



Contents lists available at ScienceDirect

# European Journal of Obstetrics & Gynecology and Reproductive Biology: X

journal homepage: [www.elsevier.com/locate/eurox](http://www.elsevier.com/locate/eurox)

## The Mode of delivery of grand multiparous with post-caesarean single uterine scar in low resources settings: A retrospective cohort study



Mve Koh Valère<sup>a,b,\*</sup>, Belinga Etienne<sup>a,c</sup>, Elong Phelix Adolphe<sup>d,e</sup>, Toko Fokam Brice<sup>e</sup>, Pierre Marie Tebeu<sup>a</sup>

<sup>a</sup> Faculty of Medicine and Biomedical Sciences of University of Yaoundé, Yaoundé, Cameroon

<sup>b</sup> University Teaching Hospital of Yaoundé, Yaoundé, Cameroon

<sup>c</sup> Centre Hospitalier de Recherche et d'Application en Chirurgie Endoscopique et Reproduction Humaine (CHRACERH) Yaoundé Cameroon

<sup>d</sup> Faculty of Health Sciences of the University of Buea, Buea, Cameroon

<sup>e</sup> Buea Regional Hospital, Buea, Cameroon

### ARTICLE INFO

#### Article history:

Received 1 February 2019

Received in revised form 17 June 2019

Accepted 24 June 2019

Available online 5 July 2019

#### Keywords:

Grand multiparity  
Scar uterus  
Cameroon

### ABSTRACT

The prevalence of post-caesarean scar uterus, the most important risk factor of uterine rupture is increasing globally. Grand multiparity can also increase the risk of uterine rupture. The issue of grand multiparous with single post caesarean scar is poorly investigated.

**Objectives:** The purpose of this study was to assess the factors associated with the mode of delivery of grand multiparous with post caesarean single uterine scar in low resources settings.

**Patients and Method:** It was a retrospective cohort study conducted from the 1<sup>st</sup> January to the 31<sup>st</sup> of May 2016, in three university teaching hospitals of the university of Yaoundé I in Cameroon. Grand multiparous (GMP) defined as parity  $\geq 5$  with single post-caesarean lower segment uterine scar admitted at a gestational age of 37 completed weeks and above were compared to grand multiparous without scar uterus at term. GMP with unknown scar were excluded. The mode of delivery and materno-fetal and neonatal outcome were investigated.

**Results:** We included 33 GMP with single lower segment uterine scar and 120 GMP without uterine scar. Induction of labor and acute fetal distress were not related to having a scar or not in grand GMP, but augmentation of labor was less likely to be conducted in case of GMP with scar uterus ( $p=0.08$ ). The frequency of vaginal delivery was 75.8 and 87.5% in grand multiparous with and without uterine scar respectively (OR 0.17–1.16;  $P=0.085$ ), with one case of instrumental delivery in scarless group. However, single scar multiparity status increased by 2.42 folds the risk of delivery by caesarian section ( $P=0.066$ ). Cephalo-pelvic disproportion increased the indication of caesarian section by 12-fold in the GMP with scar group ( $p=0.031$ ), but mechanical dystocia related indications (CPD, macrosomia,) were present in only 4 cases out of 8 caesarian sections in the exposed group. The Apgar score at the fifth minute was better in the GMP with scar group. ( $p=0.037$ ).

**Conclusion:** Grand multiparous with single post-caesarean uterine scar should be given a chance of vaginal delivery in the absence added fetomaternal morbidity.

© 2019 The Author. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

### Introduction

Ensuring healthy lives and promoting wellbeing for everyone at all ages including maternity without risk is one of the objectives of Sustainable Development Goals (SDGs) [1], especially in

developing countries where 99% of maternal and neonatal mortalities are recorded [2,3]. Caesarean section rate is increasing globally, from 6.7% in 1990 to 19.1% in 2014 [4,5], increasing the prevalence of scarred uteri, which is among the morbidities affecting the outcome of maternal health. It is the most important risk factor of uterine rupture even in developed countries [6]. The incidence of uterine rupture among women who previously underwent caesarean section ranged from 0.22% to 0.5% in some developed countries [7–9]. The incidence of uterine rupture is higher in developing countries and occurs in 1/250 deliveries, compared to 1/5000 deliveries in developed countries hosting only

\* Corresponding author.

E-mail addresses: [vmvekoh@yahoo.com](mailto:vmvekoh@yahoo.com) (M.K. Valère), [belingaetienne@yahoo.fr](mailto:belingaetienne@yahoo.fr) (B. Etienne), [adolpheelong@yahoo.fr](mailto:adolpheelong@yahoo.fr) (E. Phelix Adolphe), [bricetoko92@gmail.com](mailto:bricetoko92@gmail.com) (T.F. Brice).

1% of reported uterine rupture [10]. Uterine rupture is a significant cause of maternal and perinatal death, with a higher risk of maternal near miss or death and perinatal death in developing countries [11].

Grand multiparity defined as parity 5 and above, can also increase the risk of uterine rupture [12,13]. In developed countries, the incidence of grand multiparity is 3–4% of all births [14], but it varies between 10–33.64% in developing countries with higher rates in Islamic countries [15–17]. Grand multiparity can increase antenatal and intra-partum maternal complications, such as, anaemia, hypertensive disorders, preterm labour, postpartum haemorrhage resulting in severe maternal morbidity [18], fetal macrosomia, Diabetes mellitus [19], perinatal mortality [20].

It has been established that implementing timely and appropriate evidence-based antenatal care (ANC) can reduce the risks related to grand multiparity [21]. However, this is not always the case in low resources settings [22]. Cameroon is a developing country with a significant Muslim community. Additionally, grand multiparity is not uncommon in the Cameroonian Christian community, making this country an interesting case study.

Studies on grand multiparity and VBAC (vaginal birth after caesarean) are scarce in recent literature. In a prevalence study, Dyack et al show that 60% had a successful vaginal delivery, though the risk of complications was high. [23]. Grand multiparity increased the risk of uterine rupture in the presence of a scarred uterus (level of proof NP4) but there was no recommendation due to the small number of studies [24].

TOLAC (trial of labor after caesarean) in the context of grand multiparity is therefore a challenge in low resource settings. The purpose of this study was to assess the factors associated with the mode of delivery of grand multiparous with a single uterine scar in Cameroon.

## Patients and method

It was a retrospective cohort study, conducted over a period of eight or five (5) months, from the 1<sup>st</sup> January to the 31<sup>st</sup> of May 2016 at three university teaching hospitals affiliated to the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I, Cameroon namely the University Teaching Hospital, the Central Hospital and the Gyneco-Obstetrics and Paediatric hospital. They collectively manage more than 8000 deliveries yearly.

The study population was grand multiparous women admitted for delivery. Grand multiparity was defined as parity  $\geq 5$ . The exposed-group was grand multiparous with a single lower segment caesarean scar. The non-exposed group was grand multiparous without a uterine scar. All grand multiparous with a single lower segment caesarean scar admitted at a gestational age of 37 completed weeks and above were included.

Grand multiparous with unknown or multiple uterine scars, or a single scar other than a lower segment scar, or those fulfilling the inclusion criteria but programmed for elective caesarean section were excluded.

Patients were enrolled on admission for delivery and were reassessed 2 h postpartum.

The sampling was exhaustive. We recruited all the cases of grand multipara with a single uterine scar.

The data analysed were maternal socio-demographic data, foeto-maternal obstetrical data, the mode of delivery and perinatal clinical data.

This study received the approval of the Ethics committee of the University of Yaoundé I and authorization from the Directors of the three university teaching hospitals.

Statistical analysis was done using Epi info 3.5.4, SPSS 20.0. We used X2 to analyse data distribution.  $P \leq 0.05$  was the significance threshold. Odds ratio was defined according to  $OR > 1$  with a confidence interval of 95%. We used tables to present all the results. Cohabiting meant living in the same house with the supposed “father” of the pregnancy.

## Results

We included 153 grandmultiparous, 33 with a single lower segment uterine scar and 120 without. The incidence of a single caesarean scar among grand multiparous was 21.6%. (33/153). The mean age was  $37.7 \pm 4.3$  with a minimum of 23 years and maximum 47 years.

The Apgar score at the fifth minute was better in the exposed group. ( $p=0.037$ ). The number of macrosomic newborns was higher in the exposed group.

## Discussion

### Socio-demographic factors

Scarred uterus among multiparous was not related to age. (Table 1). The correlation between maternal age and a primary caesarean section is inconsistent. Some studies have shown a relationship between a concomitant increase in maternal age and caesarian section rate, but they suspected influence by care provider and maternal preferences [25,26], and increasing parity with maternal age [27]. In India, socio-economic class was related to scarred uterus, the rate thereof reducing with poverty [28]. This factor was not investigated in this study.

### Antenatal care (Contacts) factors associated with scarred uterus among GMP.

Having a scarred uterus did not bring extra awareness for better follow up among GMP as there was no statistical difference between the two groups. Grand multiparity is often associated with lack of antenatal care [30].

One of the reasons is probably the so called « over-confidence » [31]. Afolabi had observed the same phenomenon in Nigeria, a neighboring country to Cameroon and socio-culturally similar, naming it the dangerous and over-confident multiparous [32]. As maternities unfold, some multiparous probably neglect the necessity of good quality follow-up after going through successful delivery experiences.

**Table 1**  
Age distribution of the study population.

Age (years)	Exposed (n = 33)	Non exposed (n = 120)	OR (CI 95%)	P
< 25	0(0)	2(1.7)	0,00	0.614
[25–30]	2(6.1)	15(12.5)	0.45 (0.09–2.08)	0.241
[30–35]	16(48.5)	41(34.2)	1,81 (0,83–3.95)	0.097
$\geq 35$	15(45.5)	69(57.5)	0.61 (0.28–1,33)	0.150

There was no statistically significant age difference among the two groups.  
Pregnancy follow up.

Another reason might be “reassuring” vaginal delivery experiences before or after “the caesarian section trauma” which, although not investigated in this study, certainly characterized all of the study population, resulting in a sort of “business as usual mode”. One limitation of this study was that it didn’t assess the timing between the caesarian section and the ongoing pregnancy (Tables 2 and 3).

The other reason might be poverty as grand multiparity is known to be frequently associated with low socio-economic conditions [33]

#### Induction of labor and uterine rupture

There was no association between the induction of labor and scarred uterus status among GMP. Although not statistically significant, the scarred uterus status reduced the need for labor augmentation ( $p = 0.08$ ), (Table 4). Induction of labor is associated with maternal and perinatal complications even in the absence of morbidity like scarred uterus or grand multiparity. Induction of labor can increase caesarean section rate and uterine rupture. Chibber et al analysing 152,426 deliveries in the Middle-East found that induction of labor by misoprostol or oxytocin was responsible for 27% of the 44 documented uterine rupture cases [34]. Induction of labour on a scarred uterus also increased the rate of caesarean delivery due to fetal distress when compared to spontaneous onset of labour on a scarred uterus, regardless of the parity [35]. But in a retrospective study in Saudi Arabia, 76.9% of the 26 GMP (parity  $\geq 6$ ) with a scarred uterus who requested vaginal delivery after caesarean section and were induced for different reasons with prostaglandine-E2, an induction method associated with uterine rupture [34] delivered vaginally and there was no case of uterine rupture or dehiscence [36].

Moreover, a recent systematic review also didn’t point out grand multiparity or induction of labour as constantly related to uterine rupture, and 2129 induced labour on a scarred uterus (5.7% of scar uterus) delivered without dehiscence or rupture versus 11 cases of post induction rupture although parity was not specified [9], leaving room for the existence of other determining factors. Therefore, should induction of labour in grand multiparous with a scarred uterus still remain a contra-indication? From the above evidence and the results of this study beyond the limitations due to the small number of inductions, in a setting with qualified and skilled human resources and the availability of all requested equipment for prompt and efficient management of obstetrical complications, there seem to be grounds for induction of labor in single lower segment uterine scars even in case of GM with a scarred uterus.

The most frequent complication of a scarred uterus and multiparity is uterine rupture [24]. The single uterine rupture case during the study period only occurred in GMP without uterine scar. Rouzi et al had the same findings the three(3) cases of uterine rupture/dehiscence only occurred in the control group (Parity 2–5 with scarred uterus) versus parity  $\geq 6$  as cases) [37], probably

showing a lesser influence of the scar in the event of uterine rupture in our study.

Since both groups were managed by the same medical teams, one hypothesis to be confirmed is that there was increased attention due to the presence of two morbidities, in a country where grand multiparity is frequent and as such, is not considered as morbidity factor in daily management, but with a uterine scar, increased awareness might have led to better preparation and therefore, better management of cases probably expressed by the increased risk of emergency caesarian section and the significant caesarian section number due to CPD in this study (Table 5)

Uterine rupture during labor has pre-rupture signs like Bandle’s ring which in the presence of appropriate monitoring and skilled medical staff can be prevented by on-time emergency caesarean section. So, the quality of management of labour after induction was probably one of the main parameters explaining the differences among those studies and, might explain the absence of uterine rupture in the exposed groups in our study, since they all delivered in university teaching hospitals with qualified and well trained personnel, and appropriate medical equipment and drugs, even if the relatively small size of our exposed group (25 cases) should temper this observation, waiting for larger scale studies. The presence of a skilled health professional present at every delivery can indeed reduce maternal and newborn mortality and morbidity [38]

#### Mode of delivery.

Concerning the route of delivery, this study shows the “safety” of vaginal route as the majority delivered vaginally in both groups ( $p = 0.08$ ) Although a scarred uterus in GMP increased the risk of delivery by emergency caesarean section by 2.4 fold, the outcome was good ( $p = 0.06$ ). Rouzi et al had a successful VBAC rate of 82.1% out of 117 in grand multiparous women (para 6 or more) compared to 79.1% out of 185 in multiparous women (para 2–5) and there was no statistically significant correlation between the mode of delivery in both groups [37]. Tarik Y Zamzami et al also didn’t find any statistically significant correlation between the mode of delivery of vaginal birth after caesarean section (VBAC) in grand multiparous ( $p \geq 6$ ) compared to VBAC in multiparous women (para 2–5) [39].

This study is advocating that in the absence of another added morbidity, grand multiparous with a scarred uterus should be given a chance at vaginal delivery like scar-less grand multiparous, a possibility of trial of scar within good materno-fetal monitoring for prompt emergency caesarean section if indicated. Of course, due to the small size of our exposed group, further and larger scale studies are needed to confirm this. Concerning the indications of caesarean section, only cephalopelvic disproportion was statistically significant, ( $p = 0.03$ ), a common indication of caesarean section not specific to having a scarred uterus or grand multiparity, and only four out of the eight emergency caesarean section in the exposed group were indicated for mechanical dystocia.

**Table 2**

Number of antenatal contacts (antenatal consultations).

Antenatal contacts number	Exposed (n = 33)	Non-exposed (n = 120)	OR (CI 95%)	P
Antenatal contact done	32(97)	116(96.7)	1.10 (0.11-10.22)	0.705
0	1(3)	4(3.3)	–	> 0.05
1-3	12(36.4)	52(43.3)	0.74 (0.33-1.65)	0.303
$\geq 4$	20(60.6)	64(53.3)	1.34 (0.61-2.95)	0.293

There was a statistically significant difference between the number of antenatal consultations (ANC) between the two groups. One (1) case of exposed and four (4) non-exposed did no ANC but this was not statistically significant ( $p > 0.05$ ).

**Table 3**  
Gestational age on admission in labour room.

Gestational age (weeks)	Exposed (n = 33)	Non-exposed (n = 120)	OR (CI 95%)	P
[34-37[	3(9.1)	16(13.3)	0.65 (0.17-2.38)	0.376
[37-42[	27(81.8)	97(80.8)	1.06 (0.39-2.88)	0.56
≥42	3(9.1)	7(5.8)	1.61 (0.39-6.61)	0.369

There was no statistically significant difference in the gestational age on admission for delivery in both groups.

**Table 4**  
Management of labour and intrapartum complications.

Labor management	Exposed (n = 33)	Non-exposed (n = 120)	OR (CI 95%)	P
Induction of labour	1(3)	7(5.8)	0.50 (0.05-4.25)	0.453
Augmentation of labour	7(21.2)	43(35.8)	0.48 (0.19-1.20)	0.081
Cord prolapse	2(6.1)	1(0.8)	7.67 (0.67-87.45)	0.117
Acute fetal distress	4(12.1)	13(10.8)	1.13 (0.34-3.74)	0.522
Uterine rupture	0(0)	1(0.8)	0.00	

Delivering after induction of labor and the event of acute fetal distress were not related to having a scar or not in grand GMP, but augmentation of labor was less likely to be conducted in cases of GMP with scarred uterus(p = 0.08).

**Table 5**  
Mode of delivery.

Mode of delivery	Exposed (n = 33)	Non-exposed (n = 120)	OR (CI 95%)	P
Vaginal delivery	25(75.8)	105(87.5)	0.44 (0.17-1.16)	0.085
Instrumental delivery	0(0)	1(0.8)		0.784
Emergency caesarian section	8(24.2)	14(11.7)	2.42 (0.91-6.40)	0.066

The majority delivered vaginally in both groups (OR 0.17–1.16) though P = 0.085, and single scar multiparity status increased the risk of cesarean delivery by 2.42 folds (P = 0.066).

**Table 6**  
Indications of emergency caesarian section.

Indications of emergency caesarian section	Exposed (n = 33)	Non-exposed (n = 120)	OR (CI 95%)	P
CPD	3(8.6)	1(0.8)	11.90 (1.19-118.30)	<b>0.031</b>
Macrosomia	1(2.9)	3(2.3)	1.22 (0.12-12.15)	0.623
Malposition	0(0)	2(1.6)		0.615
Placenta Prævia	0(0)	1(0.8)		0.785
Severe pre-eclampsia	1(2.9)	0(0)		0.214
Cord prolapse	0(0)	1(0.8)		0.785
Acute fetal distress	1(2.9)	5(3.9)	0.72 (0.08-6.40)	0.618
Pre-rupture syndrome	0(0)	1(0.8)	0.00	0.785
Stagnant cervical dilatation	0(0)	1(0.8)		0.785
Twin pregnancy	2(5.7)	0(0)		<b>0.045</b>

CPD: cephalo-pelvic disproportion.

The presence of scar in GMP resulted in a 12-fold increase in caesarian sections due to CPD (p = 0.031). But mechanical dystocia-related indications (CPD, macrosomia,) were present in only 4 cases out of 8 caesarian sections in the exposed group.

**Table 7**  
Neonatal outcome.

Apgar score	Exposed (n = 35)	Non-exposed (n = 128)	OR (CI 95%)	P-value
At the first minute				
<7	3(8.6)	23(18)	0.42 (0.12-1.51)	0.137
≥7	32(91.4)	105(82)	2.33 (0.65-8.29)	0.137
At the fifth minute				
<7	0(0)	13(10.2)	0.00	<b>0.037</b>
≥7	35(100)	115(89.8)		<b>0.037</b>
Newborn weight				
<2500	4(11.4)	23(17.8)	0.59 (0.19-1.84)	0.265
2500-3999	20(57.1)	89(69)	0.59 (0.27-1.28)	0.132
≥4000	11(31.4)	16(12.4)	3.23 (1.33-7.84)	<b>0.010</b>

The American College of Obstetricians and Gynecologists in 2017 recommendations didn't consider GMP with a scarred uterus as an absolute contra-indication of vaginal birth after caesarean section even if the incidence of such cases might be low in America. [40]

#### *Fetal events during labor and neonatal outcome*

Grand multiparity and a scarred uterus are known to increase fetal and neonatal morbidities [[24]] [41],– [43]] but in this study, we didn't find any statistically significant increased risk of fetal distress and neonatal morbidity between grand multiparous with or without scar (Table 4 and 6). Fetal distress in the absence of uterine rupture might be related to grand multiparity rather than the scarred uterus status. Grand multiparity is indeed associated with hypertensive diseases, anemia, gestational diabetes [[20]], [42]] [44],], conditions that may predispose to acute fetal distress at the onset of fetal stress due to uterine contractions for example (Table 7).

Apgar score was better in the scarred uterus group than the non-exposed group and it was statistically significant at the fifth minute ( $p=0.03$ , Table 6) in accordance with the results of Table 4 which didn't show a statistically significant increase of fetal distress in the exposed group.

In this study, the presence of added risk factors (GM and a scarred uterus) improved the outcome of newborns probably because of increased awareness due to the presence of a second but more considered morbidity, the uterine scar as mentioned above. An unexpected finding was an increased number of macrosomia in the exposed group but we were not able to find any explanation in the literature. Beyond the bias due to the short time of the study period, macrosomia is associated with many factors not investigated in this study like mother's body mass index, height, past history of macrosomia, newborn sex etc. [45]

#### **Conclusion**

The presence of a uterine scar didn't increase uterine rupture or fetal distress risks. There was no difference in the vaginal delivery opportunity among the two groups although emergency caesarian section risk was increased in the scar group but not due to mechanical dystocia and no worsening of neonatal outcome was noticed. Grand multiparous with scar uterus should be given a chance of vaginal delivery in the absence added fetomaternal morbidity.

#### **Declaration of Competing Interest**

The authors declare no conflict or competing interest; this work was not sponsored by any organization and was self-financed.

#### **Acknowledgements**

We thank all the team of the three university teaching hospitals including the directors who made this study possible.

#### **References**

- [1] From MDGs to SDGs: What are the Sustainable Development Goals? November 2015, ICLEI BRIEFING SHEET - Urban Issues, No. 01 3. <http://localizingthesdgs.org/library/251/From-MDGs-to-SDGs-What-are-the-Sustainable-Development-Goals.pdf> accessed the 22 December 2018. –bbbb.
- [2] WHO/RHR/14.06. World Health Organization, 2014 facts sheet. On line [http://apps.who.int/iris/bitstream/handle/10665/112318/WHO\\_RHR\\_14.06\\_eng.pdf;jsessionid=EF683F50F27E80E1BE35A10A511A72F4?sequence=1](http://apps.who.int/iris/bitstream/handle/10665/112318/WHO_RHR_14.06_eng.pdf;jsessionid=EF683F50F27E80E1BE35A10A511A72F4?sequence=1) Accessed on December 24th 2018.
- [3] Ahmed OB, Lopez AD, Inoue M. The decline in child mortality: a reappraisal. *Bull World Health Organ* 2000;78:1175–91.
- [4] Vogel JP, et al. Use of the Robson classification to assess caesarean section trends in 21 countries: a secondary analysis of two WHO multicountry surveys. *Lancet Glob Health* 2015;3:e260–70, doi:[http://dx.doi.org/10.1016/S2214-109X\(15\)70094-x](http://dx.doi.org/10.1016/S2214-109X(15)70094-x).
- [5] Betran AP, et al. The increasing trend in caesarean section rates: global, regional and national estimates: 1990–2014. *PLoS One* 2016;11:e0148343, doi: <http://dx.doi.org/10.1371/journal.pone.0148343>.
- [6] Landon MB, Spong CY, Thom E, Hauth JC, Bloom SL, Varner MW, et al. Risk of uterine rupture with a trial of labor in women with multiple and single prior cesarean delivery. *Obstet Gynecol* 2006;108:12–20.
- [7] Kennare R, Tucker G, Heard A, Chan A. Risks of adverse outcomes in the next birth after a first cesarean delivery. *Obstet Gynecol* 2007;109:270–6.
- [8] Lydon-Rochelle M, Holt VL, Easterling TR, Martin DP. Risk of uterine rupture during labor among women with a prior cesarean delivery. *N Engl J Med* 2001;345:3–8.
- [9] Al-Zirqi I, Stray-Pedersen B, Forsen L, Vangen S. Uterine rupture after previous caesarean section. *BJOG* 2010;117:809–20.
- [10] WHO systematic review of maternal mortality and morbidity: the prevalence of uterine rupture. *Bjog Int J Obstet Gynaecol* 2005;(September):1221–8.
- [11] Motomura K, Ganchimeg T, Nagata C, Ota E, et al. Incidence and outcomes of uterine rupture among women with prior caesarean section: WHO Multicountry Survey on Maternal and Newborn Health. *Sci Rep* 2017;7:44093, doi:<http://dx.doi.org/10.1038/srep44093>.
- [12] Karaman E, Çim N, Çetin O, Alkış İ, Kolusarı A, et al. Analysis of uterine rupture cases at a tertiary referral center: a retrospective study. *Van Tıp Derg* 2016;23 (3):269–73.
- [13] Workie A, Getachew Y, Temesgen K, Kumar P. Determinants of uterine rupture in Dessie Referral Hospital, North East Ethiopia, 2016: case control design. *Int J Reprod Contracept Obstet Gynecol* 2018;7(May (5)):1712–7.
- [14] WHO: WHO Report. Geneva WHO; 2004. <http://www.who.int/whr/2004/annex/country/can/en/> Centers for Disease Control and Prevention (2004) National Center for Health Statistics: NCHS definitions. National Survey of Family Growth.
- [15] Raudaskoski T, Gissler M. Obstetric characteristics of a grand multipara. *Duodecim* 2014;130:1309–17.
- [16] Muthir JT. Obstetric outcome of the grandmultipara in Jos, Nigeria. *J Med Trop* 2005;7:14–20.
- [17] Yasir R, Perveen FZ, Ali L, Perveen S, Tayyab S. Grand-multiparity still an obstetric risk for developing countries. *Med Channel* 2010;16:264–8.
- [18] Roy R, Vernekar M. Feto-maternal outcome in grand multipara. *Int J Reprod Contracept Obstet Gynecol* 2017;6(July (7)):2846–51.
- [19] Al-Shaikh GK, Ibrahim GH, Fayed AA, Al-Mandee H. Grand multiparity and the possible risk of adverse maternal and neonatal outcomes: a dilemma to be deciphered. *BMC Pregnancy Childbirth* 2017;17(310), doi:<http://dx.doi.org/10.1186/s12884-017-1508-0>.
- [20] Aragaw YA, Mahtemilliasie M, Jarso H. Grand Multiparity and Pregnancy Related Complications among Women Who Gave Birth at Jimma University Specialized Hospital, Jimma, Southwest Ethiopia. *Gynecol Obstet (Sunnyvale)* 2017;7(4), doi:<http://dx.doi.org/10.4172/2161-0932.1000438>.
- [21] Kumari AS, Badrinath P. Extreme grand multiparity: is it an obstetric risk factor? *Eur J Obstet Gynecol Reprod Biol*. 2002;101(February (1)):22–5.
- [22] Khan NR, Perveen S, Begum Z, Qayyum R, Malik R. Grand multiparity and maternal outcome in absence of adequate antenatal care. *J Postgrad Med Inst* 2017;31(1):67–71.
- [23] Dyack CI, Hughes PF, Simbakalia JB. Vaginal delivery in the grand multipara following previous lower segment cesarian section. *J Obstet Gynaecol Res* 1997;23(April (2)):219–22.
- [24] d'Ercole C, Bretelle F, Piechon L, Shojai R and Boublil L. Recommandations pour la pratique Clinique. La césarienne a-t-elle une indication en cas d'uterus cicatriciel? *J Gynecol Obstet Biol Reprod* 2000;29(Suppl. 2):51–67.
- [25] Janoudi G, Kelly S, Yasseen A, Hamam H, Moretti F, Walker M. Factors associated with increased rates of caesarean section in women of advanced maternal age. *J Obstet Gynaecol Can* 2015;37(6):517–26.
- [26] Wang LL, Xu XL, Baker P, Tong C, Zhang L, Qi H, et al. Patterns and associated factors of caesarean delivery intention among expectant mothers in China: implications from the implementation of China's new national two-child policy. *Int J Environ Res Public Health* 2016;13:686, doi:<http://dx.doi.org/10.3390/ijerph13070686>.
- [27] Saadia Zaheera. Grand-Multiparity in Saudi Arabia—Examining the Obstetric Risk. *J Gynecol Obstet* 2014;2(2):16–9, doi:<http://dx.doi.org/10.11648/j.jgo.20140202.12>.
- [28] Maktha VK, Ghatam A, Padamata H, Ravulakol A. Prevalence and factors associated with caesarean section: a community based cross sectional study in rural parts of Rangareddy district, Telangana, India. *Int J Community Med Public Health*. 2016;3(August (8)):2054–7.
- [29] Villar J, Ba'aqeel H, Piaggio G, Lumbiganon P, Miguel BJ, Farnot U. WHO antenatal care randomized trial for the evaluation of a new model of routine antenatal care. *Lancets* 2001;357:1551–64, doi:[http://dx.doi.org/10.1016/S0140-6736\(00\)04722-X](http://dx.doi.org/10.1016/S0140-6736(00)04722-X).
- [30] Bezircio lu I, Göral NY, Balolu A, Baydar Y. The effect of grand multiparity on maternal, obstetric, fetal and neonatal outcomes. *Perinat J* 2013;21(1):17–22.
- [31] Solomon B. The dangerous multipara. *Lancet* 1934;2:8–11.
- [32] Afolabi AF, Adewale S. Grand-multiparity: is it still an obstetric risk? *OJOG* 2013;3:411–5.

- [33] Simonsen SM, Lyon JL, Adler SC, Varner MW. Effect of grand multiparity on intrapartum and newborn complications in young women. *Am J Obstet Gynecol* 2005;106:454–60.
- [34] Chibber A, El-Saleh E, Al Fadhli R, Al Jassar W, et al. Uterine rupture and subsequent pregnancy outcome – how safe is it? A 25-year study. *J Matern Neonatal Med* 2010;23(5):421–4.
- [35] Kiwan Rana, Qahtani NourahAl. Outcome of vaginal birth after cesarean section: a retrospective comparative analysis of spontaneous versus induced labor in women with one previous cesarean section. *Ann Afr Med* 2018;17 (July–September (3)):145–50.
- [36] Yamani TY, Rouzi AA. Induction of labor with vaginal prostaglandin-E2 in grand multiparous women with one previous cesarean-section. *Int J Gynecol Obstet* 1999;65:251–3.
- [37] Rouzi Abdulrahim A. Vaginal Birth After Cesarean Section in Grand Multiparous Women. *J Soc Obstet Gynaecol Can* 2000;22(6):437–9.
- [38] The Maternal Health Thematic Fund-Business Plan 2008-2011. UNFPA 's Contribution to the joint United Nations Accelerated Support to Countries in Maternal and Newborn Health. Accelerating Progress towards Millennium Development Goal 5. No Woman Should Die Giving Life. UNFPA. 2011 [https://www.unfpa.org/sites/default/files/resource-pdf/mhtf\\_business\\_plan.pdf](https://www.unfpa.org/sites/default/files/resource-pdf/mhtf_business_plan.pdf).
- [39] Zamzani TarikY. Vaginal birth after cesarean section in grand multiparous women. *Arch Gynecol Obstet* 2004;270(1):21–4.
- [40] ACOG Practice Bulletin. Clinical management guidelines for obstetrician-gynecologists. No 184, November. 2017. <https://vbacfacts.com/wp-content/uploads/2018/05/ACOG-PB184-VBAC-2017.pdf>.
- [41] Nasrullah FD, Khan A, Haque S. Grand multiparity and obstetric complications: a comparative study with women of low parity in a tertiary care hospital. *Med Channel*. 2016;22(2):21–6.
- [42] Al-Shaikh GK, Ibrahim GH, Fayed AA, Al-Mandeeel H. Grand multiparity and the possible risk of adverse maternal and neonatal outcomes: a dilemma to be deciphered. *BMC Pregnancy Childbirth* 2017;17:310.
- [43] Alhainiah MH, Abdulljabbar HSO, Bukhari YA. The prevalence, the fetal and maternal outcomes in grand multiparas women. *Mater Sociomed* 2018;30 (June (2)):118–20.
- [44] Abbass AA, Salman ST, Ali MK. Is Grand Multiparity Still An Obstetrics Risk? *Diyala J Med* 2015;8(1):21–8.
- [45] Glodean DM, Miclea D, Popa AR. Macrosomia. A systematic review of recent literature. *Rom J Diabetes Nutr Metab Dis* 2018;25(2):187–95, doi:<http://dx.doi.org/10.2478/rjdnmd>.