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Do Outcome Parameters Differ in Babies Born at the Gestational Ages of 36 and 37 Weeks?

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ABSTRACT

Background: The aim was to compare aspects of late preterm birth at 36 gestational weeks (GW) and early-term birth at 37 GW and determine the connection of risk factors for both gestational ages during hospitalization.

Methods: This retrospective epidemiological study included 200 newborn babies of a gestational age of 36+0/7 GW to 37+6/7 GW and their mothers who were treated at the Department for Intensive Care and Neonatology during the period from January 1, 2020, to December 31, 2022.

Main findings: The mothers who gave birth in the 36th week of pregnancy were not significantly different according to age, parity, type of birth, abortion history, and mode of conception from those who gave birth in the 37th week. Furthermore, 80% of the newborn babies in both sample groups had good APGAR scores and birthweights, but only approximately 20% had no pathological conditions and required no therapy, with approximately 30% of both sample groups having some neurological pathology when discharged.

Principal conclusion: It is crucial to recognize that there is no significant difference in the outcome of newborns at 36 and 37 GW and that they require significant medical multidisciplinary supervision by obstetricians and pediatricians.

Key words: infants, late preterm infants, early-term infants

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INTRODUCTION

Late preterm birth (LPTB) refers to a newborn born between 34 and 36 weeks of gestation, while an early preterm birth (ETB) denotes a premature newborn born between 37 and 38 weeks of gestation (1). Despite increasing knowledge of the adverse clinical outcomes associated with late preterm birth and preterm birth, these newborns represent a significant burden on the health care system (2). Neonatologists bear the brunt of the burden, as all eyes are on them regarding the duration, treatment, and follow-up of these babies, and obstetricians and parents always expect a positive outcome (3).

Experience has shown that pediatricians should explain to parents that birth before 39 weeks of gestation (GW) is accompanied by health and neurodevelopmental risks that may increase later in childhood and are likely to persist into adulthood (1). However, previous works on the association between gestational age and neonatal outcome have demonstrated that LPTBs and ETBs account for almost a third of all live births (4). LPTBs represent 75% of all preterm births and 20%–25% of admissions to intensive care units (5), as indicated by our published paper from 2022 (3). The prevalence rate of ETB is 15% to 30% worldwide, and it is more common than LPTB (5). However, data on the impact of preterm birth on maternal and neonatal outcomes are lacking. A USA study notes that every week is important for the health of the newborn, and that elective cesarean sections before 39 GW can be accompanied by a number of complications. However, it found that more than half of elective cesarean sections were performed at 37 GW without any indication (6).

LPTB is not the only GW subgroup at risk of adverse clinical outcomes (7). The LPTB brain is still immature and therefore susceptible to harmful stimuli that may arise from postnatal complications, such as respiratory distress, hypoglycemia, hyperbilirubinemia, or apnea (8), which studies have also confirmed for ETB (9, 10). Therefore, the definition of pregnancy has been updated, prompted by increasing evidence that there are significant differences in the outcomes of newborns born within this five-week interval (11).

Ten years ago, full-term pregnancy (FTB) was redefined as a pregnancy lasting between 39+0/7 GW and 40+6/7 GW, while the period between 37 and 38 GW is now called preterm birth (11, 12). Works aimed at assessing the incidence as well as the risk factors and feto-maternal outcomes of LPTBs and ETBs can help in making the right decisions, especially regarding the week of delivery if it is an elective cesarean section or induction of labor, and in establishing clinical guidelines for the management of such children. The main question of this study is whether there is a statistically significant difference in the health outcomes of newborns born at 36 and 37 weeks of gestation. Since this population is insufficiently researched, but makes up a significant proportion of newborns, we wanted to investigate whether children born late preterm are at higher risk for certain neonatal complications compared to children born early term and to determine the association of risk factors for both gestational ages during hospitalization at the Clinic for Intensive Care and Neonatology.

PARTICIPANTS AND METHODS

Participants

The study included 200 newborn babies of a gestational age of 36+0/7 GW to 37+6/7 GW who were treated at the Department for Intensive Care and Neonatology of the Clinic for Children's Diseases, University Clinical Hospital (UCH) Mostar, and their mothers who gave birth at the Clinic for Gynecology and Obstetrics, UCH Mostar.

Methods

This retrospective epidemiological study was conducted at the Clinic for Gynecology and Obstetrics of the University Clinical Hospital

Mostar (UCH Mostar) and the Department of Intensive Care and Neonatology of the Clinic for Children's Diseases, UCH Mostar, in the period from January 1, 2020, to December 31, 2022. The data were collected from the protocols, patient histories, and discharge letters of pregnant women who had given birth at the Clinic for Gynecology and Obstetrics, UCH Mostar, as well as the above data pertaining to newborn babies transferred to the Department for Intensive Care and Neonatology of the Clinic for Children's Diseases, UCH Mostar.

The following parameters were taken into consideration for the mother: age, parity, type of birth, abortion, mode of conception, type and course of pregnancy, medication during it, and pathological conditions. The parameters for the newborn babies were gestational age, sex, birthweight, APGAR score, admitting and discharge diagnosis, therapy, mechanical ventilation, cranial ultrasound after birth, feeding tolerance time, duration of stay in THE department, and treatment outcome. The birthweight of the newborn was determined immediately upon birth using the Momert MM6475 digital scale. The gestational age was calculated on the basis of the pregnancy due date and the date of delivery of the mother, which were entered into the transfer papers for the baby. The APGAR index is the sum of the values of five criteria which are scored from 0 to 2, and the total index score can be a value from 0 to 10 that is determined at the first and fifth minutes.

Statistical analysis

The categorial variables are presented as a number and percentage, and the χ^2 test was used to test the significant difference (if the expected frequency was lacking, Fisher's exact test was employed). Age as the only numerical variable was presented as a median and quartile, and the Mann-Whitney test was utilized to test the difference. The normality of numerical variables was determined with the Kolmogorov–Smirnov test. The threshold of statistical significance was set at $p=0.05$. P-values which could not be reported to three decimal places were presented as $p<0.001$. The statistical data analysis was conducted in IBM SPSS Statistics for Windows, version 25 (Armonk, NY: IBM Corp., USA).

RESULTS

During the two-year period of the study, 3,600 babies were born at the Clinic for Gynecology and Obstetrics, of which 166 were late preterm births (36 GW) (4.61%) and 284 (7.8%) were early-term births (37 GW). The sample included 178 pregnant women, of which 88 (49.4%) gave birth in the 36th week of pregnancy (36+0/7–36+6/7) and 90 (50.6%) in the 37th week of pregnancy (37+0/7–37+6/7). There were 27 twin pregnancies. In 22 of the twin pregnancies, both newborn babies were admitted to the neonatology department, and in five of them, only one newborn baby was admitted whilst the other remained with the mother upon birth. The mothers who gave birth in the 36th week of pregnancy were not significantly different according to age, parity, type of birth, abortion history, and mode of conception from those who gave birth in the 37th week. Nor was there any significant difference with respect to newborn gestational age for the course of pregnancy, consumption of medication during it, or pathological conditions (Table 1).

A significant difference with respect to gestational age was found for the admitting and discharge diagnoses, as well as therapy. Jaundice and small for gestational age as admitting diagnoses were more frequent with ETBs, whilst LPTBs were frequently discharged with a neurological disorder diagnosis. Respiratory therapy in combination with antibiotics and support therapy occurred more frequently with LPTBs, whereas more ETBs were treated with antibiotics but without the need for supportive therapy. No statistically significant difference was determined for the other newborn characteristics with respect to newborn gestational age (Table 2).

Table 1. The distribution of the characteristics of the pregnant women according to the gestational age of the newborn

	Gestational age				p
	36+0/7 – 36+6/7		37+0/7 – 37+6/7		
	n	%	n	%	
Age/year[a]	31 (26–36)		31 (27–35)		0.915[b]
Pregnancy					0.688
1	35	39.8	42	46.7	
2	25	28.4	22	24.4	
3	21	23.9	17	18.9	
≥4	7	8.0	9	10.0	
Mode of delivery					0.287
Vaginal	37	42.0	45	50.0	
Cesarean	51	58.0	45	50.0	
Abortion					0.416
No	78	88.6	83	92.2	
Yes	10	11.4	7	7.8	
Type of fertilization					0.682[c]
Natural conception	86	97.7	86	95.6	
Assisted fertilization	2	2.3	4	4.4	
Pregnancy type					0.490
Single	73	83.0	78	86.7	
Multiple pregnancy	15	17.0	12	13.3	
Medications taken in pregnancy					0.877
No	42	47.7	44	48.9	
Yes	46	52.3	46	51.1	
Pathological conditions					0.419[c]
Normal	48	54.5	44	48.9	
Hypertension	12	13.6	6	6.7	
Diabetes	4	4.5	7	7.8	
Infection	8	9.1	10	11.1	
Thyroid disorders	9	10.2	8	8.9	
Hematological disorders	2	2.3	5	5.6	
And other	5	5.7	10	11.1	
The course of pregnancy					0.328
Normal	57	64.8	61	67.8	
Disorders of the placenta	12	13.6	6	6.7	
Leaking amniotic fluid	15	17.0	15	16.7	
Other	4	4.5	8	8.9	

[a]Results are expressed as median (first quartile – third quartile); [b]Mann-Whitney test; [c]Fisher's exact test

DISCUSSION

The main findings of this study were that a normal course of pregnancy without pathological conditions was the case for 50% of the pregnant women in the sample, and a C-section delivery was performed in more than 50% of the women in both sample groups.

Furthermore, 80% of the newborn babies in both sample groups had good APGAR scores and birthweights, but only approximately 20% had no pathological conditions and required no therapy, with approximately 30% of both sample groups having some neurological pathology when discharged.

Table 2. Characteristics of newborns according to gestational age

	Gestational age (weeks)				p
	36+0/7 – 36+6/7		37+0/7 – 37+6/7		
	n	%	n	%	
Gender					0.668
Male	59	59.0	56	56.0	
Female	41	41.0	44	44.0	
Score vitality (1st min)					0.841
0–7	15	15.0	14	14.0	
8–10	85	85.0	86	86.0	
Score vitality (5th min)					0.096
0–7	4	4.0	10	10.0	
8–10	96	96.0	90	90.0	
Referral diagnosis					**<0.001***
Jaundice	13	13.0	27	27.0	
Twins	20	20.0	14	14.0	
Neurological disorder	10	10.0	15	15.0	
Respiratory disorder	3	3.0	4	4.0	
Clinical monitoring	16	16.0	13	13.0	
Small for gestational age	4	4.0	11	11.0	
Other pathology	11	11.0	16	16.0	
Discharge diagnosis					**0.015***
Without pathological conditions	25	25.0	16	16.0	
Jaundice	19	19.0	20	20.0	
Neurological disorder	32	32.0	25	25.0	
Perinatal infection	12	12.0	10	10.0	
Hematological disorder	0	0	10	10.0	
Respiratory disorder	2	2.0	6	6.0	
Small for date	7	7.0	7	7.0	
Other pathology	3	3.0	6	6.0	
Therapy					**0.002**
Without therapy	18	18.0	14	14.0	
Phototherapy	13	13.0	12	12.0	
Antibiotics	16	16.0	35	35.0	
Respiratory therapy + antibiotics + supportive therapy	51	51.0	30	30.0	
Other therapy	2	2.0	9	9.0	
Mechanical ventilation					0.170*
Yes	7	7.0	2	2.0	
No	93	93.0	98	98.0	
Brain ultrasound after birth					0.957*
Normal	72	72.0	74	74.0	
Bleeding degree (HIC) 1	17	17.0	14	14.0	
Bleeding degree (HIC) 2	9	9.0	10	10.0	
Bleeding degree (HIC) 3	2	2.0	2	2.0	
Meal tolerance time					0.079
Up to 24	80	80.0	89	89.0	
Over 24	20	20.0	11	11.0	
Number of days in the department					0.088
<7	73	73.0	83	83.0	
> 7	27	27.0	17	17.0	
Outcome					0.497*
Discharged from the hospital	98	98.0	100	100.0	
Death	2	2.0	0	0	

*Fisher's exact test

Although preterm births have been extensively researched, there is still a lack of information on newborn babies born in the later phases of pregnancy, particularly on LPTBs at 36 GW and

ETBs at 37 GW. Nevertheless, research is in this direction is increasing because more recent works in the field of neonatology are finding greater evidence that ETBs (9, 10), as well as LPTBs, are at significant risk of developing various pathological conditions (8). Both gestational ages are exposed to significant perinatal mortality and morbidity, and to a larger number of admissions to neonatal intensive care units, as well as to a higher risk of respiratory diseases and neurological deficits, according to findings published in recent years (7–10). Epidemiological studies have found that the comorbidity and mortality of these groups of newborn babies are the direct result of their immature physiology, and with respect to adaptation, they behave like typical preterm babies (1, 11, 12).

Despite these poor conclusions, the incidence of preterm births is on the rise around the world, mostly due to the larger incidence of indicated preterm labor (13). This is also confirmed by our results, where approximately 50% of the pregnancies in both sample groups were ended by C-sections. Our results show that more than 40% of the women were primigravida, with 50% being normal pregnancies without pathological conditions in both gestational age groups. This indicates that they had no anticipated risk factors for labor in 36 and 37 GW, in contrast to the findings of a study published in 2021 (15).

As for the characteristics of the newborn babies, more than 80% in both sample groups had good APGAR scores and birthweights, but the finding that only approximately 20% underwent no therapy and had no pathological conditions during hospitalization is a concern. Of particular importance is the fact that 32% of those born at 36 GW and 25% of those at 37 GW had neurological pathology as a discharge diagnosis, which is a potential pathway to neurological deviations in early childhood and later age, which was also indicated by a paper published in 2016 by Helle et al. (10). This is similar to the findings of many international studies which suggest that these children later experience adverse short- and long-term consequences, including behavioral and neurological disorders and chronic conditions (1, 10, 14).

The trend in elective labor in LPTB and ETB is different in individual developed countries (5). In our circumstances, the proportion of elective labor is slowly on the rise, but it is certainly much greater than 10 years ago, which is in line with world trends. ETBs are more frequent than LPTBs, with international prevalence rates in the range of 15% to 30% (5). This is similar to our percentage of newborn babies with respect to the total number of babies born. Most infants in these gestational age groups are separated from their mothers and transferred to the neonatology department due to some deviation in clinical and neurological status. This is a clear confirmation that these infants behave like immature infants and require critical monitoring with the assumption that they may have a poor outcome. Our experience also showed that these infants are often readmitted to hospital during the first month of life due to poor weight gain, prolonged jaundice, or aspiration of milk, which has also been demonstrated by other studies (1). Therefore, any work conducted on this topic can contribute to new knowledge about the impact of birth at the gestational ages of 36 and 37 GW, and can contribute to the creation of clinical guidelines for the treatment and monitoring of such at-risk groups of infants.

CONCLUSION

There are some clinically important differences, but no strong statistical association has been confirmed in the outcomes of newborns of 36 and 37 GW, and they require significant medical supervision by obstetricians and pediatricians. The negative reactions of parents are a consequence of inadequate knowledge and information during pregnancy and after birth. Any study conducted on this topic may be an indicator for the development of clinical

guidelines for such pregnancies and newborns by offering direct evidence of the adverse impact of gestational age (36 and 37 GW) on the outcome parameters of newborns.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

MJR conceived and designed the study, performed data analysis and interpretation, conducted the literature review, and wrote the manuscript. JP contributed to the study conception and design, data interpretation, literature review, and critical revision of the manuscript. SGR contributed to the literature review and supervised the study. AR was involved in data acquisition, study design, data analysis and interpretation, and critical revision of the manuscript. All authors read and approved the final manuscript.

ETHICAL BACKGROUND

Institutional review board statement: This retrospective study was conducted according to all ethical principles of the University Clinical Hospital Mostar. This study was approved by the Ethics Committee of Clinical Hospital Center Mostar and valid documentation exists for this matter (number 1356/23), date 4.27.2023.

Informed consent statement: Informed consent was obtained from all subjects involved in the study.

Data availability statement: We deny any restrictions on the availability of data, materials, and associated protocols.

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