

## Benefits of a prenatal physical preparation program on the condition of the perineum and Apgar scores at birth

François Njimbu<sup>1</sup>, Ines Bilo<sup>1</sup>, Andy-Muller Nzanga<sup>1</sup>, Teddy Bofosa<sup>1</sup>, Eric Kam<sup>1</sup>, Anselme Paka<sup>2</sup>, Augustin Buhendwa<sup>1</sup>, Vicky Lokomba<sup>2</sup>, Roger Mbungu<sup>3</sup>, Betty Miangindula<sup>1</sup>

<sup>1</sup> Department of Physical Medicine and Rehabilitation, Faculty of Medicine, University of Kinshasa, University Clinics of Kinshasa, Uro-Pelvi-Perineal Rehabilitation Unit, Democratic Republic of Congo

<sup>2</sup> Department of Gynecology and Obstetrics, Mont Amba Hospital Center, Lemba-Kinshasa, Democratic Republic of Congo

<sup>3</sup> Department of Gynecology and Obstetrics, Faculty of Medicine, University of Kinshasa, University Clinics of Kinshasa, Democratic Republic of Congo

### ORCID ID of the author(s)

FN: 0000-0003-3085-5117  
IB: 0000-0002-1955-1713  
AN: 0000-0003-0608-9424  
TB: 0000-0002-9878-4995  
EK: 0000-0002-8408-7160  
AP: 0000-0002-8808-4420  
AB: 0000-0001-8666-9730  
VL: 0000-0002-8666-8241  
RM: 0000-0002-9754-0606  
BM: 0000-0003-3923-8799

### Corresponding Author

François Njimbu

Department of Physical Medicine and Rehabilitation, Faculty of Medicine, University of Kinshasa, University Clinics of Kinshasa, Uro-Pelvi-Perineal Rehabilitation Unit, Democratic Republic of Congo  
E-mail: francoisnjimbu1@gmail.com

### Ethics Committee Approval

The study was approved by School of Public Health of the Faculty of Medicine of the University of Kinshasa (date and number: September 17, 2019).

All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

### Conflict of Interest

No conflict of interest was declared by the authors.

### Financial Disclosure

The authors declared that this study has received no financial support.

### Published

2023 February 27

Copyright © 2023 The Author(s)

Published by JOSAM

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License 4.0 (CC BY-NC-ND 4.0) where it is permissible to download, share, remix, transform, and buildup the work provided it is properly cited. The work cannot be used commercially without permission from the journal.



### Abstract

**Background/Aim:** The practice of physical activities among pregnant women remains a significant health challenge in the Democratic Republic of Congo. The aim of this study was to examine the influence of prenatal physical preparation on the state of the perineum and Apgar scores at birth.

**Methods:** This experimental study included 89 pregnant women, with 38 of them subjected to an 8-month prenatal physical preparation program that involved weekly sessions of 45 min of low to moderate intensity. The remaining 51 pregnant women did not participate in the program and served as a control group. The variables of interest, including episiotomy, perineal tear, intact perineum, and Apgar scores, were measured, and the chi-square statistical test was used to compare the two study groups. *P*-values <0.05 were considered statistically significant.

**Results:** The present study reveals that the women in labor in the experimental group (EG) had fewer perineal tears and less episiotomy compared to the control group (CG). Specifically, the incidence of perineal tear was significantly lower in the EG (5.3%) than in the CG (27.5%) with a *P*-value of 0.001, while the incidence of episiotomy was also significantly lower in the EG (7.9%) than in the CG (25.5%) (*P*=0.032). Furthermore, a significant number of women in the EG (86.8%) had an intact perineum compared to those in the CG (47%) (*P*=0.001).

**Conclusion:** The delivery parameters of pregnant women who followed a prenatal physical preparation program underwent significant changes compared to those who did not participate in the program. These findings suggest that the program should be continued to improve the care of women who have given birth.

**Keywords:** labor, physical preparation, pregnant women

## Introduction

Childbirth refers to the set of phenomena that contribute to the exit of the fetus and its annexes from the maternal genital tract at term [1-5]. These phenomena are governed by the adaptation of the fetal head and the maternal pelvis and genitals, accompanied by uterine contractions that push the fetus outward [6-10].

Despite these accommodations, complications during vaginal delivery frequently occur at the perineal level and are challenging for new mothers. These complications can alter pelvic muscles, leading to postpartum pain, dyspareunia, urinary incontinence, anal incontinence in the case of damage to the external and internal anal sphincter, prolapse, and obstetric fistula [11, 12]. Moreover, these complications can cause psychological distress, particularly after an episiotomy, leading to a sense of mutilation [11, 12]. Maternal morbidity and mortality are high due to the complications arising from vaginal delivery [13-18].

About six out of ten women experience partial perineal tears during vaginal delivery due to the tension exerted by the baby on the vagina at the time of birth [19]. Although perineal tears and episiotomy can limit fetal suffering by helping the rapid expulsion of the baby, they are traumatic and painful episodes that affect the perineal area, which is extremely sensitive and weakened by nine months of pregnancy [20]. Anal sphincter tears during childbirth represent a public health problem that has long-term medico-socioeconomic risks and a negative impact on the quality of life of young women in childbirth.

It is known that regular physical activity before and during pregnancy improves the physical condition of women. Some authors have investigated its effect on the duration of childbirth by comparing the duration of labor in active and sedentary women [21]. Bechmann and Bechmann reported a significantly reduced duration of labor at delivery for participants in the physical activity program [22]. Physical activity allows pregnant women to maintain their autonomy and psychological well-being by safeguarding their image and self-esteem [23]. Additionally, regular and appropriate physical activity during the third trimester alleviates mood disorders that can accompany pregnancy, such as anxiety and depression [24].

Although physical activity is a recommended therapy in the care of pregnant women [25-28], it is not integrated into the preparation of pregnant women for childbirth in the Democratic Republic of Congo. To reduce maternal and fetal morbidity due to traumatic lesions of the perineum during vaginal delivery in the Democratic Republic of Congo, a physical and psychological preparation program has been established. This program aims to systematically use the methods and techniques of prenatal physical and psychological preparation.

## Materials and methods

### Nature and period of the study

We opted for the evaluative method and conducted an experimental study of pregnant women undergoing a prenatal physical preparation program for 8 months (September 2020 to April 2021).

### Study framework

The Mont-Amba hospital center in Kinshasa, Democratic Republic of Congo and the University of Kinshasa clinics served as the framework for this study.

### Study population and sample

The total population of our study was composed of 138 pregnant women, including 87 in the experimental group (EG) and 51 in the control group (CG). The distribution of the groups was a function of the women's availability to join the program.

Out of a population of 87 pregnant women in the experimental group, 49 were excluded from the study. Exclusion criteria included 15 women with a gestational age of fewer than 20 weeks of amenorrhea, 8 who refused to participate in the program, 17 who were lost to follow-up, and 9 who did not attend the required number of sessions (at least 12 sessions). In the end, 38 pregnant women were included in the experimental sample, which was gradually recruited. Of these women, 8 entered the program in September, 17 in October, and 13 in November. The control group consisted of 51 pregnant women who were retained in the study.

The inclusion criteria were: a pregnancy with a gestational age greater than or equal to 5 months; agreeing to go regularly to prenatal consultations (PNCs) during the study period; absence of pathologies or anomalies contraindicated to the practice of physical activities; a chronological age between 20 and 39 years; freely agree to participate in the program from the beginning to the end of the study. Any pregnant woman who did not meet the above criteria was excluded.

### Data collection techniques

The data for this study were collected from the records of pregnant women at delivery. Episiotomy, perineal tear, intact perineum, and Apgar served as variables of interest.

### Support Protocol

The care protocol consisted of two parts, a conventional program and a prenatal physical preparation program.

*The conventional program:* The control group subjects took part in this protocol, consisting of prenatal consultations without practicing physical exercises.

*The prenatal physical preparation program:* The prenatal physical preparation program was led by physiotherapy experts, accompanied by trainees in Physical Medicine and Rehabilitation. Each 45-minute session, held once a week, began with warm-up and stretching exercises, followed by muscle-strengthening exercises for the lower limbs, pelvic muscles (with a focus on perineal work), abdominals, and upper limbs. Breathing exercises (deep inspiration, slow expiration) were also used to prepare for labor and maintain breathing throughout pregnancy. The session ended with relaxation exercises.

### Ethical considerations

The protocol for this study was defended and approved by the ethics committee of the School of Public Health of the Faculty of Medicine of the University of Medicine under number ESPCE2542019, dated September 17, 2019. Written informed consent was obtained from pregnant women.

### Statistical analysis

Data were entered into Microsoft Excel 2013 software and then imported into SPSS version 22.0 for Windows. Quantitative variables were presented as the median and

interquartile range, while qualitative variables were presented as frequency and percentage in tables. The non-parametric chi-square test was used to compare qualitative variables. *P*-values <0.05 were considered statistically significant.

## Results

We found that the women in the experimental group had a significantly better condition of the perineum than those in the control group (Table 1).

Table 1: Comparison of childbirth variables between the two groups.

Variables	Group		<i>P</i> -value
	Experimental (n=38) n (%)	Control (n=51) n (%)	
Torn perineum	2 (5.3)	14 (27.5)	0.001
Episiotomy	3 (7.9)	13 (25.5)	0.032
Intact perineum	33 (86.8)	24 (47)	0.001

Table 2 presents the APGAR scores of newborns in the experimental and control groups at the first, fifth, and tenth minutes. The newborns in the experimental group had APGAR scores within the lower normal limit or above the normal limit, with a median and interquartile range (IQR) of 8 at the first minute, 9 at the fifth minute, and 10 at the tenth minute. Similarly, newborns in the control group had APGAR scores within the lower normal limit or above the normal limit at the first, fifth, and tenth minutes, with a median and IQR of 2 at the first minute, 9 at the fifth minute, and 9 at the tenth minute.

Table 2: Presentation of the Apgar scores of the experimental and control groups after birth.

Apgar score	Experimental group				Control group			
	Med*	IQR**	Min	Max	Med	IQR	Min	Max
In the 1 <sup>st</sup> min	8	2	7	10	7	2	5	9
In the 5 <sup>th</sup> min	9	2	7	10	9	2	7	10
In the 10 <sup>th</sup> min	10	1	9	10	9	3	9	10

\*Median; \*\*Interquartile range

## Discussion

The objective of this study was to investigate the effect of a prenatal physical preparation program on vaginal delivery, with a specific focus on perineal protection. This was achieved by describing the characteristics of vaginal delivery for pregnant women in the experimental and control groups and the sociodemographic characteristics of these two groups of pregnant women at the Mont Amba Hospital Center in Kinshasa.

We found that, after childbirth, the perineum of mothers in the experimental group was in a better condition than those of the control group. Owe et al. [29] reported that the regular practice of physical activities minimizes the risk of episiotomy, perineal tears as well as cesarean sections.

Bechmann CRB and Bechmann CA [22] reported a predominance of vaginal delivery in the trained group, although the results were lower than those of our study. Lawani et al. [28] found that the trained group had a preference for vaginal delivery, with 88% having an intact perineum.

The APGAR score at the first minute had a median of 8 (range: 7–10), while at the fifth minute, it was 9 (range: 7–10), and at the tenth minute, it was 10 ± 1 (range: 9–10). All the children had a good score from the first minute. In contrast, the APGAR score for children born to mothers who did not follow the program had a median of 7 (range: 5–9) at the first minute, 9 (range: 7–10) at the fifth minute, and 9 (range: 9–10) at the tenth minute. No statistically significant difference was found between the two groups at the fifth minute.

It should be noted that the majority of children had a good score from the first minute, and all children had a very good score at the tenth minute. There was no significant difference in the APGAR scores of children whose mothers were subjected to the program and those whose mothers did not follow the program. However, the trained group had a higher APGAR score compared to the sedentary group between the first and fifth minutes of birth, which is consistent with the results of our study and those of Bachmann and Bachmann.

When comparing trained and untrained groups, Barakat et al. [30] detected no difference in the APGAR scores at the first minute and the fifth minute. All the individual values at 5 minutes were greater than or equal to 9. These results agree with those of our study, which were greater than or equal to 9 at the 5th minute of birth.

In our study, the prenatal physical preparation program was found to be very effective, with a once-a-week frequency and useful and simple exercises that could be performed at home. The hypotheses of our work were verified, and the program achieved the desired objective. The participating pregnant women benefited significantly from the program, which was positive and effective.

In Morkved et al.'s [31] program, the mothers performed at a frequency of once per week, and the ensuing results were satisfactory. Lawani et al. [28] chose a frequency of twice per week, and the results were also satisfactory.

## Limitations

The small sample size of this study (38 pregnant women in the experimental group who completed the program) was limited by the number of new cases of pregnant women received per month at the PNCs of the Centre Hospitalier Mount Amba/Kinshasa during the study period.

## Conclusion

Regular physical activity has beneficial effects on the health of postpartum women. Our study shows that the practice of physical activity during pregnancy can reduce the risk of tears and episiotomy during childbirth and help maintain an intact perineum. Therefore, it is recommended that this program be continued after childbirth to help postpartum women maintain their physical fitness.

## Acknowledgments

Our thanks go first to the authorities of the Canter Hospitalier du Mont-Amba and the pregnant women who agreed to join the prenatal physical preparation program.

## References

- Carbrol D. Collection: Abbreviated perinatology, Ed. Masson, 2003, p.60-62.
- Lansac J, Berger C. Obstetrics, Collection for the Practitioner, 3rd Edition, 2000.
- Lansac J, Marret H. Practice of Childbirth, 3rd Edition. 2001;544(7):205-10.
- Ladewing, Patricia. Nursing and Perinatal Care. 4th Ed, Saint Laurent. 2010; 1010p.
- Brabant I. Living your pregnancy and childbirth, A happy birth, Edition Saint Martin. 2001;23(4):32-5.
- Ageron C, Michelin JM. Practical guide to Obstetrics and gynecology. Ed. Satas, 2000.
- Thoulon JM. Labor monitoring, Practical Collection in Obstetrics gynecology. 2003;34(6):345-75.
- Tourris H. Illustrated summary of gynecology and of obstetrics, Ed. Masson, Paris. 2001;18(6):25-7.
- Bernadette. Well-being and maternity, Marabout Editions. 2009;15-18.
- Trabecchi F. Potential consequences of pregnancy and childbirth, 18th Day of gynecology of Nice and the Cte d'Azur, France. May 2000;16(2):10-7.
- Parant O, Reme J-M, Monorozi. Recent obstetric tears of the perineum and episiotomy. EMC (Elsevier Masson, Paris). Obstetrics. 1999;57(9):54-71.
- Barot S, Tardif D. Old obstetric tears. J Gynecol. Obstet. 2010;84(3):200-10.
- Ardon D, Reinbold D, Dregfus M. Episiotomy and recent obstetric lacerations. J Gynecol. 2010;76(2):232-45.
- Beucher G. Maternal complications of instrumental extractions. J Gynecol Obstet Biol Repr. 2008;37(8):244-59.
- CNOF. Episiotomy. Text of recommendations. J Gynecol Obstet Biol. Repr. 2006;35:n1:1S77-1S80.

16. Organisation mondiale de la santé. Recent data reveals that women are victims of ill-treatment during childbirth. October 2019.
17. Faltin D. Long-term consequences of perineal tears. *Swiss Med J.* 2017;88(10):768-74.
18. Said Ait L, Abdelmalek H, Khalid M. Preparation of the direct sphincter: technical points, indications and results. *The Pan African Medical J.* 2013;44(16):134-40.
19. Tayrac Which perineal protective measures during childbirth. *J Gynecol. Obstet.* 2017;63(7):62-9.
20. Frenette P. Impact of episiotomy during operative vaginal delivery on obstetrical and sphincter injuries. *Journal of Obstetrics and gynecology of Canada.* 2019;41(12):1734-41.
21. Committee report. Physical activity guidelines Advisory. Washington, DC: US. Department of Health and Human Services, 2008.
22. Bechmann CRB, Bechmann CA. Effect of a structural antepartum exercise program on pregnancy and labor outcome in primiparas. *J Repr Med.* 1990;35(19):704-9.
23. American College of Obstetricians and Gynecologists (ACO). Exercise during pregnancy and postnatal period. Washington (DC). ACO, 2002.
24. Babyak M, Blumenthal M. Exercise treatment for major depression: maintenance of therapeutic benefit at 10 months. *Psychosom Med.* 2000;62(4):633-8.
25. Clap J.F. The effects of maternal exercise on early pregnancy out as. *Am J Obstet Gynecol.* 1989;16(161):1453-7.
26. Hall DC, Kaufmann DA. Effects of aerobic and strength conditioning on pregnancy outcomes. *Am J Obstet Gynecol.* 1987;157(76):1199-03.
27. Mersy DJ. Health benefits of aerobic exercise. *Postgrad Med.* 1991;90(103):110-2.
28. Lawani M.M, Alihonou E, Akplogan B, Poumart, Okou L. The effect of prenatal gymnastics on childbirth: study of 50 sedentary Beninese women during the 2nd and 3rd trimesters of pregnancy. *Health.* 2003;13(4):235-41.
29. Owe KM, Nystad W, Stigum H, Vangen S, Bø K. Exercise during pregnancy and risk of cesarean delivery in nulliparous women: a large population-based cohort study. *Am J Obstet Gynecol.* 1 déc 2016;215(6):791.e1-791.e13.
30. Virginia APAR. Evaluation of the physical health of newborns, 1953.
31. Morkved S, Bø K, Schei B, Salvesen KA. Pelvic floor muscle training during pregnancy to prevent urinary incontinence; A single-blind randomized controlled trial. *Obstet Gynecol.* 2003;101(2):313-9.