בית הספר למדעי המוח ולקוגניציה
אוניברסיטת בן-גוריון בנגב
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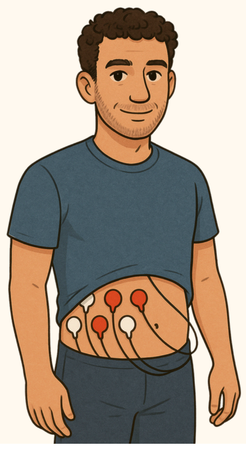
THE INFLUENCE OF MENSTRUAL STATUS ON GASTRIC ACTIVITY AS MEASURED BY ELECTROGASTROGRAM (EGG)



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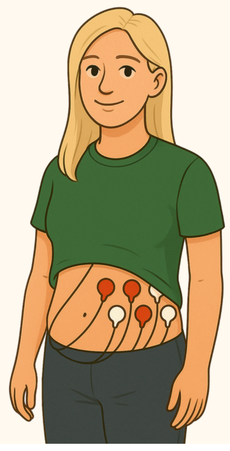

Introduction

• Interoception refers to the process by which the nervous system interprets and senses signals and stimulations from within the body.

• The menstrual cycle comprises of hormonally regulated phases which influence interoceptive sensitivity, as well as physiological processes such as gastric function.

• Gastric myoelectrical activity consists of rhythmic slow waves that can be recorded using electrogastrogram (EGG). The dominant and most physiologically relevant rhythm is normogastria, characterized by a peak frequency at 0.05 Hz (3 cycles per minute), which typically exhibits the highest signal power. Other rhythmic frequencies include bradygastria (‹ 0.05 Hz) and tachygastria (› 0.05 Hz) (Koch, 2023).

• While previous research (Lim et al., 2024) has explored sex differences in gastric rhythms and the effects of menstrual cycle phases, no studies have specifically examined the effect of female subjects currently being in the menstrual phase on gastric activity using EGG measures.

• This study aims to examine whether menstrual status affects gastric activity as measured by EGG. The results may impact other studies in the field, leading to improved design and analysis.

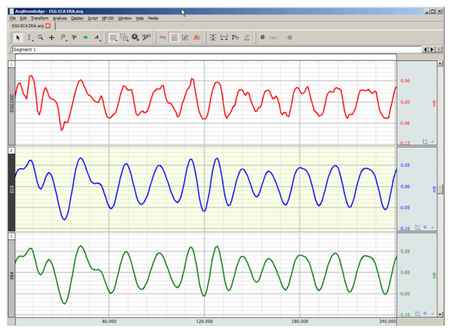

Figure 1. Trace of a typical electrogastrogram (EGG) signal.

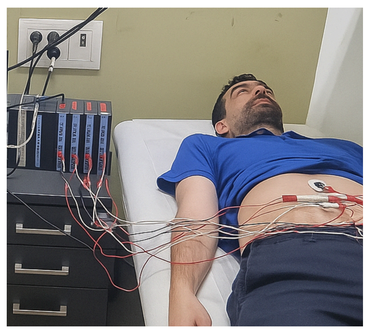

Figure 2. A participant connected to an electrogastrogram (EGG). Electrodes are placed on the participant's abdomen to record gastric activity.

Hypothesis

The menstrual phase will affect the EGG measures in such way that women in the menstrual phase will show an EGG pattern that is different from men and women not in the menstrual phase.

Method

• This study is based on a secondary analysis of data originally collected for a broader experimental protocol. The data was used post hoc to examine targeted hypotheses.

• N = 73 participants (M_{Age} = 24.00, SD_{Age} = 1.46; 49 Female [8 in menstrual phase, 41 not in menstrual phase], 24 Male).

• Participants arrived at the lab after fasting for at least three hours from food and half an hour from drinking water. Upon arrival, they completed a series of self-report questionnaires, comprising of physiological (including whether female subjects are currently in the menstrual phase) and psychological measures.

• After completing the questionnaires, participants were connected to the EGG electrodes. Recordings were collected under standardized resting conditions, using a four channel setup over a 15 minute session.

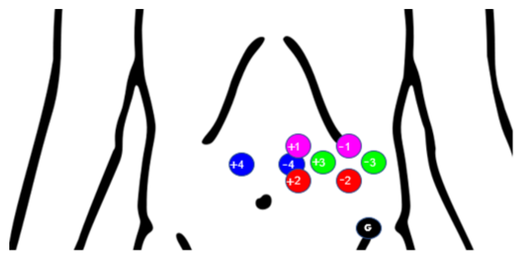

Figure 3. Electrode placement map for electrogastrography (EGG). Colored circles indicate differential electrode positions on the abdomen, including positive, negative, and ground (G) references.

Results

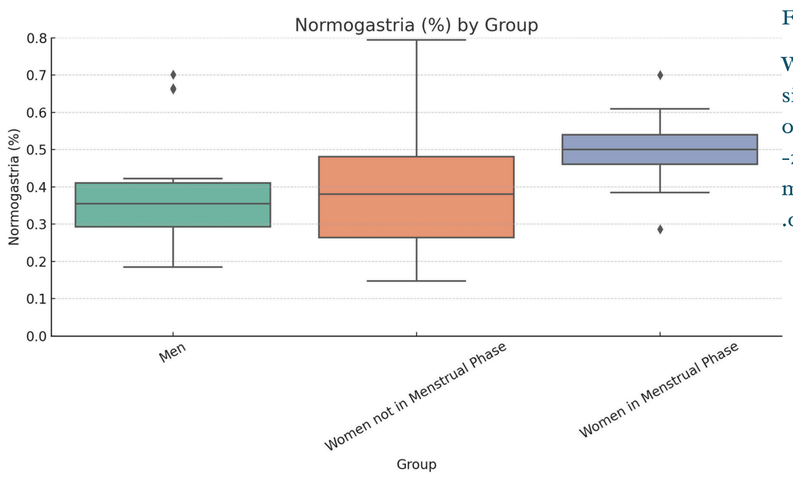

Figure 4. Normogastria (%) across groups.

Women in the menstrual phase showed significantly higher normogastria (M = 0.4978) than both men (M = 0.3762, t = -2.3221, p = .0375) and women not in the menstrual phase (M = 0.3864, t = -2.1890, p = .0498).

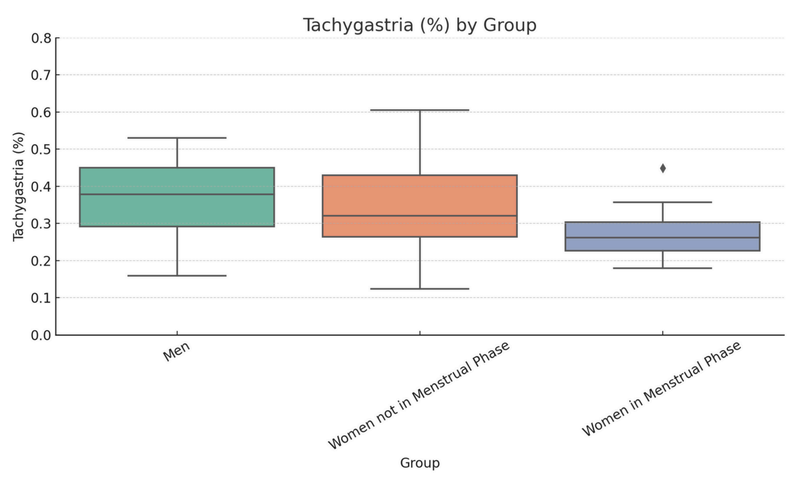

Figure 5. Tachygastria(%) across groups.

Women in the menstrual phase showed significantly lower tachygastria (M = 0.2800) compared to men (M = 0.3648, t = 2.2899, p = .0377).
In contrast, the difference between men and women not in the menstrual phase (M = 0.3386) was not significant (t = 0.9607, p = .3412).

• No significant differences were found in all measures except normogastria between women in the menstrual phase and women not in the menstrual phase.

• ANOVA tests across the three groups revealed no significant main effects, though power and bradygastria approached significance (F = 2.42, p = .0962; F = 2.51, p = .0882). Bonferroni post-hoc comparisons did not yield significant pairwise differences (p › .09 for all).

Conclusions

• Differences in gastric electrophysiology were found between men, women in the menstrual phase, and women not in the menstrual phase in normogastria and tachygastria.

• These results indicate that the menstrual cycle modulates EGG measures beyond baseline sex differences, supporting a hormonal or physiological influence of the menstrual phase on gastric activity.

• These findings warrant careful consideration of menstrual phase in both participant recruitment and data analysis strategies in studies using EGG data. In particular, researchers should account for menstrual phase when including female participants, as grouping all women together may obscure meaningful physiological variation.

• The overall sample size was limited, and the subgroup of women in the menstrual phase included only 8 participants. This small sample warrants caution in generalizing the findings and highlights the need for replication with larger and more balanced groups.

References

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This research is supported by an ISF grant 2274/21 and a BSF grant 2023143 to GA.