Jurnal Ilmiah Kesehatan Sandi Husada

Volume 14 Number 1 Desember 2025. Page 239-247
DOI: https://doi.org/10.35816/jiskh.v14i2.1293

ORIGINAL ARTICLES OPEN ACCESS

No significant association between term premature rupture of membranes and neonatal APGAR score: A cross-sectional study

Shelvy Era Chintia [a]✉, **Henidekasari** [a], **Veronica Ela Rimawati** [a], **I Nengah Budiarta** [a]

[a] Medical Education Study Program, Faculty of Medicine, Universitas Malahayati, Lampung, Indonesia

Received: 2025-07-09 ○ Revised: 2025-10-20 ○ Accepted: 2025-11-20 ○ Published: 2025-12-12

ABSTRACT

Introduction: Premature rupture of membranes (PROM) is defined as the rupture of the amniotic sac before the onset of labor, potentially increasing the risk of infection, hypoxia, and a low APGAR score in newborns. The APGAR score assesses neonatal health immediately after birth and can be influenced by maternal and delivery factors, including the duration of PROM.

Methods: This analytical observational study employed a cross-sectional design and involved 119 term-pregnant women with PROM, selected through purposive sampling from medical records at Dr H. Abdul Moeloek Regional General Hospital, Lampung Province, in 2024. The independent variable was PROM duration (<12 hours or >12 hours), and the dependent variable was the neonatal APGAR score (>7 or <7). Data analysis employed the Chi-square test with a 95% confidence level.

Results: Most respondents (83.2%) experienced PROM lasting <12 hours, and 79% of newborns had APGAR scores >7. Chi-square analysis revealed no statistically significant association between PROM duration and APGAR score ($p = 0.092$; OR = 0.93). Although a higher proportion of low APGAR scores occurred in the >12-hour PROM group, the relationship was not statistically significant.

Conclusion: The study indicates no significant correlation between PROM duration in term pregnancies and neonatal APGAR scores. Prompt medical interventions may mitigate potential risks, reducing the impact of PROM duration on immediate neonatal outcomes. These findings underscore the importance of timely obstetric management and suggest that further research with larger sample sizes is warranted to investigate other potential contributing factors.

Keywords: APGAR Score; Neonatal Outcome; Premature Rupture of Membranes; Term Pregnancy; Delivery Timing.

✉ Correspondence: Medical Education Study Program, Faculty of Medicine, Universitas Malahayati, Lampung, Indonesia.
Email: shelvyera@gmail.com

INTRODUCTION

During pregnancy, the fetus is enclosed within a soft, protective membrane known as the amniotic sac, which consists of two layers: the amnion and the chorion (Dadkhah Tehrani *et al.*, 2021). Amniotic fluid begins to form early in gestation and plays a vital role in supporting fetal growth, acting as both a cushion and a protective medium (Crosland *et al.*, 2025). Premature rupture of membranes (PROM), also referred to as pre-labor rupture of membranes, is a clinical condition characterized by the amniotic sac rupture before the onset of uterine contractions and labor (Xu *et al.*, 2024). According to the World Health Organisation (WHO), the global prevalence of PROM is approximately 12.3% of all deliveries, with 50–60% of births worldwide affected by this condition. In Indonesia, the incidence of PROM was reported at 35% in 2013 and 5.6% according to the 2018 Basic Health Research (Riskesdas) report. Lampung Province's incidence reached 4.2% (Murtado *et al.*, 2023). PROM is further classified into preterm PROM, occurring before 37 weeks of gestation, and term PROM, occurring at or beyond 37 weeks (Getnet *et al.*, 2023). Preterm PROM is generally associated with pathological factors, whereas term PROM is often related to physiological weakening of the fetal membranes triggered by shear forces from uterine contractions (Danciu *et al.*, 2023).

Infection, particularly bacterial infection, is a leading cause of PROM. Microbial invasion induces the release of pro-inflammatory cytokines from the amniotic membranes and decidua, weakening and eventually rupturing the membranes (Šket *et al.*, 2021). PROM is associated with various maternal and neonatal complications. In mothers, these may include intrauterine infection, such as chorioamnionitis and postpartum endometritis, which can progress to sepsis if left untreated (Feruza and Wang, 2023). In neonates, complications include fetal distress due to placental abruption or umbilical cord compression, both of which can result in hypoxia (De Preud'homme d'Hailly de Nieuport *et al.*, 2024). Multiple maternal and pregnancy-related factors have been identified as risk factors for PROM, including maternal age, parity, gestational age, infection, multiple pregnancy, and increased intrauterine pressure (Jan *et al.*, 2025). Women under the age of 20 are considered to be in the reproductive maturation phase, whereas those over 35 often experience decreased estrogen production, which affects reproductive tissue function (Cohen *et al.*, 2024). Regarding parity, multiparous women have a higher risk of PROM than primiparous women (Lucidi *et al.*, 2024).

PROM is a known contributor to neonatal asphyxia and infection, with prolonged latency between rupture and delivery increasing the risk. The APGAR score, which assesses heart rate, respiration, muscle tone, reflexes, and skin colour, is used at one and five minutes after birth to evaluate neonatal status (Yagi, Nurmalasari, and Rafie, 2021). Extended PROM (>12 hours) has been linked to lower APGAR scores and greater asphyxia risk due to amniotic fluid loss, umbilical cord compression, and fetal hypoxia (Guerra *et al.*, 2024). Although the term PROM poses potential risks, evidence on its association with neonatal APGAR scores remains inconsistent. Several studies found no significant relationship, often attributing this to timely interventions such as neonatal resuscitation and oxygen administration. Given these mixed findings, further research is needed to clarify this relationship in varied clinical and geographic contexts. This study examines the relationship between term PROM and neonatal APGAR scores in a tertiary hospital in Lampung Province, Indonesia, to strengthen the evidence base and inform clinical management.

RESEARCH METHODOLOGY

Study Design and Setting

This study employed an analytical observational design with a cross-sectional approach to examine the association between the duration of term premature rupture of membranes (PROM) and neonatal APGAR scores. The research was conducted at Dr. H. Abdul Moeloek Regional General Hospital, a tertiary referral hospital in Lampung Province, Indonesia. Data were collected from January to December 2024, with analysis performed in April 2025.

Population and Sampling

The study population comprised all term pregnant women (gestational age ≥37 weeks) diagnosed with PROM who delivered at the hospital during the study period. The sample size was determined by the Slovin formula, yielding a minimum of 119 participants. A purposive sampling technique was applied based on predefined inclusion and exclusion criteria. Inclusion criteria included: Medical records of pregnant women diagnosed with PROM. Complete data on PROM duration (<12 hours or >12 hours) and neonatal APGAR scores. Exclusion criteria included: Term pregnancies complicated by conditions such as preeclampsia, eclampsia, chronic infectious diseases, diabetes mellitus, or hematologic disorders. Incomplete or missing medical record data. Variables. Independent Variable: Duration of PROM, categorized as <12 hours or >12 hours from membrane rupture to delivery. Dependent Variable: Neonatal APGAR score, classified as good (>7) or poor (<7) based on the score at the first and fifth minute after birth.

Data Collection

Data were obtained retrospectively from patient medical records that met the inclusion criteria. Collected data included maternal demographics (age, parity), PROM duration, and neonatal APGAR scores. The APGAR assessment was based on five parameters —skin colour, heart rate, reflex irritability, muscle tone, and respiratory effort —evaluated by attending medical personnel at 1 and 5 minutes post-delivery.

Data Analysis

Data processing involved four stages: editing, coding, processing, and cleaning to ensure accuracy and completeness. Descriptive statistics were used to summarize the distribution of each variable. The Chi-square test was applied to examine the association between PROM duration and neonatal APGAR scores, with a 95% confidence level ($\alpha = 0.05$) as the threshold for statistical significance. The Odds Ratio (OR) was also calculated to estimate the strength of association. Data analysis was conducted using IBM SPSS Statistics version 27.

Ethical Considerations

This study adhered to the ethical principles outlined in the Declaration of Helsinki. Ethical clearance was obtained from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Malahayati. The hospital management granted permission to access and use medical record data. Patient confidentiality was maintained by anonymizing all personal identifiers.

RESULT

Table 1. Maternal Characteristics, PROM Duration, and Neonatal APGAR Scores (n = 119)

Variable	Category	n	%
Maternal Age	20–35 years	103	86.6
	<20 or >35 years	16	13.4
Parity	Primiparous	81	68.1
	Multiparous	38	31.9
PROM Duration	<12 hours	99	83.2
	>12 hours	20	16.8
Neonatal APGAR Score	>7 (Good)	94	79.0
	<7 (Poor)	25	21.0

Based on Table 1, the analysis of maternal characteristics revealed that most participants (86.6%) fell within the optimal reproductive age range of 20–35 years, while a smaller proportion (13.4%) were aged 20 or younger or 35 or older. In terms of parity, most mothers experiencing PROM were primiparous (68.1%), indicating a higher prevalence in first-time pregnancies compared to multiparous mothers (31.9%). Regarding PROM duration, most cases (83.2%) lasted less than 12 hours, while 16.8% lasted more than 12 hours. This suggests that, in most instances, delivery occurred relatively soon after membrane rupture. Assessment of neonatal outcomes revealed that most newborns (79.0%) achieved a good APGAR score (>7), indicating favourable immediate postnatal conditions. In comparison, 21.0% had a poor APGAR score (<7), which may reflect perinatal complications or the need for additional resuscitative measures. Overall, the data suggest that PROM in this population was more common among women of optimal reproductive age and primiparous mothers, with the majority experiencing shorter rupture durations and delivering neonates with satisfactory APGAR scores.

Table 2. Association Between PROM Duration and APGAR Score

PROM Duration	>7 (Good) n (%)	<7 (Poor) n (%)	Total n (%)	p-value	OR
<12 hours	78 (86.2)	21 (72.0)	99 (83.2)		
>12 hours	16 (13.8)	4 (28.0)	20 (16.8)	0.092	0.93
Total	94 (100)	25 (100)	119 (100)		

The bivariate analysis using the Chi-square test demonstrated no statistically significant association between PROM duration and neonatal APGAR scores (p = 0.092; OR = 0.93). Among mothers with PROM lasting less than 12 hours, 86.2% delivered neonates with good APGAR scores (>7), while 72.0% of mothers with PROM exceeding 12 hours also had good APGAR scores. Conversely, poor APGAR scores (<7) were observed more frequently among neonates whose mothers experienced prolonged PROM (more than 12 hours) than among those with shorter PROM. Although a higher proportion of poor APGAR scores was noted in the >12-hour group, the difference did not reach statistical significance. This suggests that while prolonged PROM may be associated with an increased likelihood of adverse neonatal outcomes, timely obstetric and neonatal interventions in the hospital setting may mitigate its impact on immediate postnatal condition as measured by the APGAR score.

DISCUSSION

This study investigated the association between the duration of term premature rupture of membranes (PROM) and neonatal APGAR scores at Dr H. Abdul Moeloek Regional General Hospital in Lampung Province, Indonesia. The findings indicate that the majority of mothers experiencing PROM were within the optimal reproductive age range of 20–35 years and were predominantly primiparous. Most cases of PROM lasted less than 12 hours, and most neonates had good APGAR scores (>7). Statistical analysis revealed no significant association between PROM duration and neonatal APGAR scores, despite a higher proportion of poor scores in the prolonged PROM group (>12 hours).

Maternal Characteristics. The predominance of PROM among mothers aged 20–35 years in this study aligns with the understanding that this age range represents optimal reproductive potential, characterised by mature reproductive organs and hormonal balance, which support healthy pregnancies (Messinger *et al.*, 2025). Although extreme maternal ages (<20 or >35 years) are associated with increased obstetric risks, our results suggest that PROM is not limited to these high-risk groups (Çarkçı Yıldız and Yapar Eyi, 2025). Regarding parity, the higher incidence of PROM in primiparous mothers may reflect physiological adaptations of the cervix and pelvic structures during first pregnancies, which could influence membrane tension and susceptibility to rupture (Ospina *et al.*, 2025).

PROM Duration. Most participants in this study experienced PROM for less than 12 hours. Shorter latency periods between membrane rupture and delivery are generally associated with a lower risk of intrauterine infection and neonatal complications (Kalifa *et al.*, 2024). The relatively high proportion of short-duration PROM in our population may be related to efficient hospital admission processes, prompt diagnosis, and timely initiation of labour induction or augmentation in accordance with established clinical guidelines (Ghosh *et al.*, 2025).

Neonatal APGAR Scores. Most neonates had good APGAR scores, reflecting favorable immediate postnatal adaptation. The APGAR score remains a practical and widely used tool for assessing newborn health in the first few minutes of life, particularly in resource-limited settings (Rosenthal *et al.*, 2025). Poor APGAR scores (<7) in 21% of neonates may indicate perinatal stress, transient respiratory compromise, or the influence of other obstetric factors not directly assessed in this study, such as intrapartum fetal distress, maternal comorbidities, or the use of sedatives during labor (Hu *et al.*, 2024).

Association Between PROM Duration and APGAR Score. Although the proportion of neonates with poor APGAR scores was higher among those born after prolonged PROM (more than 12 hours), the association was not statistically significant. This finding is consistent with several studies, including those by Gunnarsdottir et al. (, which also reported no significant relationship between PROM duration and neonatal APGAR scores. One plausible explanation is the impact of timely obstetric and neonatal interventions (Kong *et al.*, 2025). In hospital settings with adequate resources, immediate management following PROM, such as prophylactic antibiotics, expedited delivery, and neonatal resuscitation, can mitigate the potential adverse effects of prolonged latency on neonatal outcomes (Zullo and Di Mascio, 2025).

From a pathophysiological perspective, prolonged PROM may lead to progressive amniotic fluid loss, increasing the risk of umbilical cord compression, impaired placental blood flow, and fetal hypoxia (Athauda *et al.*, 2025). These factors theoretically contribute to lower APGAR scores. However, our results suggest that such risks can be

reduced in a well-equipped tertiary hospital through early detection and prompt intervention. This could explain the lack of statistical significance despite an observable trend toward poorer outcomes with prolonged PROM (Shamim *et al.*, 2024).

Comparison with Previous Research. The results of this study contrast with findings by Algeri *et al.* (2025), who reported a significantly higher risk of poor neonatal outcomes, including lower APGAR scores, in cases of PROM exceeding 12 hours. Differences in study settings, sample characteristics, and clinical protocols likely contribute to these discrepancies (Liu *et al.*, 2025). For example, Endale's study was conducted in a setting where delayed access to care and limited neonatal support services may have exacerbated the impact of prolonged PROM. In contrast, our study setting benefits from readily available obstetric teams and neonatal intensive care facilities.

Clinical Implications and Limitations

Although the statistical association was insignificant, the clinical trend observed in this study —where prolonged PROM is associated with a higher proportion of poor APGAR scores —remains relevant for clinical practice. It reinforces the importance of minimizing the latency period between membrane rupture and delivery, particularly in term pregnancies, to reduce the potential risk of fetal hypoxia and infection. Obstetric care providers should maintain vigilance in monitoring both maternal and fetal status in cases of PROM and initiate timely interventions when indicated.

This study has several limitations. First, the retrospective design relies on the accuracy and completeness of medical records, which may introduce limitations in the data. Second, the analysis did not control for confounding factors, including maternal infection status, intrapartum fetal monitoring results, and delivery method. Third, the single-centre setting may limit the generalizability of the findings to other populations or healthcare environments. Recommendations for Future Research. Future studies should consider prospective designs with larger, multicenter samples to enhance generalizability. Incorporating additional variables, such as maternal infection markers, labor management protocols, and neonatal blood gas analysis, may provide a more comprehensive understanding of the relationship between PROM duration and neonatal outcomes. Furthermore, examining long-term neonatal morbidity in relation to PROM could yield valuable insights for clinical care and policy development.

CONCLUSION

While prolonged PROM (>12 hours) was associated with a higher proportion of poor neonatal APGAR scores in this study, the association was not statistically significant. The findings suggest that with timely and effective obstetric and neonatal care, the potential negative impact of prolonged PROM on immediate neonatal outcomes can be mitigated. These results highlight the importance of prompt clinical management in cases of PROM to optimize neonatal health.

Acknowledgement

The authors would like to express their sincere gratitude to the management and medical staff of Dr. H. Abdul Moeloek Regional General Hospital, Lampung Province, for their support and assistance in providing access to the medical records used in this study. We also extend our appreciation to the Faculty of Medicine at Universitas Malahayati for their guidance and academic support throughout the research process. Finally, we extend our deepest thanks to all colleagues and contributors whose valuable input and encouragement enabled us to complete this study.

Conflict of Interest

There are no potential conflicts of interest relevant to this article.

References

Algeri, P. *et al.* (2025). Rupture of the membrane at term. Titled oral misoprostol: a most effective labor induction method compared to vaginal prostaglandin: Titled oral Misoprostol in tPROM induction, *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 312, p. 114089. doi: https://doi.org/10.1016/j.ejogrb.2025.114089.

Athauda, P. *et al.* (2025) 'Monitoring and timing of delivery in suspected late fetal growth restriction at term', *American Journal of Obstetrics and Gynecology*. doi: https://doi.org/10.1016/j.ajog.2025.04.051.

Çarkçı Yıldız, D. and Yapar Eyi, E. G. (2025) 'Association of Robson Ten Group Classification System with neonatal/postneonatal mortality: an analysis for the effect of the mass migration', *AJOG Global Reports*, 5(2), p. 100464. doi: https://doi.org/10.1016/j.xagr.2025.100464.

Cohen, A. *et al.* (2024) 'Investigation of health inequities in maternal and neonatal outcomes of patients with placenta accreta spectrum: a multicenter study', *American Journal of Obstetrics & Gynecology MFM*, 6(7), p. 101386. doi: https://doi.org/10.1016/j.ajogmf.2024.101386.

Crosland, B. A. *et al.* (2025) 'Amniotic fluid: its role in fetal development and beyond', *Journal of Perinatology*, pp. 1–8. doi: https://dx.doi.org/10.1038/s41372-025-02313-1.

Dadkhah Tehrani, F. *et al.* (2021) 'A Review on Modifications of Amniotic Membrane for Biomedical Applications', *Frontiers in Bioengineering and Biotechnology*, 8, p. 606982. doi: https://dx.doi.org/10.3389/fbioe.2020.606982.

Danciu, B. M. *et al.* (2023) 'Is Spontaneous Preterm Prelabor of Membrane Rupture Irreversible? A Review of Potentially Curative Approaches', *Biomedicines*, 11(7), p. 1900. doi: https://dx.doi.org/10.3390/biomedicines11071900.

Feruza, N. and Wang, Z. (2023) 'Evaluation of Puerperal and Postpartum Infections after Cesarean Section and Their Clinical Outcomes', *Open Journal of Internal Medicine*, 13(04), pp. 330–350. doi: https://dx.doi.org/10.4236/ojim.2023.134030.

Getnet, A. *et al.* (2023) 'Determinants of premature rupture of membrane among pregnant women in Harar town, Eastern Ethiopia: A case-control study', *Heliyon*, 9(4), p. e15445. doi: https://doi.org/10.1016/j.heliyon.2023.e15445.

Ghosh, D. *et al.* (2025) 'Safety and efficacy of extended expectant management in preterm premature rupture of membrane between 32 and 34 weeks of pregnancy-A randomization control trial', *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 310, p. 113971. doi: https://doi.org/10.1016/j.ejogrb.2025.113971.

Guerra, S. *et al.* (2024) 'Megacolon diagnosis in pregnancy: A case report and literature review', *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 300, pp. 124–128. doi: https://doi.org/10.1016/j.ejogrb.2024.07.016.

Gunnarsdottir, J. *et al.* (2025) 'Respiratory distress after planned births compared to expectant management – Target trial emulation', *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 307, pp. 184–190. doi: https://doi.org/10.1016/j.ejogrb.2025.02.012.

Hu, Y. *et al.* (2024) 'Association between timing of labor induction and neonatal and maternal outcomes: an observational study from China', *American Journal of Obstetrics & Gynecology MFM*, 6(10), p. 101456. doi: https://doi.org/10.1016/j.ajogmf.2024.101456.

Jan, M. *et al.* (2025) 'Induction of labor in late-term pregnancy: amniotomy plus early oxytocin perfusion versus amniotomy plus oxytocin perfusion delayed by 24 h', *Journal of Gynecology Obstetrics and Human Reproduction*, 54(1), p. 102875. doi:

https://doi.org/10.1016/j.jogoh.2024.102875.

Kalifa, T. M. *et al.* (2024) 'Is a pregnancy following a second trimester uterine evacuation associated with increased adverse maternal and neonatal outcomes?', *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 292, pp. 25–29. doi: https://doi.org/10.1016/j.ejogrb.2023.11.002.

Kong, F. *et al.* (2025) 'Neonatal and maternal morbidity rates in low-risk nulliparous women across different gestational ages', *iScience*, 28(4), p. 111636. doi: https://doi.org/10.1016/j.isci.2024.111636.

Liu, D. *et al.* (2025) 'No difference in outcomes with early vs late antibiotic prophylaxis for term premature rupture of membranes: a multicenter analysis', *American Journal of Obstetrics and Gynecology*, 233(2), pp. 129.e1-129.e13. doi: https://doi.org/10.1016/j.ajog.2025.01.017.

Lucidi, A. *et al.* (2024) 'Emergency delivery in pregnancies at high probability of placenta accreta spectrum on prenatal imaging: a systematic review and meta-analysis', *American Journal of Obstetrics & Gynecology MFM*, 6(10), p. 101432. doi: https://doi.org/10.1016/j.ajogmf.2024.101432.

Melikova, S., Mammadbayli, A. and Guekht, A. (2025) 'Factors predicting seizure control and delivery outcomes in women with epilepsy with planned and unplanned pregnancy', *Revue Neurologique*. Doi: https://doi.org/10.1016/j.neurol.2025.07.006.

Messinger, C. J. *et al.* (2025) 'Effect of transabdominal versus transvaginal cerclage on preterm birth and neonatal outcomes among patients with a history of cervical insufficiency', *American Journal of Obstetrics and Gynecology*. Doi: https://doi.org/10.1016/j.ajog.2025.06.049.

Murtado, A. *et al.* (2023) 'Hubungan Ketuban Pecah Dini Terhadap Kejadian Sepsis Neonatorum Di Ruang Perinatologi Rsud Dr.H. Abdul Moeloek Provinsi Lampung', *Jurnal Ilmu Kedokteran dan Kesehatan*, 10(11), pp. 3117–3122. Doi: https://dx.doi.org/10.33024/jikk.v10i11.10037.

Ospina, M. B. *et al.* (2025) 'Ehawawisit: Sociodemographic, Clinical Characteristics, and Perinatal Outcomes of Métis Pregnancies in Alberta, Canada', *Journal of Obstetrics and Gynaecology Canada*, p. 103044. doi: https://doi.org/10.1016/j.jogc.2025.103044.

De Preud'homme d'Hailly de Nieuport, S. M. I. *et al.* (2024) 'Delayed cord clamping vs cord milking in elective cesarean delivery at term: a randomized controlled trial', *American Journal of Obstetrics & Gynecology MFM*, 6(3), p. 101279. doi: https://doi.org/10.1016/j.ajogmf.2024.101279.

Rosenthal, E. A. *et al.* (2025) 'Delivery timing of placenta accreta spectrum: later is feasible', *American Journal of Obstetrics and Gynecology*. Doi: https://doi.org/10.1016/j.ajog.2025.02.027.

Shamim, Muhammad Aaqib *et al.* (2024) 'PeRinatal, neOnatal, and Maternal OuTcomEs with azithromycin prophylaxis in pregnancy and labour (PROMOTE-PROPHYLAXIS): systematic review and meta-analysis', *eClinicalMedicine*, 73, p. 102691. doi: https://doi.org/10.1016/j.eclinm.2024.102691.

Šket, T. *et al.* (2021) 'The Role of Innate Immune System in the Human Amniotic Membrane and Human Amniotic Fluid in Protection Against Intra-Amniotic Infections and Inflammation', *Frontiers in Immunology*, 12, p. 735324. doi: https://dx.doi.org/10.3389/fimmu.2021.735324.

Xu, L. *et al.* (2024) 'Frontiers in the Etiology and Treatment of Preterm Premature Rupture of Membrane: From Molecular Mechanisms to Innovative Therapeutic Strategies', *Reproductive Sciences*, 31(4), pp. 917–931. doi: https://dx.doi.org/10.1007/s43032-023-01411-9.

Yagi, S. I., Nurmalasari, Y. and Rafie, R. (2021) 'Pengaruh Ekstrak Habbatussauda Nigella Sativa terhadap Status Gizi', *Jurnal Ilmiah Kesehatan Sandi Husada*, 10(1), pp. 214–222. Doi: https://doi.org/10.35816/jiskh.v10i1.586.

Zullo, F. and Di Mascio, D. (2025) 'Management of cervical cerclage after preterm premature rupture of membranes: an argument for removal', *American Journal of Obstetrics & Gynecology MFM*, 7(1, Supplement), p. 101570. doi: https://doi.org/10.1016/j.ajogmf.2024.101570.