



# Can prenatal online education improve pregnancy outcomes compared to classic education?

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## Abstract

**Aim:** Cesarean section rates have increased, and although various measures such as antenatal education programs have been introduced to correct this, these could not be performed face-to-face due to the COVID-19 pandemic and were largely carried out online. The aim of this study was to find out what effect traditional education during pregnancy and its online replacement have on the rate of cesarean births and how the pregnancy turns out in unusual situations.

**Materials and Methods:** The research was designed as a retrospective cross-sectional study. Fifty women undergoing childbirth in our hospital who received online antenatal education (Group 1), 101 women who received classic education (Group 2), and 77 women receiving no education (Group 3) took part in the study. Patient data were retrieved from the hospital information system and patient records.

**Results:** This study involved 228 pregnant women. Fifty pregnant women (22%) receiving antenatal online education were assigned to Group 1, 101 women (44%) receiving classic face-to-face education to Group 2, and 77 women (34%) receiving no education to Group 3. Forty percent of Group 1, given online education, and 62.4% of Group 2, given classic education, were able to give birth via the normal vaginal route, and the difference was statistically significant (0.001). Cesarean delivery rates were significantly higher in Group 1 (60%) than in Group 2 (37.6%) (0.001). Statistically similar results were determined in all three groups in terms of birth weight, birth length, and low birth weight. No significant difference was also observed between the three groups in terms of premature birth (37 weeks) ( $p=0.67$ ).

**Conclusion:** Online antenatal education does not reduce cesarean delivery rates compared to classic education. However, neonatal outcomes are similar.



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## Introduction

The COVID-19 pandemic continues to impact pregnant women in various ways, but particularly in terms of health. Its most important effects include pregnant women being unable to access health institutions during the pandemic, interruptions to pregnancy follow-up, and delays in presenting for the detection of risky situations. Interruption of the education and counseling normally provided for pregnant women has also given rise to the need for telehealth services [1]. The most important aims of antenatal education, whether face-to-face or online, are to prepare pregnant women to make informed decisions and to reduce primary cesarean delivery rates, which are widely described as a public health problem [2]. Increased knowledge of childbirth and increased self-confidence are power-

fully associated with a decreased fear of childbirth (FOC) and an increased preference for vaginal delivery. Both difficulties in pregnant women accessing health services due to the pandemic and the birth process itself further increase maternal anxiety about the baby's health, resulting in further exacerbation of FOC. Such factors and ideas also further increase the risk of cesarean delivery [3]. Antenatal care services provide women and their families with appropriate information concerning healthy pregnancy, safe birth, neonatal care, and postnatal recovery, including the promotion of early breastfeeding, reducing anxiety in women, making decisions concerning future pregnancies, and improving pregnancy outcomes. Enabling women to make informed choices by means of education can reduce FOC and improve the general childbirth experience. These are the objectives of many antenatal classes. There is also evidence that women attending such classes experience less fear [4] and greater satisfaction from childbirth [5]. Re-

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search has shown that antenatal education groups can be effective in preparing for childbirth, reducing anxiety, and raising spousal participation to maximum levels. However, these outcomes depend on the organization, format, and content of the education involved [6, 7]. However, research into which approaches to antenatal education best achieve these aims is limited.

The purpose of this study was to investigate the effects of classic or/and online antenatal education programs provided by hospitals on type of delivery, delivery, and neonatal outcomes.

## Materials and Methods

Our study was planned and completed in accordance with the Declaration of Helsinki. It was approved by the ethics committee of our university. (Erzincan Binali Yıldırım University Ethics Committee Date: 27.07.2021, Issue: 09/07).

### Study design

The research was designed as a retrospective, cross-sectional study.

### Participants and sampling

Two hundred twenty-eight pregnant women giving birth in our hospital, a tertiary institution, between March 2020, the beginning of the COVID-19 pandemic, and February 2022 were included in the study. One group consisted of 50 women receiving online antenatal education (Group 1), another of 101 women receiving classic (face-to-face) antenatal education (Group 2), and a third of 77 women receiving no antenatal education (Group 3). All women from all three groups underwent routine pregnancy follow-up and childbirth. The sample was not selected in the study, who applied to the Mengücek Gazi Training and Research Hospital between the dates of March 2020 and February 2022; All women who met the acceptance criteria were included in the study. Women with risky pregnancies, such as pre-eclampsia, eclampsia, multiple pregnancies, and polyhydramnios, women with chronic diseases, and women with type 1 diabetes mellitus, hypertension, fetal anomalies, or incomplete records were excluded. All pregnant women were informed about antenatal education and its content. Women wishing to receive education were assigned to the group-based (Group 1) and classic (Group 2) education groups based on the principle of voluntary participation. Pregnant women who did not wish to receive antenatal education comprised Group 3. Participation in the antenatal education program was free of charge. Our hospital's antenatal education program lasts for five days and involves theoretical and practical procedures (Table 1). Both the online and classic education classes consisted of five or six participants. The sessions were run by an experienced midwife, a physiotherapist, and a dietician with training certification, under the supervision of a specialist obstetrician (Table 1). The files of the women receiving online and traditional education were reviewed retrospectively, and parameters such as delivery types, birth weights, APGAR scores at 1 and 5 minutes, and length of hospital stay were compared.

### Antenatal education content

The theoretical and practical antenatal education program at the Mengücek Gazi Training and Research Hospital lasts for five days (Table 1). The program was provided by a team consisting of a dietician, a physiotherapist, and an experienced midwife and was moderated by a specialist obstetrician. Each class consisted of a maximum of five or six participants. The online education group received the same program, but via the internet. Pregnant women were assigned to the online or classic education group based on the principle of voluntary participation.

### Statistical analysis

The independent variables of research demographic characteristics, reasons for cesarean section, baby birth weight and gender, 1st and 5th minute APGAR scores were recorded from patient files. The primary output or dependent variable was the type of delivery (vaginal or cesarean section), IBM SPSS version 25.0 software (Armonk, NY, IBM Corp, USA) was used for statistical analysis. Data analysis was performed using descriptive statistics, chi-square test (continuity correction), and One-Way Analysis of Variance as Bonferroni post-hoc.  $p < 0.05$  values were considered statistically significant. Variables found to be statistically significant in univariate analysis, logistic regression as a multivariate analysis method evaluated using.

## Results

The study involved 228 pregnant women. Group 1 consisted of 50 women (22%), who received online antenatal education; 101 women (44%), who received classic (face-to-face) antenatal education; and 77 women (34%), who received no antenatal education. Proportions of vaginal births were higher in control group than in other groups ( $p=0.001$ ). No statistically significant difference was found when the education categories and the control group were compared separately in terms of independent variables to the mode of delivery. In terms of the groups' characteristics shown in Table 1, maternal ages were similar in all three groups (G1:  $27.40 \pm 3.2$ , G2:  $27.19 \pm 4.1$ , and G3:  $27.9 \pm 5.8$ ) the differences being statistically insignificant. Body mass index (BMI) values were similar in the online and classic groups but higher in the control group than in the classic education group ( $p=0.001$ ). Gestational ages were similar in all three groups (G1:  $38.6 \pm 1.48$ , G2:  $39.1 \pm 1.63$  and G3:  $38.9 \pm 1.6$  weeks), the differences being statistically insignificant ( $p=0.14$ ,  $p=0.69$ , and  $p=0.99$ , respectively). In terms of education, the proportion of high

**Table 1.** Antenatal Education Program implemented by our hospital in both online and classical education.

Days	Lessons
1. Day	Female reproductive system anatomy
2. Day	Female reproductive system physiology
3. Day	Formation and periods of pregnancy
4. Day	Types of birth and methods of coping with birth pain
5. Day	Postpartum period, breastfeeding and baby care training

**Table 2.** Clinical and demographic profiles of the study population.

Parameters	Groups			p-value		
	Online (n=50)	Classic (n=101)	Control (n=77)	p1	p2	p3
Age (year)	27.40±3.2	27.19±4.1	27.9±5.8	0.99	0.99	0.93
BMI (kg/m <sup>2</sup> )	25.32±5.3	23.86±3.8	26.74±4.9	0.20	0.27	0.001*
Pregnancy; weeks	38.6±1.48	39.1±1.63	38.9±1.6	0.14	0.69	0.99
Education status						
High School	45 (90.0%)	75 (74.3%)	12 (15.6%)	0.001*		
Other	5 (10.0%)	26 (25.7%)	65 (84.4%)			
Type of delivery						
Vaginal	20 (40.0%)	63 (62.4%)	71 (93.2%)	0.001*		
Cesarean	30 (60.0%)	38 (37.6%)	6 (7.8%)			

Cesarean delivery rates were given as number of percentage, and other values were given as mean ± standard deviation.\*p<0.05 was considered statistically significant. P1: Comparison of distance education and classical education; p2: Comparison of distance education and control group; p3: Comparison of distance classic and control group.

**Table 3.** Neonatal outcomes in pregnant groups.

Parameters	Online	Classic	Control	p-value		
	(n=50)	(n=101)	(n=77)	p1	p2	p3
Fetal Gender						
Female	25 (50%)	45 (45.5%)	35 (45.5%)	0.85		
Male	25 (50%)	54 (54.5%)	42 (54.5%)			
Birth weight (grams)	3202±532.74	3232±418.02	3132±415.71	0.14	0.69	0.99
Fetal length	49.24±2.35	48.7±4.85	49.55±1.45	0.99	0.99	0.34
Low Birth Weight						
<2500 gr	5 (10.0%)	4 (4.0%)	6 (7.8%)	0.31		
Gestational age at birth						
<37 week	5 (10.0%)	6 (5.9%)	6 (7.8%)	0.14	0.69	0.99
Apgar score						
1st minute	7.92±0.39	7.78±0.60	7.99±0.11	0.27	0.99	0.03*
5st minute	8.92±0.40	8.78±0.64	8.99±0.10	0.27	0.99	0.03*
Need of NICU	8 (16.0%)	21 (20.8%)	6 (7.8%)	0.04*		

NICU; newborn intensive care unit. Values were given as mean ± standard deviation. P1: Comparison of online education and classical education; p2: Comparison of online education and control group; p3: Comparison of classical education and control group. \*p<0.05 was considered statistically significant.

**Table 4.** Logistic regression final model.

Variable	B	S.E.	Wald	Sig. <sup>2</sup>	Exp(B)	%95 CI <sup>3</sup>	
						Lower	Upper
Complication	1.800	0.468	14.767	0.000	6.050	2.416	15.193
Education status <sup>1</sup>	1.121	0.335	11.178	0.001	3.068	1.590	5.918
Apgar score 1. Min.	-1.064	0.405	6.891	0.009	0.345	0.156	0.764
Constant	5.592	3.240	2.978	0.084	268.206	-	-

<sup>1</sup>: More than high school educated and others <sup>2</sup>: Significance <sup>3</sup>: Confidence Interval.

school graduates was significantly higher in groups 1 and 2 than in the control group (p=0.001). The proportion of university graduates was also higher in Group 1 than in Group 2 (p=0.04). As shown in Table 2, proportions of vaginal births were higher in Group 3 than in the other groups (p=0.001), while cesarean section num-

bers were lower (p: 0.001). The rate of vaginal births was significantly lower in Group 1, the online education group, (40.0%) than in Group 2, the classic education group (62.4%) (p=0.001). The cesarean section rate was significantly higher in Group 1 (60%) than in Group 2 (37.6%) (p=0.001). Examination of the neonatal outcomes

in Table 2 revealed no gender difference between the three groups ( $p=0.85$ ). No statistically significant difference was also observed between the three groups in terms of infant birth weights ( $p=0.14$ ,  $p=0.69$ , and  $p=0.99$ , respectively). There was also no significant difference between the babies' birth lengths ( $p=0.99$ ,  $p=0.99$ , and  $p=0.34$ , respectively). Similarly, no statistically significant difference was determined between the groups in terms of low birth weight babies (2500 g) ( $p=0.31$ ) or prematurity (37 weeks) ( $p=0.67$ ). As shown in Table 3, APGAR scores at 1 minute only differed significantly between groups 2 and 3 ( $p=0.03$ ). APGAR scores at 5 minutes also differed between groups 2 and 3 ( $p=0.03$ ). Admission to neonatal intensive care (NICU) was higher in Group 2 (20.8%) than in Group 3 (7.8%) ( $p=0.04$ ). No significant difference was observed between Group 1 (16.0%) and Group 2 (20.8%) ( $p=0.62$ ). According to the logistic regression final model (Table 4), women with complications were 6.050 (95% CI: 2.416-15.153,  $p=0.000$ ) times, women with more education 3.068 (95% CI: 1.590-5.918,  $p=0.001$ ) times more cesarean deliveries. The first-minute Apgar score was significantly higher in those who delivered vaginally, 0.345 (95% CI: 0.156-0.764,  $p=0.009$ ).

## Discussion

This study compared the effects of antenatal preparation education given using two methods (classic and online) on childbirth, type of delivery, and perinatal outcomes. The findings show that neither method significantly improved the experience of pregnancy compared to the control group. However, the number of cesarean deliveries was higher in the online education group compared to the classic education group. The findings reveal that neither antenatal education method improves the pregnancy experience compared to the control group. It was also observed that the 1st-minute Apgar score of the pregnant women who gave vaginal delivery was higher.

The basic aim of antenatal education is to prepare both the mother and the family for events that will take place during pregnancy and childbirth and also for baby care by adapting them to the postnatal period. Pregnant women have recently elected to receive either classic (face-to-face) or online antenatal education [8]. One of the basic aims of both classic and online antenatal education programs is to lower the incidence of cesarean birth, which is sadly increasing to a worrying extent across the world [9]. A study investigating the effect of education programs for pregnant women on childbirth compared women receiving and not receiving classic antenatal education and reported that maternal education level had no effect on type of delivery [10]. A study examining the increase in already high cesarean section rates in Peru performed a mass analysis of 3,376,062 births between 2012 and 2020 and reported that cesarean delivery rates rose in line with maternal education levels [11]. Consistent with these studies, the education level of the online group in the present study was higher than those of the classic education group and the control group given no instruction, and cesarean delivery rates were positively correlated with maternal education. However, in contrast to the present research, there are also studies reporting that antenatal education

reduces cesarean rates. For example, a study from Ireland reported lower cesarean section rates among women receiving antenatal education compared to a control group [12]. Reports in the literature concerning the effect of antenatal education on vaginal birth numbers are inconsistent. Mehdizadeh et al. [13] reported higher vaginal delivery numbers, while Artieta-Pinedo et al. [14] observed a lower number of vaginal deliveries. In agreement with Mehdizadeh et al., we observed a low vaginal birth rate in groups 1 and 2 compared to the control group. A study from China examining the relationship between participation in a web-based antenatal health program and infant outcomes (low birth weight, prematurity, small for gestational age), among other results, found that health education had no impact on infants' APGAR scores. Consistent with that finding, APGAR scores in the online education group in the present study were similar to those in both the classic education group and the control group. Although the Chinese study reported an association between education during pregnancy and the risk of a lower birth weight, that finding was not compatible with the present research [15]. All three groups in this study were similar in terms of low birth weight. There is no one standard for prenatal education around the world, and even different hospitals and institutions have come up with their own ways to do it [8]. While some authors have maintained that the effectiveness and productivity of antenatal education are limited by the lack of a global standard and the variety of different types of delivery (cesarean, vaginal, delivery with intervention, etc.) [7], there are also studies espousing the idea that online education programs in particular are effective in some areas [12, 16]. Researchers also say that online programs are making it easier for more people to take antenatal classes [17], and that this may be the only option in certain situations (like pandemics) and for meeting the needs of certain users (like those who live in rural areas) [18]. Women access antenatal classes or programs through a variety of means, including online. In addition, the development and encouragement of online health education is an inexpensive method for providing information, resources, and education to a broad audience [19].

There are a number of limitations to this study, including its retrospective nature and the limited time frame involved, as well as the low number of pregnant women receiving online education. Another weakness concerning the study group involves the patients' education levels and the group's heterogeneity. The particular strengths of this study include the experience of the individuals providing the education and the relatively higher number of participants compared to other studies.

In this study, women who got a traditional education were more likely to give birth vaginally than those who got an online education. Higher cesarean section rates were reported in the online education group. Education levels were higher in both the online and classic education groups than in the control group. No difference was observed among the groups in terms of neonatal problems such as weight, height, prematurity and low birth weight. However, admission to the NICU was greater in the classic education group than in the control group.



## Conclusion

Cesarean rates in Turkey are quite high, due to an unfounded fear of childbirth. We think that this fear can be overcome by both classic and online antenatal education. However, web-based antenatal education provides support for parents while complementing, but not replacing, the support provided by professionals. Although our study results clash with the literature information, there is an increase in the rates of cesarean section in women receiving prenatal care since the time period of the study coincided with the COVID-19 pandemic. For this reason, prospective studies are needed in a larger population when there are no extraordinary situations such as pandemics.

## Ethical approval

Our study was approved by the ethics committee of our university. (Erzincan Binali Yıldırım University Ethics Committee Date: 27.07.2021, Issue: 09/07).

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