ARTICLE

Role of Japanese acupuncture in early return of bowel function after intraabdominal surgery in children between 3-18 years of age

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OBJECTIVE: This study aims to assess the effectiveness of unilateral ST 36 stimulation using Japanese acupuncture technique in the early return of bowel function after intrabdominal surgery compared with placebo in children between 3-18 years of age undergoing general anesthesia.

MATERIALS AND METHODS: This is a single-center, prospective, randomized controlled trial (RCT) among American Society of Anesthesiologists (ASA) I-III children aged 3-18 admitted for elective intraabdominal surgery under general anesthesia. Thirty-eight subjects were randomly assigned to non-acupuncture or acupuncture group. Press tack needle was placed on the right ST 36 point of the subject and stimulated on five occasions. Bowel motility, time to first flatus, first sips of water, start of solid food, first defecate, and length of hospital stay were the outcomes recorded.

RESULTS: The acupuncture group had earlier normal bowel sounds appreciated, and faster time to first flatus and defecate. Time to start sips of water, initiate feeding, and discharged from the hospital were earlier in the non-acupuncture group. Nonetheless, these were all statistically insignificant (p=0.188, 0.270, 0.307, 0.472, 0.085, and 1.0). Return of bowel sounds per minute was found to be prompter in the acupuncture group compared to non-acupuncture, which was statistically significant on the first day postoperatively with a p value of=0.045.

CONCLUSION: Unilateral ST 36 stimulation using Japanese acupuncture can help with early recovery of normoactive bowel sounds onthe first day after intraabdominal surgery. However, this was ineffectual in enhancing overall bowel function following intraabdominal operation. Larger, homogeneous abdominal surgery is advised for future investigations.

Keywords: *Japanese Acupuncture, Post Operative Ileus (POI), ST 36*

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INTRODUCTION

Abdominal surgery is the third most common surgery performed in our institution, Philippine Children's Medical Center (PCMC), following vascular access and herniotomy. In 2022, Seventeen percent of operations performed were abdominal surgeries for various pathologies. Post-operative ileus (POI) is a common complication of gastrointestinal surgery. This places patients in a prolonged fasting phase post-operatively, leading to patient and guardian dissatisfaction and longer hospital stays. Given the prevalence of POI and the associated impact on patient outcomes and satisfaction, exploring alternative or adjunctive therapies like acupuncture holds promise for improving perioperative care in pediatric patients.

Acupuncture has gained recognition in Western medicine primarily for its role in pain management and reducing post-operative nausea and vomiting (PONV), among other conditions. However, its potential to improve bowel motility in the perioperative period, especially among pediatric patients, has been less explored than other applications.

While there's growing interest in acupuncture, particularly in pediatric care, the limited research on its specific effects on bowel motility in the perioperative setting underscores the need for further investigation. Understanding the mechanisms by which acupuncture may influence gastrointestinal function and conducting well-designed clinical studies in pediatric populations undergoing abdominal surgery may provide valuable insights into its efficacy and safety.

Incorporating acupuncture into the management of postoperative ileus at PCMC may offer a holistic approach to care, potentially improving patient outcomes and satisfaction. Collaborative efforts between surgeons, anesthesiologists, and other healthcare practitioners may facilitate the integration of acupuncture into existing clinical pathways ensuring safe and effective use for pediatric patients undergoing abdominal surgery.

Acceptability of acupuncture as part of perioperative management in children, or even in adults, has been challenging due to the process of inserting needles into the skin. Fear of needles, pain, and discomfort associated with the procedure are common concerns among patients and caregivers.

While there have been various studies investigating the use of perioperative acupuncture to improve bowel function and reduce the incidence of POI in adult populations, research in the pediatric population is relatively limited. Postoperative ileus is indeed distressing physically, emotionally, and economically, and finding effective interventions to mitigate its

occurrence is crucial, especially in vulnerable pediatric patients. Given the limited research conducted locally on acupuncture as an intervention for POI in pediatric patients, there is an opportunity for further investigation in this area.

Acupuncture has various beneficial effects, among which is early recovery of bowel function. However, limited studies have been done involving the pediatric population. This study aims to assess the effectiveness of acupuncture in improving bowel function after abdominal surgery among children and its applicability to anesthesiologists and other medical personnel. Hopefully, this study will provide statistical evidence for the inclusion of acupuncture performed by non-acupuncturists in Enhanced Recovery After Surgery (ERAS) protocol in pediatrics.

After abdominal surgery, the small intestine function is expected to recover within hours after the procedure, followed by the stomach at 1-2 days, and the colon at 3-5 days. [2] However, this is not always the case. Postoperative ileus is a common occurrence following abdominal surgery. It is defined as transient slowing or stopping of bowel motility occurring within 3-5 days post-operation. [3,5,6] It is frequently presented with abdominal distention, vague diffuse abdominal discomfort, nausea, and vomiting. [3,4,5] This can lead to patients' and caregivers' discomfort and prolonged hospital stay.

Some of the risk factors identified for postoperative ileus include male gender, poor American Society of Anesthesiologists (ASA) physical status, advanced malignancy, emergency procedures, extensive bowel manipulation, long duration of operation, significant blood loss, electrolyte imbalances, and opioid use. [5,7,8,9]

The study conducted by Mazzotta et al. (2020) explained the pathogenic cellular mechanisms underlying postoperative ileus. It suggests that POI results from the intricate interplay of inflammatory and immune cells in response to surgical manipulation and trauma within the muscularis externa of the gastrointestinal tract. These insults prompt the activation of reactive enteric glial cells, ultimately disrupting the enteric nervous system.[10

Venara et al. (2016) stated that postoperative ileus evolves across three stages. The first stage entails a neurologic process via the sympathetic nervous system, and the subsequent stage involves hormonal and inflammatory mechanisms. Lastly, stimulation of the parasympathetic nervous system or resolution of ileus. [6]

Hyperactivity of the sympathetic nervous system results in inhibition of Enteric Nervous System (ENS) circuits due to α_2-mediated presynaptic suppression of excitatory transmission and direct postsynaptic inhibition of ENS activity. [11]

Furthermore, Alpha-2 adrenergic receptors stimulation in the inflamed muscularis mucosa increases the synthesis of messenger RNA of the inducible nitric oxide synthetase with the release of nitric oxide (NO) [12]. Activation of Cyclooxygenase-2 (COX2) caused by an upsurge in NO. Consequently, triggering gastrointestinal dysfunction and inhibitory motor reflexes. [13]

Furthermore, manipulation of the intestines activates the inflammatory cells and increases permeability of the intestinal epithelial barrier resulting in bacterial translocation leading to postoperative ileus. [6]

Despite a plethora of pediatric research attempts to define the term, there is still no widely recognized definition of postoperative ileus in pediatrics. Pediatric patients with POI face particular difficulties because of differences in age, underlying medical issues, and surgical techniques.

Owing to the numerous literatures published supporting the efficacy and safety of acupuncture in the adult population, acupuncture has been popular as part of complementary medicine across the world since its first use in 1958. Acupuncture has a myriad of roles in the perioperative period; these include anxiety and pain management, reduction of postoperative nausea and vomiting, and postoperative ileus. [14,15] However, only qualified acupuncturists can utilize Traditional Chinese Medicine (TCM) due to the complexity of the technique.

The role of acupuncture in gastrointestinal motility is due to the regulation of pathways, transmitters, and modulators of the nervous system. Among the most studied acupuncture points that facilitate bowel motility is ST 36, also known as Zusanli, located lateral to the tibia, four fingerbreadths below the patella. [16] (see Appendix A) Stimulation of ST36 restores impaired gastric slow waves via the vagal pathway, the efferent parasympathetic pathway, and the enhancement of SCF/ckit pathway. [17, 18] Furthermore, acupuncture at ST36 increases motilin and cholecystokinin secretion, which are potent regulators of gastric motility. [19]

A study conducted by Jung et al. (2017), probed the effect of acupuncture on postoperative ileus after distal gastrectomy among adults, wherein they used sitz markers, time to first flatus, start of sips of water, and soft diet as parameters to evaluate postoperative ileus. The result of the study showed that the acupuncture group had better surgical outcomes and fewer remnant sitz markers on postoperative days 3 and 5. [4]

The study conducted by Liu et al in 2022 evaluated the effectiveness of nurse-delivered acupressure on early postoperative gastrointestinal function among patients who underwent colorectal cancer surgery. The study applied acupressure at

on early postoperative gastrointestinal function among patients who underwent colorectal cancer surgery. The study applied acupressure at ST36 for five consecutive days after surgery and measured outcomes such as passage of flatus, defecation, abdominal distention, and bowel motility. The results unambiguously showed a significantly shortened bowel recovery in the intervention group. [17]

Several meta-analyses were also conducted, probing the effectiveness of acupuncture on the early return of bowel function following surgery among adults. Though there is low-quality evidence due to the limited number of studies available, most literature showed favorable responses in the acupuncture group; time to first flatus and defecate were both reduced. [4,16]

In traditional Chinese acupuncture, the fundamental correlate of analgesia has been the "De-Qi sensation." [20] De-Qi is usually translated as needle sensation. It is often purported to cause aching, tingling, pressure, distention, and heaviness. [21] A sensation not tolerated by children.

Japanese acupuncture is based on meridian therapy (wherein great emphasis has been placed on the palpation of pulses in the wrist and abdominal areas). [22] In Japanese acupuncture, smaller, finer, and sharper needles are used, which makes the needling process unnoticeable. Needle placement is gentle and superficial, which makes it more tolerable. [23] Furthermore, newer technologies have produced needles in the form of adhesive discs that can be used by non-acupuncturists and are more suitable for use with pediatric patients.

Acupuncture in children has been gaining attention in Western medicine. In the US, about one-third of pediatric pain centers include acupuncture as part of their treatment armamentarium. [24] Traditional Chinese medicine (TCM) believes that children tend to positively respond to acupuncture because they have genial acupoints through their extremities, abdomen, and face. [25]

Several studies have shown that acupuncture is effective and safe for addressing myriad medical concerns in pediatric patients with minimal adverse events, including transient bleeding, numbness, and infection [24,25,26,27]. In the perioperative period, the most commonly studied uses of acupuncture are managing acute pain, and postoperative nausea and vomiting.

In 2015, Tsao et al conducted a randomized control study on the role of intraoperative acupuncture for post-tonsillectomy pain in children. Acupuncture did not cause any adverse events, and the study found that it improved pain control and earlier resumption of food after surgery[28]. A similar study was done by Ismail et al (2021) which also showed better postoperative pain control with no adverse effects after

unilateral acupuncture in children who had undergone adenotonsillectomy. [29]

The first local study on acupuncture was conducted at PCMC in 2019. This study probed the use of Japanese acupuncture for postoperative nausea and vomiting among children ages 5-18 years old who underwent general anesthesia for various surgeries. In the said study, P6 stimulation using Japanese press-tack needles was done perioperatively. Single-point localization was done by the primary investigator, and stimulation was provided by anesthesia providers who didn't have training in acupuncture. Postoperative nausea and vomiting were recorded using a BARF scale. This study showed a lesser incidence of postoperative nausea and vomiting in the acupuncture group compared to the control group. Additionally, the simplicity of the single acupuncture point and the ease of use of press-tack needles provide avenues for the utilization of acupuncture even by non-acupuncturists [30].

A journal published by Jindal et al. in 2008 reviewed the evidence on the safety and efficacy of acupuncture in children. Among the frequent reactions reported are sedation, needle pain, redness, and neuropathy. Puncture erythema is the most commonly recounted side effect. [31]

In 2023, a retrospective study on pain and satisfaction during pediatric acupuncture was done by Gold et al., wherein outpatients in a pain clinic aged 8–12 underwent acupuncture. A Likert scale and a face pain scale were used to assess satisfaction and pain, respectively. The results showed that patients experienced minimal pain and had a high satisfaction rating. [32]

GENERAL OBJECTIVE

This study aims to assess the effectiveness of unilateral ST 36 stimulation using the Japanese acupuncture technique in the early return of bowel function after intraabdominal surgery compared with placebo in children between 3-18 years of age undergoing general anesthesia.

SPECIFIC OBJECTIVES

1. To describe the demographic characteristics of participants from both groups. (acupuncture and non-acupuncture)
2. To determine the difference in the surgical outcomes among acupuncture and non-acupuncture groups.
    a. Time to first flatus
    b. Time to first defecate
    c. Length of hospital stay
3. To describe adverse events from the use of press tack needles during the perioperative period.

4. To determine the acceptability of Japanese acupuncture among the pediatric population.

Materials and Methods

This is a single-center, prospective, randomized controlled trial (RCT) among children 3-18 years old who underwent intraabdominal surgery under general anesthesia.

Patients who had undergone intraabdominal surgery under general anesthesia at the Philippine Children's Medical Center were recruited in this study. Inclusion and exclusion criteria are listed below.

Inclusion criteria	Exclusion criteria
1. Children between 3-18 years old	1. On medications that affect gastrointestinal function for the past 7 days (see Appendix B)
2. ASA PS 1-3	2. Bleeding tendencies*
3. Admitted patients	
4. Elective surgery	

*based on PT/PTT above acceptable range or based on history of bleeding tendencies such as spontaneous or unusual bruising or bleeding

The sample size was computed using OpenEpi Version 3.01. Based on the results of the study by Jung et al. in 2017 [4] wherein acupuncture was investigated in relation to post-operative bowel motility with a confidence interval of 95% and a power of 80%, the sample size was computed to be 19 patients per group with a total sample size of 38.

Right ST36 stimulation using Japanese press tack acupuncture needles, Pyonex (see Appendix C) on five occasions: (1) upon receiving the patient at the holding area, (2) before induction of anesthesia, (3) after transferring the patient to the PACU, (4) 12- 24h, and (5) 24-48h postoperative period. Stimulation was done by gently tapping the right ST36 point 10 times by the primary investigator.

All potential subjects were evaluated pre-operatively. Intervention and possible complications were explained to guardians and patients. Parental consent or assent, if applicable, was secured from guardians and patients who meet the inclusion criteria. Simple randomization to either acupuncture or placebo group in a 1:1 ratio was done using fishbowl technique. The patient, caregiver, and anesthesiologists were blinded to group assignments.

The type of intervention was concealed from the investigators during the application process and until data collection was completed. Press-tack needles were opened inside an opaque box to hide the presence or absence of needle components.

Upon receiving the patient at the Operating Room (OR) complex, vital signs at the ward were recorded. Based on the randomization, the localization of the ST 36 point and application of intervention were performed by a trained investigator at the OR complex waiting area or in the ward.

Group A (Acupuncture) received acupuncture as follows: Right ST36 point was identified by the investigator, press-tack needle was placed and then covered by a medical bandage.

Group NA (Non-acupuncture) received a placebo as follows: Right ST36 was identified by the investigator, identical press tack without the needle tip was placed and covered by an identical medical bandage.

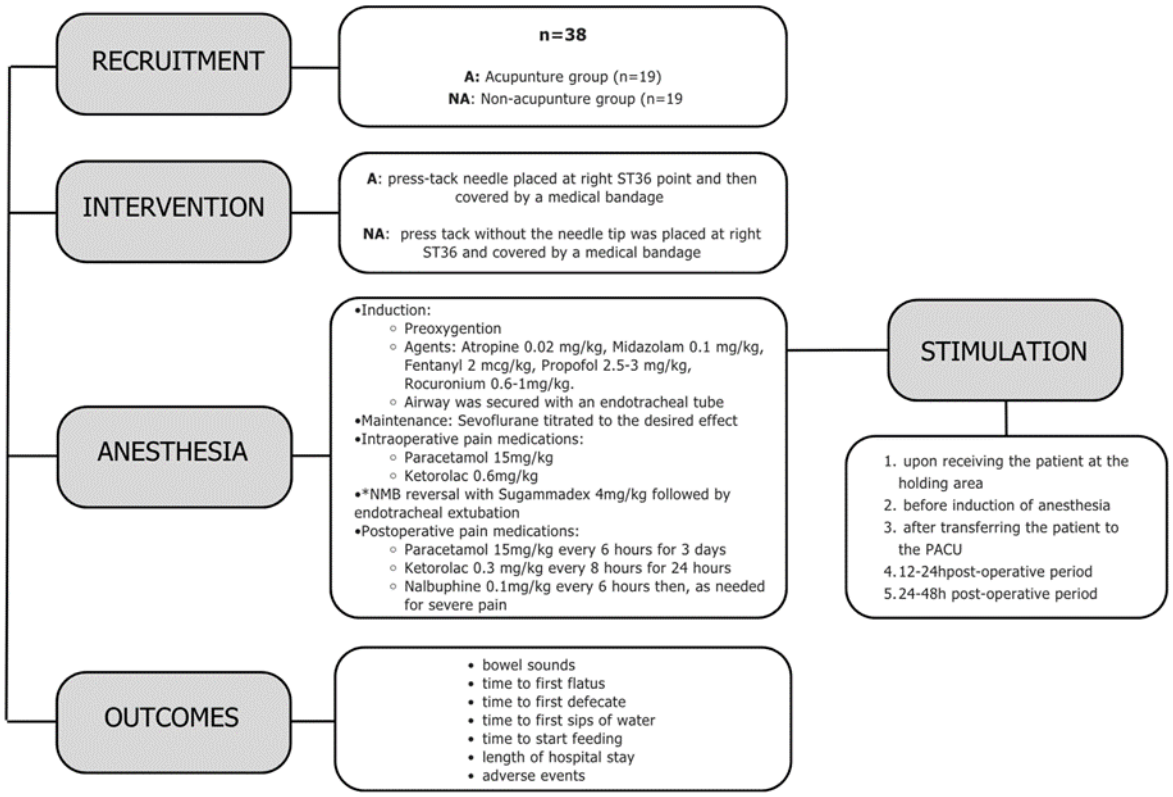
After placement of the intervention, the primary investigator stimulated the ST36 point by gentle tapping 10 times. Stimulation was repeated before induction of general anesthesia as well.

Induction of general anesthesia transpired as follows: preoxygenation, Atropine 0.02 mg/kg, Midazolam 0.1 mg/kg, Fentanyl 2 mcg/kg, Propofol 2.5-3 mg/kg, Rocuronium 0.6-1mg/kg. The airway was secured with an endotracheal tube. Anesthesia was maintained with sevoflurane titrated to the desired effect. Paracetamol 15mg/kg and Ketorolac 0.6mg/kg were given intraoperatively. At the end of the surgery, neuromuscular blockade was reversed with Sugammadex 4mg/kg followed by endotracheal extubation. Stimulation of the ST 36 point was repeated at the PACU.

Pain control was managed with the following medications: Paracetamol 15mg/kg every 6 hours for 3 days, Ketorolac 0.3 mg/kg every 8 hours for 24 hours, and Nalbuphine 0.1mg/kg every 6 hours then, as needed for severe pain using age-appropriate pain scale (FLACC age 3 to 7 years old, FACES scale 8-12 years old, NRS >12 years old).

Stimulation was repeated 12-24h and 24-48h postoperatively by the primary investigator. Abdominal auscultation on the right lower quadrant of the abdomen was done once daily for 1 minute by the primary investigator. Bowel motility, time to first flatus, time of first sips of water, start of solid food, time to first defecate, length of hospital stay, and adverse outcomes were recorded.

Figure 1. *Methodology*



*NMB: Neuromuscular blockade

OUTCOME ASSESSMENT

The following data were recorded for each participant:

1. Demographics
2. Time to first flatus
3. Time to first defecate
4. Time to first sips of water
5. Time to start feeding
6. Length of hospital stay
7. Adverse reactions
8. Satisfaction rating (5-point bipolar likert scale) of the patient and caregiver

This study adhered to ethical guidelines and secured approval from the Institutional Research-Ethics Committee (IREC). Written consent and assent, if necessary, were obtained.

The procedure, complications, risks, and benefits were thoroughly explained to the patient and their parents or guardians. Physical and psychological harm were kept to an absolute minimum. Any adverse reactions that develop were reported accordingly.

Guardians accompanying the patient in the OR complex or PACU were advised that they could withdraw from the study at any moment. Similarly, patients were informed that they could drop out at any time and still receive the same standard of care. The data of the subjects were kept confidential and concealed from anyone not involved in the study.

The study was not supported or funded by any company. There were no additional costs or financial benefits for the subjects. In exchange for participating in the trial, a pen was given to the patient or guardian.

Data was encoded using Microsoft Excel Version 16.78.3 and was analyzed with Stata 17 MP. The clinicodemographic data was presented using summary statistics. Numerical variables such as age, height, weight, and total operating time were reported as mean and standard deviation whereas categorical variables were demonstrated as frequency and percentage. Data was checked for normality using the Shapiro-Wilk test. Kruskall-Wallis test was used for numerical variables while, the Fisher exact test was performed for ASA classification, anesthesia technique, and procedure. For the remaining categorical variables, Chi-square was utilized. Fisher exact test was also used to compare outcomes such as time to flatus and length of hospital stay, as well as patient and caregiver satisfaction. The level of significance was set at 0.05.

Thirty-eight patients were recruited and randomly assigned to either NA (n=19) or A (n=19) group. One patient from the NA group and two patients from the A group were withdrawn from the study due to infringement in the protocol (use of Morphine post-operation). A total of 35 subjects, NA (n=18) A (n=17), were assessed for the study outcomes. No adverse events related to acupuncture were observed or reported. (Figure 2)

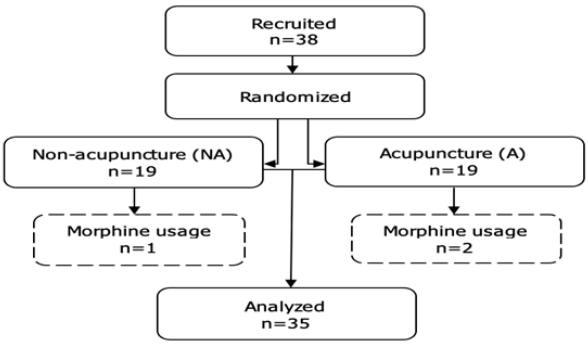


Figure 2. *Flowchart for clinical trial*

The clinicodemographic profiles were comparable for both groups. (Table 1) The majority of the surgical procedures performed were closure of colostomy and pullthrough with abdominal approach. Other procedures performed were as follows: oophorocystectomy duodenostomy, excision of meckels diverticulum, open cholecystectomy, splenectomy, appendectomy, and augmentation cystoplasty. (Table 2)

Table 1. *Clinicodemographic data*

	Acupuncture Group (n=17)	Non-Acupuncture Group (n=18)	p-value
Age (years)	6.23 ± 4.88	7.5 ± 4.46	0.1639
Gender			0.546
Male	5	6	
Female	12	12	
ASA Classification			0.401
1	7	10	
2	10	7	
3	0	1	
Height (cm)	114.06 ±23.14	117.01 ± 19.91	0.3907
Weight (kg)	22.43 ± 15.64	23.56 ± 10.97	0.3727
BMI			0.358
Underweight	5	8	
Healthy	12	10	
Diagnosis			0.607
Hirschprung's Disease	5	8	
Imperforate anus	7	5	
Others	5	5	
Procedure			0.294
Closure of Colostomy	11	8	
Pullthrough	2	6	
Others	4	4	
Anesthesia Technique			0.402
GETA	2	5	
GETA + Regional	15	13	
OR Time (minutes)	187.12 ± 66.72	249 ± 154.22	0.4879

Table 2. *Intraabdominal procedure distribution between the acupuncture and non-acupuncture groups*

	Acupuncture Group (n=17)	Non-Acupuncture Group (n=18)
Closure of Colostomy	11	8
Pullthrough	2	6
Oophorocystectomy	1	1
Explore laparotomy, duodenostomy	0	1
Excision of Meckel's diverticulum	0	1
Open cholecystectomy	1	0
Splenectomy	0	1
Explore laparotomy, appendectomy	1	0
Augmentation cystoplasty	1	0

The comparison of surgical outcomes between NA and A groups is shown in Table 3. All patients in the A group had their bowel sounds return to normal in <24 hours. Whereas 83% of patients in the non-acupuncture group had their bowel sounds return to normal in <24h, the remaining 17% of the patients had normal bowel sounds returned in 48h. More patients in the A group than in the NA group (55% vs.35%) had their first flatus within a 24-hour period. The proportion of patients who defecated in <48h was greater in the A compared to NA group (64.71% vs 44.44%). Patients in the NA group were noted to have earlier sips of water and start oral feeding earlier, and shorter hospital stay. However, no statistical difference in the surgical outcomes was noted in both groups (p=0.188, 0.270, 0.307, 0.472, 0.085, and 1.0).

Table 3. *Comparison of surgical outcomes between the acupuncture and non-acupuncture groups*

	Acupuncture Group (n=17)	Non-Acupuncture Group (n=18)	p-value
Return to Normal Bowel Sounds			0.188
< 12hour	4	1	
12 - <24h	13	14	
24 - <36h	0	2	
36 - <48h	0	1	
Time to flatus			0.270
<12h	0	0	
12 - <24h	10	6	
24 - <36h	4	8	
36 - <48h	2	4	
48 - <60h	1	0	
Time to defecate			0.307
< 12h	0	0	
12 - <24h	2	0	
24 - <36h	2	4	
36 - <48h	7	4	
48 - <60h	1	5	
60 - <72h	4	3	
72 - <84h	1	1	
84 - <96h	0	1	
Time to first sips of water			0.472
< 12h	0	0	
12 - <24h	0	1	
24 - <36h	1	0	
36 - <48h	2	1	
48 - <60h	1	3	
60 - <72h	3	7	
72 - <84h	4	2	
84 - <96h	6	4	
Time to start feeding			0.085
24 - <36h	0	1	
36 - <48h	1	0	
48 - <60h	1	1	
60 - <72h	2	3	
72 - <84h	2	8	
84 - <96h	11	5	
Length of hospital stay			1.000
60 - <72h	0	1	
72 - <84h	1	1	
84 - <96h	1	1	
≥ 96h	15	15	

A significant statistical difference in bowel sounds per minute between the A and NA groups was observed on the first day (p= 0.045). Hypoactive bowel sounds are present in all patients in the NA group, while in the acupuncture groups, this is only the case in 76.47% of patients. Eighty-three percent of the patients in the NA group and all of the patients in the A group had normoactive bowel sounds on the second day. Still, the p-value of 0.229 indicates that this is not statistically significant. (Table 4)

Table 4. *Comparison of bowel sounds per minute between the acupuncture and non-acupuncture groups*

	Acupuncture Group (n=17)	Non-Acupuncture Group (n=18)	p-value
Bowel Sounds per minute – Day 1			
< 5	13	18	0.045
5-35	4	0	
Bowel Sounds per minute – Day 2			
< 5	0	3	0.229
5-35	17	15	

The acceptability of Japanese acupuncture among children and guardians was assessed using a 5-point Likert scale (a score $\geq$ 4 was considered acceptable). Acceptability to guardians was calculated to be 80%. However, its acceptance among pediatric patients was inconclusive (Table 5).

Table 5. *Satisfaction rating between the acupuncture and non-acupuncture groups*

	Acupuncture Group (n=17)	Non-Acupuncture Group (n=18)	p-value
Patient Satisfaction			1.000
1	1	0	
2	2	2	
3	9	10	
4	5	6	
Parent/Caregiver Satisfaction			
3	4	3	1.000
4	12	12	
5	2	2	

DISCUSSION

Postoperative ileus is a common nuisance after abdominal surgery. This poses substantial medical and economic affliction. Several studies on the role of acupuncture in improving bowel function after surgery in adults have been reported. However, no journal on the use of Japanese acupuncture in postoperative ileus among children has been published.

In an attempt to address POI among the pediatric population, Japanese acupuncture at ST 36 acupoint was conducted among (ASA) I -III children aged 3-18 years old admitted for elective intraabdominal surgery under general anesthesia. In this study, the acupuncture group had earlier bowel sounds appreciated. On the first day, the A and NA groups showed a substantial statistical difference in the number of bowel sounds per minute. Faster time to first flatus and defecate were also reported in the A group. However, these were statistically insignificant. These findings were congruent with those of Jung et al [4], Ye et al [34] Yang et al [35], and Wang et al [36] who showed that acupuncture enhances bowel function in adults after abdominal surgery.

Though clinically insignificant, the non-acupuncture group was noted to start sips of water, initiate feeding, and be discharged from the hospital earlier than the acupuncture group. This finding was distinct in this study as this was not seen in the literature reviewed. The discrepancies with the published journals' results could have been caused by variations in the intraabdominal surgical procedures that were carried out.

Numerous studies have examined the safety of acupuncture in children. A systematic review by Adams et al. assessed the safety of pediatric acupuncture and identified some adverse events associated with Chinese acupuncture in this age group. Most reported events were mild, including pain, bruising, and bleeding. The authors concluded that acupuncture is safe for children when appropriate precautions are taken. [37] In this particular trial, no adverse events were reported or observed.

The acceptability of acupuncture among parents has gradually improved. Owing to the myriad of benefits it possesses and its affordability. [32,38] Furthermore, newer technology, such as the Japanese press tack needles, enhances compatibility among the pediatric population because of its filiform needle, making acupuncture much more pleasant, and leading to parental and patient satisfaction. [1]

The strength of this trial lies in its randomized controlled design. Another strong point of this paper is the application of a press-tack needle as an adequate placebo. Moreover, the patients and investigator were blinded throughout the study. Heterogeneity among intervention groups was kept to a bare minimum.

There were limitations in this study. Like in the trial done by Maala in 2019, English transcriptions of the Japanese acupuncture research are scarce thus, were not included in this paper. The surgical outcome could have been affected by variations in intraabdominal procedures. Hence, a specific intraabdominal surgery is suggested for further investigation. The small sample size may be inadequate to compare the parameters being studied, larger population is recommended.

This trial found that unilateral ST 36 stimulation using the Japanese acupuncture approach can help with early recovery of normoactive bowel sounds after the first day of intraabdominal surgery. However, intrabdominal surgery in children was found to be ineffectual in terms of improving overall bowel function. With the lack of adverse events reported, this study may have provided additional evidence supporting the safety of Japanese acupuncture among children. Results demonstrated high parental acceptance of Japanese acupuncture. The ease with which press-tack needles can be used makes them suitable for use by non-acupuncturists. Given the safety and acceptability of Japanese acupuncture exhibited in this study, it is hoped that this fuels interest in further research on acupuncture among pediatric patients.

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