

# Simple Antenatal Preparation to Improve Breastfeeding Practice

## A Randomized Controlled Trial

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**OBJECTIVE:** To address the impact of simple antenatal educational interventions on breastfeeding practice.

**METHODS:** A randomized controlled trial was carried out in a tertiary referral center from May 2002 to December 2004. A random sample of eligible low-risk antenatal patients was recruited from clinics in the National University Hospital, Singapore. Group A received breastfeeding educational material and individual coaching from a lactation counselor. Group B received breastfeeding educational material with no counseling. Group C received routine antenatal care only.

**RESULTS:** A total of 401 women were recruited. Mothers receiving individual counseling and educational material practiced exclusive and predominant breastfeeding more often than mothers receiving routine care alone at 3 months (odds ratio [OR] 2.6, 95% confidence interval [CI] 1.2–5.4) and 6 months (OR 2.4, 95% CI 1.0–5.7) postpartum. More mothers practiced exclusive and predominant breastfeeding at 6 months among women receiving individual counseling compared with women exposed to educational material alone (OR 2.5, 95% CI 1.0–6.3).

**CONCLUSION:** Where breastfeeding practices are sub-optimal, simple one-encounter antenatal education and counseling significantly improve breastfeeding practice up to 3 months after delivery. Provision of printed or audiovisual educational material is not enough. Health care workers should make every effort to have one face-to-face encounter to discuss breastfeeding with expectant mothers before they deliver.

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**LEVEL OF EVIDENCE: I**

Exclusive and predominant breastfeeding rates in many developed countries often fall short of the practice recommended by the World Health Organization and the American Academy of Pediatrics. Both recommend exclusive breastfeeding for the first 6 months, followed by the introduction of suitable complementary foods and continued breastfeeding up to 2 years of age.<sup>1,2</sup> Despite increasing awareness of the many advantages of breastfeeding,<sup>3–14</sup> the challenge remains to implement programs that can effectively improve short- and long-term breastfeeding rates, especially of exclusive and predominant breastfeeding. In the United States a campaign is underway<sup>15</sup> aimed at improving breastfeeding practice to meet the goals of Healthy People 2010, in which 75% of mothers initiate breastfeeding and 50% still breastfeed at 6 months postpartum.<sup>16</sup> Although the U.S. breastfeeding initiation rate has improved from 53.6% in 1994<sup>17</sup> to 65.1% in 2001,<sup>18</sup> continued breastfeeding in the 2001 survey was 27.0% at 6 months, with exclusive breastfeeding rates at only 7.9%,<sup>18</sup> falling short of the Healthy People 2010 goals.

Singapore sees a similar trend. The National Breastfeeding Survey 2001 demonstrated an encour-

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aging breastfeeding initiation rate of 94.5%. However, only 21.1% of mothers continued to breastfeed at 6 months, with fewer than 5% breastfeeding exclusively.<sup>19</sup> In comparison, 46% of Australian mothers continue to breastfeed at 6 months, with 18.6% practicing exclusive breastfeeding.<sup>20</sup> Importantly, among the many factors<sup>21-23</sup> influencing the decision not to breastfeed was a lack of support from health professionals (reported by over 10% of Singapore mothers) and a lack of knowledge about breastfeeding.<sup>19</sup> These factors are not unique to Singapore, and both can be addressed by appropriate interventions by health care providers.

Programs aimed at promoting breastfeeding through patient education and caregiver encouragement have delivered mixed results.<sup>24-27</sup> Systematic reviews conclude that educational programs are more effective at improving breastfeeding initiation and its short-term duration<sup>28,29</sup> than literature alone.<sup>30</sup> This trial studies the impact of single-encounter antenatal education, combining educational material with individual instruction, on breastfeeding initiation, exclusivity, and duration compared with routine antenatal care and educational material used alone in a tertiary hospital setting.

## MATERIALS AND METHODS

Recruitment for this randomized controlled trial was performed between May 2002 and December 2003 at the National University Hospital. The trial was aimed at women with low-risk pregnancies who would have term deliveries, and one research assistant recruited participants from the antenatal population at the outpatient obstetric clinic.

Inclusion criteria were singleton pregnancy, gestation of at least 36 weeks at recruitment, no uterine scar, and the absence of any obstetric complication that would contraindicate vaginal delivery. The women who agreed to participate were required to give written informed consent. The study was approved by the institutional ethics review board. Each participant was followed up for 1 year. Final data were collected by December 2004.

Groups A and B were the designated intervention groups. Group C was the control group. Women randomized to group A received an information booklet describing the techniques and benefits of breastfeeding, which was written and published by the hospital's breastfeeding support group.<sup>31</sup> It contains practical advice on feeding techniques, expressing breast milk, and management of common breastfeeding problems. Patients also watched a 16-minute educational video entitled "14 Steps to Better Breastfeeding" (InJoy Videos,

Boulder, CO), in which the benefits of breastfeeding were introduced, correct positioning, latch-on, and breast care were demonstrated, and common concerns (such as nipple pain) discussed. In addition, each woman had one 15-minute session with a lactation counselor who examined the woman's nipples to assess adequacy for breastfeeding and answered questions on breastfeeding. Women randomized into group B received the same booklet and watched the same video but did not have an individual session with the lactation counselor. Women in group C did not receive the breastfeeding booklet, did not watch the video, and did not have counseling (Fig. 1). No attempt was made to prevent the women in any group from seeking additional information or assistance in breastfeeding from the regular clinic and hospital resources. All groups received standard care in all aspects of pregnancy and delivery, including access to postnatal breastfeeding support.

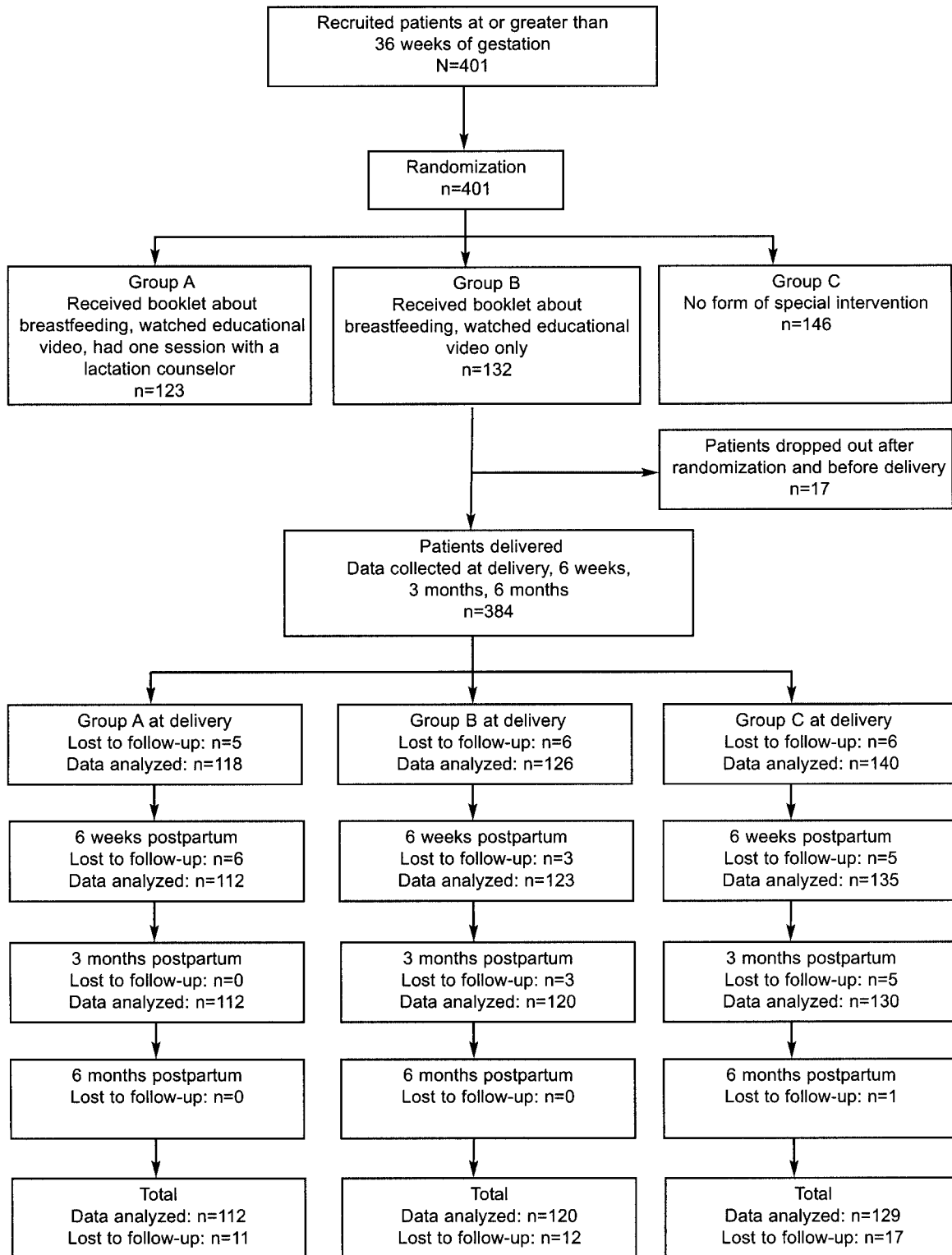
The primary outcomes were rates of exclusive and predominant breastfeeding at 2 weeks, 6 weeks, 3 months, and 6 months after delivery. Secondary outcomes were the overall breastfeeding rates at each of these intervals.

A computer-generated list was used to randomize the women into the three groups. This list was kept by the research assistant based in the antenatal clinic. Each woman was allocated to the intervention group next on the list after written informed consent had been obtained. Data were collected at 6 weeks postpartum with self-administered questionnaires and through telephone interviews conducted by a second research assistant. The questionnaires were developed by the research team for this trial and had hitherto not been assessed for reliability or validity. The second assistant was blinded to the intervention received by the women and trained to ask the questions in a neutral noninfluential manner.

The allocated group was concealed from the woman at the point of recruitment and from the second research assistant collecting postnatal data, who was also blinded to the intervention. The investigators analyzing the data were not blinded. The women received the predetermined interventions (groups A and B) or routine antenatal care (group C). They were not allowed to change their groups, but there was no attempt to prevent mothers in the control group from exchanging information with mothers in the intervention groups.

Participants recruited during the antenatal visit had to complete one questionnaire covering the socioeconomic background, medical and obstetric history, and pre-existing experience of breastfeeding.





**Fig. 1.** Participant recruitment, randomization, and interventions.  
 Mattar. *Antenatal Preparation for Breastfeeding*. *Obstet Gynecol* 2007.



Groups A and B were exposed to the allocated intervention at this time or at the next visit. Routine antenatal, intrapartum, and postnatal care continued for all three groups of women subsequently.

Postpartum questionnaires were administered a day after delivery (before discharge from hospital) and 6 weeks later, either over the telephone or in person during a clinic visit. The information gathered concerned the delivery and feeding practices during each of the first 6 weeks of the puerperium. Follow-up questionnaires were administered over the telephone 3 and 6 months after delivery.

Descriptions of different feeding practices were printed on each questionnaire. Women were informed that *exclusive breastfeeding* meant no formula or water in the baby's diet, *predominant breastfeeding* meant no formula (water allowed), and *partial breastfeeding* meant feeding formula in addition to breast milk. *Breastfeeding initiation* was defined as any breastfeeding within the first 2 weeks of delivery.

A study in Singapore showed that in 1996 only 15.9% of mothers were still breastfeeding their children 4 months after delivery.<sup>32</sup> We assumed an  $\alpha$  of 0.05 and power of 0.8. Taking the exclusive and predominant breastfeeding rate at 3 months among women not receiving any antenatal education as 15% compared with 30% among mothers who were given antenatal preparation, the estimated sample size required was 134 in each group. The planned analysis was a pairwise comparison between exclusive and predominant breastfeeding rates in groups A and C. We did not perform power analysis for any other group comparisons.

Analysis of breastfeeding rates was by intention to treat. All analyses were performed using SPSS 13.0 (SPSS Inc, Chicago, IL). The association between intervention groups and feeding practices was determined using chi-square/Fisher exact tests, with odds ratios presented where applicable. We performed pairwise comparisons between exclusive and predominant breastfeeding and no breastfeeding (comparing groups A and B, A and C, B and C). Subsequently, multiple comparisons were adjusted for using the Bonferroni correction. Comparisons of baseline data among the groups were performed using one-way analysis of variance.

## RESULTS

We planned to recruit 450 women into the study but only 401 women had consented to participate in the trial by the end of the recruitment period. Of these, 123 women were assigned to Group A, 132 women to Group B and 146 women to Group C. 17 women were

lost to follow-up after randomization but before delivery. Data were collected at delivery from 384 patients. A further 9 women were lost to follow-up before the 6<sup>th</sup> week visit and another 9 women dropped out after 6 months postpartum. The reasons for loss to follow-up were stillbirth, delivery in another country, a change of address without forwarding new contact information to the clinic, incorrect contact information, or withdrawal for personal reasons. Complete data sets from 361 participants were finally analyzed, bringing the dropout rate to 10%. Figure 1 shows the randomization and number lost to follow-up at each stage.

Participants were similar in all respects across the three groups (Tables 1 and 2). A majority of the women were aged between 20 and 39 years, with Malays being the highest represented ethnicity in all groups, followed by Chinese and Indian women. Most were multiparas, lived in government subsidized public housing, did not have tertiary education, were housewives and lived within a nuclear family setting with a household income not exceeding US \$3000 a month. Most women had vaginal deliveries at term. No differences were found in the distribution of previous breastfeeding experience among the groups. Of mothers with no prior breastfeeding experience, 95.8% had planned to breastfeed at the time of recruitment versus 94.9% of mothers with prior experience ( $P=.71$ ).

In each group the number of women practicing exclusive or predominant breastfeeding was compared with the number who were exclusively feeding formula (Table 3). When groups A and C were compared, the proportion of women who exclusively or predominantly breastfed at each interval was higher in group A. Before correction, the difference in rates was significant at 3 and 6 months. At 3 months, 36.0% in group A compared with 17.9% in group C practiced exclusive or predominant breastfeeding ( $P=.01$ , odds ratio [OR] 2.6, 95% confidence interval [CI] 1.2–5.4). At 6 months, women in group A were again more than twice as likely to practice exclusive or predominant breastfeeding (20.0% versus 9.5%,  $P=.047$ , OR 2.4, 95% CI 1.0–5.7). For every 6 women given antenatal preparation, one additional woman would practice exclusive or predominant breastfeeding at 3 months. For every 10 women given antenatal preparation, one additional woman would exclusively or predominantly breastfeed at 6 months. When groups A and B were compared, the only significant difference was noted at 6 months postpartum, with 20% of women from group A breastfeeding exclusively or predominantly compared with 9.0% from Group B ( $P=.041$ , OR 2.5, 95% CI 1.0–6.3).



**Table 1. Baseline Comparison of Intervention and Control Groups**

Variable	Group A (n=123)	Group B (n=132)	Group C (n=146)	P
Age				
Less than 29 y	62 (50.4)	74 (56.1)	80 (54.8)	.64
Ethnicity				
Chinese	35 (28.5)	35 (26.5)	42 (28.7)	.87
Malay	69 (56.1)	79 (59.9)	86 (58.9)	
Indian	16 (13.0)	16 (12.1)	15 (10.3)	
Others	3 (2.4)	2 (1.5)	3 (2.1)	
Parity				
Multipara	76 (61.8)	81 (61.4)	95 (65.1)	.78
Prior breastfeeding experience				
Yes	63 (56.3)	79 (67.5)	76 (58.0)	.17
Tertiary education				
Yes	31 (25.2)	22 (16.7)	33 (22.6)	.24
Employed				
Yes	46 (37.4)	51 (38.6)	60 (41.1)	.804
Housing				
Public	120 (97.6)	129 (97.7)	141 (96.6)	.81
Household monthly income				
Less than SGD 5,000	116 (94.3)	129 (97.7)	134 (91.8)	.09
Family structure				
Nuclear	96 (78.0)	105 (79.5)	110 (75.3)	.47
Extended	21 (17.1)	25 (18.9)	28 (19.2)	
Domestic aid	6 (4.9)	2 (1.5)	8 (5.5)	

SGD, Singapore dollars.  
Data are expressed as n (%).

**Table 2. Comparison of Delivery and Birth Weight**

Variable	Group A (n=123)	Group B (n=132)	Group C (n=146)	P
Mode of delivery: vaginal [n (%)]	115 (93.5)	122 (92.4)	129 (88.4)	.32
Gestational age at birth (wk, mean±SD)	38.6±1.6	38.7±1.4	38.7±1.3	.96
Birth weight (g, mean±SD)	3,093±411	3,204±424	3,148±405	.27

SD, standard deviation.

**Table 3. Distribution of Exclusive and Predominant Breastfeeding by Groups**

Postpartum Period	Group A [n/Total (%)]*	Group B [n/Total (%)]*	Group C [n/Total (%)]*	P [OR (95% CI)]		
				A and B	A and C	B and C
Week 2	61/67 (91.0)	60/72 (83.3)	69/80 (86.3)	.176 [2.0 (0.7–5.8)]	.365 [1.6(0.6–4.6)]	.616 [0.8(0.3–1.9)]
Week 6	40/73 (54.8)	33/68 (48.5)	36/85 (42.4)	.457 [1.3 (0.7–2.5)]	.119 [1.7(0.9–3.1)]	.446 [1.3(0.7–2.4)]
Month 3	27/75 (36.0)	21/75 (28.0)	15/84 (17.9)	.294 [1.4 (0.7–2.9)]	.010 [2.6(1.2–5.4)] <sup>b</sup>	.127 [1.8(0.8–3.8)]
Month 6	16/80 (20.0)	8/89 (9.0)	9/95 (9.5)	.041 [2.5 (1.0–6.3)] <sup>a</sup>	.047 [2.4(1.0–5.7)] <sup>c</sup>	.910 [0.9(0.3–2.0)]
				P=.12 <sup>†</sup>	P=.14 <sup>†</sup>	

OR, odds ratio; CI, confidence interval.

Chi-square tests performed: a) OR 2.5, 95% CI 1.02–6.3; b) OR 2.6, 95% CI 1.2–5.4; c) OR 2.4, 95% CI 1.01–5.7.

\* Total = number (exclusive and predominant breastfeeding) + number (exclusive formula feeding).

<sup>†</sup> Adjusted for multiple comparisons.

However, after correction for multiple comparisons, the difference in exclusive and predominant breastfeeding rates between groups A and C remained statistically significant only at 3 months

( $P=.03$ ). Comparing groups B and C, we found no difference in breastfeeding rates at any interval.

At 2 weeks postpartum, 341 of the 370 women (92.2%) breastfed. Exclusive or predominant breast-



feeding was practiced by 190 women (51.4%), and 151 (40.8%) mixed breastfeeding and formula. By 6 weeks postpartum, the number of breastfeeding women had dropped to 253 from the original 370 (68.4%), with 109 women (29.5%) exclusively or predominantly breastfeeding compared with 117 (31.6%) who fed formula. At 3 months postpartum, 63 of the 362 women (17.4%) were breastfeeding exclusively or predominantly while 172 women (47.5%) were now only feeding formula. By 6 months, only 33 of the 361 women (9.1%) were still exclusively or predominantly breastfeeding compared with 232 (64.3%) who were no longer breastfeeding. There were no intergroup differences in the type of continued breastfeeding up to 6 months.

The mean age at which infants started being weaned onto solids was 17.24 weeks. Weaning of group A infants started at  $17.04 \pm 3.6$  weeks, group B infants started solids at  $17.75 \pm 4.6$  weeks, and infants in group C started solids at  $16.95 \pm 3.1$  weeks. The difference was not statistically significant ( $P = .313$ ). No adverse events were reported in this trial.

## DISCUSSION

Our results showed that mothers who received simple antenatal instruction with a short, single, individual counseling session combined with educational material were twice as likely to practice exclusive or predominant breastfeeding at 3 and 6 months postpartum compared with mothers who did not receive formal antenatal instruction. The observed difference was no longer statistically significant at 6 months after correction for multiple comparisons probably due to an inadequate sample size. Providing printed information on breastfeeding alone before delivery was not as effective as personalized antenatal counseling at enhancing exclusive or predominant breastfeeding rates. The introduction of solids did not appear to influence the outcome because weaning began at similar ages across the groups.

This trial was limited by a number of factors. Block randomization would have ensured the same number of participants in each group. We also did not recruit enough women to fulfill our power calculations. Contamination between groups was not strictly prevented, and women in the control group came to know about the interventions offered to the other groups simply by speaking to women in those groups. They were, however, not given access to the booklet or the video, which were available only at the clinic. It is unclear how much contamination there was and how it affected outcomes.

This study was conducted in a pragmatic fashion

in a tertiary hospital setting. The two antenatal interventions were given in addition to routine ambulatory and inpatient hospital care. Other than the interventions, all other aspects of management were similar. There were no differences between groups. The findings are therefore generalizable to any hospital setting where pregnancy and delivery are managed. In addition, the deliberate single-encounter design is easy to implement in any clinic, and the materials used were inexpensive to procure.

Antenatal preparation of pregnant women for breastfeeding raises awareness of the importance of breastfeeding, empowers them with practical knowledge and skills in breastfeeding techniques, and prepares them for possible difficulties. Meeting with a lactation counselor antenatally puts them in touch with someone who can continue to provide postnatal care and support. Although the decision to initiate breastfeeding and the eventual decision to stop are influenced by other factors such as family and work, it is still worthwhile integrating lactation preparation into routine pregnancy care. This should be part of a greater multifaceted program aimed at educating pregnant women for motherhood.

Many women make infant feeding decisions before delivery and before any contact with health professionals.<sup>33-35</sup> Although health promotion campaigns are influential in educating women about breastfeeding, they often do not dissuade women from formula feeding once the decision has been made.<sup>35</sup>

Although new mothers may be aware of breastfeeding benefits, they often lack practical knowledge about the technique and process of initiating and maintaining breastfeeding, and this may make them resort to infant formula instead. In a survey of newborn health care knowledge among Brazilian women, almost 60% of the women were ill prepared for breastfeeding, with perceived difficulties leading to a conscious decision to formula-feed.<sup>36</sup>

Mothers also vary in their knowledge of breastfeeding, and standard breastfeeding educational material may not answer all their questions. Individualized counseling enables mothers to clarify any personal doubts they may have about the theoretical and practical aspects of breastfeeding.

Various forms of breastfeeding education have been tried with mixed results. Henderson found that teaching first-time mothers about positioning and breast attachment in the puerperium did not increase breastfeeding duration.<sup>37</sup> In other trials, individual or small-group teaching, counseling, practical advice, audio-visual aids, and demonstrations were associated



with improved breastfeeding rate and duration.<sup>38-42</sup> Systematic reviews show that postnatal support from health care professionals and peer counselors leads to a modest reduction in breastfeeding cessation and a prolonged duration of exclusive breastfeeding<sup>43</sup> and suggest that these trained health care professionals should give women early practical advice on correct positioning and attachment to reduce lactation difficulties and increase breastfeeding duration.<sup>44</sup>

Our results support the current body of evidence in favor of educational intervention. The outcome of this trial demonstrates the effectiveness of a simple, structured, one-encounter form of antenatal intervention leading to a significant increase in exclusive and predominant breastfeeding at 3 months. There is a definite trend toward higher exclusive and predominant breastfeeding rates at 6 months. Provision of printed or audiovisual educational material is not enough. The most useful intervention includes demonstration of breastfeeding techniques (educational video), one-to-one teaching by a trained lactation counselor, and a breastfeeding information booklet. There is a trend toward exclusive or predominant breastfeeding with a greater degree of intervention. Thus, health care workers should provide at least one face-to-face encounter to educate and prepare mothers for breastfeeding before they deliver.

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