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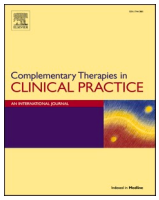

Effects of auriculotherapy on nausea and vomiting in pregnant women: A randomized clinical trial

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ABSTRACT

Background: Pregnancy induces physiological changes, commonly marked by nausea and vomiting in the first trimester, posing risks for both mother and baby. This study evaluates the effects of auriculotherapy on nausea and vomiting during the first trimester of pregnancy.

Materials and Methods: A randomized clinical trial was conducted in two primary health care centers with 56 Brazilian pregnant women who reported nausea or vomiting in the first trimester. The participants were divided into an intervention group (auriculotherapy with seeds) and a placebo group (sham auriculotherapy). The intervention was divided into three moments: pre-intervention with assessment of nausea and vomiting and application of questionnaires, and two follow-ups conducted on the fourth and seventh day of the intervention, with reassessment of nausea and vomiting.

Results: Both groups experienced a decrease in nausea and vomiting over time, with no statistically significant differences between groups in the within-group analyses at various time points. The intervention group had a greater reduction in symptoms. Within the intervention group, symptoms were more common among ferrous sulfate users and those without reported dietary disturbances. In addition, a higher incidence of nausea and vomiting was associated with the use of analgesics, morning snacks, and low intake of protein, vegetables, and fruits.

Conclusions: The intervention did not affect the between-group differences in the incidence of nausea and vomiting and vomiting effort in the first trimester of pregnancy. However, a greater reduction was observed in the intervention group.

1. Introduction

Pregnancy is characterized by physiological changes in the female body. One of the most reported complaints in the first trimester of pregnancy is nausea and vomiting, with a prevalence that can reach nearly 90% of women [1]. These symptoms can adversely affect the health of pregnant women and their infants, with mental health effects comparable to those of women diagnosed with postpartum depression [2]. In addition to the pregnant woman, the baby is exposed to risks associated with mild to moderate nausea and vomiting, such as an increased risk of low birth weight [3]. A prospective cohort of 2229 pregnant women found an association between nausea and vomiting during pregnancy and an increased risk of low birth weight [3]. In addition, low birth weight is one of the major risk factors associated with neonatal and postneonatal mortality [4].

Acupuncture is one of the complementary integrative practices to control nausea and vomiting. Auriculotherapy is emerging as a modality of acupuncture widely used to relieve various health problems, including anxiety during labor, chronic pain and chemotherapy-induced nausea and vomiting [5–8].

Several studies have investigated the effects of auriculotherapy on nausea and vomiting in pregnant women [9–12]. A comprehensive literature search identified thirteen studies with a total of 1026 participants. Regarding nausea and vomiting of pregnancy (NVP), a subtle but

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statistically significant difference was observed between the two groups. The systematic review found that the efficacy of auricular acupressure in the treatment of NVP is considered insufficient and its effectiveness remains limited [11]. Another review showed that complementary and alternative medicine (CAM) therapies were successful in alleviating NVP. Acupressure demonstrated superiority over conventional medicine in reducing antiemetic use and achieving a higher efficacy rate [12].

Thus, studies published to date have not yielded consistent conclusions regarding the effectiveness of auricular acupressure on nausea and vomiting of pregnancy (NVP) [9–12]. Therefore, there is a need for rigorously designed randomized controlled trials (RCTs) with larger sample sizes to confirm the effects of auriculotherapy in reducing nausea and vomiting in pregnancy [11,12], which is the aim of the present study. Considering the above, the aim of this study was to evaluate the effects of auriculotherapy on nausea and vomiting during the first trimester of pregnancy.

2. Material and methods

2.1. Design

An experimental randomized controlled trial was conducted with a similar and between-groups design comparing the intervention to a placebo group. The primary outcome measure was nausea and vomiting.

The study complied with the requirements of Brazilian Resolution No. 466/2012 and was registered in the Brazilian Clinical Trials Registry (registration number: RBR-7gshm23). The Consolidated Standards of Reporting Trials (CONSORT) [13] were followed in this study. The study was also approved by the Research Ethics Committee of the Federal University of Ceara in February 2020, with data collection starting in September 2020 and ending in March 2021.

2.2. Sample and participants

The study was conducted in two primary health care centers in Fortaleza, a large city in the northeastern region of Brazil. Inclusion criteria were pregnant women with gestational age (GA) up to 13 weeks, who reported nausea or vomiting, who were not using antiemetics, and who were characterized as usual risk pregnant women, and who were available to return in 7 days for follow-up of the intervention.

The exclusion criteria were diagnosis of mental disorder, speech problems or deafness that could prevent participation in the interview, presence of dermatological lesions in the auriculotherapy points that would be used in the study, and allergy to the material used in the intervention.

The criteria for discontinuation were willingness to withdraw from the study at any time after the first day of treatment, use of antiemetic drugs during the study period, unpleasant reactions associated with the treatment (such as pain or dizziness), and failure to return to the centers for reassessment or failure to answer telephone calls after 2 days from the end of the treatment period due to forgetting bias regarding the effects of the intervention.

Sample size was calculated using a formula for comparison group studies [14], with the following parameters $Z\alpha = 95\%$, $Z\beta = 80\%$, $p = 80\%$, $d^2 = 35\%$. The sample size resulted in 23 pregnant women for each group, for a total of 46 women. A percentage of 20% was added to this value to compensate for losses, resulting in a total of 56 pregnant women.

2.3. Randomization and blinding

The randomness of this study was ensured by a table of random numbers generated from the Random.org website [15] and stored in Microsoft Excel. Randomization was performed by a third party to reduce the risk of bias. Patient names for allocation by random numbers were obtained using the order of arrival at the centers during the first study approach. The flow of recruitment, exclusion, and allocation of participants is shown in Fig. 1.

Blinding was not possible in this trial because the primary researcher was the only person trained to perform the auriculotherapy session with the patients. Blinding of the participants was achieved by applying the auriculotherapy seeds in different points than in the intervention group. In addition to the participants, the evaluators were also blinded during the first and second follow-up.

2.4. Intervention

Participants were informed about the purpose of the study, the duration of treatment, and the possible effects of acupuncture at the time of the initial approach. A sociodemographic and clinical data questionnaire was then administered in a closed room at the pre-intervention moment.

The second instrument used was the Rhodes Index of Nausea, Vomiting, and Retching (RINVR), which was used to assess the intensity and frequency of nausea and vomiting. This is an eight-item scale scored from 0 to 4 (mild to severe). The scale allows assessment of the duration, frequency, discomfort, and amount of nausea, vomiting, and vomiting effort over a 12-h period, with a minimum final score of 0 and a maximum of 32.

In the present study, the RINVR scale, which evaluated the use of the scale in pregnant women and considered that the best model is the one that groups the items according to the following domains: duration, discomfort and frequency of nausea; frequency, discomfort and amount of vomiting; and discomfort and frequency of effort to vomit [16].

The intervention was conducted by the researcher, who is an auriculotherapist and nurse. In the pre-intervention phase, both groups of pregnant women received dietary advice based on the recommendations of the Brazilian Ministry of Health. These guidelines, which are routinely provided during prenatal consultations at primary health care centers, cover aspects such as the recommended frequency and quantity of food per meal, avoiding intervals of more than 3 h between meals, choosing healthy foods, avoiding processed foods, and avoiding lying down immediately after meals [17]. In addition, an initial assessment of RINVR was performed in both groups to establish a baseline for comparison with values obtained at the 1st and 2nd follow-up sessions.

The first session, conducted by the researcher, aimed to provide patients with the necessary instructions to perform acupressure at home. The interview and auriculotherapy intervention lasted approximately 30 min, and the post-treatment evaluation lasted approximately 15 min. The points selected for the intervention group included Shenmen, Sympathetic, Subcortex, Stomach and Cardia. During this initial phase, patients were introduced to the materials used for acupressure (seeds and microporous adhesive). After applying the seeds, patients were instructed to touch each seed to locate the points where pressure should be applied at home.

During the session, the researcher demonstrated the correct technique and the required pressure intensity on the applied points (circular pressure, 30 s on each point). The patients were then asked to demonstrate their understanding of the instructions by applying pressure to each point. It was emphasized that the procedure should be repeated three times a day. The seeds were applied, and the points were pressed in the following order: Shenmen, Subcortex, Stomach, Cardia, and Sympathetic. Patients were informed that although following this order was recommended, choosing a different order would not affect the treatment, consistent with another study of similar design [9]. The importance of checking for detached adhesives at home to ensure proper replacement was emphasized.

Patients were also informed that the research team would make a phone call on day 4 of treatment to ensure proper application of seed pressure, to check the integrity of the adhesives, and to confirm continued auricular stimulation. During the call, a new RINVR measurement would be taken to assess treatment effects up to that point. The

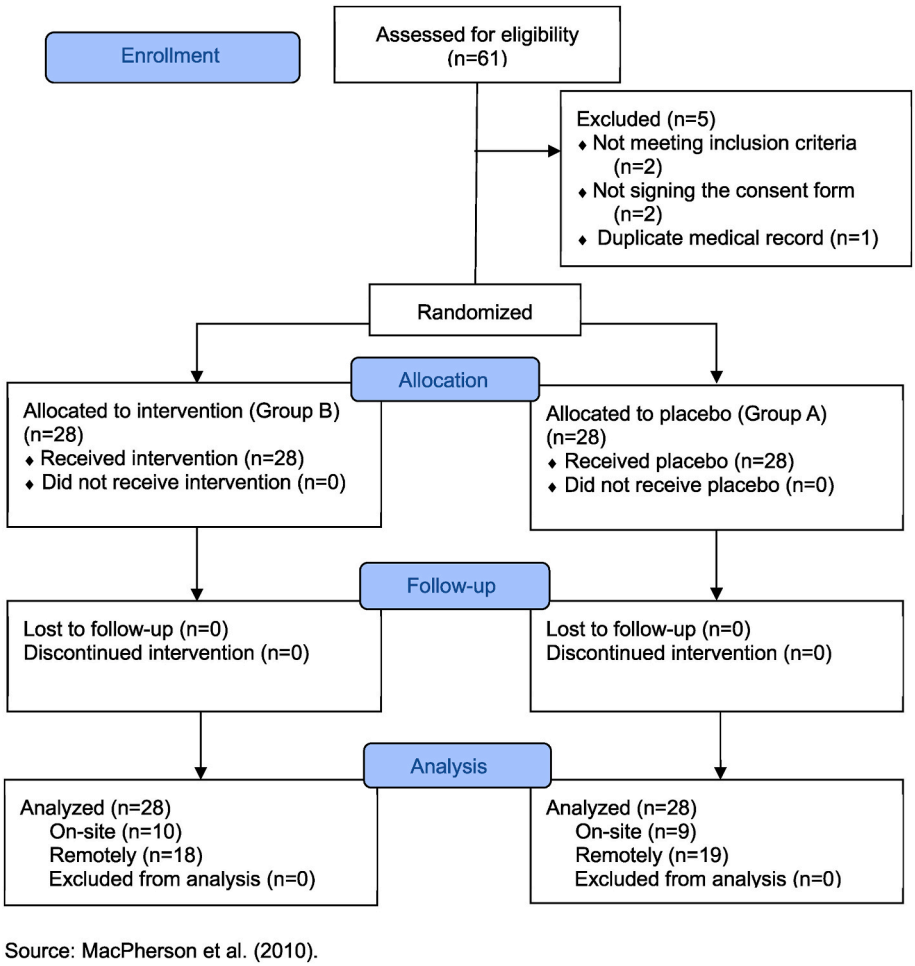

Fig. 1. Participant flow diagram depicting recruitment, randomization, and allocation to intervention and control groups in the study.
Source: MacPherson et al. (2010).

frequency was thus determined based on the efficacy of the interventions in the literature review studies, and the duration was determined based on a previous study in pregnant women, which, although it did not find significant results, did find a reduction in nausea and vomiting in the intervention group compared to the control group [10].

Immediately after the intervention, the pregnant women were given a follow-up form that reiterated the instructions received in the pre-intervention phase regarding the intensity, duration, and frequency of acupressure on the seeds. The form also emphasized the importance of checking the integrity of the adhesives. In addition, contact information for the researcher was provided in case of adverse effects or if the adhesive did not adhere properly to the skin. The form included a chart where the pregnant woman could record the number of times she applied pressure to the points each day, note the occurrence of any adverse effects, and indicate if any of the adhesives had fallen off.

Treatment lasted for a total of seven days, with the average duration of seed placement per session determined based on another study that used auriculotherapy in a similar population to treat nausea and vomiting [10]. After this period, the pregnant women returned to the center for reassessment and the RINVR scale was again applied. Each participant was given instructions on how to apply pressure to the seeds.

Follow-up was done halfway through the treatment period (day 4) by a telephone call made by a trained volunteer from the Sexual and Reproductive Health Research Group of the University associated with the study, or by nurses trained at the Primary Health Care Center who volunteered to help. The evaluators who conducted the follow-ups followed a guideline provided to them during training. The guideline included a series of questions to ensure proper pressure on the seeds, to check the integrity of the microporous adhesives, to confirm the persistence of the auricular stimulus, to inquire if the pregnant woman had used any antiemetic since the intervention until the call, and to assess the occurrence of adverse effects. The guideline also included questions for each item of the RINVR to determine if there was any improvement during this initial period.

After the seven-day period, the pregnant women returned to the centers for reassessment using the RINVR, facilitated by either a trained volunteer or a nurse with specialized training who volunteered their assistance. These volunteers were selected from different communities than the pregnant women to reduce bias. During this session, the pregnant women were asked the same set of questions as at the initial follow-up to assess changes since day 4 of the intervention. In cases where the physical return of the pregnant woman was not possible, as initially agreed, a telephone call was initiated using the same procedure as at the initial follow-up. The purpose of this call was to collect information from the questionnaire and to document any adverse effects.

In addition to the dietary guidelines for pregnant women assigned to the placebo group, seeds were applied to the Headache, Dorsalgia, and SanJiao points. The placebo group underwent identical evaluations (1st and 2nd follow-up) as the intervention group, strictly following the same protocols.

2.5. Data analysis

Data were tabulated and analyzed using the Statistical Package for The Social Sciences, version 24.0. Absolute and relative frequencies were calculated to describe categorical variables, and for numerical variables, the test of normality was performed in addition to checking means with standard deviation or median with interquartile range.

The Student's t-test was used to assess the association between quantitative variables, while the repeated measures ANOVA test was used to examine the differences between the scores within and between the intervention groups. A longitudinal mixed linear model was also constructed to verify the inference of the variables with RINVR as the response variable, also analyzing RINVR as time elapsed after the intervention. The full model was constructed (with all explanatory variables) and variables were selected using the stepwise method. The F-test was performed using one-way ANOVA to determine significance.

3. Results

3.1. Participants profile

Fifty-six pregnant women were evaluated, equally divided between the intervention group (n = 28) and the placebo group (n = 28). The mean age was 25 years, with a standard deviation of 5.48 years, a minimum age of 17 years, and a maximum age of 40 years. Most participants were in a stable relationship, self-identified as mixed race, and were unemployed homemakers. The placebo and intervention groups were compared and there were no statistically significant differences except for fruit intake, demonstrating the homogeneity of the sample.

None of the pregnant women studied reported any adverse effects during seed application or at the first and second assessments. If the participant was unable to attend, she answered the questions remotely.

3.2. Comparison of RINVR values at baseline (pre-intervention), first, and second follow-ups

Table 1 compares the mean RINVR values at baseline (before the intervention), at the first follow-up, and at the second follow-up. Table 2 shows the correlation of numerical variables with the RINVR score in both groups and the entire sample.

It is noted that the RINVR mean values decreased over time. However, the comparative analysis did not show a statistically significant difference between the groups. The data comparing the groups at different times after the intervention are shown in Fig. 2.

Repeated measures ANOVA with Greenhouse-Geisser correction revealed no statistically significant difference in mean RINVR scores between groups at the assessed time points (F (1, 211, 65.408) = 0.939; p = 0.3541). However, the mean RINVR score within the sample was significantly different between groups at the three assessments (F (1, 211, 65.408) = 55.284; p < 0.001).

Post hoc testing with Bonferroni correction indicated that the most significant differences were observed in group A (placebo), with a statistically significant difference between Time 1 and Time 2 (p < 0.001) and between Time 1 and Time 3 (p < 0.001). In group B (intervention), there was also a statistically significant difference between time 1 and both time 2 (p < 0.001) and time 3 (p < 0.001). In addition, Time 2 and Time 3 differed from Time 1 (p < 0.001), as shown in Fig. 2.

Table 1
Comparative analysis of RINVR means among groups at baseline, first follow-up, and second follow-up periods.

Groups	Initial moment		1st follow-up		2nd follow-up	
	Average	SD	Average	SD	Average	SD
Placebo	9.7500	5.038	6.8929	4.717	6.3571	4.778
Intervention	10.7143	6.229	7.0357	5.239	6.2857	5.283
	p-value*		**p-value***		**p-value***	
	0.527		0.915		0.958	

*Student's t-test; P-value referring to the difference between groups.

Table 2
Correlation coefficients of numerical variables with the RINVR score in both groups and the entire sample.

Numeric variables	Coefficients	SD	df	T	p-value[a]
Both groups					
Age	−0.267	0.120	36	−2.216	0.0331
Elapsed time until the 1st follow-up	−7.205	1.395	110	−5.164	0.0000
Elapsed time until the 2nd follow-up	1.313	0.345	110	3.802	0.0002
Placebo	Coefficients	SD	df	T	p-value
BMI	0.337	0.216	36	1.563	0.1268
Gestational Age	−0.867	0.322	36	−2.691	0.0107
Number of pregnancies	−0.130	0.525	36	−0.249	0.8050
Onset of symptoms (weeks)	1.995	0.526	36	3.795	0.0005
Intervention	Coefficients	SD	df	T	p-value
BMI	−0.429	0.313	36	−2.446	0.0195
Gestational Age	2.384	0.564	36	4.227	0.0002
Number of pregnancies	2.348	0.803	36	2.923	0.0060
Onset of symptoms (weeks)	−4.055	0.727	36	−5.581	0.0000

[a] F-test.

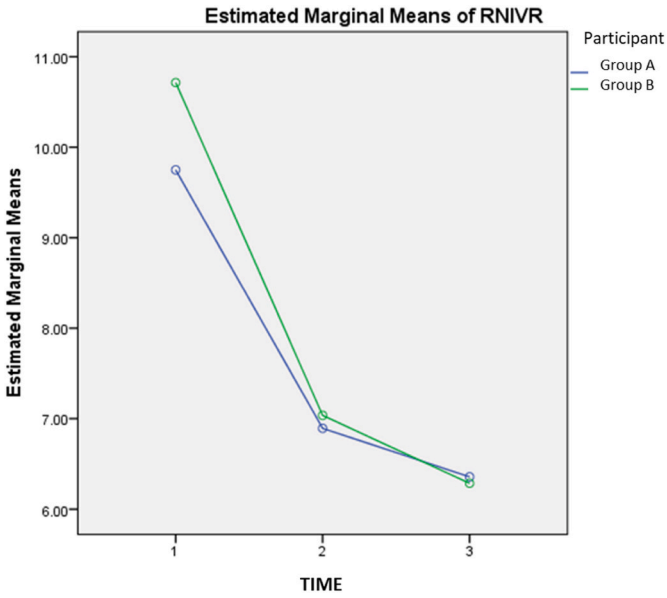

Fig. 2. Comparative analysis of groups at different time points post-intervention.

3.3. Analysis of numerical variables

The longitudinal mixed model analysis, performed with the stepwise method, showed that with the increase of 1 year of age (and considering the other fixed variables), there was a decrease of 0.267 in RINVR; that is, the RINVR seems to decrease with increasing age. When interpreting the variable time to first follow-up, an abrupt decrease in RINVR values can be seen in both groups, followed by a gradual and more stable decrease during the second follow-up.

The variables BMI, gestational age, number of pregnancies and symptom onset showed different behaviors for each group. In the placebo group, the RINVR increased by 0.337 for every unit increase in BMI. For the intervention group, the RINVR decreased by 0.429 for

every one unit increase in BMI. For the placebo group, RINVR decreased by 0.867 for every one unit increase in BMI. For the intervention group, the RINVR increased by 2.384 for each one-unit increase in GI. For the placebo group, RINVR decreased by 0.130 units for each unit increase in GI. For the intervention group, the RINVR increased by 2.348 units for every one unit increase in the number of pregnancies. For the placebo group, the RINVR increased by 1.995 units for every one unit increase in symptom onset. In the intervention group, the RINVR decreased by 4.055 units for every one unit increase in the number of weeks of symptom onset.

It was then necessary to evaluate the differences between the groups in RINVR values and possible relationships with the use of supplements and analgesics, the presence of dietary interference with nausea and vomiting, and the ingestion of certain foods. These differences are presented in Tables 3 and 4.

3.4. Analysis of differences between groups

The coefficients presented highlight a remarkable observation: pregnant women in the intervention group had higher RINVR values when using ferrous sulfate. This observation refers to the period before the interventions. Conversely, among women who reported not using ferrous sulfate, those in the intervention group also had higher RINVR values.

In relation to dietary disturbances, pregnant women in the intervention group who reported this outcome due to nausea and vomiting had higher RINVR values than those in the placebo group. Pregnant women in the intervention group who did not report dietary disturbances had a higher RINVR than those in the placebo group. However, it should be noted that the number of pregnant women who reported no dietary interference was small compared to those who reported interference, with a high discrepancy. Table 4 shows the contrasts between the levels of analgesic use, morning snack, protein, vegetable, and fruit intake (use and non-use, intake or not).

The results suggest that pregnant women who used analgesics had higher RINVR values than those who did not use analgesics at the 5% significance level (the estimate was positive). Similarly, women who ate morning snacks had a significantly higher RINVR compared to those who did not. Pregnant women who did not eat protein, vegetables, and fruits had significantly higher RINVR than those who did, with negative estimates. All variables examined refer to reports within the last 12 h from the time of the first assessment.

4. Discussion

The study showed a reduction in RINVR scores for nausea and vomiting over time in both the intervention and control groups. However, the comparative analysis showed no significant difference between the groups throughout the study. Similar results were observed in another clinical trial of 98 pregnant women of comparable duration to the present study. In this study, participants were instructed to apply pressure at home according to a guideline. Of note, the intervention group included only one auricular point in the protocol, the abdomen. Although the RINVR in the intervention group was lower than in the placebo group, statistical significance was not reached [10].

Another clinical trial with an intervention similar to this study, using the same number of seeds and lasting approximately one week, included 128 pregnant women who practiced acupressure at home. They were monitored remotely to control the intervention. The study reported a reduction in the mean nausea score on the RINVR when comparing the intervention and placebo groups. However, when the differences in vomiting and retching scores between the groups were analyzed, no significant difference was observed. The variance in nausea reduction may be due to the larger, more powerful sample size and the increased number of remote follow-ups [9].

The mean age of the participants was similar in both groups, ranging from 24 to 25 years in the analysis, with a minimum age of 17 and a maximum age of 40. The longitudinal mixed model analysis showed that RINVR decreased with increasing age. In contrast to the results of the current study, a prospective cohort of 256 UK women trying to become pregnant found that nausea and vomiting started slightly later with increasing age, by almost one day for a 3-year increase [18].

The groups differed in the relationship between BMI and RINVR values. While higher BMI values were associated with higher RINVR values in the placebo group, an inversely proportional relationship was observed in the intervention group. The UK prospective cohort showed that nausea and vomiting started earlier in women with higher BMI, about one day per 5 kg/m^2 increase [18].

The pattern of association between symptom onset and gestational age differed between groups. The later the onset of symptoms, the higher the RINVR values in the placebo group and the lower the RINVR values in the intervention group. On the other hand, as gestational age increased, RINVR values decreased in the placebo group and increased in the intervention group. The association between gestational age and nausea and vomiting symptoms is also discussed in a retrospective study of 2803 pregnant women. The study showed that the risk of prolonged nausea and vomiting of moderate intensity decreased with increasing gestational age [19].

Primiparity correlated with RINVR values only in the intervention group, with global RINVR values increasing for each unit increase in the number of deliveries, demonstrating a higher incidence of symptoms in non-primiparous women. A retrospective study on the use of antiemetics in pregnant women from national databases over 13 years, with a total of 762,437 records, showed that compared with women who did not use antiemetics during pregnancy, women who used this type of medication were mostly in their second pregnancy or higher (59.5%), suggesting a greater association between symptoms and multiparity [20].

Regarding the use of ferrous sulfate in the sample, although the prevalence was low (10.7% in the placebo group and 7.1% in the intervention group), the longitudinal analysis using a mixed model showed a global influence of ferrous sulfate on the RINVR value. This influence was evidenced by higher values in women who used this supplement. A systematic review of the interference of adverse effects of ferrous sulfate on adherence to supplementation in pregnant women indicated that the consequences of iron intake include nausea, vomiting, constipation, diarrhea, epigastric pain, and dark stools. These effects

Table 3
Group differences in ferrous sulfate usage and the impact of dietary interference on symptoms.

Variable	Difference				Measurement	SD	p-value[a]
	Group	Use	Group	Use			
Ferrous sulfate	P	Yes	I	Yes	−17,573	4.872	0.0049
	P	No	I	No	−8.682	3.308	0.0584
Dietary interference	**Group**	**Interference**	**Group**	**Interference**			
	P	Yes	I	Yes	−1.765	1.964	0.8057
	P	No	I	No	−24,490	6.548	0.0034

[a] F-test; P – Placebo, I – Intervention.

Table 4
Differences in analgesic use, morning snack consumption, protein, vegetable, and fruit intake.

Variable	Use			Measurement	SD	df	T	p-value[a]
Analgesic use	Yes	–	No	8.747	2.618	36	3.341	0.0020
Morning snack	Yes	–	No	2.753	1.004	36	2.742	0.0095
Protein	Yes	–	No	−22,957	4.239	36	−5.416	0.0000
Vegetable	Yes	–	No	−3.701	1.165	36	−3.177	0.0030
Fruit	Yes	–	No	−4.021	1.377	36	−2.919	0.0060

[a] F-test.

often cause pregnant women to discontinue iron supplementation [21].

The use of analgesics was reported only in the placebo group (n = 3, 10.7%) for complaints such as headache, lumbar and pelvic pain and was associated with an increase in global RINVR values in the longitudinal analysis. A clinical trial comparing the analgesic effects of acetaminophen and ibuprofen reported nausea as one of the adverse effects of acetaminophen, with an incidence of 4.2% in the acetaminophen group, but without a statistically significant difference [22].

Regarding dietary interference with nausea and vomiting, women in the intervention group who did not report dietary interference had higher RINVR values than those in the placebo group. Contrary to our results, a cross-sectional study of 400 Canadian pregnant women showed that 94.7% of them changed their diet to avoid nausea and vomiting [23].

Another dietary practice examined was the habit of skipping meals. Of all the meals analyzed, the morning snack was the one that affected RINVR values - pregnant women who reported not skipping this meal had higher global RINVR values. A prospective cohort study of 365 pregnant women in the United States, using multiple dietary recalls by telephone, suggests that smaller meals, such as snacks, tend to consist of processed foods. This dietary pattern may have an impact on the manifestation of symptoms [24]. This may explain our results regarding the association between the consumption of morning snacks and the worsening of symptoms in both groups (placebo: n = 12, 42.9%; intervention: n = 19, 67.9%), although this specific variable (consumption of processed foods) did not affect the RINVR values in our descriptive and longitudinal analyses.

Regarding protein, fruit and vegetable intake, pregnant women who reported not including these food groups in their daily diet had higher RINVR values in the study. The consumption of these foods is known to be recommended at the expense of fatty foods. A cohort study conducted in the United Kingdom using dietary recalls to assess the experience of nausea and vomiting in over 2000 pregnant women found that increased severity of nausea was associated with changes in food intake. Specifically, there was a decrease in the consumption of vegetables, tea/coffee, rice/pasta, breakfast cereals, beans, and citrus fruits/fruit juices, and an increase in the consumption of white bread and soft drinks [25].

Pregnant women with low intakes of protein, fruits, vegetables, and legumes had higher RINVR values in this study. A diet rich in small, frequent meals, low-fat foods, and increased intake of fresh vegetables and fruits is recommended to alleviate gastric emptying problems. Protein-rich liquid diets have been shown to be effective in reducing first-trimester nausea and dyspepsia [26]. Therefore, the study suggests that inadequate protein, vegetable, and legume intake may exacerbate nausea and vomiting in early pregnancy.

As study limitations, despite the remote follow-up sessions, the study could have benefited from more face-to-face interactions with participants beyond the first and last seed collection sessions. Due to the sample size, it is not possible to generalize the results found in this study.

A positive aspect of the study was the analysis of the pregnant women's diet and medications, excluding antiemetics, and how these factors may have influenced RINVR values. These are important considerations when assessing nausea and vomiting in pregnant women. Unfortunately, it was not possible to conduct dietary recalls at each follow-up visit, which could have provided additional insight into the influence of these components on patients' symptoms.

5. Conclusion

In the present study, a statistically significant difference was found between the RINVR means of the two groups analyzed separately at three different times, with a more pronounced reduction of symptoms in the intervention group. However, no significant statistical difference was found between the groups, which prevents us from attributing the observed result to auriculotherapy.

The intervention used is considered effective in reducing the overall symptoms of nausea, vomiting and retching, as observed in the global RINVR values throughout the intervention. It is evident that this method is feasible during prenatal consultations and serves as a tool to alleviate discomfort reported by pregnant women. In addition, with proper training, nurses can easily administer this intervention, providing an additional means to address early pregnancy discomfort in addition to dietary counseling.

The absence of adverse effects, as confirmed at the initial assessment and subsequent intervention sessions, is noteworthy. The longitudinal analysis allowed the evaluation of variables influencing symptom change, providing valuable insights to be reinforced during low-risk prenatal consultations.

Further clinical trials should be conducted with greater time and professional availability, to obtain a greater number of sessions and more detailed information on the dietary routine of the participants.

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CRediT authorship contribution statement

Nathaly Bianka Moraes Fróes: Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Priscila de Souza Aquino:** Writing – review & editing, Supervision, Resources, Formal analysis, Data curation, Conceptualization. **Paula Renata Amorim Lessa Soares:** Writing – review & editing, Supervision, Methodology, Formal analysis. **Lorena Pinheiro Barbosa:** Writing – review & editing, Methodology, Formal analysis, Conceptualization. **Victórya Suéllen Maciel Abreu:** Writing – original draft, Visualization, Project administration, Methodology, Conceptualization. **Ana Izabel Oliveira Nicolau:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Herla Maria Furtado Jorge:** Writing – review & editing, Writing – original draft, Project administration, Methodology. **Camila Biazus Dalcin:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Methodology.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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