ARCHIVES OF HELLENIC MEDICINE: ISSN 11-05-3992

ORIGINAL PAPER
ΕΡΕΥΝΗΤΙΚΗ ΕΡΓΑΣΙΑ

# The effect of a pessary in women with a short cervix

ARCHIVES OF HELLENIC MEDICINE 2026, 43(Suppl 1):63–69
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2026, 43(Συμπλ 1):63–69

**I.V. Lakhno**

*Department of Obstetrics and Gynecology, Kharkiv National Medical University, Kharkiv, Ukraine*

Η επίδραση ενός κολπικού υποστηρίγματος στις γυναίκες με βραχύ τράχηλο

*Περίληψη στο τέλος του άρθρου*

OBJECTIVE **To investigate a possible relationship between preterm birth (PTB) prevention via pessary insertion and fetal heart rate variability (HRV), term of birth, neonatal biometry, and Apgar score in women with a short cervix (ShC).** METHOD **A total of 64 patients with threatened preterm delivery and ShC between 22 and 30 weeks of gestation were enrolled in the study. Thirty patients treated with acute tocolysis, chronic use of nifedipine, progesterone, and cervical pessary insertion were included in group I. Thirty-four pregnant women treated with acute, and chronic tocolytics and progesterone were included in group II. All patients included in the study had no personal history of spontaneous miscarriages or PTB. HRV parameters were obtained from an RR-interval time series recorded from the maternal abdominal wall fetal non-invasive electrocardiography (FNI-ECG). The study protocol also included several parameters: term at birth, neonatal body weight, body length, head circumference, and Apgar score.** RESULTS **The data on fetal HRV, term at birth, neonatal anthropometry, and Apgar score revealed certain regularities. The mean gestational term at birth was significantly higher in group I. This fact demonstrated that pessary was a useful part of the therapeutic strategy in patients with threatened PTB. The prolongation of pregnancy until the stage of fetal complete development reflected the statistically significant difference of neonatal biometry variables and a tendency to a statistically significant difference in Apgar score between the representatives of groups I and II. The logistic regression model with term of birth showed the relationship with Apgar score and the pessary insertion.** CONCLUSIONS **Pessary was an efficient supplement to tocolytics and progesterone in women with threatened PTB. The insertion of pessary contributed to pregnancy prolongation.**

**Key words**

Fetal growth and maturation
Pessary
Preterm birth
Preventive interventions

*Submitted 10.8.2025*
*Accepted 6.9.2025*

Preterm birth (PTB) remains a significant problem, with both short- and long-term projections on newborns' health. A decreased cervical length (<25–30 mm) during the second trimester as measured via transvaginal ultrasound, is a well-established predictive marker for PTB. There are several known interventions for the prevention of PTB: cerclage, vaginal progesterone, and pessary.[1] Cerclage is conventionally used in cases of cervical insufficiency (incompetence) due to morphological weakness of the circular muscle layer. The rate for this pathology is not higher than 1% of all pregnancies.[2] In contrast, most cases of short cervix (ShC) cases are associated with an increased uterine tone,[3] and autonomic dysfunction is also involved in the scenario of PTB.[4] Several studies have demonstrated the efficacy of progesterone in asymptomatic pregnant women with ShC.[5–7] However, the utility of pessary remains controversial and disputable.[8–10] Pessary was found to increase perinatal morbidity and mortality in one study[11] and increased vaginal discharge has also been observed in pessary-treated patients.[12] The indications for pessary use during pregnancy are not clearly defined. Tocolysis was found to be a meaningful factor for pessary efficiency.[13] Therefore, the women with a ShC after tocolysis could be a target population for a pessary. The necessity of testing the hypothesis on pessary as an efficient supplement to tocolytics is rather obvious.

The fetal programming theory of adulthood diseases explains the effect of the disturbed uterine environment during the antepartum period.[14] Fetal neurological maturation is an inevitable stage in the process of preparation for extrauterine life. Fetal non-invasive electrocardiography (FNI-ECG) is a prospective method for assessing fetal health and autonomic function.[15] Fetal heart rate variability (HRV)

detected via FNI-ECG is known as a marker of fetal growth and surveillance.[16]

This research was focused on the detection of a possible relationship between PTB prevention via pessary insertion, maternal and fetal HRV, term of birth, neonatal biometry, and Apgar score in women with a ShC.

## MATERIAL AND METHOD

### Participants

In a total of 64 patients with threatened preterm delivery and ShC at 22–30 weeks of gestation, were enrolled in the study. The 30 patients treated with acute tocolysis, chronic use of nifedipine, progesterone, and cervical pessary insertion were included in group I. The 34 pregnant women treated with acute, and chronic tocolytics, and progesterone were included in group II. All patients included in the study have no personal history of spontaneous miscarriages or PTB. The therapeutic course lasted until 36 weeks of gestation in the study population.

### Study design

This descriptive cross-sectional study was performed among pregnant women admitted to Kharkiv Municipal Perinatal Center between 1 January 2024 and 30 September 2024. Participants were randomly selected from the department of maternal-fetal medicine. The research was carried out as part of the project led by the Department of Obstetrics and Gynecology No 3 of Kharkiv National Medical University (0123U104315), titled "Developing of a system for predicting, preventing, and treating pregnancy, labor, and postpartum complications in women affected by wartime stress". Eligible participants were informed about the study's methodology, aims, objectives, indications, and eventual complications before enrollment.

The fetal HRV variables were obtained from an RR-interval time series registered from the maternal abdominal wall via FNI-ECG. The registration of FNI-ECG was performed after the acute tocolysis was completed. The equipment "Cardiolab Baby Card" (Scientific Research Center "KhAI-Medica", Ukraine) was used in the study. The registration was carried out over 30–60 minutes. The stress index was selected for evaluation among all linear HRV variables. SI=AMo (%)/(2×Mo×Var); Var=NNmax–NNmin; AMo (the most frequent value of NN interval or the highest column in the histogram), with the number of NN intervals included in the pocket corresponding to the mode being measured in percentages (%). The obtained fetal RR interval time series was transformed into cardiotocographic (CTG) tracing. The following CTG parameters were determined: short-term variation (STV) and long-term variation (LTV). The variables of AC/DC (acceleration capacity/deceleration capacity) were also detected.[17] The study protocol also included several parameters: term at birth, neonatal body weight, body length, head circumference, and Apgar score. The ShC was diagnosed according to ultrasound measurements.

### Criteria

Inclusion criteria were threatened pre-term delivery, ShC. Exclusion criteria were chromosomal abnormalities, multiple pregnancy, preexisting medical disorders like diabetes mellitus, metabolic syndrome, cardiac diseases, renal disease, and thyrotoxicosis. The data was obtained from the hospital automation system.

### Statistical analysis

The Statistical Package for Social Sciences (SPSS) program (IBM SPSS Statistics for Windows, IBM Corp, Armonk, NY), version 28.0, was used for statistical analysis. Results were presented as means and standard deviations for numerical variables, and frequencies and percentages for categorical data. The suitability of numerical variables to normal distribution was evaluated using skewness values and histograms. An independent sample t-test was used in comparing numerical variables fitting normal distribution. Variables that did not conform to normal distribution were analyzed by the Mann-Whitney U test. The Chi-square or Fisher's exact test was used for comparing categorical variables. Depending on their distribution, Spearman or Pearson correlation analysis was used to assess the relationships between numerical variables. For multivariate examinations, a logistic regression analysis with the entered model was used. A p-value of $<0.05$ was considered sufficient for statistical significance.

## RESULTS

The mean age of the patients was comparable between the two study groups: 23.6±4.8 in group I and 24.1±5.9 ($p>0.05$) in group II. The mean gestational term at inclusion was 26.8±3.0 and 27.1±4.2 in groups I and II, respectively ($p>0.05$). The mean term at NIF-ECG registration was not different: 28.4±3.1 and 28.2±2.7 in the pessary group and comparison group ($p>0.05$). The data on maternal and fetal HRV, term at birth, neonatal anthropometry, and Apgar score revealed certain regularities (tab. 1). No statistically significant differences in maternal and fetal AC/DC, SI, STV, and LTV were found. The mean gestational term at birth and the parameters of neonatal biometry were significantly higher in the pessary group.

The investigation of the relationship between detected variables showed a moderate positive correlation between fetal AC/DC and Apgar score (tab. 2). The parameters of correlation in pair fetal AC versus Apgar score ($r=0.34$; $p=0.034$), fetal DC versus Apgar score ($r=0.37$; $p=0.019$) were significant. No relationship between neonatal parameters and other fetal HRV variables was detected.

The relationship between several maternal and fetal

**Table 1.** The variables of fetal HRV, neonatal anthropometry, and Apgar score in the study population.

| Variable, units of measure | Intervention | Mean | SD | Minimum | Maximum | p |
|---|---|---|---|---|---|---|
| AC maternal | Pessary | 8.45 | 2.12 | 4.25 | 12.17 | 0.7341 |
| | Standard | 8.7 | 3.63 | 3.54 | 17.44 | |
| DC maternal | Pessary | 8.7 | 2.14 | 5.11 | 13.58 | 0.7675 |
| | Standard | 8.5 | 3.2 | 3.9 | 17.13 | |
| SI maternal | Pessary | 145.32 | 82.03 | 32.0 | 430.0 | 0.0872 |
| | Standard | 197.83 | 153.15 | 34.0 | 744.0 | |
| STV, ms | Pessary | 6.65 | 2.44 | 1.7 | 12.3 | 0.6313 |
| | Standard | 6.98 | 3.03 | 1.2 | 13.0 | |
| LTV, ms | Pessary | 34.42 | 12.32 | 12.3 | 71.0 | 0.6199 |
| | Standard | 36.04 | 13.68 | 9.3 | 58.7 | |
| Term at birth, weeks | Pessary | 38.05 | 2.87 | 27.0 | 41.0 | 0.0001* |
| | Standard | 34.84 | 3.37 | 26.0 | 39.0 | |
| Neonatal body weight, g | Pessary | 3333.5 | 1011.48 | 440.0 | 5530.0 | <0.0001* |
| | Standard | 2294.74 | 853.32 | 410.0 | 3500.0 | |
| Neonatal body length, cm | Pessary | 52.0 | 7.22 | 29.0 | 62.0 | 0.0003* |
| | Standard | 44.84 | 7.64 | 27.0 | 56.0 | |
| Neonatal head circumference, cm | Pessary | 33.55 | 3.97 | 19.0 | 38.0 | 0.0327* |
| | Standard | 31.32 | 4.19 | 19.0 | 36.0 | |
| Apgar score, points | Pessary | 7.7 | 2.08 | 0 | 9.0 | 0.0684 |
| | Standard | 6.74 | 2.05 | 0 | 9.0 | |

*The differences were statistically significant ($p<0.05$)

HRV: Heart rate variability

HRV variables was found (tab. 3). The negative moderate or weak correlation in pairs: maternal SI versus fetal AC ($r=-0.42$; $p<0.001$), maternal SI versus fetal DC ($r=-0.37$; $p=0.001$), and maternal SI versus STV ($r=-0.27$; $p=0.22$) demonstrated the coupling of maternal and fetal autonomic tone.

The logistic regression model with the term of birth showed the relationship between the Apgar score and pessary insertion (tab. 4). This model was found to be meaningful. The use of a pessary contributed to the increased Apgar score.

## DISCUSSION

Fetuses in both study groups demonstrated similar levels of autonomic function and neurological maturation.[18] Tocolysis contributed to fetal well-being, as well as its intrauterine growth and development. This fact demonstrated that a pessary was a useful part of the therapeutic strategy in patients with threatened PTB. The prolongation of pregnancy to the stage of fetal complete development reflected a statistically significant difference in neonatal biometry variables and a tendency towards a statistically significant difference in Apgar scores between the representatives of group I and group II. The obtained results showed the considerable use of pessary insertion in women with ShC. Several previous studies demonstrated controversial findings.[19–22] The issue was that the differentiation of the study group population following a complicated anamnesis was not performed in these studies. Our research detected that a pessary could improve perinatal outcomes in women with threatened PTB. However, the issue of the efficiency of a pessary in cervical insufficiency is still open.

The linear correlation between fetal AC/DC and Apgar score supported the prospect of AC/DC in diagnosing fetal deterioration.[23] The link between fetal HRV variables and neonatal biometric parameters was not found. Probably, the possible coupling of fetal growth parameters and HRV variables was disturbed in threatened PTB. The

**Table 2.** A linear correlation between fetal HRV variables, term at birth, neonatal anthropometry, and Apgar score in the study population.

| Variable | Correlation | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AC fetal | r | 1 | 0.86 | -0.65 | 0.85 | 0.84 | 0.22 | 0.06 | 0.16 | 0.23 | 0.34 |
| | p | | *<0.001** | *<0.001** | *<0.001** | *<0.001** | 0.183 | 0.717 | 0.317 | 0.155 | *0.034** |
| DC fetal | r | 0.86 | 1 | -0.63 | 0.9 | 0.84 | 0.2 | 0.05 | 0.15 | 0.21 | 0.37 |
| | p | *<0.001** | | *<0.001** | *<0.001** | *<0.001** | 0.226 | 0.746 | 0.36 | 0.208 | *0.019** |
| SI fetal | r | -0.65 | -0.63 | 1 | -0.73 | -0.8 | -0.1 | 0.07 | -0.09 | -0.14 | -0.24 |
| | p | *<0.001** | *<0.001** | | *<0.001** | *<0.001** | 0.543 | 0.675 | 0.569 | 0.382 | 0.144 |
| STV | r | 0.85 | 0.9 | -0.73 | 1 | 0.96 | 0.1 | 0.02 | 0.14 | 0.2 | 0.28 |
| | p | *<0.001** | *<0.001** | *<0.001** | | *<0.001** | 0.53 | 0.913 | 0.389 | 0.222 | 0.09 |
| LTV | r | 0.84 | 0.84 | -0.8 | 0.96 | 1 | 0.06 | -0.03 | 0.1 | 0.16 | 0.23 |
| | p | *<0.001** | *<0.001** | *<0.001** | *<0.001** | | 0.695 | 0.857 | 0.551 | 0.319 | 0.157 |
| Term at birth | r | 0.22 | 0.2 | -0.1 | 0.1 | 0.06 | 1 | 0.85 | 0.83 | 0.68 | 0.73 |
| | p | 0.183 | 0.226 | 0.543 | 0.53 | 0.695 | | *<0.001** | *<0.001** | *<0.001** | *<0.001** |
| Neonatal body weight | r | 0.06 | 0.05 | 0.07 | 0.02 | -0.03 | 0.85 | 1 | 0.92 | 0.84 | 0.68 |
| | p | 0.717 | 0.746 | 0.675 | 0.913 | 0.857 | *<0.001** | | *<0.001** | *<0.001** | *<0.001** |
| Neonatal body length | r | 0.16 | 0.15 | -0.09 | 0.14 | 0.1 | 0.83 | 0.92 | 1 | 0.85 | 0.74 |
| | p | 0.317 | 0.36 | 0.569 | 0.389 | 0.551 | *<0.001** | *<0.001** | | <0.001* | *<0.001** |
| Head circum-ference | r | 0.23 | 0.21 | -0.14 | 0.2 | 0.16 | 0.68 | 0.84 | 0.85 | 1 | 0.72 |
| | p | 0.155 | 0.208 | 0.382 | 0.222 | 0.319 | *<0.001** | *<0.001** | *<0.001** | | *<0.001** |
| Apgar score | r | 0.34 | 0.37 | -0.24 | 0.28 | 0.23 | 0.73 | 0.68 | 0.74 | 0.72 | 1 |
| | p | *0.034** | *0.019** | 0.144 | 0.09 | 0.157 | *<0.001** | *<0.001** | *<0.001** | *<0.001** | |

*The differences were statistically significant (p<0.05)

HRV: Heart rate variability

**Table 3.** A linear correlation between maternal and fetal HRV in the study population.

| Variable | Correlation | AC maternal | DC maternal | AC fetal | DC fetal | SI maternal | SI fetal | STV | LTV |
|---|---|---|---|---|---|---|---|---|---|
| AC maternal | r | 1 | *0.95* | 0.19 | 0.15 | *-0.71* | -0.01 | 0.05 | 0 |
| | p | | *<0.001** | 0.115 | 0.204 | *<0.001** | 0.943 | 0.685 | 0.981 |
| DC maternal | r | *0.95* | 1 | 0.21 | 0.18 | *-0.78* | 0.01 | 0.07 | -0.02 |
| | p | <0.001* | | 0.079 | 0.132 | *<0.001** | 0.923 | 0.581 | 0.84 |
| AC fetal | r | 0.19 | 0.21 | 1 | *0.91* | *-0.42* | *-0.64* | *0.91* | *0.81* |
| | p | 0.115 | 0.079 | | *<0.001** | *<0.001** | *<0.001** | <0.001* | *<0.001** |
| DC fetal | r | 0.15 | 0.18 | *0.91* | 1 | *-0.37* | *-0.63* | *0.91* | *0.83* |
| | p | 0.204 | 0.132 | *<0.001** | | 0.001* | *<0.001** | <0.001* | *<0.001** |
| SI maternal | r | *-0.71* | *-0.78* | *-0.42* | *-0.37* | 1 | 0.05 | *-0.27* | -0.11 |
| | p | *<0.001** | *<0.001** | *<0.001** | *0.001** | | 0.674 | *0.022** | 0.342 |
| SI fetal | r | -0.01 | 0.01 | *-0.64* | *-0.63* | 0.05 | 1 | *-0.74* | *-0.84* |
| | p | 0.943 | 0.923 | *<0.001** | *<0.001** | 0.674 | | *<0.001** | *<0.001** |
| STV | r | 0.05 | 0.07 | *0.91* | *0.91* | -0.27 | *-0.74* | 1 | *0.9* |
| | p | 0.685 | 0.581 | *<0.001** | *<0.001** | 0.022* | *<0.001** | | *<0.001** |
| LTV | r | 0 | -0.02 | *0.81* | *0.83* | -0.11 | *-0.84* | *0.9* | 1 |
| | p | 0.981 | 0.84 | *<0.001** | *<0.001** | 0.342 | *<0.001** | *<0.001** | |

*The differences were statistically significant (p<0.05)

HRV: Heart rate variability

**Table 4.** The logistic regression model with term of birth.

| Unstandardized coefficients | Standardized coefficients | | Standard error | t | 95% confidence interval for B | | |
|---|---|---|---|---|---|---|---|
| **Model** | **B** | **Beta** | | | **p** | **Lower bound** | **Upper bound** |
| (Constant) | 26.51 | | 5.12 | 5.18 | <0.001 | 16.0 | 37.02 |
| AC maternal | 0.36 | 0.34 | 0.18 | 1.94 | 0.058 | -0.01 | 0.73 |
| DC maternal | -0.39 | -0.34 | 0.2 | -1.91 | 0.061 | -0.8 | 0.02 |
| SI maternal | 0 | 0.01 | 0 | 0.08 | 0.933 | 0 | 0 |
| AC fetal | 0.75 | 0.12 | 0.97 | 0.77 | 0.447 | -1.24 | 2.74 |
| DC fetal | 0.35 | 0.07 | 0.89 | 0.39 | 0.698 | -1.47 | 2.17 |
| SI fetal | 0 | -0.19 | 0 | -1.8 | 0.082 | 0 | 0 |
| STV | -0.14 | -0.11 | 0.32 | -0.44 | 0.663 | -0.81 | 0.52 |
| LTV | -0.03 | -0.1 | 0.05 | -0.52 | 0.605 | -0.13 | 0.08 |
| Neonatal body weight | 0 | 0.16 | 0 | 0.66 | 0.512 | 0 | 0 |
| Neonatal body length | 0.18 | 0.43 | 0.12 | 1.57 | 0.127 | -0.06 | 0.42 |
| Neonatal head circumference | -0.06 | -0.07 | 0.2 | -0.29 | 0.774 | -0.47 | 0.36 |
| Apgar score | 0.6 | 0.36 | 0.26 | 2.34 | 0.027 | 0.07 | 1.13 |
| PTB prevention pessary | 1.11 | 0.16 | 0.55 | 2.03 | 0.033 | -0.01 | 2.22 |

PTB: Preterm birth

known relationship between maternal and fetal autonomic tone was supported.[14,24] The coupling between maternal sympathetic tone and fetal HRV demonstrated the role of autonomic dysfunction in preterm birth. Maternal increased sympathetic activity negatively affected fetal HRV in women with ShC. The linear correlation between several variables of HRV or between the term at birth and neonatal parameters was rather logical. Thus, the prolongation of pregnancy in threatened PTB is anaxiom and a milestone of modern obstetrics.[25–27]

Contemporary strategies for preventing major obstetrical syndromes are grounded in evidence-based approaches.[28–30] Our study demonstrated the excellent efficiency of a pessary insertion in managing threatened PTB. The use of a pessary contributed to enhanced fetal growth and functional maturation. As a result, theoretical value of the results was supported practically. Therefore, PTB prevention was effective in the pessary group. However, this study does not represent the final step in the process of identifying the most effective therapeutic intervention. Probably, the tocolytics, progesterone, and pessary are the main parts of the PTB prevention in women without complicated anamnesis.[31,32] Further research is required to validate this hypothesis.

In conclusion, pessary was an efficient supplement to tocolytics and progesterone in women with threatened PTB. The pessary insertion contributed to pregnancy prolongation.

## ACKNOWLEDGEMENTS

*The author appreciates the help of the staff of Kharkiv Municipal Perinatal Center.*

## ΠΕΡΙΛΗΨΗ


### Η επίδραση ενός κολπικού υποστηρίγματος στις γυναίκες με βραχύ τράχηλο

I.V. LAKHNO

*Department of Obstetrics and Gynecology, Kharkiv National Medical University, Kharkiv, Ουκρανία*

*Αρχεία Ελληνικής Ιατρικής 2026, 43(Συμπλ 1):63–69*

**ΣΚΟΠΟΣ** Η διερεύνηση μιας πιθανής σχέσης μεταξύ της πρόληψης του πρόωρου τοκετού (PTB) μέσω εισαγωγής κολπικού υποστηρίγματος και της μεταβλητότητας του καρδιακού ρυθμού του εμβρύου (HRV), της ημερομηνίας τοκετού, της νεογνικής βιομετρίας και της βαθμολογίας Apgar σε γυναίκες με βραχύ τράχηλο (ShC). **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Συγκεντρώθηκαν συνολικά 64 ασθενείς με απειλούμενο πρόωρο τοκετό και ShC στις 22–30 εβδομάδες κύησης. Οι 30 ασθενείς που υποβλήθηκαν σε οξεία τοκολυτική θεραπεία, χρόνια χρήση νιφεδιπίνης, προγεστερόνης και εισαγωγή υποστηρίγματος συμπεριλήφθηκαν στην Ομάδα Ι. Οι 34 έγκυες γυναίκες που υποβλήθηκαν σε οξεία και χρόνια τοκολυτικά και προγεστερόνη συμπεριλήφθηκαν στην Ομάδα ΙΙ. Όλες οι ασθενείς που περιλήφθηκαν στη μελέτη δεν είχαν προσωπικό ιστορικό καθ' έξιν αποβολών ή PTB. Οι μεταβολές του καρδιακού ρυθμού του εμβρύου (HRV) ελήφθησαν από μια χρονοσειρά διακυμάνσεων RR που καταγράφηκε από το κοιλιακό τοίχωμα της μητέρας μέσω μη επεμβατικής ηλεκτροκαρδιογραφίας του εμβρύου (NIF-ECG). Το πρωτόκολλο μελέτης περιλάμβανε επίσης αρκετές παραμέτρους, όπως ημερομηνία τοκετού, σωματικό βάρος νεογνού, σωματικό μήκος, περίμετρος κεφαλής και βαθμολογία Apgar. **ΑΠΟΤΕΛΕΣΜΑΤΑ** Τα δεδομένα σχετικά με τη μεταβλητότητα του καρδιακού ρυθμού του εμβρύου, την ημερομηνία γέννησης και την ανθρωπομετρία των νεογνών, καθώς και τη βαθμολογία Apgar, αποκάλυψαν ορισμένες κανονικότητες. Ο μέσος όρος του γονικού χρόνου γέννησης ήταν σημαντικά μεγαλύτερος στην Ομάδα Ι. Αυτό το γεγονός έδειξε ότι το κολπικό υποστήριγμα ήταν χρήσιμο μέρος της θεραπευτικής στρατηγικής σε ασθενείς με απειλούμενη πρόωρη γέννηση. Η παράταση της εγκυμοσύνης μέχρι το στάδιο της πλήρους ανάπτυξης του εμβρύου αντικατοπτρίζει τη στατιστικά σημαντική διαφορά στις βιομετρικές μεταβλητές των νεογνών και μια τάση για στατιστικά σημαντική διαφορά στη βαθμολογία Apgar μεταξύ των εκπροσώπων των Ομάδων Ι και ΙΙ. Το μοντέλο λογιστικής παλινδρόμησης με τον χρόνο γέννησης έδειξε τη σχέση με τη βαθμολογία Apgar και την εισαγωγή της κολπικής υποστήριξης. **ΣΥΜΠΕΡΑΣΜΑΤΑ** Η κολπική υποστήριξη ήταν ένα αποτελεσματικό συμπλήρωμα στα τοκολυτικά και στην προγεστερόνη σε γυναίκες με απειλούμενη πρόωρη γέννηση. Η εισαγωγή του κυλίνδρου συνέβαλε στην παράταση της εγκυμοσύνης.


**Λέξεις ευρετηρίου:** Ανάπτυξη και ωρίμανση του εμβρύου, Κύλινδρος, Προληπτικές παρεμβάσεις, Πρόωρη γέννηση

## References


1. HEZELGRAVE NL, SUFF N, SEED P, ROBINSON V, CARTER J, WATSON H ET AL. Comparing cervical cerclage, pessary and vaginal progesterone for prevention of preterm birth in women with a short cervix (SuPPoRT): A multicentre randomised controlled trial. *PLoS Med* 2024, 21:e1004427
2. ZHU J, HUANG Y, ZENG H, HUANG J, ZHANG W. Pregnancy outcomes of twin pregnancies with cervical insufficiency undergoing cervical cerclage. *Sci Rep* 2024, 14:27414
3. LUO JF, LIU D, LIU J. Different interventions to prevent preterm birth in pregnant women with cervical shortening during pregnancy: A protocol for a network meta-analysis. *BMJ Open* 2024, 14:e084015
4. FELI M, AZIMI I, SARHADDI F, SHARIFI-HERIS Z, NIELA-VILEN H, LILJEBERG P ET AL. Preterm birth risk stratification through longitudinal heart rate and HRV monitoring in daily life. *Sci Rep* 2024, 14:19896
5. VAN DIJK CE, VAN GILS AL, VAN ZIJL MD, KOULLALI B, VAN DER WEIDE MC, VAN DEN AKKER ES ET AL. Cervical pessary versus vaginal progesterone in women with a singleton pregnancy, a short cervix, and no history of spontaneous preterm birth at less than 34 weeks' gestation: Open label, multicentre, randomised, controlled trial. *Br Med J* 2024, 384:e077033
6. OTSUKA N, IMAI K, TANO S, MATSUO S, USHIDA T, NOMOTO M ET AL. Possible efficacy of vaginal progesterone on asymptomatic women with a short cervix after 24 weeks of gestation: A historical cohort study in Japan. *JMA J* 2024, 7:582–589
7. WANG X, MAERDAN M, XI J, ZHANG M, YANG H, SHI C. The effectiveness of vaginal progesterone to prevent preterm birth in singleton pregnant women with a short cervix at 18–32 weeks gestation. *J Matern Fetal Neonatal Med* 2024, 37:2412751
8. PRATCORONA L, GOYA M, MERCED C, RODÓ C, LLURBA E, HIGUERAS T ET AL. Cervical pessary to reduce preterm birth <34 weeks of gestation after an episode of preterm labor and a short cervix: A randomized controlled trial. *Am J Obstet Gynecol* 2018,

219: 99.e1–99.e16
9. GASCÓN A, MAIZ N, BRIK M, MENDOZA M, DEL BARCO E, CARRERAS E ET AL. Cervical cerclage vs cervical pessary in women with cervical insufficiency: A multicentric, open-label, randomised, controlled pilot trial [the CEPEIC trial]. *Eur J Obstet Gynecol Reprod Biol X* 2024, 24:100347
10. ABDEL-ALEEM H, SHAABAN OM, ABDEL-ALEEM MA, MOHAMED AA. Cervical pessary for preventing preterm birth in singleton pregnancies. *Cochrane Database Syst Rev* 2022, 12:CD014508
11. HOFFMAN MK, CLIFTON RG, BIGGIO JR, SAADE GR, UGWU LG, LONGO M ET AL. Cervical pessary for prevention of preterm birth in individuals with a short cervix: The TOPS randomized clinical trial. *JAMA* 2023, 330:340–348
12. IVANDIC J, CARE A, GOODFELLOW L, POLJAK B, SHARP A, ROBERTS D ET AL. Cervical pessary for short cervix in high-risk pregnant women: 5 years experience in a single centre. *J Matern Fetal Neonatal Med* 2020, 33:1370–1376
13. MERCED C, GOYA M, PRATCORONA L, RODÓ C, LLURBA E, HIGUERAS T ET AL. Cervical pessary for preventing preterm birth in twin pregnancies with maternal short cervix after an episode of threatened preterm labor: Randomised controlled trial. *Am J Obstet Gynecol* 2019, 221:55e1–55.e14
14. HOYER D, ŻEBROWSKI J, CYSARZ D, GONÇALVES H, PYTLIK A, AMORIM-COSTA C ET AL. Monitoring fetal maturation – objectives, techniques and indices of autonomic function. *Physiol Meas* 2017, 38:R61–R88
15. FRENKEN MWE, VAN DER WOUDE DAA, VULLINGS R, OEI SG, VAN LAAR JOEH. Implementation of the combined use of non-invasive fetal electrocardiography and electrohysterography during labor: A prospective clinical study. *Acta Obstet Gynecol Scand* 2023, 102:865–872
16. HOYER D, SCHMIDT A, GUSTAFSON KM, LOBMAIER SM, LAKHNO I, VAN LEEUWEN P ET AL. Heart rate variability categories of fluctuation amplitude and complexity: Diagnostic markers of fetal development and its disturbances. *Physiol Meas* 2019, 40:064002
17. LOBMAIER SM, VAN CHARANTE NM, FERRAZZI E, GIUSSANI DA, SHAW CJ, MÜLLER A ET AL. Phase-rectified signal averaging method to predict perinatal outcome in infants with very preterm fetal growth restriction – a secondary analysis of TRUFFLE-trial. *Am J Obstet Gynecol* 2016, 215:630.e1–630.e7
18. LAKHNO IV, ALEXANDER S. Fetal autonomic malfunction as a marker of fetal distress in growth-restricted fetuses: Three case reports. *Obstet Gynecol Sci* 2019, 62:469–473
19. HERKILOGLU D, AYVACI H, PEKIN O, TARHAN N, KARATEKE A, SAHIN S. Pessary use in patients diagnosed with short cervix and cervical insufficiency. *J Matern Fetal Neonatal Med* 2022, 35:1834–1840
20. KUMAGAI K, MUROTSUKI J, DOHI S, NISHIKAWA N, KIMURA N, NOMIYAMA M ET AL. Does a cervical pessary reduce the rate of preterm birth in women with a short cervix? *J Perinat Med* 2022, 50:1107–1114
21. THOM EA, SAADE GR, ASKIE LM, UGWU LG, MOL BWJ, VAYSSIERE C ET AL. PROMPT: Prospective Meta-analysis for Pessary Trials study protocol. *Am J Perinatol* 2024, 41:e2230–e2237
22. FRANÇA MS, DE ANDRADE VL Jr, HATANAKA AR, SANTOS R, CARVALHO FHC, COSTA ML ET AL. A new screening of preterm birth in gestation with short cervix after pessary plus progesterone. *Rev Bras Ginecol Obstet* 2024, 46:e-rbgo39i
23. RIVOLTA MW, BARBIERI M, STAMPALIJA T, SASSI R, FRASCH MG. Relationship between deceleration morphology and phase rectified signal averaging-based parameters during labor. *Front Med (Lausanne)* 2021, 8:626450
24. LAKHNO IV. The hemodynamic repercussions of the autonomic modulations in growth-restricted fetuses. *Alex J Med* 2017, 53:333–336
25. WENLING H, JIANGLI D, AIQUN H, WEI Z, HUANQING H, SIDI C. Analysis of the relationship between the quality of antenatal care examinations and the incidence of preterm birth and low birth weight. *BMC Public Health* 2024, 24:3134
26. PATEL J, OLUWAFEMI O, TANG T, SUNNY A, PARMAR N, DOSHI H ET AL. Trends in the mortality and death of periviable preterm infants in the United States, 2011 to 2020. *Am J Perinatol* 2025, 42:854–861
27. VAN LIMBURG STIRUM EVJ, PILARSKI N, DE BOER MA, PAJKRT E, OUDIJK MA, VAN 'T HOOFT J. Variation between countries for routine transvaginal cervical length measurement and interventions to prevent preterm birth. *Eur J Obstet Gynecol Reprod Biol* 2024, 303:266–271
28. GIOULEKA S, TSAKIRIDIS I, KOSTAKIS N, KOUTSOUKI G, KALOGIANNIDIS I, MAMOPOULOS A ET AL. Preterm labor: A comprehensive review of guidelines on diagnosis, management, prediction and prevention. *Obstet Gynecol Surv* 2022, 77:302–317
29. BRESLIN N, GYAMFI-BANNERMAN C. Current preterm birth prevention strategies. *Clin Perinatol* 2020, 47:705–717
30. HUANG X, ZHOU Y, LIU B, HUANG Y, WANG M, LI N ET AL. Prediction model for spontaneous preterm birth less than 32 weeks of gestation in low-risk women with mid-trimester short cervical length: A retrospective cohort study. *BMC Pregnancy Childbirth* 2024, 24:621
31. BREUKING SH, VAN DIJK CE, VAN GILS AL, VAN ZIJL MD, KAZEMIER BM, PAJKRT E ET AL. The impact of cut-off values on the prevalence of short cervical length in pregnancy. *Eur J Obstet Gynecol Reprod Biol* 2024, 302:65–72
32. RAMACHANDRAN A, CLOTTEY KD, GORDON A, HYETT JA. Prediction and prevention of preterm birth: Quality assessment and systematic review of clinical practice guidelines using the AGREE II framework. *Int J Gynaecol Obstet* 2024, 166:932–942

*Corresponding author:*

I.V. Lakhno, Department of Obstetrics and Gynecology No 3, Kharkiv National Medical University, Kharkiv, Ukraine
e-mail: igorlakhno71@gmail.comiv; lakhno@knmu.edu.ua