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ORIGINAL ARTICLE

Prevalence, Risk Factors, Maternal and Perinatal Outcome of Patients with Eclampsia in University of Maiduguri Teaching Hospital, Maiduguri, Nigeria: A 15-Year Retrospective Review

Prévalence, Facteurs de Risque, Résultats Maternels et Périnataux des Patientes Atteintes D'éclampsie à l'Hôpital Universitaire de Maiduguri, Maiduguri, Nigeria. Une Etude Retrospective de 15 Ans

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ABSTRACT

BACKGROUND: Eclampsia, defined as the occurrence of generalised, tonic-clonic convulsions or coma that is unrelated to other medical conditions in a woman with hypertensive disorder of pregnancy, is a leading cause of maternal and perinatal morbidity and mortality.

METHODS: Retrospective review of cases of eclampsia managed over 15 years (2006 to 2020) at the University of Maiduguri Teaching Hospital, Borno State, Nigeria. Factors associated with adverse maternal and perinatal outcomes were determined using appropriate bivariate analysis. Statistical significance was set at $P < 0.05$.

RESULTS: The prevalence of eclampsia was 2.96%. Most of the patients, 55.2% (420/761) were ≥ 35 years, 76% (579/761) were primigravidae and 80.4% (612/761) were unbooked. In 59.1% (450/761) of the cases, the eclampsia was antepartum and 40.3% (301/761) were delivered through a caesarean section. The commonest risk factor was previous eclampsia. There were 58(7.6%) maternal deaths, and the perinatal mortality was 18.1% (138/761). There was a statistically significant association between adverse maternal outcomes and having no formal education (P<0.001), being unemployed (P<0.001), being in coma for ≥10 hours(P=0.029), caesarean delivery (P<0.001), SBP ≥ 160mmHg (P<0.001) and DBP ≥110mmHg (P<0.001). Adverse perinatal outcome was significantly associated with having no formal education (P<0.001), being unemployed (P=0.004), unbooked status (P=0.015), multiple pregnancy (P=0.021), preterm delivery(P<0.001), caesarean delivery (P=0.012) and Systolic BP ≥160mmHg (P<0.001).

CONCLUSION: The prevalence of eclampsia is high. Having no formal education, unemployment, coma of 10 hours or more, vaginal delivery and severe hypertension, unbooked status, and multiple gestation are significantly associated with poor maternal or fetal outcomes. **WAJM 2023; 40(1): 97–103.**

Keywords: Eclampsia, Maternal outcome, Perinatal outcome, Prevalence, Risk factors.

RÉSUMÉ

CONTEXTE: L'éclampsie, définie comme la survenue de convulsions tonico-cloniques généralisées ou d'un coma sans rapport avec d'autres conditions médicales chez une femme atteinte d'un trouble hypertensif de la grossesse, est une cause majeure de morbidité et de mortalité maternelles et périnatales.

METHODES: Examen rétrospectif des cas d'éclampsie pris en charge sur 15 ans (2006 à 2020) à l'hôpital universitaire de Maiduguri, État de Borno, Nigéria. Les facteurs associés aux issues maternelles et périnatales indésirables ont été déterminés à l'aide d'une analyse bivariée appropriée. La signification statistique a été fixée à $P < 0,05$.

RESULTATS: La prévalence de l'éclampsie était de 2,96 %. La plupart des patients, 55,2 % (420/761) ≥ 35 ans, 76 % (579/761) étaient Primigravidés et 80,4 % (612/761) non réservés. Dans 59,1 % (450/761) des cas, l'éclampsie était antepartum et 40,3 % (301/761) ont été accouchés par césarienne. Le facteur de risque le plus courant était une éclampsie antérieure. Il y avait 58 (7,6%) décès maternels et la mortalité périnatale était de 18,1% (138/761). Il y avait une association statistiquement significative entre les issues maternelles défavorables et l'absence d'éducation formelle (P<0,001), le chômage (P<0,001), le coma pendant ≥10 heures (P=0,029), l'accouchement par césarienne (P<0,001), PAS ≥ 160 mmHg (P<0,001) et PAD ed110 mmHg (P<0,001). Les résultats périnataux indésirables étaient significativement associés à l'absence d'éducation formelle (P<0,001), au chômage (P=0,004), au statut non réservé (P=0,015), à la grossesse multiple (P=0,021), à l'accouchement prématuré (P<0,001), à la césarienne accouchement (P=0,012) et TA systolique ≥160mmHg (P<0,001).

CONCLUSION: La prévalence de l'éclampsie est élevée. L'absence d'éducation formelle, le chômage, le coma de 10 heures ou plus, l'accouchement vaginal et l'hypertension sévère, le statut non réservé et la grossesse multiple sont significativement associés à de mauvais résultats maternels ou fœtaux. **WAJM 2023; 40(1): 97–103.**

Mots clés: Eclampsie, Issue maternelle, Issue périnatale, Prévalence, Facteurs de risque

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Abbreviations: **ARF,** Acute Renal Failure; **BBB,** Brain Blood Barrier; **Bp,** Blood Pressure; **CHT,** Chronic Hypertension; **CVA,** Cerebro Vascular Accident; **IBM,** International Business Machines Corporation; **ICU,** Intensive Care Unit; **MMR,** Maternal Mortality Ratio; **OR,** Odd Ratio; **PIH,** Pregnancy Induced Hypertension; **SCBU,** Special Care Baby Unit; **SPSS,** Statistical Package For Social Sciences; **UMTH,** University of Maiduguri Teaching Hospital.

INTRODUCTION

Eclampsia, defined as the occurrence of tonic-clonic convulsions or coma that is unrelated to other medical conditions in a woman with hypertensive disorder of pregnancy, is a leading cause of maternal and perinatal morbidity and mortality.[1,2]

The prevalence of eclampsia varies widely and shows a significant disparity between developed and developing countries.[3] While the prevalence in the developed countries is low and reducing,[4] it remains very high in developing countries.[1,5,6] For example, while the prevalence of eclampsia was reported to be 4.9/10,000 deliveries in the United Kingdom,[7] it is reported to be as high as 5.7% in Nigeria.[1]

Eclampsia can occur in the antepartum (59–70%), intrapartum (20–30%), or postpartum (20–30%) period [8] and usually manifests as a single or multiple seizures, each lasting for about 60–75 seconds.

Although the cause of eclampsia is not clearly understood (but it is thought to involve a pathologic process causing brain blood barrier (BBB) dysfunction with increased BBB permeability),[3] its risk factors include advanced maternal age, nulliparity, maternal age $\leq$ 20, multifetal gestation, preterm delivery, and lack of prenatal care.[9–11.]

Eclampsia is associated with adverse maternal and perinatal outcomes due to the convulsions and the multiple system affectation of the disease. In addition to maternal death, eclampsia is associated with maternal morbidity such as *abruptio placentae,* disseminated intravascular coagulation, pulmonary edema, aspiration pneumonia, stroke, cardiopulmonary arrest and acute renal failure.[1,9,12] Adverse perinatal outcome are usually due to foetal hypoxia, placental abruption, fetal growth restriction or extreme prematurity.[12–14] Early detection and treatment of eclampsia will reduce its adverse outcome, and the knowledge of the factors associated with adverse outcomes in eclampsia will assist in its early detection.

This study aimed to determine the prevalence, risk factors, and factors associated with eclampsia's adverse maternal and perinatal outcomes in our environment. The findings can assist in the early detection and treatment of this important obstetrics condition to improve outcomes.

SUBJECTS, MATERIALS AND METHODS

Cases of eclampsia managed over 15 years (2006 to 2020) at the University of Maiduguri Teaching Hospital (UMTH), Maiduguri, Borno State, Nigeria, were reviewed.

The hospital numbers of patients diagnosed with eclampsia over the study period were identified using the Labour ward, Antenatal ward, Postnatal ward and Obstetrics theatre records and used to retrieve their case files from the central record library.

A study proforma was designed to extract data from the case notes that included sociodemographic and clinical characteristics and maternal and perinatal outcomes. Data analysis was performed using the statistical package for social sciences (SPSS) version 25 (IBM SPSS Statistics). The data were presented as tables. Factors associated with adverse maternal and perinatal outcomes were determined using appropriate bivariate analysis. Statistical significance was set at $P < 0.05$.

Ethical clearance was obtained from the health research ethics committee (HREC) of the University of Maiduguri Teaching Hospital, Maiduguri.

The adverse maternal outcome is death or development of complications such as acute renal failure, cerebrovascular accident, aspiration pneumonitis, admission into ICU etc., and the adverse perinatal outcome is perinatal mortality or development of perinatal morbidities such as low birth weight, admission into SCBU and 5-minute Apgar score below 7.

Severe proteinuria is defined as 24 hours urine collection protein $\geq$5g and/or 3+ on dipstick.

RESULTS

There were 1,253 cases of eclampsia out of 42,269 deliveries during the study period giving a prevalence of 2.96% or 29.6/1000 deliveries. Out of the 1,253 cases, about 1023 files were retrieved, but only 761 case notes had complete information, resulting in a retrieval rate of 60.7%.

The sociodemographic and clinical characteristics of the study population are presented in table 1. The majority of the patients, 55.2% (420/761), were 35 years and above, 76% (579/761) were Primigravidae, 80.4% (612/761) were unbooked, and 72.4% (552/761) had no formal education. The eclampsia was antepartum in 59.1% (450/761) of the cases, and 45.6% (347/761) were delivered preterm. Sixty (7.9%) of the patients convulsed 10 times or more, and 14.6% (111/761) presented to the hospital 10 hours or more after eclampsia. In 96.2% (732/761) of the cases, the pregnancy was a singleton, and 40.3% (301/761) were delivered through a caesarean section.

Table 2 shows the risk factor of eclampsia among the patients in this study. The commonest risk factors were primigravity 47.4% (361/761), previous eclampsia, seen in 14.8% (113/761) of the cases, and in 3.5% (27/761), the identified risk factor was positive family history. There was no identifiable risk factor in 12% (91/761) of the cases.

The maternal and perinatal outcomes are shown in Table 3 and Table 4. There were 58(7.6%) maternal deaths, and 15.2% (116/761) of the mothers developed ARF. 5.7% (43/761) were admitted into ICU, although 74.6% (568/761) of the mothers had a favourable outcome.

The perinatal mortality was 18.1% (138/761). In 36.8% (280/761), the 5th minutes APGAR score was less than 7 and 61.5% (468/761) of the babies were of LBW.

There was a statistically significant association between adverse maternal outcomes and having no formal education ($P<0.001$), being unemployed ($P<0.001$), duration of a coma of $\geq$10 hours($P=0.029$), caesarean delivery ($P<0.001$), SBP $\geq$ 160mmHg ($P<0.001$) and DBP $\geq$110mmHg ($P<0.001$). Adverse perinatal outcome was significantly associated with having no formal education ($P<0.001$), being unemployed ($P=0.004$), unbooked status ($P=0.015$), multiple pregnancy ($P=0.021$), preterm delivery ($P<0.001$), caesarean delivery ($P=0.012$) and Systolic BP $\geq$160mmHg ($P<0.001$). Tables 5&6.

Table 1: Sociodemographic and Clinical Characteristics of the Study Population

Characteristics	Frequency	Percentage (%)
Age Group		
≥19	328	43.1
20–34	13	1.7
≥35	420	55.2
Total	761	100.0
Parity Group		
Primips	579	76.1
Multips	182	23.9
Total	761	100.0
Education		
No	552	72.5
Yes	209	27.5
Total	761	100.0
Employment Status		
Unemployed	665	87.4
Employed	96	12.6
Total	761	100.0
Booking Status		
Unbooked	612	80.4
Booked	149	19.6
Total	761	100.0
Type of Eclampsia		
Antepartum	450	59.1
Intrapartum	260	34.2
Postpartum	51	6.7
Total	761	100.0
Type of Gestation		
Singleton	732	96.2
Multiple	29	3.8
Total	761	100.0
Gestational Age at delivery		
<37	347	45.6
≥37	414	54.4
Total	761	100.0
No. of Convulsions		
≥10	60	7.9
<10	701	92.1
Total	761	100.0
Duration of Coma		
≥10hrs	22	2.9
<10hrs	739	97.1
Total	761	100.0
Onset to Admission		
≥10hrs	111	14.6
<10hrs	650	85.4
Total	761	100.0
Delivery		
Undelivered	15	2.0
Delivered	746	98.0
Total	761	100.0
Mode of Delivery		
Caesarean Section	301	40.3
Vaginal Delivery	445	59.7
Total	746	100.0

(Contd on)

DISCUSSION

The prevalence of eclampsia in this study was 2.96%, and previous eclampsia, PIH, CHT and family history of eclampsia were the commonly identified risk factors. Having no formal education, unemployment, coma of 10 hours or more, vaginal delivery and severe hypertension were found to be significantly associated with a poor maternal outcome while having no formal education, unemployment, unbooked status, preterm delivery, multiple gestation, vaginal delivery and severe systolic hypertension were found to be significantly associated with poor perinatal outcome.

The prevalence of eclampsia of 2.96% found in this study shows that this important pregnancy complication was not uncommon in our environment as it was far higher than the reported global prevalence of 0.3%,[15] and the reported 0 to 0.1% incidence in Europe.[16] This prevalence is also higher than the 0.45% reported by Rita *et al* from India.[17] This high prevalence may be attributed to the quality of obstetric care in our environment and the poor health-seeking behaviour of our women. It may also partly be due to referral bias.

Established risk factors for eclampsia include multifetal gestation, primigravity, a previous or a family history of eclampsia, as well as co-morbidities like chronic hypertension and diabetes Mellitus,[3,18] and in this study, previous eclampsia, PIH, CHT, family history of eclampsia and multifetal gestation, were the identified risk factors. Knowledge of the risk factors will make it possible to closely monitor at-risk groups for early detection and management and the institution of potential interventions that may improve health outcomes, such as low dose aspirin for women at risk of preeclampsia as a primary prevention strategy.

Eclampsia is associated with adverse maternal outcomes as a result of multiple systemic derangements involving the hematologic, hepatic, renal, and cardiovascular systems as well as the central nervous system,[19] which can result in disseminated intravascular coagulation (DIC), hepatic derangement, acute renal failure, pulmonary edema, aspiration pneumonia, cardiopulmonary

Table 1 (Contd.): Sociodemographic and Clinical Characteristics of the Study Population

Characteristics	Frequency	Percentage (%)
Treatment Given		
MgSo4	497	65.3
Others	264	34.7
Total	761	100.0
Systolic BP		
≥160	422	55.5
<160	339	44.5
Total	761	100.0
Diastolic BP		
≥110	232	30.5
<110	529	69.5
Total	761	100.0
Severe Proteinuria		
Yes	311	40.9
No	450	59.1
Total	761	100.0
Time of Presentation		
0800–1800hrs	518	68.1
1801–0759hrs	243	31.9
Total	761	100.0
PCV		
<30	183	24.0
≥30	578	75.9
Total	761	100.0

Table 2: Risk Factors of Eclampsia in the Study Group[a]

Risk Factors	Frequency	Percentage (%)
Primigravity	361	47.2
Previous eclampsia	113	14.8
PIH	100	13.1
Chronic hypertension	31	4.1
Family Hx of Eclampsia	27	3.5
Multifetal gestation	18	2.4
DM	4	.5
Anti-phospholipid syndrome	2	.3
Age ≥ 35 years	4	.5
Others	10	1.3
None	91	12.0
Total	761	100.0

[a] if a primigravida or age ≥ 35 years have another risk factor it was taken as the main risk factor.

arrest and placental abruption. The occurrence and severity of these derangements may be correlated with some maternal conditions/characteristics. In this study, having no formal education, unemployment, coma of 10 hours or more, vaginal delivery, and severe hypertension were significantly associated with poor maternal outcomes.

Education plays an essential role in health by shaping opportunities, employment, and income.[20] Having no formal education is usually associated with poor health behaviour leading to poor outcomes, and the unemployment being associated with poor outcomes found in this study may be a representation of having no formal education. Also, it is a known fact that unemployment is detrimental to health, more so in our environment where health is paid out of pocket.

A coma of 10 hours or longer is associated with poor outcomes in this study. The longer a patient remains in a coma, the poorer her chance of recovery and the greater her chance of poor outcomes.

As the time interval between 'onset of fit and delivery' increased, chances of adverse outcomes also increased, and in this study, we found vaginal delivery to be associated with poor maternal outcomes compared to caesarean delivery. This was similar to the report of Deepika Pannu *et al,*[21] but the mode of delivery was not found to be associated with adverse maternal outcomes in other studies.[22,23]

Similar to another study,[24] severe hypertension was associated with poor maternal outcomes. Severe hypertension leads to increased hydrostatic pressure that is potentially damaging to the micro vessels of the organ system, and Gupta *et al*[25] in a retrospective review, showed that timely management of severe maternal hypertension was associated with a 72% reduction in relative risk of severe maternal morbidity in patients with eclampsia.

In this study, having no formal education, unemployment, unbooked status, preterm delivery, multiple gestation, vaginal delivery, and severe systolic hypertension were significantly associated with poor perinatal outcomes. Similarly, Pooja *et al*[26] reported that perinatal outcome was affected by mode of delivery and gestational age at delivery. But in contrast, Odelola *et al*[23] reported that booking status, mode of delivery and parity were not associated with foetal outcome. The adverse fetal outcome in eclampsia is due to the poor uteroplacental circulation leading to prematurity, respiratory distress syndrome, intrauterine asphyxia, intrauterine growth restriction and intrauterine death.

Table 3: Maternal Outcomes (Complications) of the Study Population

Complications #	Frequency	Percentage (%)
ARF	116	15.2
Maternal death	58	7.6
ICU Admission	43	5.7
Haemorrhage	17	2.2
CVA	13	1.7
Aspiration pneumonitis	11	1.4
Others	33	4.3
Normal	568	74.6

[#] *Some have more than one entry.*

Table 4: Perinatal Outcomes of the Study Group

Outcomes	Frequency	Percentage (%)
Death	138	18.1
NICU admission	307	40.3
LBW (<2.5Kg)	468	61.5
5 Min APGAR <7	280	36.8
Normal	115	15.1

[#] *Some have more than one entry.*

The strength of this study was the large study sample size and the long period; while its limitation is the study design as being a retrospective chart review, it is prone to misclassification bias and the possibility of inconsistency and mistakes in the coding of some of the original chart information.

CONCLUSION

The prevalence of eclampsia is high in our environment. Having no formal education, unemployment, coma of 10 hours or more, vaginal delivery and severe hypertension, unbooked status, and multiple gestation were significantly associated with poor maternal or fetal outcomes. These identified factors should be used to aid management decisions to improve maternal and fetal outcomes.

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We wish to thank the staff of the medical record of UMTH who helped to retrieve the patients' case files from the central record library.

Declarations

Ethical Approval and Consent to Participate: Ethical approval was provided by the health research ethics committee of the University of Maiduguri Teaching Hospital.

Getting consent to participate is not applicable because the study is a retrospective chart review.

Availability of Data and Materials: The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Competing Interest

Authors have no competing interest.

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Table 5: Bivariate Analysis showing the Relationship between Sociodemographic and Clinical Characteristics with the Maternal Outcome of the Study Population

Factors	Maternal Outcome		χ^2	P-Value
	Adverse (%)	Favourable (%)		
Age Group				
≤19	88(26.8)	240(73.2)	2.531	0.282
20–34	1(7.7)	12(92.3)		
≥35	105(25.0%)	315(75.0)		
Parity Group				
Primips	152(26.3)	427(73.7)	0.735	0.391
Multips	42(23.1)	140(76.9)		
Education				
No	167(30.3)	385(69.7)	23.985	<0.001
Yes	27(12.9)	182(87.1)		
Employment				
Unemployed	185(27.8)	480(72.2)	15.025	<0.001
Employed	9(9.4)	87(90.6)		
Booking Status				
Unbooked	97(15.8)	515(84.2)	1.764	0.184
Booked	31(20.8)	118(79.2)		
Type of Eclampsia				
Antepartum	125(27.8)	325(72.2)	3.085	0.214
Intrapartum	57(21.9)	203(78.1)		
Postpartum	12(23.5)	39(76.5)		
Type of Gestation				
Singleton	188(25.7)	544(74.3)	0.366	0.545
Multiple	6(20.7)	23(79.3)		
Gestational Age				
<37	77(22.2)	270(77.8)	3.663	0.056
≥37	117(28.3)	297(71.7)		
No. of Convulsions				
≥10	17(28.3)	43(71.7)	0.211	0.599
<10	177(25.2)	524(74.8)		
Duration of Coma				
≥10hr	10(45.5)	12(54.5)	4.753	0.029
<10hrs	184(24.9)	555(75.1)		
Onset to Admission				
≥10hrs	22(19.8)	89(80.2)	2.202	0.138
<10hrs	172(26.5)	478(73.5)		
Mode of Delivery				
Caesarean Section	06(19.9)	241(80.1)	15.881	<0.001
Vaginal Delivery	125(28.1)	320(71.9)		
Treatment				
MgSo4	127(25.6)	370(74.4)	0.003	0.958
Others	67(25.4)	197(74.6)		
Systolic BP				
≥160	148(43.7)	191(56.3)	106.201	<0.001
<160	46(10.9)	376(89.1)		
Diastolic BP				
≥110	161(30.4)	368(69.6)	22.312	<0.001
<110	33(14.2)	199(85.5)		
Severe Proteinuria				
Yes	73(23.5)	238(76.5)	1.130	0.288
No	121(26.9)	329(73.1)		
Time of Presentation				
0800–1800hrs	140(27.0)	378(73.0)	2.010	0.156
1801–0759hrs	54(22.2)	189(77.8)		
Admission PCV				
<30	55(30,1)	128(69.9)	2.640	0.104
≥30	139(24.0)	439(76.0)		

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Table 6: Bivariate Analysis showing the Relationship between Sociodemographic and Clinical Characteristics with the Perinatal Outcome of the Study Population

Factors	Perinatal Outcome		χ^2	P-Value
	Adverse (%)	Favourable (%)		
Age Group				
≤19	284(86.6)	44(13.4)	2.086	0.352
20–34	12(92.3)	1(7.7)		
≥35	350(83.3)	70(16.7)		
Parity Group				
Primips	492(85.0)	87(15.0)	0.014	0.906
Multips	154(84.6)	28(15.4)		
Education				
No	486(88.0)	66(12.0)	15.598	<0.001
Yes	160(76.6)	49(23.4)		
Employment				
Unemployed	574(86.3)	91(13.7)	8.374	0.004
Employed	72(75.0)	24(25.0)		
Booking Status				
Unbooked	510(78.9)	102(88.7)	5.892	0.015
Booked	136(21.1)	13(11.3)		
Type of Eclampsia				
Antepartum	391(86.9)	59(13.1)	3.557	0.169
Intrapartum	214(82.3)	46(17.7)		
Postpartum	41(80.4)	10(19.6)		
Type of Gestation				
Singleton	671(84.3)	115(15.7)	5.367	0.021
Multiple	19(100.0)	0(0.0)		
Gestational Age				
<37	324(93.4)	23(6.6)	35.785	<0.001
≥37	322(77.8)	92(22.2)		
No. of Convulsions				
≥10	46(76.7%)	14(23.3)	3.432	0.064
<10	600(85.6%)	101(14.4)		
Duration of Coma				
≥10hr	18(81.8)	4(18.2)	0.166	0.683
<10hrs	628(85.0)	111(15.0)		
Onset to Admission				
≥10hrs	92(82.9)	19(17.1)	0.407	0.523
<10hrs	554(85.2)	96(14.8)		
Mode of Delivery				
Caesarean Section	256(81.0)	60(19.0)	6.328	0.012
Vaginal Delivery	390(87.6)	55(12.4)		
Treatment				
MgSo4	430(86.5)	67(13.5)	2.970	0.085
Others	216(81.8)	48(18.2)		
Systolic BP				
≥160	338(52.3)	84(73.0)	16.969	<0.001
<160	308(47.7)	31(27.0)		
Diastolic BP				
≥110	195(84.1)	37(15.9)	0.182	0.670
<110	451(85.3)	78(14.7)		
Time of Presentation				
0800–1800hrs	438(84.6)	80(15.4)	0.140	0.709
1801–0759hrs	208(85.5)	35(14.4)		
Admission PCV				
<30	156(85.2)	27(14.8)	0.024	0.877
≥30	490(84.8)	88(15.2)		

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