Scientific Research Publishing

Open Journal of Obstetrics and Gynecology, 2025, 15(10), 1795-1814
https://www.scirp.org/journal/ojog
ISSN Online: 2160-8806
ISSN Print: 2160-8792

Clinical Overview of Prolonged Pregnancies and Early Neonatal Well-Being in Cameroon: Pilot Case-Control Study at the Laquintinie Hospital in Douala

Henri Essome[1,2], Moustapha Bilkissou[1], Merlin Boten[3], Fulbert Mangala Nkwele[1], Grace Ngounoue[4], Reine Koundo Motah[5], Lionel Oscar Essome Tocky[6], Junie Ngaha Yaneu[1], Elvire Eyenga Mfomo[1], Florence Ornella Obono Ebo[1], Honorine Ehete[1], Ingrid Doriane Ofakem Ilick[2], Gervais Mounchikpou Ngouhouo[1], Alphonse Galame[6], Robert Tchounzou[6], Grâce Tocki Toutou[2], Astrid Ndolo Kondo[1,2], Darolles Mwandje[1], Michel Roger Ekono[1], Théophile Nana Njamen[6], Estelle Wafo[1], Pascal Foumane[7]

[1]Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon
[2]Laquintinie Hospital, Douala, Cameroon
[3]Faculty of Health Sciences of Bamenda, University of Bamenda, Bamenda, Cameroon
[4]Higher Institute of Health Sciences, University of Banganté, Banganté, Cameroon
[5]Faculty of Health Sciences of Cotonou, University of Abomey Calavi, Abomey Calavi, Benin
[6]Faculty of Health Sciences of Buea, University of Buea, Buea, Cameroon
[7]Faculty of Medicine and Pharmaceutical Sciences of Sangmelima, University of Ebolowa, Ebolowa, Cameroon
Email: tockigrace@yahoo.fr

How to cite this paper: Essome, H., Bilkissou, M., Boten, M., Nkwele, F.M., Ngounoue, G., Motah, R.K., Tocky, L.O.E., Yaneu, J.N., Mfomo, E.E., Ebo, F.O.O., Ehete, H., Ilick, I.D.O., Ngouhouo, G.M., Galame, A., Tchounzou, R., Toutou, G.T., Kondo, A.N., Mwandje, D., Ekono, M.R., Njamen, T.N., Wafo, E. and Foumane, P. (2025) Clinical Overview of Prolonged Pregnancies and Early Neonatal Well-Being in Cameroon: Pilot Case-Control Study at the Laquintinie Hospital in Douala. *Open Journal of Obstetrics and Gynecology*, **15**, 1795-1814.
https://doi.org/10.4236/ojog.2025.1510150

Received: September 22, 2025
Accepted: October 28, 2025
Published: October 31, 2025

Abstract

Introduction: A pregnancy is said to be "prolonged" according to the National College of French Gynecologists and Obstetricians (NCFGO) from a gestational age greater than 41 + 0 weeks. This purely chronological definition of prolonged pregnancy is associated with an increase in maternal-fetal morbidity and mortality. **Objective:** This study aimed to study the early obstetric and neonatal outcome of these pregnancies in our environment to improve obstetric surveillance and neonatal well-being. **Method:** To this end, we conducted a cross-sectional analytical study with prospective collection of data over a period of 5 months from January 7, 2020 to May 30, 2020 at the maternity ward of Laquintinie Hospital in Douala. We defined prolonged pregnancy according to NCFGO as gestational age greater than 41 + 0 weeks. The parturients were divided into two groups. We included the pregnant women whose gestational age was greater than 41 weeks in the group of prolonged pregnancies according to the date of the last period and/or the obstetric ultrasound of the first trimester and the pregnant women whose gestational age was between 37

weeks and 41 weeks in the group of non-prolonged pregnancies. The analysis was carried out using Epi-Info 7.2.2.1 and SPSS version 20.0 software. The chi^2 test was used to compare variables. A p-value less than 0.05 was considered statistically significant. **Results:** During the study period, we recorded 58 cases of prolonged pregnancy out of 666 deliveries, *i.e.* a frequency of 8.7%. We did not identify socio-demographic variables associated with prolonged pregnancy in our study. Family history of prolonged pregnancy (OR = 4.4 [95% CI: 1.6 - 12.4], p = 0.003) and personal history of prolonged pregnancy (OR = 3.5 [95% CI: 1.0 - 12.0], p = 0.044) were associated clinical variables. Maternal and neonatal complications were: cesarean section (OR = 2.2 [95% CI: 1.2 - 4.1], p = 0.008), prolonged duration of labor (OR = 3.6 [95% CI: 1.0 - 12.5], p =0 .039), signs of post-maturity (OR = 25.1 [95% CI: 3.0 - 205.7], p = 0.002), chronic fetal distress and acute fetal distress (OR = 3.3 [95% CI: 1.6 - 6.9], p = 0.001). Given the nature of family and personal history associated with prolonged pregnancy, it is important to look for it during the first prenatal consultations.

Keywords

Prolonged Pregnancy, Associated Variables, Complications, Laquintinie Hospital

1. Introduction

Prolonged pregnancy is a pregnancy that lasts more than 42 completed weeks of amenorrhea (AS), or 294 days, according to the definitions of the International Federation of Gynecology and Obstetrics (FIGO) and the World Health Organization (WHO) in 2007 [1]. This definition is subject to numerous dating and nomenclature controversies. Thus, a recent definition developed by the National College of French Gynecologists and Obstetricians (NCFGO) in December 2011 updated the old definition, establishing that pregnancy is said to be "prolonged" beyond 41 + 0 weeks, but that the term is only said to be "exceeded" from 42 + 0 weeks due to the increase in fetal mortality and morbidity at this term [2].

At full term, placental apoptosis begins; the placenta becomes less, and less efficient and maternal-fetal exchanges suffer. The main complication of this placental senescence is the appearance of post-maturity syndrome, which is the association of a reduction in active fetal movements, oligohydramnios and emission of meconium into the amniotic fluid [3]. Fetal heart rate abnormalities are also to be feared due to perinatal asphyxia. Finally, macrosomia often combines with fetal characteristics and causes more obstetric risks than fetal risks per se; it is five times greater in post-term newborns [3]. Maternal complications are mainly obstetrical. Indeed, it has been observed and reported that the further the age of pregnancy, the greater the risk of cesarean section. It is multiplied by 1.5 in the event of prolonged pregnancy [2]. It has also been reported that there is a reduction in spon-

taneous contractility of the uterine muscle and a poorer response to oxytocin when the term is exceeded [4]. This could then explain: the increase in the induction rate, the increase in the number of dynamic dystocias, the increase in post-partum hemorrhages (PPH) (20% of the PPH rate is attributable to overruns), the increase in artificial deliveries, and the moderate increase in the risk of instrumental extractions and 3rd and 4th degree perineal injuries. Finally, the risks of infection (chorioamnionitis, endometritis) and thromboembolism also seem to be increased when the term is exceeded [4].

Following the work of Zeitlin *et al.*, the incidence of deliveries with a gestational age at delivery greater than or equal to 42 weeks for 27 European countries in 2004 varied from 0.2% in Luxembourg and Austria to 7.1% in Sweden [5]. Two groups with extreme incidences stood out. On the one hand, the group of countries where less than 1% of live births are concerned pregnancies carried beyond term: Austria, Belgium, Estonia, Hungary, Lithuania and Luxembourg [2]. On the other hand, Scandinavian countries represented the group of countries with the highest proportions of over-term pregnancies: Sweden (7.1%), Norway (6.6%), Denmark (6.1%) and Finland (4.8%) [2]. The incidences in Ireland and Netherlands were 4.8% and 5.3%, respectively.

Prolonged pregnancy (>41 weeks) concerns nearly 15% of pregnant women in France, while late-term pregnancy (≥42 weeks) only concerns 1%. In the United States, the incidence of overterm pregnancy varied between 1 and 10% of pregnancies [2]. In Africa and more precisely in Mali, the frequency of prolonged pregnancy (>41 weeks) was 3.62% [6]. As for Cameroon, post-term pregnancies (≥42 weeks) vary from 3% to 5% of all deliveries [7].

The mother-child couple in a context of prolonged pregnancy therefore presents an increased risk of morbidity and mortality, which should be remembered to understand the interest and challenges of managing this period of pregnancy. It therefore seems legitimate to implement early and vigilant obstetric and neonatal surveillance in order to reduce them. These data are known in developed countries, with more adequate and efficient means of care. In our environment, this situation may be different because obstacles exist for better monitoring, such as low socio-economic level, financial constraints and a very low level of education. Thus, we proposed to carry out this study in our context for an operational approach to its results. In our study, we considered the definition of the National College of French Gynecologists and Obstetricians for prolonged pregnancy because it is common in our francophone scientific societies and it helps in anticipating complications, notably placental calcifications, oligohydramnios, fetal distress, and macrosomia.

2. Methodology

2.1. Type of Study

We conducted a prospective analytical cross-sectional case-control study.

2.2. Study Location

Our study took place in the maternity ward of Laquintinie Hospital in Douala due to its very high patient queue, but also its cosmopolitan aspect encompassing all social strata.

2.3. Period and Duration of the Study

Our study was conducted over 7 months, January 2020 to July 2020, and data was collected from January 2020 to May 31, 2020.

2.4. Study Population

2.4.1. Target Population

Our target population consisted of all pregnant women admitted to the delivery room of Laquintinie Hospital in Douala during the study period.

2.4.2. Inclusion Criteria

Prolonged pregnancies: Pregnant women whose gestational age (GA) was >41 weeks were included according to the date of the last period and/or the obstetric ultrasound of the 1st trimester.

Un-prolonged pregnancies: Pregnant women whose gestational age was between 37 weeks and 41 weeks.

2.4.3. Exclusion Criteria

Multiple pregnancies, patient's refusal to participate in the study.

2.5. Material

To carry out this study, we needed equipment, including:

-For the interrogation: A pre-established form which was completed by patients who consented to the study.

-For the clinical examination: A room with chairs and a table; a stethoscope; a weighing scale; a measuring tape; a measuring rod; white coats; an antiseptic soap; and treatment gloves.

-For data collection and analysis: A computer; USB keys; reams of A4 paper; a 200-page notebook; pens, pencils, and erasers.

2.6. Sampling

We carried out consecutive and exhaustive sampling.

The minimum sample size was calculated using the formula proposed by Shulz and Grimes in 2005 [8] below:

$$n = 10.51\ [(R + 1) - P2\ (R^2 + 1)]/P2\ (1 - R)^2$$

where n = minimum size for each group;

P2 = event rate in group 2;

P1 = event rate in group 1;

R = risk ratio (P1/P2).

Digital application

The risk of artificial induction of labor was greater in the event of prolonged pregnancy in the study carried out by Tangara in Mali [6].

P1 = proportion of pregnant women whose gestational age (GA) was >41 weeks for whom artificial induction of labor was carried out: 30.2%.

P2 = proportion of pregnant women whose gestational age was between [37 weeks - 41 weeks] in whom artificial induction of labor was carried out: 4.3%.

Our minimum sample size will therefore be:

$$n = 10.51\ [(7.0 + 1) - 0.043\ (7.0^2 + 1)]/0.043\ (1 - 7.0)^2$$

Hence, there were 41 subjects in each group.

2.7. Procedure

2.7.1. Administrative Arrangements and Ethical Consideration

This research obtained the authorizations after its completion, including the research authorization from the director of the Laquintinie Hospital in Douala.

The data were collected and processed in compliance with the fundamental principles of medical research, namely: confidentiality, the principle of safety of research, the principle of the interest and benefit of research and the principle of justice.

Each participant gave informed consent after reading the information letter.

2.7.2. Study Variables

The different variables studied were:

-Socio-demographic: Age, profession, marital status, region of origin, level of education.

-Clinical and reproductive: The method of admission; gyneco-obstetric history of: prolonged pregnancy, intrauterine fetal death, abortion, gestational age, parity; medical history: high blood pressure, diabetes; surgical history: previous cesarean section; history of prolonged pregnancy in the family; data from the current pregnancy: follow-up, author of prenatal consultations, progress, ultrasound data, gestational age; physical examination data: blood pressure, height, weight, fundal height, uterine contraction, fetal heart sounds, Bishop's, appearance of amniotic fluid, presentation of the fetus, condition of the pelvis; data on childbirth: labor, duration of labor, route of delivery.

-Maternal and fetal complications: Apgar score, birth weight, neonatal resuscitation, signs of post-maturity, malformation, neonatal death, delivery hemorrhage, soft tissue lesions, uterine rupture, and maternal death.

2.7.3. Procedure and Data Collection

The patients identified were approached upon admission to the delivery room. And following their consent, a clinical examination was carried out either in the delivery room or immediately post-partum associated with the use of birth registers or post-operative protocols. The response elements were collected on pretested and validated technical sheets. Additional information was received by tel-

ephone call from the mother seven days later to inquire about the state of health of her newborn and whether the latter had left the hospital with his mother or not; or if the newborn was followed in pediatrics, as well as to record possible cases of death.

2.7.4. Statistical Analysis

The data were integrated and analyzed by descriptive and analytical statistics methods using Epi-Info 7.2.2.1 and SPSS (Statistical Package for the Social Sciences) version 20.0 software. Qualitative data were presented as frequencies expressed as percentages and quantitative variables as averages. The statistical test used for the comparison was Pearson's chi^2. The difference was significant if $p < 0.05$.

3. Results

The frequency of prolonged pregnancy: During the study period, we recorded 666 deliveries, including 58 cases of prolonged pregnancy, *i.e.* a frequency of 8.7%.

The majority age group was [25 - 30] years old, with 77.5% among prolonged pregnancies and 79.1% among non-prolonged pregnancies; the difference was not statistically significant ($p = 0.808$). Parturients or married women giving birth represented 36.2% in prolonged pregnancies compared to 50% in non-prolonged pregnancies; the difference was not statistically significant ($p = 0.073$). Housewives represented 25.8% in prolonged pregnancies compared to 28.4% in non-prolonged pregnancies; the difference was not statistically significant ($p = 0.703$). According to the administrative division of Cameroon, pregnant women originating from the Western region were in the majority, *i.e.* 58.6% in prolonged pregnancies compared to 51.2% in non-prolonged pregnancies; the difference was not statistically significant ($p = 0.337$). The majority of our parturients had a secondary level of education, *i.e.* 56.9% among prolonged pregnancies compared to 39.8% among non-prolonged pregnancies; the difference was statistically significant ($p = 0.026$) (Table 1).

Referred gestations represented 58.6% in prolonged pregnancies compared to 27.2% for non-prolonged pregnancies, with a statistically significant difference ($p < 0.001$). The study of medical history was non-contributory. The history of prolonged pregnancy was found in 10.3% of prolonged pregnancies compared to 3.1% in non-prolonged pregnancies, with a statistically significant difference ($p = 0.044$). Primigravid represented 36.2% in prolonged pregnancies compared to 31.0% for non-prolonged pregnancies without statistically significant difference ($p = 0.470$). Nulliparous women represented 44.8% in prolonged pregnancies compared to 36.0% for non-prolonged pregnancies without statistically significant difference ($p = 0.242$). Most of the surgical history was cesarean section, with 17.2% in prolonged pregnancies compared to 11.3% in non-prolonged pregnancies, with no statistically significant difference ($p = 0.259$). The mother's history of prolonged pregnancy was found in 17.2% of prolonged pregnancies compared to 4.4% in

non-prolonged pregnancies, with a statistically significant difference (p = 0.003) (Table 2).

Table 1. Socio-demographic characteristics.

	Prolonged pregnancies (N = 58) n (%)	Un-prolonged pregnancies (N = 158) n (%)	OR	CI (95%)	p
Age in years					
[15 - 20]	6 (10.3)	13 (8.2)	1.2	[0.4 - 3.5]	0.627
[20 - 25]	7 (12.0)	20 (12.6)	0.9	[0.3 - 2.3]	0.907
[25 - 30]	45 (77.5)	125 (79.1)	0.8	[0.4 - 1.8]	0.808
Marital status					
Married	21 (36.2)	79 (50.0)	0.5	[0.3 - 1.0]	0.073
Widow	0 (0)	1 (0.6)	0.8	[0.0 - 22.3]	0.947
Single	37 (63.7)	78 (49.3)	1.8	[0.9 - 3.3]	0.061
Type of occupation					
Trader	10 (17.2)	26 (16.4)	1.0	[0.4 - 2.3]	0.890
Pupil/student	13 (22.4)	33 (20.8)	1.0	[0.5 - 2.2]	0.808
Housewife	15 (25.8)	45 (28.4)	0.8	[0.4 - 1.7]	0.703
Civil servant	3 (5.1)	17 (10.7)	0.4	[0.1 - 1.6]	0.219
Other	17 (29.3)	37 (23.4)	1.3	[0.6 - 2.6]	0.376
Region of origin					
Center	6 (10.3)	15 (9.4)	1.1	[0.4 - 2.9]	0.851
East	0	1 (0.6)	0.8	[0.0 - 22.3]	0.947
Far North	0	3 (1.8)	0.3	[0.0 - 7.4]	0.524
Littoral	11 (18.9)	31 (19.6)	0.9	[0.4 - 2.0]	0.914
North	1 (1.7)	8 (5.06)	0.3	[0.0 - 2.6]	0.299
Northwest	4 (6.9)	12 (7.6)	0.9	[0.2 - 2.9]	0.862
South	1 (1.7)	4 (2.5)	0.6	[0.0 - 6.1]	0.728
Southwest	1 (1.7)	3 (1.8)	0.9	[0.0 - 8.8]	0.932
West	34 (58.6)	81 (51.2)	1.3	[0.7 - 2.4]	0.337
Educational level					
Non scolarised	0 (0)	2 (1.2)	0.5	[0.0 - 11.3]	0.687
Secondary	33 (56.9)	63 (39.8)	1.9	[1.0 - 3.6]	0.026
University	24 (41.3)	88 (55.6)	0.5	[0.3 - 1.03]	0.063
Primary	1 (1.7)	5 (3.1)	0.5	[0.0 - 4.6]	0.574

Table 2. Past history.

	Prolonged pregnancies (N = 58) n (%)	Un-prolonged pregnancies (N = 158) n (%)	OR	CI (95%)	p
Admission method					
Referred	34 (58.6)	43 (27.2)	3.7	[2.0 - 7.1]	<0.001
Coming by herself	24 (41.3)	115 (72.7)	0.2	[0.1 - 0.4]	<0.001
Medical history					
Other (HIV, hepatitis)	4 (6.8)	16 (10.1)	0.6	[0.2 - 2.0]	0.470
Diabetes	0 (0)	3 (1.8)	0.3	[0.0 - 7.4]	0.524
None	54 (93.1)	139 (87.9)	1.8	[0.6 - 5.6]	0.2
History of prolonged pregnancy					
Yes	6 (10.3)	5 (3.1)	3.5	[1.0 - 12.0]	0.044
No	52 (89.6)	153 (96.8)	0.2	[0.0 - 0.9]	0.044
Gravidity					
Great multi-gravid (≥G6)	0 (0)	13 (8.2)	0.0	[0.0 - 1.5]	0.099
Multigravid (G4 - 5)	19 (32.7)	37 (23.4)	1.5	[0.8 - 3.0]	0.166
Paucigravid (G2 - 3)	18 (31.0)	59 (37.3)	0.7	[0.3 - 1.4]	0.391
Primigravid (G1)	21 (36.2)	49 (31.0)	1.2	[0.6 - 2.3]	0.470
Parity					
Multiparous (P4 - 5)	2 (3.4)	21 (13.2)	0.2	[0.0 - 1.0]	0.054
Nulliparous (P0)	26 (44.8)	57 (36.0)	1.4	[0.7 - 2.6]	0.242
Pauciparou (P2 - 3)	18 (31.0)	44 (27.8)	1.1	[0.6 - 2.2]	0.646
Primiparous (P1)	12 (20.68)	36 (22.78)	0.8	[0.4 - 1.7]	0.657
Previous cesarean section					
Yes	10 (17.2)	18 (11.3)	1.6	[0.6 - 3.7]	0.259
No	48 (82.7)	140 (88.6)	0.6	[0.2 - 1.4]	0.259
Similar case in the mother					
Yes	10 (17.2)	7 (4.4)	4.4	[1.6 - 12.4]	0.003
No	48 (82.7)	151 (95.5)	0.2	[0.0 - 0.6]	0.003

The number of prenatal consultations was between 4 - 7 in 82.7% of prolonged pregnancies compared to 87.9% in non-prolonged pregnancies without statistically significant difference (p = 0.321). Pregnancy monitoring was carried out by a gynecologist-obstetrician in 32.5% of prolonged pregnancies compared to 41.7% for non-prolonged pregnancies, with no statistically significant difference (p = 0.153). Most pregnant women had a height greater than 1.5 m, *i.e.* 87.9% in prolonged pregnancies compared to 87.9% for non-prolonged pregnancies without statistically significant difference (p = 0.995). Patients with a normal body mass index were in the majority, *i.e.* 56.8% in prolonged pregnancies compared to 56.3% for non-prolonged pregnancies, with no statistically significant difference (p =

0.940). Blood pressure was greater than 140/90 mm Hg in 6.8% of prolonged pregnancies compared to 5.0% in non-prolonged pregnancies, with no statistically significant difference (p = 0.603). Fundal height was greater than 35 cm in 46.5% of prolonged pregnancies compared to 29.7% for non-prolonged pregnancies, with a statistically significant difference (p = 0.022) (Table 3).

Table 3. Follow up of pregnancy.

	Prolonged pregnancies (N = 58) n (%)	Un-prolonged pregnancies (N = 158) n (%)	OR	CI (95%)	p
Number of antenatal consultations					
[4 - 7]	48 (82.7)	139 (87.9)	0.6	[0.2 - 1.5]	0.321
≥8	8 (13.7)	13 (8.2)	1.7	[0.6 - 4.5]	0.226
<4	2 (3.4)	6 (3.7)	0.9	[0.1 - 4.6]	0.904
Author(s) of antenatal consultations					
Midwife	32 (55.1)	77 (48.7)	1.2	[0.7 - 2.3]	0.402
Obstetrician-gynecologist	18 (32.5)	66 (41.7)	0.6	[0.3 - 1.1]	0.153
General practitioner	3 (5.1)	2 (1.2)	4.2	[0.6 - 26.1]	0.118
Other	5 (8.6)	13 (8.2)	1.0	[0.3 - 3.0]	0.926
Height					
>1.5 m	51 (87.9)	139 (87.9)	0.9	[0.3 - 2.5]	0.995
≤1.5 m	7 (12.0)	19 (12.0)	1.0	[0.3 - 2.5]	0.995
Body mass index					
Severe obesity	1 (1.72)	2 (1.26)	1.3	[0.1 - 15.3]	0.799
Moderate obesity	9 (15.5)	14 (8.8)	1.8	[0.7 - 4.6]	0.165
Overweight	15 (25.8)	53 (33.5)	0.6	[0.3 - 1.3]	0.282
Normal	33 (56.8)	89 (56.3)	1.0	[0.5 - 1.8]	0.940
Blood pressure					
>140/90 mmHg	4 (6.8)	8 (5.0)	1.3	[0.4 - 4.7]	0.603
≤140/90 mmHg	54 (93.1)	150 (94.9)	0.7	[0.2 - 2.4]	0.603
Fundal height					
[32 - 35] cm	26 (44.8)	94 (59.4)	0.5	[0.3 - 1.0]	0.056
>35 cm	27 (46.5)	47 (29.7)	2.2	[1.1 - 3.8]	0.022
<32 cm	5 (8.6)	17 (10.7)	0.7	[0.2 - 2.2]	0.645

The majority of presentations were peak, *i.e.* 89.6% in prolonged pregnancies compared to 93.6% in non-prolonged pregnancies, with no statistically significant difference (p = 0.322). Fetal heart sounds were normal in 82.7% of prolonged pregnancies compared to 90.5% in non-prolonged pregnancies, with no statistically significant difference (p = 0.119). The Bishop score was favorable in 80.7% of prolonged pregnancies compared to 77.7% in non-prolonged pregnancies, with

no statistically significant difference (p = 0.646). The amniotic fluid was meconium in 18.9% of prolonged pregnancies compared to 7.5% in non-prolonged pregnancies, with a statistically significant difference (p = 0.020). The pelvis was normal in 94.8% prolonged pregnancies compared to 94.9% for non-prolonged pregnancies, with no statistically significant difference (p = 0.974). Fetal heart rate was pathological in 6.8% of prolonged pregnancies compared to 6.9% for non-prolonged pregnancies, without statistically significant difference (p = 0.986) (Table 4).

Table 4. Fetal parameters.

	Prolonged pregnancies (N = 58) n (%)	Un-prolonged pregnancies (N = 158) n (%)	OR	CI (95%)	p
Presentation					
Face	1 (1.7)	3 (1.8)	0.9	[0.0 - 8.8]	0.932
Peak	52 (89.6)	148 (93.6)	0.5	[0.2 - 1.6]	0.322
Transverse	0 (0)	3 (1.8)	0.3	[0.0 - 7.4]	0.524
Breach	5 (8.6)	4 (2.5)	1.8	[0.9 - 14.0]	0.061
Fetal heart sounds					
[120 - 160]	48 (82.7)	143 (90.5)	0.5	[0.2 - 1.1]	0.119
≥160	6 (10.3)	11 (6.9)	1.5	[0.5 - 4.3]	0.416
<120	4 (6.8)	4 (2.5)	2.8	[0.6 - 11.8]	0.148
Bishop score					
[5 - 6]	10 (17.5)	22 (14.3)	1.2	[0.5 - 2.8]	0.571
≥7	46 (80.7)	119 (77.7)	1.1	[0.5 - 2.5]	0.646
[1 - 4]	1 (1.7)	12 (7.8)	0.2	[0.0 - 1.6]	0.133
Appearance of amniotic fluid					
Clear	43 (74.1)	139 (87.9)	0.3	[0.1 - 0.8]	0.015
Pea puree	1 (1.7)	2 (1.2)	1.3	[0.1 - 15.3]	0.254
Yellowish tinted	3 (5.1)	5 (3.1)	1.6	[0.3 - 7.2]	0.492
Meconium stained	11 (18.9)	12 (7.5)	2.8	[1.1 - 6.8]	0.020
Pelvis					
Normal	55 (94.8)	150 (94.9)	0.9	[0.2 - 3.8]	0.974
Contracted	0 (0)	4 (2.5)	0.2	[0.0 - 5.5]	0.413
Borderline	3 (5.1)	4 (2.5)	2.1	[0.4 - 9.6]	0.341
Fetal heart rate recording					
Abnormal	4 (6.8)	11 (6.9)	0.9	[0.3 - 3.2]	0.986
Not done	44 (75.8)	113 (71.5)	1.2	[0.6 - 2.5]	0.526
Normal	10 (17.2)	34 (21.5)	0.7	[0.3 - 1.6]	0.489

Artificial induction was carried out in 8.6% of prolonged pregnancies compared to 3.7% for non-prolonged pregnancies, with no statistically significant difference (p = 0.164). Prolonged pregnancy was the indication for artificial induction in 100%

of prolonged pregnancies versus 0% of non-prolonged pregnancies, with a statistically significant difference (p = 0.017). Labor lasted more than 12 hours in 12.5% of prolonged pregnancies compared to 3.7% in non-prolonged pregnancies, with a statistically significant difference (p = 0.039). Caesarean section was performed in 56.8% of prolonged pregnancies compared to 36.9% in non-prolonged pregnancies, with a statistically significant difference (p = 0.008). Acute fetal distress was the majority indication for cesarean section in 27.2% of prolonged pregnancies compared to 10.3% for non-prolonged pregnancies, with a difference that was statistically significant (p = 0.042) (Table 5).

Table 5. Follow up of labor.

	Prolonged pregnancies (N = 58) n (%)	Un-prolonged pregnancies (N = 158) n (%)	OR	CI (95%)	p
Mode of entry into labor					
Spontaneous	53 (91.3)	152 (96.2)	0.4	[0.1 - 1.4]	0.164
Artificial	5 (8.6)	6 (3.7)	2.3	[0.7 - 8.1]	0.164
Artificial: indication					
Prolonged pregnancy	5 (100)	0 (0)	143.0	[2.4 - 8467.6]	0.017
Severe pre-eclampsia	0 (0)	2 (33.3)	0.1	[0.0 - 4.3]	0.279
Premature rupture of membranes	0 (0)	4 (66.6)	0.0	[0.0 - 1.3]	0.074
Duration of labor					
>12 H	6 (12.5)	5 (3.7)	3.6	[1.0 - 12.5]	0.039
6 -12 H	18 (37.5)	45 (33.8)	1.1	[0.5 - 2.3]	0.647
<6 H	24 (50.0)	83 (62.4)	0.6	[0.3 - 1.1]	0.135
Delivery route					
With episiotomy	4 (6.8)	9 (5.6)	1.2	[0.3 - 4.1]	0.742
Caesarean section	33 (56.8)	58 (36.7)	2.2	[1.2 - 4.1]	0.008
Suction cup	0 (0)	1 (0.6)	0.8	[0.0 - 22.3]	0.066
Spontaneous	21 (36.2)	90 (56.9)	0.4	[0.2 - 0.7]	0.007
Caesarean section: indication					
Other	19 (57.5)	42 (72.4)	0.5	[0.2 - 1.2]	0.150
Double-scarred uterus	1 (3.0)	2 (3.4)	0.8	[0.0 - 10.0]	0.914
Failure of the test	1 (3.0)	1 (1.7)	1.7	[0.1 - 29.4]	0.686
Acute fetal distress	9 (27.2)	6 (10.3)	3.2	[1.0 - 10.1]	0.042
Obstructed presentation	3 (9.0)	7 (12.0)	0.7	[0.1 - 3.0]	0.663

In 51.7% the sex of the newborn was male in prolonged pregnancies compared to 49.3% in non-prolonged pregnancies, with no statistically significant difference (p = 0.758). Signs of post-maturity in newborns were found in 13.7% of prolonged pregnancies compared to 0.6% of non-prolonged pregnancies, with a significant difference (p = 0.002). At the first minute, the Apgar score in newborns was less than 7 in 34.4% of prolonged pregnancies compared to 13.2% for non-prolonged

pregnancies, with a significant difference ($p < 0.001$). At the fifth minute the Apgar score in newborns was less than 7 in 12.0% of prolonged pregnancies compared to 3.1% for non-prolonged pregnancies, with a statistically significant difference ($p = 0.018$). Newborns were resuscitated in 10.3% of prolonged pregnancies compared to 5.0% in non-prolonged pregnancies, with no statistically significant difference ($p = 0.170$). Neonatal macrosomia was found in 18.9% of prolonged pregnancies compared to 10.1% for non-prolonged pregnancies, with no statistically significant difference ($p = 0.086$). Neonatal malformation was found in 1.7% of prolonged pregnancies (hydrocephalus type) compared to 0.64% (laparoschisis type) in non-prolonged pregnancies, with no statistically significant difference ($p = 0.476$). We recorded 0% neonatal deaths in prolonged pregnancies compared to 0.6% in non-prolonged pregnancies, with no statistically significant difference (Table 6).

Table 6. Fetal outcome.

	Prolonged pregnancies (N = 58) n (%)	Un-prolonged pregnancies (N = 158) n (%)	OR	CI (95%)	p
Gender					
Female	28 (48.2)	80 (50.6)	0.9	[0.4 - 1.6]	0.758
Male	30 (51.7)	78 (49.3)	1.0	[0.6 - 2.0]	0.758
Signs of post-maturity					
Yes	8 (13.7)	1 (0.6)	25.1	[3.0 - 205.7]	0.002
No	50 (86.2)	157 (99.3)	0.0	[0.0 - 0.3]	0.002
Apgar score: 1st min					
<7	20 (34.4)	21 (13.2)	3.4	[1.6 - 6.9]	<0.001
≥7	38 (65.5)	137 (86.7)	0.2	[0.1 - 0.5]	<0.001
Apgar score: 5th min					
<7	7 (12.0)	5 (3.1)	4.2	[1.2 - 13.8]	0.018
≥7	51 (87.9)	153 (96.8)	0.2	[0.0 - 0.7]	0.018
Neonatal resuscitation					
Yes	6 (10.34)	8 (5.0)	2.1	[0.7 - 6.5]	0.170
No	52 (89.65)	150 (94.9)	0.4	[0.1 - 1.3]	0.170
Birth weight					
≥4000 g	11 (18.9)	16 (10.1)	2.0	[0.9 - 4.7]	0.086
2500 - 3999 g	46 (79.3)	139 (87.9)	0.99	[0.1 - 9.7]	0.990
<2500 g	1 (91.7)	3 (1.8)	0.5	[0.2 - 1.1]	0.111
Malformation					
Yes	1 (1.7)	1 (0.6)	2.7	[0.1 - 44.7]	0.476
No	57 (98.2)	157 (99.3)	0.3	[0.0 - 5.9]	0.476
Neonatal death					
Yes	0 (0)	1 (0.6)	0.8	[0.0 - 22.3]	0.947
No	58 (100)	157 (99.3)	1.1	[0.0 - 27.7]	0.947

Post-partum hemorrhage was found in 5.1% in prolonged pregnancies compared to 3.1% in non-prolonged pregnancies, with no statistically significant difference (p = 0.492). Perineal tears were found in 3.4% of prolonged pregnancies compared to 6.9% in non-prolonged pregnancies, with no statistically significant difference (p = 0.345). Cervical tearing was found in 3.4% of prolonged pregnancies compared to 0% in non-prolonged pregnancies; the difference is not statistically significant (p = 0.089). Uterine rupture was found in 1.7% of prolonged pregnancies compared to 0% in non-prolonged pregnancies, with no statistically significant difference (p = 0.197). Placental calcification was present in 6.8% of prolonged pregnancies compared to 0% in non-prolonged pregnancies, with a statistically significant difference (p = 0.029) (Table 7).

Table 7. Post-partum complications.

	Prolonged pregnancies (N = 58) n (%)	Un-prolonged pregnancies (N = 158) n (%)	OR	CI (95%)	p
Post-partum hemorrhage					
Yes	3 (5.1)	5 (3.1)	1.6	[0.3 - 7.2]	0.492
No	55 (94.8)	153 (96.8)	0.5	[0.1 - 2.5]	0.492
Perineal tear					
Yes	2 (3.4)	11 (6.9)	0.4	[0.1 - 2.2]	0.345
No	56 (96.5)	147 (93.0)	2.0	[0.4 - 9.7]	0.345
Cervical tear					
Yes	2 (3.4)	0 (0.0)	14.0	[0.6 - 296.0]	0.089
No	56 (96.5)	158 (100.0)	0.07	[0.0 - 1.5]	0.089
Uterine rupture					
Yes	1 (1.7)	0 (0.0)	8.2	[0.3 - 205.9]	0.197
No	57 (98.2)	158 (100.0)	0.1	[0.0 - 3.0]	0.197
Placental calcification					
Yes	4 (6.8)	0 (0.0)	26.1	[1.3 - 494]	0.029
No	54 (93.1)	158 (100.0)	0.0	[0.0 - 0.7]	0.029

4. Discussion

During the study period, we recorded 666 deliveries, including 58 cases of prolonged pregnancy, *i.e.* a frequency of 8.7%. Our result is variable compared to that of other authors, notably below the 15% to 20% of the National College of French Gynecologists and Obstetricians [2] and higher than the 3.62% of Tangara [6]. Compared to the French middle school rate, our reduced frequency is explained by the preponderance of factors linked to prematurity in our context, in particular, the difficult socio-economic conditions with arduous housework and poorer observation of rest. In the literature, the role of maternal age in the occurrence of prolonged pregnancy is controversial. According to Beisher *et al.* [9], there is an

inversely proportional relationship between maternal age and the incidence of prolonged pregnancies. Vorheer [10] on the other hand notes the inverse correlation. For other authors, maternal age does not affect the incidence of prolonged pregnancies, likewise our study, where the majority age group was [25 - 30] years old, with 77.5% among prolonged pregnancies and 79.1% among non-prolonged pregnancies, and the difference was not statistically significant (p = 0.808).

Previous studies have reported the predominance of the 25- to 35-year-old age group [6] [11] [12]. The latter corresponds to the majority section of human procreation; our findings are no exception. Data from the literature incriminate maternal weight and more precisely a body mass index that is too high in the first trimester, as well as a significant variation in the body mass index between the first and last trimester as exposure to gestational prolongation, *i.e.* a delay in childbirth [13] [14]. In our study, 56.8% of pregnant women had a normal body mass index in women with a prolonged pregnancy compared to 56.3% for women with a non-prolonged pregnancy; the difference was however not statistically significant (p = 0.940).

For Vorheer [10], a woman who has had a prolonged pregnancy has a 50% risk of subsequently having a second prolonged pregnancy. Parturients with a history of prolonged pregnancy had 3 times the risk of having a prolonged pregnancy in our study (OR = 3.5 [95% CI: 1.0 - 12.0], p = 0.044). Our findings agree with those reported by Tangara and Mogren *et al.* [6] [15], revealing a 3 times higher risk of occurrence of prolonged pregnancy in parturients with a history of prolonged pregnancy. A significant association between the occurrence of prolonged pregnancy and the presence of similar cases in the mother was found (OR = 4.4 [95% CI: 1.6 - 12.4], p = 0.003). Our results agree with those of Papiermik *et al.* [16] who found that a woman whose mother had already given birth post-term sees her risk of giving birth after term increased for her pregnancies. These results suggest that there are genetic factors influencing the duration of gestation in women.

However, this hypothesis has not yet been the subject of in-depth scientific studies. The influence of parity has given rise to a number of studies, some of which admit a role in the variability of the duration of gestation. Indeed, several authors have reported that multiparous women give birth on average earlier than primiparous women. For example, Mittendorf *et al.* [17] estimate that primiparous women reach the term of pregnancy at 288 days from the last period and multiparous women at 283 days. According to Smith [18], who also studied the duration of pregnancy in these two populations using early ultrasound (<13 weeks) and the date of the last period in 1514 pregnant women, the average duration of pregnancy was 284 days and 282 days, respectively. In the first study, primiparous women give birth on average 5 days after multiparous women, according to the second author, the difference between these two populations is 2 days. Similarly, Mohamed [12] found an association between primiparity and prolonged pregnancy. Furthermore, Caughey *et al.* [19] and Tangara [6] identify nulliparity as a risk factor for prolonged pregnancy. This factor seems controversial, and several studies show no correlation

between parity and duration of pregnancy [20]. Beisher *et al.* [9] in a prospective study of 2972 pregnant women followed since the first trimester did not demonstrate any significant difference: 9.3% of primiparous women gave birth at 42 weeks compared to 8.9% of multiparous women. In our series, the predominant category was represented by nulliparous women, *i.e.* 44.8% in prolonged pregnancies compared to 36.0% for non-prolonged pregnancies and the difference was not statistically significant (p = 0.242). This is consistent with the studies of Beisher *et al.* [9]. Studies on the influence of fetal sex on the duration of pregnancy are contradictory. Vorheer [10] observed a predominance of the male sex.

For Divon *et al.* [21], the average duration of pregnancy was higher in boys (280.6 ± 8.9 days) compared to that of girls (279.8 ± 8.6 days); in his study, the percentage of post-term births in boys (26.5% after 41 weeks and 7.6% after 42 weeks) was significantly higher than in girls (22.5% after 41 weeks and 6.6% after 42 weeks). Smith [18] found an identical duration (283 days) for each sex in a collection of 1514 pregnancies. In our series, 51.7% of cases of newborns were male in prolonged pregnancies compared to 49.3% in non-prolonged pregnancies; the difference was not statistically significant (p = 0.758). This is consistent with the results of the study by Smith [18]. Women with prolonged pregnancy were 3 times more likely to have meconium amniotic fluid (OR = 2.8 [95% CI: 1.1 - 6.8], p = 0.020) in our study. Our findings are in the same direction as those reported by Caughey *et al.* [22] for whom, from 37 weeks the rate of meconium emission in utero gradually increases (7% between 38 and 39 weeks, 14% between 40 and 41 weeks, and 20% between 42 and 43 weeks), and the frequency of meconium amniotic fluid at delivery is twice as high at 41 weeks compared to 39 weeks; and 2% to 35% of newborns develop meconium aspiration responsible for respiratory distress at birth. Sénat [23] also finds a high level of meconium amniotic fluid in cases of prolonged pregnancy. Using the Apgar score at the 5th minute, the best correlated with neonatal prognosis, neonatal asphyxia was found significantly in 12% of newborns from prolonged pregnancies (OR = 4.2 [95% CI: 1.2 - 13.8], p = 0.018). This result is significantly higher than those of Tangara [6], Faisal [24] and Roach *et al.* [25], who found 3.9%, 4.1% and 4.4%, respectively.

Sherer *et al.* [26] note that there is an increased prevalence of alteration of the baseline heart rate during labor after 42 weeks (tachycardia, flat tracing) associated with variable slowing. The high morbidity is explained by the fact that post-term women in our study did not benefit from monitoring from the 41st week of pregnancy. Indeed, monitoring to assess the fetal heart rate, active fetal movements, the Bishop score, the quantity of amniotic fluid and the use of the non-stress and stress test makes it possible to improve the fetal outcome [27]. Signs of post-maturity were 25 times more likely to be found in newborns from prolonged pregnancies, with a frequency of 13.5% (OR = 25.1 [95% CI: 3.0 - 205.7], p = 0.002). This result is higher than those of Tangara [6] and Faisal [24], who found 8.5% and 5.4% respectively, but lower than Vorher [10], who reported a frequency of 20% - 43%. Our results confirm the literature data in the sense that signs of post-

maturity are strongly associated with prolonged pregnancy.

For Divon *et al.* [21], there is a significant increase in the risk of fetal mortality from 41 weeks. The relative risk increases from 1.5 at 41 weeks to 2.9 at 43 weeks. It demonstrates that the risk of neonatal mortality does not increase significantly with gestational age. We did not record any neonatal deaths among those born after prolonged pregnancies in our study. Several authors have long highlighted a link between the indication for cesarean section and prolonged pregnancy, with reported rates ranging from 12% to 25% [23]. Cheng *et al.* [28] also described in an American cohort 19.8% of cesarean sections at 41 weeks compared to 12.3% at 39 weeks (RR = 1.46 [1.44 - 1.48]). In total, the cesarean section rate increases approximately 1.5 times in cases of prolonged pregnancy [28]. However, the lack of precision in the studies cited does not always allow us to differentiate between the increase in the rate of cesarean sections linked to prolonged pregnancy and the increase in the rate of cesarean sections due to interventionist policies from a given gestational age. Caesarean section was performed in 56.8% of prolonged pregnancies compared to 36.7% of non-prolonged pregnancies with a statistically significant difference (OR = 2.2 [95% CI: 1.2 - 4.1], p = 0.008). Late referral from peripheral health centers and inadequate monitoring would, in our opinion, be responsible for this morbidity. On the other hand, acute fetal distress was the indication for cesarean section in 27.2% of prolonged pregnancies compared to 10.3% of non-prolonged pregnancies, with a statistically significant difference (OR = 3.2 [95% CI: 1.0 - 10.1], p = 0.042). These results correlate with those of Sanchez-Ramos *et al.* [29], who found that more cesarean sections were indicated for acute fetal distress from the 41st week.

The duration of labor was greater than 12 hours with a statistically significant difference in 12.5% of prolonged pregnancies compared to 3.7% in non-prolonged pregnancies (OR = 3.6 [95% CI: 1.0 - 12.5], p = 0.039); these results correlate with those of Caughey *et al.* [22] who found a higher risk of long labor in cases of prolonged pregnancy. In our series, we recorded 5.1% of post-partum hemorrhage in prolonged pregnancies compared to 3.1% in non-prolonged pregnancies.

According to the study by Caughey *et al.* [22], carried out in 12 centers on 120,000 pregnancies in the USA, the risk of post-partum hemorrhage is 2.5% - 5.0% and 3.6% - 5% in the Danish registry [10].

Our results confirm the data in the literature which identifies long labor as a factor in hemorrhage during delivery, to which pregnant women whose pregnancy continues are particularly exposed. In our series, we had 1 case of uterine rupture in prolonged pregnancies, *i.e.* a rate of 1.7% compared to 0% in non-prolonged pregnancies. This was a parturient who gave birth to a newborn weighing more than 4 kg. In prolonged pregnancies, fetal growth is most often preserved; this results in an increase in average birth weight: from 10% of macrosome newborns between 38 and 40 weeks, this number rises to 20% between 40 and 42 weeks, then to more than 40% between 43 and 44 weeks [20]. Macrosomia itself, being a risk of uterine overdistension, can therefore increase the risk of uterine rupture. Fol-

lowing the work of monitoring a cohort in Sweden by Kaczmarczyk *et al.* for 18 years [30], there was a risk of uterine rupture during the birth of a fetus weighing more than 4 kg. Indeed, the rate of uterine rupture of 0.76/1000 when the fetus weighed between 2500 and 3000 g increased by 1.39/1000 when the latter had a weight greater than 4 kg (OR = 1.76 [95% CI: 1.32 - 2.35]).

Elkousy *et al.* [31] found the same data in their 5-year multicenter study. The birth of a fetus weighing more than 4 kg increased the risk of uterine rupture by 2 ($p < 0.001$ and RR = 2.3). Macrosomia is factual and therefore appears to be a risk factor for uterine rupture in cases of prolonged pregnancy.

To our knowledge, there are no specific studies on the association between prolonged pregnancy and maternal death. Given the rarity of this event, published studies lack power to study this aspect. Furthermore, successive French reports from the National Committee of Experts in Maternal Mortality (CNEMM) as well as the English report do not identify full-term pregnancy as a factor associated with maternal death [32]. In our series, we did not note any cases of maternal mortality.

5. Limitations of the Study

Our inclusion criteria in the study were quite broad; we included a certain number of pregnant women and those who had given birth; this could be the cause of selection bias. Our population is perhaps not sufficient to highlight infrequent or even rare events. On the other hand, we only have a short-term view of the complications. We will not know if these women will be consulted for possible complications in the longer term.

6. Conclusions

At the end of our study on the clinical profile of prolonged pregnancies and neonatal well-being at the Laquintinie hospital in Douala, it emerged that:

The frequency of prolonged pregnancy is 8.7% in our study.

We did not identify socio-demographic variables associated with prolonged pregnancy.

Family and personal history of prolonged pregnancy are clinical variables associated with prolonged pregnancy.

Increased fundal height is a clinical parameter significantly associated with prolonged pregnancy.

Maternal and neonatal complications associated with prolonged pregnancy are cesarean section, increased duration of labor, signs of post-maturity, placental calcifications, chronic fetal distress and acute fetal distress.

Contribution of This Study to Science

Our study highlights the associative nature of family and personal history in the occurrence of prolonged pregnancies in our context.

This clarification should lead us to greater vigilance during prenatal follow-ups.

Acknowledgements

The authors thank the management and staff of the Obstetrics and Gynecology Department of Laquintinie Hospital for all the facilities granted to them for the materialization of this research.

Authors' Contributions

Essome supervised the study and wrote the manuscript; Ngounoue collected the data; Tocki and Tocky provided the English translation as well as the formatting of the manuscript; Bilkissou, Boten, Nkwele, Motah, Tchounzou, Nalame, Yaneu, Kondo, Mfomo, Ebo, Ilick, Ngouhouo, Mwandje, Ekono, and Njamen read and corrected the manuscript; Wafo and Foumane supervised the study. All authors have read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] OMS (Organisation Mondiale de la Santé) (2007) International Statistical Classification of Diseases and Related Health Problems.

[2] CNGOF (2011) Recommandation pour la pratique professionnelle: Grossesse prolongée et terme dépassé. *Journal de Gynécologie, Obstétrique et Biologie de la Reproduction*, **40**, 693-962.

[3] Mathews, D.D. (1978) Fetal Well-Being in Gravidas with Diminished Fetal Activity at Term. *Obstetrics & Gynecology*, **51**, 281-283. https://doi.org/10.1097/00006250-197803000-00005

[4] Chantry, A.A., Coatloven, F., Debord, M.P., Haumonte, J.B., *et al.* (2012) Grossesse prolongée et terme depassé: Complications fœtales et néonatales des grossesses prolongées. *Revue Sage-Femme*, **11**, 43-47.

[5] Zeitlin, J. and Mohangoo, A. (2008) European Perinatal Heath Report. Ph.D. Thesis, Institut National de la Santé et de la Recherche Médicale (INSERM).

[6] Tangara, F.M. (2012) Grossesse prolongée au service de gynéco-obstétrique du centre de santé de référence de la commune II du district de Bamako. Master's Thesis, Bamako University.

[7] Nana, P.N., Mbu, R.E., Tebeu, P.M., Fomulu, J.N., *et al.* (2013) Devenir de la grossesse après terme à la maternité principale, l'Hôpital Central Yaoundé. *Health Sciences and Diseases*, **10**, 1-5.

[8] Schulz, K.F. and Grimes, D.A. (2005) Sample Size Calculations in Randomised Trials: Mandatory and Mystical. *The Lancet*, **365**, 1348-1353. https://doi.org/10.1016/s0140-6736(05)61034-3

[9] Beischer, N.A., Evans, J.H. and Townsend, L. (1969) Studies in Prolonged Pregnancy. *American Journal of Obstetrics and Gynecology*, **103**, 476-482. https://doi.org/10.1016/s0002-9378(15)31849-4

[10] Vorherr, H. (1975) Placental Insufficiency in Relation to Post-Term Pregnancy and Fetal Post-Maturity. Evaluation of Fetoplacental Function; Management of the Post-Term Gravida. *American Journal of Obstetrics and Gynecology*, **123**, 67-103.

https://doi.org/10.1016/0002-9378(75)90951-5

[11] Vial, Y. (1992) Le dépassement de terme. *Archives of Gynecology and Obstetrics*, **252**, 58-69.

[12] Mohamed, E.I. (2006) Dépassement de terme à propos de 335 cas au service de Gynécologie Obstétrique de la maternité Lalla Meryem du CHU Ibn Rochd de Casablanca. Master's Thesis, Université Hassan II de Casablanca.

[13] Denison, F., Price, J., Graham, C., Wild, S. and Liston, W. (2008) Maternal Obesity, Length of Gestation, Risk of Postdates Pregnancy and Spontaneous Onset of Labour at Term. *BJOG: An International Journal of Obstetrics & Gynaecology*, **115**, 720-725. https://doi.org/10.1111/j.1471-0528.2008.01694.x

[14] Khashan, A.S. and Kenny, L.C. (2009) The Effects of Maternal Body Mass Index on Pregnancy Outcome. *European Journal of Epidemiology*, **24**, 697-705. https://doi.org/10.1007/s10654-009-9375-2

[15] Mogren, I., Stenlund, H. and Hogberg, U. (1999) Recurrence of Prolonged Pregnancy. *International Journal of Epidemiology*, **28**, 253-257. https://doi.org/10.1093/ije/28.2.253

[16] Papiernik, E., Alexander, G.R. and Paneth, N. (1990) Racial Differences in Pregnancy Duration and Its Implications for Perinatal Care. *Medical Hypotheses*, **33**, 181-186. https://doi.org/10.1016/0306-9877(90)90173-c

[17] Mittendorf, R., William, M.A., Berkey, C.S. and Cotter, P.F. (1990) The Length of Uncomplicated Human Gestation. *American Journal of Obstetrics and Gynecology*, **75**, 929-932.

[18] Smith, G.C.S. (2001) Use of Time to Event Analysis to Estimate the Normal Duration of Human Pregnancy. *Human Reproduction*, **16**, 1497-1500. https://doi.org/10.1093/humrep/16.7.1497

[19] Caughey, A.B., Stotland, N.E., Washington, A.E. and Escobar, G.J. (2009) Who Is at Risk for Prolonged and Post-Term Pregnancy? *American Journal of Obstetrics and Gynecology*, **200**, 683.e1-683.e5. https://doi.org/10.1016/j.ajog.2009.02.034

[20] Arias, F. (1987) Predictability of Complications Associated with Prolongation of Pregnancy. *Obstetrics & Gynecology*, **70**, 101-106.

[21] Divon, M.Y., Ferber, A., Nisell, H. and Westgren, M. (2002) Male Gender Predisposes to Prolongation of Pregnancy. *American Journal of Obstetrics and Gynecology*, **187**, 1081-1083. https://doi.org/10.1067/mob.2002.126645

[22] Caughey, A.B., Washington, A.E. and Laros, R.K. (2005) Neonatal Complications of Term Pregnancy: Rates by Gestational Age Increase in a Continuous, Not Threshold, Fashion. *American Journal of Obstetrics and Gynecology*, **192**, 185-190. https://doi.org/10.1016/j.ajog.2004.06.068

[23] Sénat, M.-V. (2011) Place de l'évaluation de la quantité de liquide amniotique, du score biophysique et du doppler dans la surveillance des grossesses prolongées. *Journal de Gynécologie Obstétrique et Biologie de la Reproduction*, **40**, 785-795. https://doi.org/10.1016/j.jgyn.2011.09.020

[24] Faisal, Y.N. (2012) Les grossesses prolongées à propos de 74 cas au service gynéco-obstétrique II du centre hospitalier universitaire Hassan II de Fes. Master's Thesis, Centre Hospitalier Universitaire Hassan II.

[25] Roach, V.J. and Rogers, M.S. (1997) Pregnancy Outcome Beyond 41 Weeks Gestation. *International Journal of Gynecology & Obstetrics*, **59**, 19-24. https://doi.org/10.1016/s0020-7292(97)00179-3

[26] Sherer, D.M., Onyeije, C.I., Binder, D., Bernstein, P. and Divon, M.Y. (1998) Uncom-

plicated Baseline Fetal Tachycardia or Bradycardia in Post-Term Pregnancies and Perinatal Outcome. *American Journal of Perinatology*, **15**, 335-338. https://doi.org/10.1055/s-2007-993953

[27] Lansac, J., Berger, C. and Magnin, G. (2003) Collection le praticien, Obstétrique. 4ème Édition, Masson.

[28] Cheng, Y.W., Nicholson, J.M., Nakagawa, S., Bruckner, T.A., Washington, A.E. and Caughey, A.B. (2008) Perinatal Outcomes in Low-Risk Term Pregnancies: Do They Differ by Week of Gestation? *American Journal of Obstetrics and Gynecology*, **199**, 370.e1-370.e7. https://doi.org/10.1016/j.ajog.2008.08.008

[29] Sanchez-Ramos, L., Olivier, F., Delke, I. and Kaunitz, A.M. (2003) Labor Induction versus Expectant Management for Post-Term Pregnancies: A Systematic Review with Meta-Analysis. *Obstetrics & Gynecology*, **101**, 1312-1318. https://doi.org/10.1097/00006250-200306000-00029

[30] Kaczmarczyk, M., Sparén, P., Terry, P. and Cnattingius, S. (2007) Risk Factors for Uterine Rupture and Neonatal Consequences of Uterine Rupture: A Population-Based Study of Successive Pregnancies in Sweden. *BJOG*: *An International Journal of Obstetrics & Gynaecology*, **114**, 1208-1214. https://doi.org/10.1111/j.1471-0528.2007.01484.x

[31] Elkousy, M.A., Sammel, M., Stevens, E., Peipert, J.F. and Macones, G. (2003) The Effect of Birth Weight on Vaginal Birth after Cesarean Delivery Success Rates. *American Journal of Obstetrics and Gynecology*, **188**, 824-830. https://doi.org/10.1067/mob.2003.186

[32] Comité National d'Experts sur la Mortalité Maternelle (2006) Rapport du comité national d'experts sur la mortalité maternelle. INSERM and INVS.