]	40	Blinded RCT	Middle ear surgery	Acupuncture with electrical stimulation	Sham acupuncture	Acupuncture had a significantly lower incidence PONV.
Misra et al. 2005 [46]	120	Double blinded RCT	Middle ear surgery	Capsicum plaster at P6 acupoint group	Placebo plaster at p6 acupoint or Placebo plaster + Ondansetron 4 mg IV	Capsicum plaster at P6 acupoint and ondansetron both significantly reduced the incidence of PONV and need for rescue antiemetics at 6 hours. At 24 hours, ondansetron group showed a reduction in the need for rescue medication. Capsicum plaster's efficacy was comparable to ondansetron for the first 6 hours post-surgery.
White et al. 2002 [43]	120	Double blinded RCT	Plastic surgery	Saline IV with Reliefband group and Ondansetron (4 mg IV) with Reliefband group	Ondansetron and sham band	Combination of ondansetron and Reliefband significantly reduced PONV and need for rescue antiemetics compared to ondansetron alone. Combination group also had improved diet resumption and higher quality of recovery.

Zhang et al. 2014 [64]	72	RCT	Cosmetic breast surgery	TEAS 30 minutes at three acupoints on hand/forearm	Sham stimulation	Transcutaneous electric acupoint stimulation reduced recovery room stay, time to removal of the laryngeal mask airway, and time to reorientation of the patient. Postoperative pain and side-effects were also lower in the treatment group.
Kim et al. 2004 [65]	66	Double blinded RCT	Breast surgery	TEAS Reliefband applied 10 min before end of surgery and remained for 24 h	Placebo band	The treatment group had a significantly lower incidence and severity of nausea during the first 24 h post-surgery. However, there was no significant difference in vomiting incidence or need for antiemetics.
Direkvand-Moghadam et al. 2013 [68]	102	RCT	Cesarean section	Acupressure bands group and Metoclopramide 10 mg IV group applied 15 min before anesthesia	Metoclopramide or Placebo	Both acupressure and metoclopramide significantly reduced PONV compared to the control group. The need for rescue antiemetics was significantly higher in the control group.
Harmon et al. 2000 [69]	94	Double blinded RCT	Cesarean section	Acupressure	Placebo	Acupressure significantly reduced intraoperative nausea and vomiting and PONV compared to placebo.
El-Deeb et al. 2011 [70]	450	RCT	Cesarean section	Electrostimulation for 30 min group and Ondansetron 4 mg IV group before anesthesia induction	Placebo	Both electrostimulation and ondansetron significantly reduced intraoperative and early postoperative (0-6 h) nausea and vomiting compared to placebo. No significant difference in nausea and vomiting between 6-24 h post-op.
Wani et al. 2015 [72]	50	RCT	Cesarean section	Spinal anesthesia with bupivacaine and carboprost; treatment group had P6 acupuncture, while control received ondansetron.	Ondansetron	Acupuncture at P6 was more effective than ondansetron for carboprost-induced nausea and vomiting.
Albooghobeish et al. 2017 [85]	122	Double-blinded RCT	Gynecological laparoscopy surgery	Acupuncture applied after induction and removed before extubation.	Metoclopramide	Acupuncture was superior to metoclopramide in reducing nausea.
Turgut et al. 2007 [79]	100	RCT	Gynecological surgery	Acupressure bands on both wrists	Sham bands	PONV incidence was lower in the acupressure group. Antiemetic use was significantly lower with acupressure.
Alkaissi et al. 2002 [78]	410	Double blinded RCT	Gynecological surgery	Acupressure	No treatment	Acupressure significantly reduced PONV incidence in vaginal surgery patients. No significant reduction in laparoscopic cases.

Yang et al. 1993 [96]	120	RCT	Gynecological laparoscopy surgery	Acupoint injection with 0.2 ml 50% glucose in water group and IV Intravenous droperidol (20 mcg/kg) group.	No treatment	Both acupoint injection and droperidol significantly reduced postoperative vomiting compared to the control group.
Fassoulaki et al. 1993 [91]	103	Double-blinded RCT	Hysterectomy	TENS worn 30-45 min before anesthesia induction and removed after 6 hours postoperatively.	Placebo	TEAS significantly reduced vomiting and antiemetic use, especially when combined with dexamethasone.
El-Bandrawy et al. 2013 [95]	150	RCT	Hysterectomy	TEAS or acupressure worn 30 min before anesthesia induction and removed after 8 hours postoperatively.	Acupressure & antiemetics	TEAS was superior to both acupressure and standard antiemetics.
Said et al. 2016 [63]	126	Double blinded RCT	Breast cancer	Acupressure using Sea-Band for 5 days post-chemotherapy	Placebo band and no band	No significant difference in acute nausea or emesis. Acupressure significantly reduced the incidence and severity of delayed nausea compared to control. Placebo also reduced nausea severity but not vomiting episodes. Acupressure significantly reduced the number of delayed emetic episodes and the need for rescue antiemetics.
Suh et al. 2012 [112]	120	RCT	Breast cancer	Four groups (control, counseling only, P6 acupressure only, and P6 acupressure + counseling) were assessed for upper-gastrointestinal distress using the Rhodes Index of Nausea, Vomiting, and Retching for acute (day 1) and delayed (days 2-5) CINV.	Placebo, counseling, and counseling/ acupressure	Combining acupressure with counseling enhanced symptom relief for delayed CINV.
Rithirangsriroj et al. 2015 [119]	70	RCT	Gynecologic cancer	Acupuncture or IV ondansetron 30 min before chemotherapy infusion in first cycle with cross-over of antiemetic regimen in consecutive cycles.	Ondansetron	P6 acupuncture was more effective than ondansetron for preventing delayed CINV.
Jin et al. 2013 [42]	120	RCT	Female thyroid tumor surgery	TEAS, IV droperidol, or P6 droperidol injection 30 minutes before anesthesia induction	Normal saline	TEAS, IV droperidol, and P6 droperidol injection all significantly reduced the incidence and severity of PONV compared to the control group. No significant difference was found between the three treatment groups.

Taspinar et al. 2010 [110]	34	Prospective pre-post study	Chemotherapy in gynecologic cancer patients	2 post-chemotherapy stages: no wristbands worn for five days in the 1st stage, while P6 wristbands worn bilaterally for 5 days in the 2nd stage.	Control: standard antiemetic but did not receive acupressure.	Acupressure significantly reduced nausea, vomiting, and anxiety in gynecologic cancer patients.
Roscoe et al. 2009 [113]	88	RCT	Radiation therapy-induced nausea	Acupressure bands with neutral or positive informational manipulation	Acupressure band + standard antiemetic vs no Acupressure band + standard antiemetic	Acupressure bands significantly reduced nausea compared to the control group. Providing positive information did not improve efficacy expectations or enhance the outcome.
Avc et al. 2016 [114]	90	RCT	CINV in acute myeloblastic leukemia	Acupressure with wristbands for band group and acupressure with finger pressure for pressure group	Standard antiemetic therapy	Acupressure with wristbands significantly reduced the number and severity of nausea-vomiting, while acupressure with finger pressure had no significant effect.
Habek et al. 2004 [98]	36	RCT	Hyperemesis gravidarum	Acupuncture and acupressure for 30 min daily for 7 days.	Sham	Acupuncture (90% success) was more effective than acupressure (63.6%) for pregnancy-related nausea.
Norheim et al. 2001 [100]	97	Double blinded RCT	Hyperemesis gravidarum in first trimester	Acupressure wristband	Placebo wristband	Intervention group reported reduced intensity and duration of morning sickness compared to the placebo group. Duration of symptoms was significantly reduced in the acupressure group.
Chang et al. 2011 [124]	115	Double blinded RCT	HIV/AIDS patients on HAART with persistent gastrointestinal symptoms	Acupuncture and relaxation response group (AR), acupuncture and health education group (AE), sham acupuncture and relaxation response group (RR)	Sham acupuncture and health education group (SE)	The AR group showed significant improvements in gastrointestinal symptoms, particularly for loose stools and nausea compared to all other groups.
Allais et al. 2012 [126]	40	RCT	Migraine without aura with accompanying nausea in female patients	Random treatment during six migraine attacks, with three attacks using the Sea-Band® wristband (phase SB) and three without it (phase C), while nausea intensity was assessed at 0, 30, 60, 120, and 240 minutes using a 0-10 scale.	Acupressure band vs no Acupressure band	Acupressure significantly reduced nausea compared to the control phase. At 30, 60, 120, and 240 minutes, nausea intensity was lower in the acupressure phase (SB). A significant reduction in nausea was noted in more patients in the acupressure phase compared to the control.

Alternative acupoint for preventing nausea and vomiting: auricular acupoint stimulation

Shin et al. [127] found that auricular acupressure significantly reduced nausea and retching in 50 colorectal cancer patients receiving chemotherapy after surgery. The experimental group showed significantly lower nausea ($p = 0.011$) and retching ($p = 0.014$) compared to the control group, with significant interaction effects between time and group on the total Index of Nausea, Vomiting, and Retching (INVR) score ($F = 8.23$, $p < 0.001$). Eghbali et al. [128] found that auricular acupressure significantly ($p = 0.001$) reduced chemotherapy-induced nausea and vomiting in 48 breast cancer patients. The comparison was made between standard medications and auricular acupressure for five days versus standard medications.

Conclusion

Stimulation of the P6 acupoint (Nei-Guan) can be an effective nonpharmacologic alternative for managing nausea and vomiting in various clinical settings, including postoperative care, pregnancy-related symptoms, and chemotherapy-induced nausea. Despite the advancements in antiemetic drug therapies, none have proven universally effective and are often accompanied by other adverse effects. In contrast, P6 stimulation via various methods such as acupressure, electroacupuncture, transcutaneous acupoint electrical stimulation (TAES), and even capsicum plaster offers a noninvasive, cost-effective, and well-tolerated approach to preventing emetic symptoms. However, the evidence remains mixed and sometimes contradictory when it comes to treating active emetic symptoms. The variability in outcomes may be attributable to differences in the type of procedure, the timing and method of P6 stimulation, as well as patient-specific factors. Overall, P6 acupoint stimulation is a very well-tolerated and cost-effective therapeutic approach to managing emetic symptoms; further standardized research is needed to better define the situations where it is most efficacious and to establish optimal treatment protocols. Stimulation of other acupoints (e.g., auricular acupoint stimulation) may also be effective alternatives to P6 acupoint stimulation for managing emetic symptoms.

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