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Original Research Article

## Advanced maternal age: maternal and perinatal outcomes

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### ABSTRACT

**Background:** Advanced maternal age is significantly associated with adverse obstetrical outcomes like pregnancy-induced hypertension and preterm Delivery. Caesarean delivery is also increased in those mothers. Advanced maternal age pregnancy was also found to be a major risk factor for low birth-weight and perinatal death.

**Methods:** A hospital based observational study was conducted with 100 patients on attending antenatal-OPD patients at K. J. Somaiya Medical College and Research centre to evaluate the risks involved with advanced maternal age, the obstetric performance with neonatal outcomes of elderly gravidas aged 33 years or older.

**Results:** The most common maternal complication was gestational diabetes mellitus (16%), pregnancy induced hypertension (13%), pre-eclampsia (11%), malpresentation (8%), oligohydramnios (6%), placenta previa (2%) and postpartum haemorrhage (2%). Caesarean Section in 39% cases and vaginal delivery in 61% cases. (78%) were term deliveries, (22%) were preterm deliveries. (9%) neonates were very low birth weight [ $<1.5$  kg, (34%) neonates were low birth weight (1.5-2.5 kg)] (36%) and (21%) neonates were in the range of 2.6-2.9 kg and  $\geq 3$  kg respectively.

**Conclusions:** Advanced maternal age is significantly associated with adverse obstetrical outcomes like pregnancy-induced hypertension and preterm delivery. Caesarean delivery was increased in those mothers. Advanced maternal age pregnancy was found to be a major risk factor for low birth-weight, perinatal death. Therefore, it is better for health care providers to counsel couples, who seek to have a child in their later ages, about the risks of advanced maternal age pregnancy.

**Keywords:** Pregnancy-induced hypertension, Caesarean delivery, Gestational diabetes mellitus, Oligohydramnios

### INTRODUCTION

#### *Am I too old to have a baby*

This association has now become especially clear, since the postponement of first births in a number of countries has now continued unabated for more than three decades, and has become one of the most prominent characteristics of fertility patterns in developed societies.<sup>1</sup>

This trend is most commonly attributed to older primigravida women who delay childbearing by lifestyle choice or due to underlying subfertility, but also includes multiparous women continuing childbearing.<sup>2</sup> Childbirth

at a young (i.e.,  $\leq 19$  years old) or advanced maternal age (i.e.,  $\geq 35$  years old) is associated with increased risk of adverse maternal perinatal outcomes, such as postpartum hemorrhage, eclampsia, and cephalopelvic disproportion, as well as adverse infant outcomes including preterm birth, poor fetal growth, low birth weight, and neonatal mortality.<sup>3</sup> Most complications remain independent of important known confounders such as poverty, inadequate prenatal care and/or weight gain during pregnancy.<sup>4,5</sup>

The term "advanced maternal age" according to Williams obstetrics defined as age 35 years or more for the mother at the time of delivery of her baby. The definition of Advanced maternal age varies from study to study with

most of earlier reports fixing the cutoff points at 35 years and more recent one around 40 years.<sup>6</sup>

Chronic medical conditions are more prevalent among elderly group. There is increased incidence of hypertension, diabetes mellitus, thyroid disorders, mental disorders and many others.<sup>7</sup> The prevalence of diabetes increases with maternal age. The rates of both pre-existing and gestational diabetes increase 3 to 6 fold in women 40 years or older as compared to women between 20 to 29 years.<sup>8</sup> Hypertension is the most frequent medical problem encountered in pregnancy, with older women having a twofold risk of being diagnosed with this problem.<sup>9</sup> There is increase in perinatal mortality in advanced maternal age. The mortality increases from 25/1000 at 17-19 years to 69/1000 after the age of 35 years. Studies have shown an increased risk of unexplained foetal deaths among elderly primigravida even after controlling for risk factors such as hypertension, diabetes mellitus, and multiple gestations.<sup>10</sup>

## METHODS

A hospital based observational study was conducted with 100 patients to evaluate the risks involved with advanced maternal age, the obstetric performance with neonatal outcomes of elderly gravida aged 33 years or older.

### *Study design*

A hospital based observational study was done.

### *Study duration*

The study period was of 18 months (January 2019- June 2020).

### *Study area*

The study was done at our tertiary care centre in the department of obstetrics and gynaecology, on attending ANC-OPD patients at K. J. Somaiya Medical College and Research centre, Mumbai.

### *Study population*

All the pregnant females attending at our tertiary care centre in the department of obstetrics and gynaecology at K. J. Somaiya Medical College and Research centre with 33 years of age who fulfilled the inclusion criteria.

### *Sample size*

100 patients were selected.

Considering a confidence level of 95% and confidence interval of 10 the number of patients in our study to achieve statistical significance is 96. This was calculated by Survey system (<http://www.surveysystem.com/sscalc.htm#one>). The survey system ignores the population size when it is

"large" or unknown. Population size is only likely to be a factor when you work with a relatively small and known group of people (e.g., the members of an association). Hence a sample size of 100 was considered adequate for our study.

### *Inclusion criteria*

All the pregnant females attending the ANC OPD with age 33 years or more.

### *Exclusion criteria*

All the pregnant females with age less than 33 years.

### *Methodology*

The study was done at our tertiary care centre in the department of obstetrics and gynaecology, on attending ANC-OPD patients at K. J. Somaiya Medical college and Research Centre, Mumbai on attending ANC-OPD patients after due permission from the Institutional Ethics Committee and Review Board and after taking written Informed consent from the patients.

After approval from the Institutional Ethics Committee a valid informed consent was taken. Once the patients were enrolled for the study, a thorough history and physical examination was done as per proforma. An informed consent was taken in written from patients or patient's attendant. The study was carried out at our tertiary care centre in the department of Obstetrics and Gynaecology, on attending ANC-OPD patients at K. J. Somaiya Medical College and Research centre, Mumbai on attending ANC-OPD patients on elderly pregnant women with 33 years of age or older over a period of 2 years. Total study of 100 patients were documented according to study performa. All the pregnant patients coming for the delivery to the hospital with age more than 33 years were included in the study. Maternal age was considered as the age at the time of delivery. Potential confounding factors to the relationship between advancing maternal age and obstetric outcomes included parity, occupation, and history of medical problems, previous adverse pregnancy outcomes and history of assisted conception such as ovulation induction or ART (*in vitro* fertilization, donor embryo transfer) were recorded.

History of pre-existing medical conditions included pre-gestational diabetes, cardiac diseases, chronic hypertension, renal diseases, thyroid diseases and genetic abnormalities (maternal or paternal), history of using medication before conception, such as insulin, cardiac medication, antihypertensive or antithyroid medication were also obtained. Previous adverse pregnancy outcomes were noted. Patient's reports of prior miscarriage, preterm delivery and fetal/neonatal chromosomal or structural abnormalities were recorded. After 20 weeks of gestations-only malformation scan was performed. Patients showing high risk in above screening test were managed according

to routine obstetrics protocol. The patients were followed up to the delivery and 4 days post-delivery. Perinatal outcome was recorded in terms of birth weight, any chromosomal abnormalities, gestational age of delivery, NICU admission, cause of NICU admission, NICU course.

Maternal outcome was recorded in terms of mode of delivery, obstetric complication, and systemic complications.

Preterm labour was defined as onset of labour before 37 completed weeks of gestation. Low birth weight was defined as <2.5 kg. Outcome was calculated in terms of fetal outcome - average birth weight, chromosomal/congenital anomalies, gestation age at delivery, NICU admission and maternal outcome - mode of delivery, obstetrics complications, systemic complications.

### **Statistical analysis**

Quantitative data was presented with the help of mean and standard deviation. Comparison among the study group was done with the help of unpaired 't' test as per results of normalcy test. Qualitative data was presented with the help of frequency and percentage table. Association among the study groups is assessed with the help of Fisher's test, Student 't' test and Chi square test. P value less than 0.05 is taken significant. The Chi square statistic was used for testing relationships on categorical variables. Student t-test was used to compare the means of a normally distributed interval dependent variable for two independent groups. The Fisher's exact test was used when we wanted to conduct a Chi-square test, but one or more of cells had an expected frequency of five or less.

Results were graphically represented where deemed necessary. Appropriate statistical software, including but not restricted to MS-Excel. SPSS version 20 was used for statistical analysis. Graphical representation was done in MS-Excel 2010.

## **RESULTS**

A hospital based observational study was conducted with 100 patients to evaluate the risks involved with advanced maternal age, the obstetric performance with neonatal outcomes of elderly gravidas aged 33 years or older.

### **Distribution of patients according to age**

Majority of the patients (56%) were in the age group of 33-35 years followed by 36-39 years (30%) and ≥40 years (14%). The mean age of the patients was 36.10±2.94 years.

### **Distribution of patients according to BMI**

34 (34%) patients had BMI in the normal range while 36 (36%) and 30 (30%) patients were overweight and obese

respectively. The mean BMI of patients was 26.95±3.68 kg/m<sup>2</sup>.

### **Distribution of patients according to gravida**

Majority of the patients were multigravida (82%) while 18 (18%) patients were primigravida.

### **Distribution of patients according to parity (n=82)**

Among the multigravida patients, 49 (59.8%) were gravida 2 while 28 (34.1%) and 5 (6.1%) patients were gravida 3 and >gravida 4 respectively.

### **Distribution of patients according to history of assisted conception**

24 (24%) patients had history of assisted conception. Out of 24 patients, 10 (41.6%) patients had Intrauterine insemination (IUI) while 9 (37.6%) and 5 (20.8%) patients conceived on ovulation induction (OI) and had In vitro fertilization (IVF) conception respectively.

### **Distribution of patients according to comorbidities**

12 (12%) and 7 (7%) patients had hypertension and diabetes mellitus respectively while 5 (5%) and 2 (2%) patients had uterine fibroid and ischemic heart disease respectively.

### **Distribution of patients according to mode of delivery**

Delivery route was caesarean section in 39% cases and vaginal was performed in 61% cases. Among vaginal delivery, induction delivery was performed in 30 (30%) patients while spontaneous and instrumental delivery were performed in 22 (22%) and 9 (9%) patients respectively.

### **Distribution of patients according to maternal complications**

The most common maternal complication was gestational diabetes mellitus (16%) followed by pregnancy induced hypertension (13%), pre-eclampsia (11%), malpresentation (8%), oligohydramnios (6%), placenta previa (2%) and post-partum haemorrhage (2%).

### **Distribution of neonates delivered term/preterm**

Majority of the neonates (78%) were term deliveries while 22 (22%) neonates were preterm deliveries.

### **Distribution of neonates according to birth weight**

9 (9%) neonates were very low birth weight (<1.5 kg) while 34 (34%) neonates were low birth weight (1.5-2.5 kg). 36 (36%) and 21 (21%) neonates were in the range of 2.6-2.9 kg and ≥3 kg respectively.

**Distribution of neonates according neonatal outcome**

The incidence of respiratory distress and Apgar<7 at 5 mins was observed in 14 (14%) and 9 (9%) neonates respectively while incidence of hyperbilirubinemia and chromosomal abnormalities was noted in 11 (11%) and 2 (2%) neonates respectively. 5 (5%) neonates died while 59 (59%) neonates were healthy.

**Table 1: Distribution of patients according to age.**

Age (years)	N	%
33-35	56	56
36-39	30	30
≥40	14	14
<b>Total</b>	100	100
<b>Mean±SD</b>	36.10±2.94	

**Table 2: Distribution of patients according to BMI.**

BMI (kg/m <sup>2</sup> )	N	%
Normal (18.5-24.9)	34	34
Overweight (25-29.9)	36	36
Obese (≥30)	30	30
<b>Total</b>	100	100
<b>Mean±SD</b>	26.95±3.68	

**Table 3: Distribution of patients according to gravidia.**

Gravidia	N	%
Primigravida	18	18
Multigravida	82	82
<b>Total</b>	100	100

**Table 4: Distribution of patients according to parity.**

Parity	N	%
G2	49	59.8
G3	28	34.1
>G4	5	6.1

**Table 5: Distribution of patients according to history of assisted conception.**

History	N	%
Intrauterine insemination (IUI)	10	41.6
Ovulation Induction (OI)	9	37.6
In vitro fertilization (IVF)	5	20.8
<b>Total</b>	24	100

**Table 6: Distribution of patients according to comorbidity.**

Comorbidity	N	%
Hypertension	12	12
Diabetes mellitus	7	7
Uterine fibroid	5	5
Ischemic heart disease	2	2

**Table 7: Distribution of patients according to mode of delivery.**

Mode of delivery	N	
<b>Caesarean section</b>	39	
<b>Vaginal (n=61; 61%)</b>	<b>Induction</b>	30
	<b>Spontaneous</b>	22
	<b>Instrumental</b>	9
<b>Total</b>	100	

**Table 8: Distribution of patients according to maternal complications.**

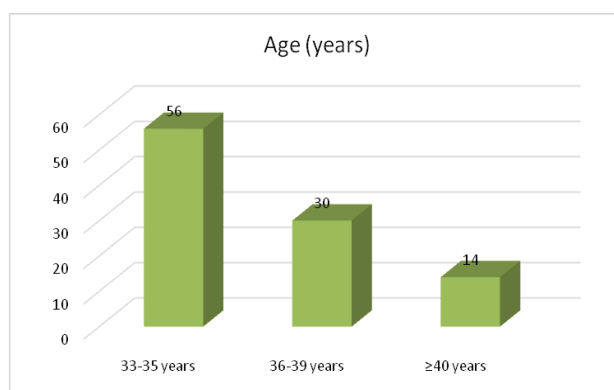
Complications	N	%
Gestational diabetes mellitus	16	16
Pregnancy induced hypertension	13	13
Pre-eclampsia	11	11
Malpresentation	8	8
Oligohydramnios	6	6
Placenta previa	2	2
Post-partum haemorrhage	2	2

**Table 9: Distribution of neonates delivered term/preterm.**

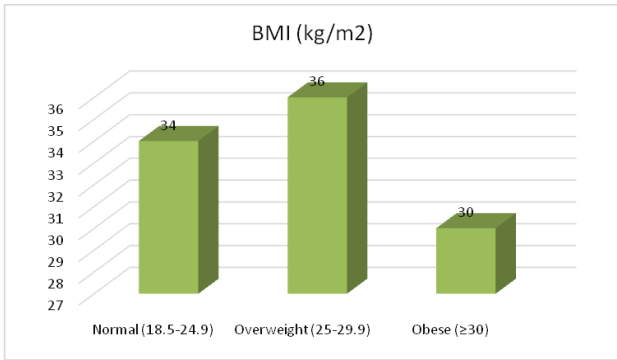
Term/pre-term	N	%
Preterm	22	22
Term	78	95
<b>Total</b>	100	100

**Table 10: Distribution of neonates according neonatal outcome.**

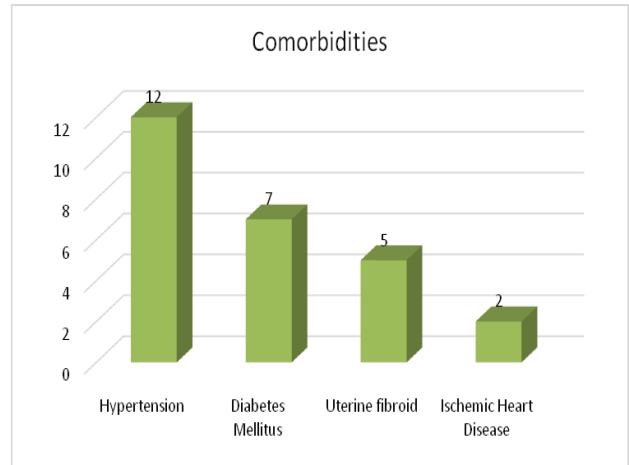
Neonatal outcome	N	%
Respiratory distress	14	14
Apgar<7 at 5 min	9	9
Hyperbilirubinemia	11	11
Mortality	5	5
Chromosomal abnormalities	2	2
Healthy	59	59



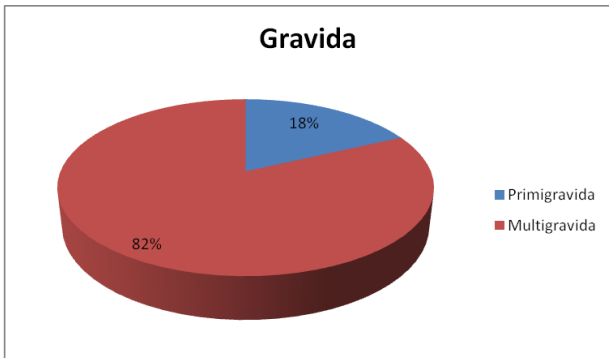
**Figure 1: Distribution of patients according to age.**



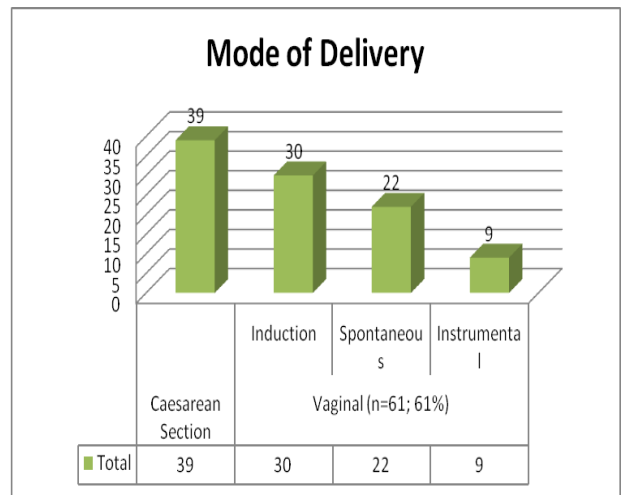
**Figure 2: Distribution of patients according to BMI.**



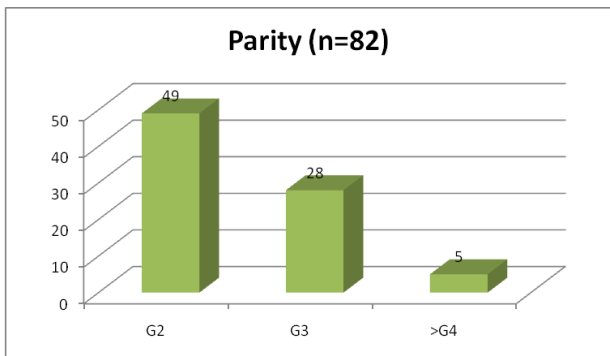
**Figure 6: Distribution of patients according to comorbidity.**



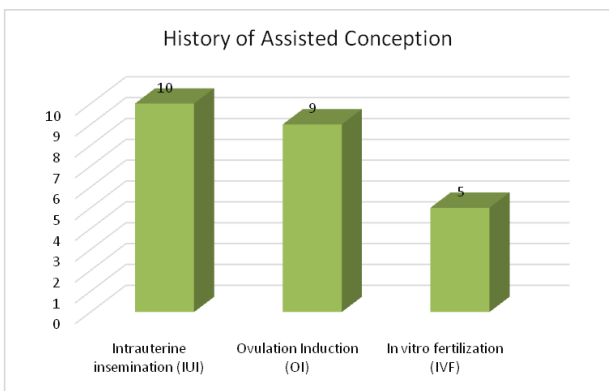
**Figure 3: Distribution of patients according to gravidia.**



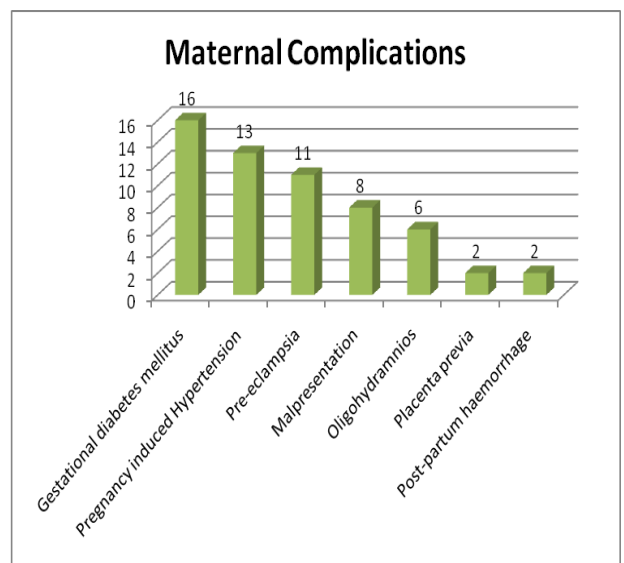
**Figure 7: Distribution of patients according to mode of delivery.**



**Figure 4: Distribution of patients according to parity.**

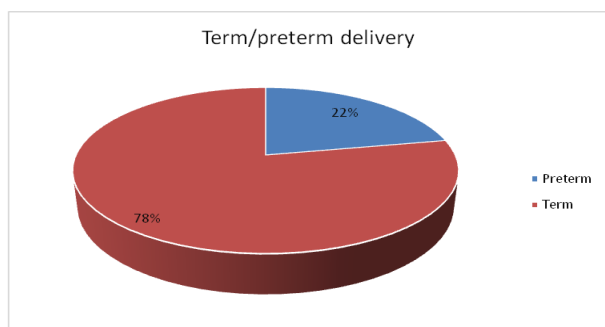


**Figure 5: Distribution of patients according to history of assisted conception.**

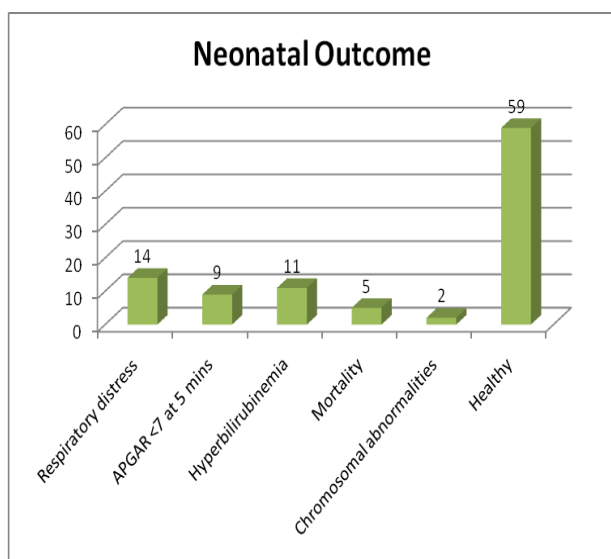


**Figure 8: Distribution of patients according to maternal complications.**





**Figure 9: Distribution of neonates delivered term/preterm.**



**Figure 10: Distribution of neonates according to neonatal outcome.**

## DISCUSSION

Pregnancy in women 35 years old is associated with a higher maternal and perinatal mortality. The older gravida also has a higher chance of being delivered by Caesarean section. Most of the complications associated with older age are caused by age-related confounders such as leiomyomas, type II diabetes, hypertension and multiparity. Pregnant women with diabetes or hypertension are at increased risk of adverse pregnancy outcome irrespective of age.

Majority of the patients were multigravida (82%) while 18 (18%) patients were primigravida. Among the multigravida patients, 49 (59.8%) were gravida 2 while 28 (34.1%) and 5 (6.1%) patients were gravida 3 and >gravida 4 respectively. This is concordant to the studies of Mihret-ab et al and Londero et al.<sup>11,12</sup>

In our study, 12 (12%) and 7 (7%) patients had hypertension and diabetes mellitus respectively while 5 (5%) and 2 (2%) patients had uterine fibroid and ischemic heart disease respectively. Delivery route was caesarean

section in 39% cases and vaginal was performed in 61% cases. Among vaginal delivery, induction delivery was performed in 30 (30%) patients while spontaneous and instrumental delivery were performed in 22 (22%) and 9 (9%) patients respectively. Mihret-ab et al, Londero et al, Paliwal et al and Kalewad et al noted similar observations in their studies.<sup>11-14</sup>

The most common maternal complication in our study was gestational diabetes mellitus (16%) followed by pregnancy induced hypertension (13%), pre-eclampsia (11%), malpresentation (8%), oligohydramnios (6%), placenta previa (2%) and post-partum haemorrhage (2%). Similar observations were noted in the studies of Mihret-ab et al, Londero et al, Kahveci et al, Kalewad et al, Cavazos-Rehg et al, Louise et al, Schimmel et al<sup>18</sup> and Wang et al.<sup>11-19</sup>

Limitation of the study is inability to distinguish the cause of mode of delivery in cases of predisposed medical illness and the overlapping of multiple factors such as genetic causes, medical illness and family history can be the reason of adverse neonatal outcome apart from advanced maternal age.

## CONCLUSION

It was observed that multigravida, cesarean section, gestational diabetes mellitus, pregnancy induced hypertension, term/preterm delivery and neonatal birth weight were significant risk factors with advanced maternal age ( $p < 0.05$ ).

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*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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