International Journal of Innovation Scientific Research and Review
Vol. 04, Issue, 06, pp.2946-2951, June 2022
Available online at http://www.journalijisr.com
SJIF Impact Factor 4.95

IJISRR

ISSN: 2582-6131

Research Article

TRAINING OF MIDWIVES ON THE RATIONAL USE OF OXYTOCIN DURING SPONTANEOUS LABOUR "EXPERIMENTAL APPROACH IN 5 BASIC MATERNITY UNITS OF KINDU/MANIEMA IN THE DEMOCRATIC REPUBLIC OF CONGO

[1,] * Bakangana Mungu A, [2]Rosebella Onyango O, [3]Malin Bogren, [4]Olela Loseke M, [5]Tagoto Tepungipame A

[1]Head of Works at the Higher Institute of Medical Techniques in Kindu and PhD student at the Great Lakes University in Kisumu, Kenya.
[2]Professor at Great Lakes University of Kisumu, Department of Community Health School of Health Sciences.
[3]Professor at Institute of Health and Care Sciences, Sahlgrenska Academy, Gothenburg University, Sweden.
[4]Head of works at the Higher Institute of Medical Techniques of Kindu and Deputy Head of Section in charge of teaching midwifery.
[5]Lecturer at the Faculty of Medicine, Department of Public Health, University of Kisangani/DRC.

Received 17th April 2022; Accepted 18th May 2022; Published online 29th June 2022

ABSTRACT

The aim of this study was to explore the possibility of improving the use of oxytocin during spontaneous labour by training midwives in the basic maternity units of Kindu in the province of Maniema in the DRC. The study was conducted in five basic maternity units in Kindu. Specifically, the study measured the effect of midwifery training on the rational use of oxytocin in the basic maternity units of Kindu. A sample of 362 women who gave birth in five basic maternity units over a period of six months was divided into two groups of equal numbers. The data were collected by literature review. STATA 14 software was used to produce frequencies, descriptive and inferential statistics to draw conclusions and generalizations about the study results. Analysis of the relationship between midwifery education and reduced oxytocin use was calculated by contingency chi-square. After analysis, it was found that midwifery training significantly reduced oxytocin use in the Kindu base maternity units by 37.46% ($\chi^2 = 97.7658$ and $p<0.001$).

Keywords: Midwifery education and the use of oxytocin.

INTRODUCTION

The WHO has issued new recommendations to set global standards of care for healthy pregnant women and to reduce unnecessary medical interventions during childbirth. According to the UN agency, over the past 20 years practitioners have increased unnecessary and even dangerous interventions during childbirth. It points the finger in particular at the use of oxytocin to accelerate labour or the sometimes still systematic recourse to episiotomy (WHO, 2018, p. 4-7). The administration of oxytocin during spontaneous labour is a frequent practice in birth rooms around the world in general, in the Democratic Republic of Congo and in particular in the basic maternity units of Kindu. Acceleration of labour usually involves the use of intravenous oxytocin infusion or artificial rupture of the amniotic membranes. While it can be beneficial in preventing prolonged labour, it's inappropriate use can be harmful (WHO, 2015). Oxytocin, discovered in 1909, is a hormone produced by the hypothalamus, secreted particularly during childbirth and breastfeeding. It acts on the uterine smooth muscle to stimulate contractions during labour (cervical dilation, expulsion of the foetus) and immediately after delivery, to reduce the risk of postpartum haemorrhage (CNSF, 2018). Oxytocin is currently used in the birth room intrapartum to induce labour or direct spontaneous labour in cases of dynamic dystocia and also after birth to prevent immediate postpartum haemorrhage. In 2017, the National College of Midwives of France in collaboration with the National College of Gynecologists Obstetricians of France provided clarification on the rational use of oxytocin in the delivery room, as follows In parturients in spontaneous labour, at term, with cephalic presentation, without scarred uterus or growth retardation, we recommend to administer oxytocin only in case of:

1. Dystocia during the active phase, i.e. if the rate of cervical dilation is less than 1 cm/4h between 5 and 7 cm or less than 1 cm/2h above 7 cm. It is also recommended to break the water bag (amniotomy) and to wait one hour before administering oxytocin.
2. Prolongation of the second stage beyond 2 hours to correct a lack of progression of the presentation.

Despite these clarifications from the National College of Midwives, the use of oxytocin has become excessive and even commonplace in maternity wards, even for parturients in spontaneous labour, with the objective of shortening the duration of labour. According to Cécile Thibert (2016), more than 60% of women worldwide receive oxytocin to accelerate labour and thus reduce its duration. In France, for example, 64% of women received oxytocin during labour and artificial rupture of membranes in 51% of women in spontaneous labour. (Belghiti *et al.*, 2010). The rate of oxytocin use during labour in Brazil was 59.5% (Vogt *et al.*, 2011). Binfa *et al.*, (2016), report that 92, 7% of women in Chile had undergone obstetric interventions such as artificial rupture of membranes, oxytocin and epidural analgesia. High frequencies of oxytocin use during effacement, dilation and expulsion have also been observed in Africa. In three urban areas in Africa, oxytocin was used in more than 20% of deliveries (Pierre Buekens, 2011). In the Democratic Republic of Congo, 338,829 women received oxytocin during labour between January and October 2019 (Ministry of Health DRC, 2019). In Maniema Province, 9059 women in spontaneous labour received oxytocin for 76,990 parturients during the period January to October 2019. The Kindu health zone alone recorded 1572 cases of oxytocin use during spontaneous labour (Maniema Provincial Health Division, 2019). The administration of oxytocin is not without danger; this product presents a number of maternal and fetal adverse effects: hyperkinesia of frequency and intensity, uterine hypertonia, and fetal suffering. However, the major complication remains maternal, namely uterine rupture (Rousseau

***Corresponding Author: Bakangana Mungu A,**
1Head of Works at the Higher Institute of Medical Techniques in Kindu and PhD student at the Great Lakes University in Kisumu, Kenya.

and Burguet, 2016). According to Dupont *et al.,* (2017), oxytocin administration during spontaneous labour exposes both mother and fetus to adverse effects that may have short-term and possibly long-term consequences. Belghiti *et al.,* (2013) found that oxytocin use during labour was associated with an increased risk of postpartum haemorrhage with a dose-dependent effect. In a study published in 2012, the authors showed that oxytocin use is significantly associated with an increased risk of severe postpartum haemorrhage even with moderate doses of oxytocin and a risk of uterine hyperstimulation, putting mother and fetus at risk of hypoxia and caesarean section during labour (Satin *et al.*, 2012). In the Democratic Republic of Congo, midwifery education has been introduced at the tertiary level as a strategy to improve maternal and newborn health. It is in this context that the Minister of Higher and University Education signed on 14 September 2013 the Ministerial Order N° 100/MINESURS/CAB.MIN/BCL/CB/NKA/2013 revising some provisions of the Ministerial Order N° MINESU/CAB. MIN/067/204 of 05/07/2004 fixing the programmes and duration of studies that prepare for an academic degree in order to comply with international standards in midwifery education as set by the World Health Organization "WHO" and the International Confederation of Midwives "ICM", on the one hand, and with the recommendations of the Ministry of Health in the area of reproductive health, on the other handSince then, the training of midwives in the Higher Institutes of Medical Technology (ISTM) organizing the midwifery sector has been carried out in two ways: The first is the normal three-year programme, i.e. six semesters, with a minimum of two semesters per year of study and a maximum of 10 semesters. One semester lasts 14-16 weeks of theoretical teaching, practical teaching, clinical teaching and assessment leading to the degree of Bachelor of Health Sciences in Midwifery in the LMD system. The second is an 18-month retraining programme for graduate nurses. The midwifery education pathway in the "reconversion" format consists of three semesters of theoretical education, practical education, clinical education and assessment leading to the degree of Bachelor of Health Sciences in Midwifery (Ministry of ESU, 2019). Through this reform, a midwifery curriculum was developed by the Ministry of Higher Education and University in collaboration with technical, financial and institutional partners, the Ministry of Public Health and health corporations. This has enabled the Democratic Republic of Congo to comply with the United Nations recommendation on the need to improve midwifery education for the achievement of sustainable development goals, in general, and goal 3, in particular, (Enable all people to live in good health and promote the well-being of all at all ages). Despite this training curriculum, the National College of Midwives of France, in collaboration with the National College of Gynecologists Obstetricians of France published in 2016 recommendations for clinical practice and clarifications regarding the rational use of oxytocin in the delivery room because of the potential adverse effects that uncontrolled use of oxytocin can cause on the health of the mother and the child. Regarding the recommendations we can note the following points:

- The importance of redefining the different stages of labour. The definitions established in the 1950s by Friedman have served as a reference for more than half a century. Recent work has challenged these definitions.
- In practice, the old definition of the stages of labour has led to excessive interventionism on the part of carers. The first stage of labour (from the onset of dilation to full dilation) is divided into two phases: the latent phase and the active phase. The onset of the active phase is now postponed to 5-6 cm of dilation compared to 3 - 4 cm in the past.
- The necessary respect of the latency phase. This phase, which lasts until the start of the active phase (5-6 cm), is crucial. Clinicians should therefore be more patient throughout the latency phase and less interventionist in the absence of maternal or fetal pathology. It is recommended that the diagnosis of dynamic dystocia not be made until 5-6 cm of cervical dilation, corresponding to the end of the latency phase of the first stage of labour. It is essential to "know how to wait" and to respect this time.

Amniotomy, the artificial rupture of the membranes, results in increased uterine dynamics. In case of dynamic dystocia during the active phase, it is recommended to perform an anatomy before oxytocin administration. After reviewing these recommendations, it would be ideal to update the new 5-6 cm active phase of labour as currently recommended. However, in reality, the reproductive health programme of the DRC Ministry of Public Health continues to refer to Friedman's old definition from the 1950s by still considering the active phase of 3 - 4 cm instead of 5 - 6 cm as currently recommended. These identified gaps in knowledge about the active phase of labour would explain the abusive use of oxytocin by midwives in the maternity wards of Kindu. No study has been initiated to date on the use of oxytocin during spontaneous labour in Maniema Province, in general, and in the city of Kindu, in particular, yet the situation remains alarming in basic maternity wards where many women in spontaneous labour continue to be subjected to oxytocin to accelerate labour, yet its systematic use is no longer recommended at present because of the risks mentioned above. This abusive and non-consensual use of oxytocin in the basic maternity units of Kindu is becoming dangerous and can cause adverse effects on the health of the woman and her birthing experience. This constitutes, in our humble opinion, a serious reproductive and perinatal health problem.
It is for this reason that in this study, in order to comply with international standards and in anticipation of the much-needed updating of the midwifery training programme, we conducted this study to measure the effect of midwifery training on the rational use of oxytocin during spontaneous labour in the basic maternity units of Kindu.

METHODS

We carried out a quasi-experimental study on 362 women who had given birth, divided into two groups of equal numbers:

- Group 1: the group of women who gave birth in maternity units whose midwives had received training in the rational use of oxytocin (Kasuku II, Lumbulumbu, Basoko, Mikelenge and Kama II maternity units).
- Group 2: the group of women who gave birth in maternity units whose midwives had not received training in the rational use of oxytocin (Maternity Kasuku I, Tokolote 100 houses, Tokolote Makengele, Lwama and Sokolo).

The study was conducted over a period of 6 months from 1 August 2021 to 31 January 2022.

Population and sample

The study population consisted of all women who delivered with spontaneous labour in the five maternity units between August 2021 and January 2022. According to the DRC reproductive health programme (218), the percentage of women who have given birth is 4% of the total population. Knowing that the total population of the five maternity units targeted by the study is estimated at 109,127 inhabitants (DPS, Maniema 2021), the number of women who delivered was 109,127 x 4/100 = 4,365

These were distributed among the five maternity units as shown in the table below

Table 1: Target population

Basic maternity	Total population	Women who have given birth (4%)
Basoko	24 131	965
Kasuku II	24 969	999
Mikelenge	24 868	995
Lumbulumbu	23 121	925
Kama II	12038	481
Total	109 127	4 365

For the sampling procedure, we used the formula of Demidenko (2008)

$$n = \frac{r+1}{r} \frac{(p-)(1-p)(Z\beta + Z\alpha /2)2}{(p1-p2)2}$$

n = sample size each group
r = ratio of case control (1)
$p-$ = A measure of variability ($\frac{35+25}{2}$) = 30% =0, 3)
$Z\beta$ = Represents the desired power (typically .84)
$p1 =$ Effect size (35% = 0, 35)
$Z\alpha /2$ = Represents the desired level of statistical significance (typically 1, 96)

For this reason, the sample size for this study was

$$n = \frac{1+1}{1} \frac{(0,3)(1-0,3)(0,84+1,96)2}{(0,35-0,25)2} = 329$$

Sample size = 329 + 33 (10%) = 362 women delivered
The final sample was selected proportionally as shown in the table below

Table 2: Study sample size for women who gave birth

Basic maternity	Women delivered	Proportion	Sample size
Basoko	965	0, 221076746849942	80
Kasuku II	999	0,228865979381443	83
Mikelenge	995	0,227949599083619	82
Lumbulumbu	925	0,211912943871706	77
Kama II	481	0,110194730813287	40
Total	4 365	1	362

Inclusion criteria

The study considered only women who delivered a pregnancy at term, cephalic presentation, and single large, non-scarring uterus and received oxytocin to accelerate spontaneous labour.

Exclusion criteria

Women with preterm delivery, breech or transverse presentation, twin pregnancy and scarred uterus were excluded from the study.

Data collection

Data were collected by document analysis of parturient records (parturient cards and partogram) using a standardized survey form.
The following variables were selected:

- Age: less than 15 years, 16-39 years and 40 years and over;
- Education level: none, primary, secondary and tertiary/university; other;
- Parity: primiparous, pauperous, multiparous and grand multiparous;
- Marital status (Single, married, divorced, widowed);
- Profession (No, government employee, trader, farmer, other to be specified)
- Training in oxytocin use: trained, not trained
- Use of oxytocin: Yes, no

Data analysis

The collected data were encoded on Excel sheets and exported to STATA 14.0 software To describe the qualitative variables in our sample, we calculated the frequency and percentage, and for the quantitative variables we calculated the means and their standard deviations. To investigate the relationship between midwifery education and oxytocin use, we calculated the contingency chi-square. We considered the difference to be significant when $p < 0.05$. This study was carried out with respect for the law and the human person. Authorizations were sought and obtained at both the provincial and local levels from the Maniema Provincial Ministry of Public Health, and the identity of the study subjects was protected.

RESULTS

Socio-demographic characteristics of women giving birth

Tableau 3: Age of the women who gave birth in the maternity units of Kindu

Variables	n=724	%	Médian ±DS	Min	Max
Age (in years)			26,3±8,1	14	45
Age group (in years)					
≤ 15 years	42	5,8			
16-39 yearsold	623	86,05			
≥ 40 years	59	8,15			

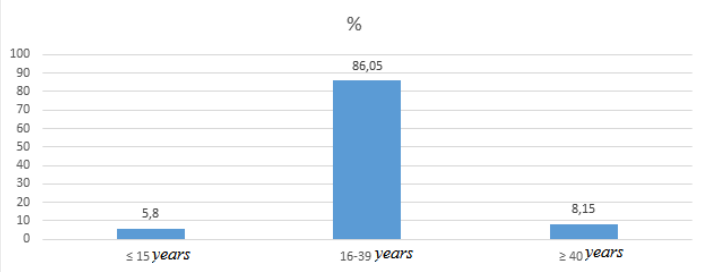

Figure 3.1 Age of women giving birth in the maternity hospitals of Kindu

The above results show that the most represented age group was 16 to 39 years (86.05%) and the average age of women giving birth was 26.3±8.1 years with a standard deviation of 8.1 years and extremes of 14 and 45 years.

Table 3.2: Distribution of women giving birth according to parity, level of education and marital status

Variables	n= 724	%
Parity		
Paucipare	166	23,93
Primiparous	218	30,11
Multiparous	234	32,32
Large multiparous	106	14,64
Level of education		
None	139	19,2
Primary	192	26,52
Secondary	344	47,51

University/Highereducation	49	6,77
Marital status		
Single	66	9,12
Married	616	85,08
Divorced	29	4,01
Widowed	13	1,8

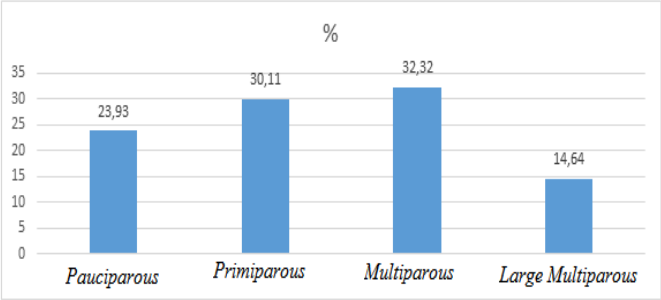

Figure 3.2. Distribution of births by parity

From the results of the above table, we can see that the majority of births were primiparous and multiparous (30.11%) and (32.32%), but pauciparous and large multiparous women were represented by significant proportions (23.93% and 14.64% respectively).

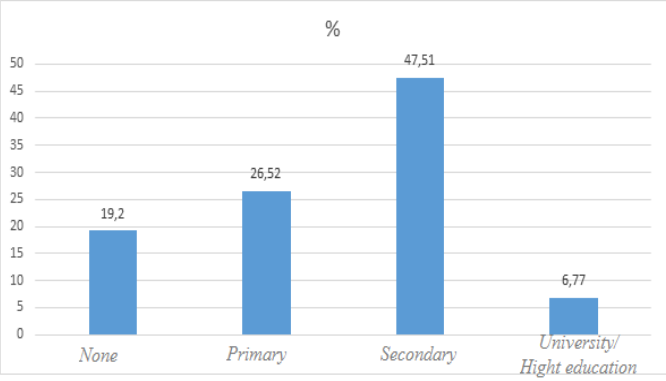

Figure 3.3 Distribution of births by level of education

Regarding the level of education, the majority of women had secondary education (47.51%), followed by primary education (26.52%), no education (19.2%) and higher education and university (6.77%).

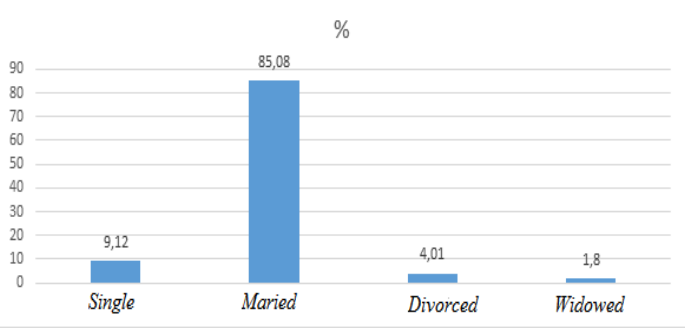

Figure 3.4. Distribution of women giving birth according to marital status

The results relating to the marital status of the women who gave birth reveal that the vast majority were married (85.08%), followed respectively by single women (9.12%), divorced women (4.01%) and widows (1.8%).

Table n°3.3: Rate of oxytocin use during spontaneous labour in the basic maternity units of Kindu

Variables	Use of oxytocin	n(%)	χ^2	p value
Maternity				
BASOKO	Yes	24(30.00)	67.7435	0.000
	No	56(70.00)		
KASUKI II	Yes	110(53,66)		
	No	95(46,34)		
Lumbulumbu	Yes	23(30,26)		
	No	53(69,74)		
KAMA II	Yes	12(30,00)		
	No	28(70,00)		
Mikelenge	Yes	27(32,53)		
	No	56(67,47)		
Tokolote 100maisons	Yes	29(67,44)		
	No	14(32,56)		
Tokolote Makengele	Yes	29(67,44)		
	No	14(32,56)		
Lwama	Yes	80(64,62)		
	No	44(35,48)		
SOKOLO	Yes	21(70,00)		
	No	9(30,00)		
KASUKU I	Yes	85 (96,72)		
	No	37(30,32)		

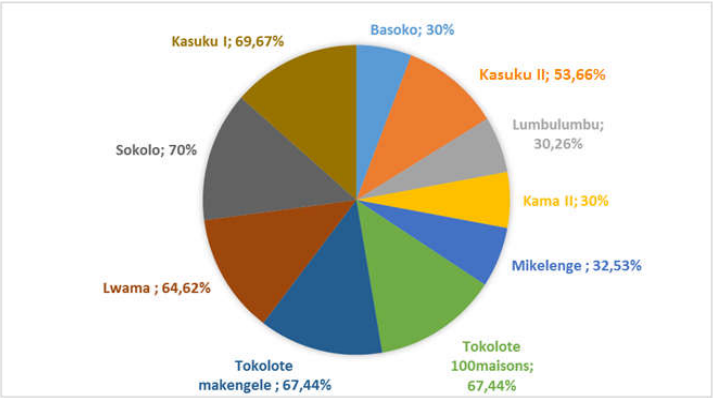

Figure 3. 5. Rate of oxytocin use during spontaneous labour in the basic maternity units in the city of Kindu

Analysis of these results shows that the rate of oxytocin use is high in the untrained control group compared to the intervention group. In the intervention group: CS Basoko 30% use vs. 70% non-use, Mikelenge 32.53% use vs. 67.47% non-use, Lumbulumbu 30.26% use vs. 69.74% non-use, Kama II 30% use vs. 70% non-use, Kasuku II 53.66% use vs. 46.34% non-use On the other hand, in the control group: CS Tokolote 100 houses 67.44% use against 32.56% non-use, Tokolote Makengele 67.44% use against 32.56% non-use, Lwama 64.62% use against 35.48% non-use and Sokolo 70% use against 30% non-use. The difference between the two groups is statistically significant with chi-square ($\chi 2$= 67.7435 p< 0.001).

Bivariate Analyses of Midwifery Education and Use of Oxytocin

Table3.4: Relationship between age of births and oxytocin use

Variables	Use of oxytocin	n(%)	χ^2	p value
Tranche d'âge (an)				
≤ 15	Yes	10(23,81)	11,45	0,003
	No	32(76,19)		
16-39	Yes	314(50,4)		

	No	309(49,6)
≥ 40	Yes	31(52,54)
	No	28(47,46)

Shows that oxytocin use is related to the age of the woman, χ^2= 11, 45 and p= 0.003

Table3.5: Relationship between birth parity and oxytocin use

Variables	Use of oxytocin	n (%)	χ^2	p value
Parity				
Paucipare	Oui	90 (54,22)	59,8644	<0,001
	Non	76(45,78)		
Primiparous	Oui	60(27,52)		
	Non	158(72,48)		
Multiparous	Oui	144(61,54)		
	Non	90(38,46)		
Large multiparous	Oui	61(57,55)		
	Non	45(42,45)		

Analysis of the above table indicates that oxytocin was used much more in multiparous women (61.54%), the difference is statistically significant with χ^2= 59.8644 and p < 0.001.

Table 3.6: Relationship between midwifery education and oxytocin use

Variables	Use of oxytocin	n(%)	χ^2	p value
Formation des sages-femmes				
Trained	Yes	111(31,27)	97,7658	<0,001
	No	251(68,02)		
Not trained	Yes	244(68,73)		
	No	118(31,98)		

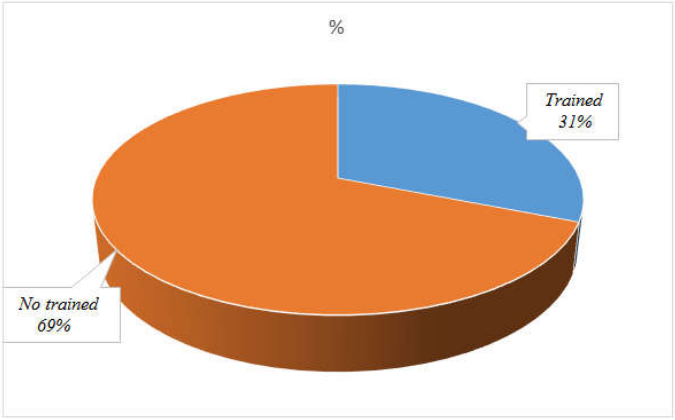

Figure 3. 6 Relationship between midwifery training and oxytocin use

From these results, we noted that oxytocin use was much higher in the control group (untrained) 68.73% versus 31.27% in the intervention group (trained). We also noted that this training significantly reduced the rate of oxytocin use by 37.46% (χ^2= 97.7658 and p< 0.001).

DISCUSSION

With regard to age, the women included in this study were relatively young with a median age of 26.3±8.1 years. The study found that oxytocin use was related to the age range of the woman delivered ($\chi^2 = 11,45$ and p= 0.003).

This result is comparable to the 24, 47±0.4 found by Bagayoko (2010) in Bamako, Mali. It is also close to that found in Norway by Dalbye *et al.,* (2017), i.e. 28.5±7 years, and that of 30.6±5.2 years found by Boujenah *et al.,* (2020) in Monaco, France. Regarding the parity of the deliveries, the study found that oxytocin was administered much more in multiparous women (61.54%), the difference was statistically significant ($\chi^2 = 59.8644$ and p < 0.001). This rate is far higher than the 42% found by Dalbye *et al.,* (2017) in nulliparous women in Norway, the 47.7% in nulliparous women and 18.5% in multiparous women found by Maria Oscarsson (2010) in Sweden and the 31% found by Bagayoko (2010) in primiparous women in Bamako, Mali. This is lower than the 75% among multiparous women and 38.1% among multiparous women found by Selin *et al.,* (2009) in Sweden. In the literature, several authors consider multiparity, with its corollary of myometrial fragility, as a relative contraindication to the administration of oxytocin during labour (Magnin *et al.*, 1989). Indeed, successive and close pregnancies weaken the uterus and thus increase the risk of uterine rupture during oxytocin infusion. As for the marital status of the women who gave birth, the vast majority were married (85.08%). This rate is close to the 80.5% found by Bagayoko (2010) in Bamako, Mali and slightly lower than the 94.8% found by Dalbye *et al.,* (2017) in Norway. The vast majority of women who delivered 74.03% had primary and/or secondary education. Clearly, these women were removed from the education system at an early age to take care of household tasks. Regarding oxytocin use rates in Kindu maternity facilities, the study found that the oxytocin use rate was 68.73%. This is similar to the rate of over 60% reported by Cécile Thibert worldwide and significantly higher than the 64%, 59.5% and 55% reported respectively by Belghiti *et al.,* (2010) in France and Vogt *et al* (2011) in Brazil and Selin *et al.,* (2009) in Sweden. We believe that the difference in rates between our study and the above-mentioned studies, particularly those conducted in France, Sweden and Brazil, is linked to the existence of a real difficulty on the part of midwives in these maternities, difficulties linked to the lack of continuous training in the use of oxytocin in the delivery room. But also and above all the lack of knowledge about the new active phase of 5 to 6 cm as currently recommended can explain this situation. The results of the study showed that the rate of oxytocin use during spontaneous labour was higher in the control (untrained) group, 68.73% than in the intervention (trained) group, 31.27%. Statistically, the difference is significant. In other words, training had significantly reduced the rate of oxytocin use by 37.46% ($\chi^2 = 97.7658$ and p< 0.001). This rate of 37.46% is comparable to the 37.3% found by Boujenah *et al.,* (2020) in France. It is higher than those of 29.6% and 16% reported respectively by Sonia Maria *et al.,* (2018) in Brazil and Nkibito (2016) in Rwanda. Steven Clark *et al.,* (2007) in Sweden, concluded that implementing a specific and conservative checklist-based protocol for oxytocin infusion based on maternal and fetal response results in a significant reduction in maximum oxytocin infusion rates without prolonging labour or increasing surgical intervention. Given that any training that complements another generally adds value to the previous one in terms of knowledge and practice, and given the overall positive results of retraining, upgrading and capacity building on the performance of beneficiaries as documented in the medical literature, midwifery training had significantly positive effects on reducing the rate of oxytocin use during spontaneous labour in Kindu's basic maternity units. Despite the reduction in this rate, it is still high compared to the WHO standards (2018) which recommend a rate of less than 10%.

CONCLUSION

The possibility of improving oxytocin use during spontaneous labour by training midwives is promising. In this study, training resulted in a 37.46% reduction in oxytocin use in basic maternity units in Kindu.

Funding

This study was funded by the non-governmental organization Santé en Milieu Rural "SANRU Asbl" as part of the BOMOYI Project.

Competing interests

The authors declare that they have no ties of interest.

REFERENCES

BagayokoYocouba (2010) Use of oxytocin during labor in the maternity ward of the Centre de Santé de Référence de Bougouni (about 300 cases). Doctoral thesis, Faculty of Medicine, Pharmacy and Odontostomatology, University of Bamako

Belghiti J et al (2011), Oxytocin during labour and risk of severe postpartum

Belghiti J, Coulen B, Kayem G, Blondel B, Deneux-Thoraux (2013). Administration of oxytocin during labor in France, results of the 2010-2013 prenatal survey, Journal of Obstetrics Gynecology and Reproductive Biology, Vol.42, pp.662-670

Cecile Thibert http://santé.lefigaro.fr/article/trop-d-accouchements-acceleres-a-tort/Cecile. Publié le 8 décembre 2016 à 18H42, accessed on Wednesday,

Dalbye R, Bernitz S, Inge C, Jun Z, Torbjorn M, Daniella R, Frey K, Pal O et Blix E (2019), The Labor Progression Study the use of oxytocin augmentation during labor following zhang's guideline and WHO partograph in a cluster randomized trial.Acta Gynecology obstetric. Vol 98 pp 1187-1194

Demidenko E (2007), Sample size and optimal design for logistic regression with bimary interaction https://doi.org/10.1002/sim.2980

Dupont C, Carayol M, Le Ray C, Barasinsi C, Beranger R, Burguet A, et al (2017). Recommendations for administering oxytocin during spontaneous labor. Short text of the recommendations, Midwives Review, Vol. 16; 1. Pp 111-118.

Magnin G, Pierre F, Ducroz B, Body G La dystocie dynamique. Encyl Med Chirur (Paris). Obstet. 1989; 5064 A105, P13.

Maniema Provincial Health Division (2019), Delivery interventions, DHIS2.

Ministry of Health DRC (2019), Childbirth Interventions, DHIS2.

Ministry of ESU DRC (2019), Midwifery Curriculum, Retraining ProgrammeNational College of Midwives – Women of France. Press kit.cnsf.asso (En ligne) Décembre 2016. http ://www.cnsfAsso.fr/doc/, accessed on Monday 30 May 2021 at 13 :40

National College of Midwives – Women of France. Presskit.cnsf.asso (En ligne) Décembre 2016. http ://www.cnsfAsso.fr/doc/, accessed on Monday 30 May 2021 at 13 :40

Vogt SE, Diniz SG, Tavares CM, Santos NC, Schneck CA, Zorzam B, Vieira Dde A, Silva KS, Dias MA. Characteristics of labor and delivery care in three models of health care within the unified national health system in Belo Horizonte, État du Minas Gerais, BrésiladSaudePublica. September 2011; 27 (9): 1789-800.

WHO, (2018), Recommendations on Intrapartum Care for a Positive Childbirth Experience

****