Systematic review and meta-analysis of randomized controlled trials evaluating primary care-based interventions to promote breastfeeding in low-income women

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Received 22 May 2011; Revised 06 September 2011; Accepted 12 September 2011.

Background. Given the benefits of breastfeeding (BF), health care institutions recommend that a child should be breastfed for the first 6 months of its life. However, differences between social groups as regards BF behaviour are very prevalent.

Objectives. To identify effective programmes that can be implemented by GPs to promote BF in low-income women.

Methods. A review of the literature was based on the Medline, Cochrane and Public Health databases (1985–2009), using index terms relating to BF, general medicine and social inequalities in health. Randomized controlled trials were included in our analysis. Two people independently selected which studies would be used by rating the quality of the articles. The results of these studies were presented in raw form and in terms of a pooled relative risk.

Results. We analysed 10 studies (of the 343 articles originally selected) involving a population of 1445 ‘mother and child’ pairs. The studies that assessed ways of encouraging the initiation of any form of BF showed that educational programmes are effective [relative risk (RR) for starting BF, 1.46, 95% confidence interval (CI): 1.03–2.08]. As regards the studies that involved ways to encourage mothers to continue BF, the programmes used showed significant success rates after 3-month postpartum (RR: 1.15, 95% CI: 1.01–1.30). The successful programmes usually involved multiple ‘short’ follow-up appointments (<20 to 30 minutes).

Conclusions. Educational programmes delivered in the context of ongoing personal contact with a health professional are effective in promoting BF in low-income women.

Keywords. Breastfeeding, child development, nutrition, primary care.

Introduction

Babies who are breastfed exclusively at 3 months have a lower incidence of digestive and respiratory infections, and the infections they do catch are likely to be less severe.1 Other benefits at 6 months for babies who are exclusively breastfed include a fall in the risk of sudden infant death, obesity, cancers such as leukaemia, type 1 and type 2 diabetes and coeliac disease, as well as a fall in the incidence of inflammatory bowel disease in young adults.2,3 The health benefits for mothers who breastfeed include a reduced risk of breast, ovarian, cervical and endometrial cancers, as well as reduced risk of anaemia and protection against osteoporosis and hip fracture.3,4 Given the health benefits of breastfeeding (BF) for both mother and child, international health care institutions (World Health Organization, American Academy of Pediatrics, National Health Service) recommend that a child should be breastfed for the first 6 months of its life.5–7

Despite these recommendations, the prevalence of mothers who breastfeed exclusively at 3 months varies...
between 30% and 70% in developed countries.\textsuperscript{8–13} Moreover, differences between social groups as regards BF behaviour are very prevalent. Women in low-income groups are less likely to start or continue BF.\textsuperscript{14–17}

Healthy People 2010 included the goal of increasing BF rates so that 50% of low-income mothers would be BF at 6 months.\textsuperscript{18} Some countries have made it a public health care goal to increase the prevalence of BF.\textsuperscript{19} In addition to the National Nutrition and Healthcare Programmes, Baby Friendly Hospitals, International Board of Lactation Consultant certification and initial and ongoing training for GPs seem to be important in promoting BF.\textsuperscript{20,21} Indeed, GPs are likely to monitor the mother of the infant before, during and after the pregnancy. The aim of this project was therefore to identify effective programmes that can be implemented by GPs for promoting BF in low-income women.

Methods

Search strategy

A review of the existing literature was based on the Medline, Cochrane and Public Health (Banque de données en santé publique) databases. All randomized controlled trials (RCTs) from January 1985 to March 2009 were initially included.

The working group teams included research units and departments of general practice, which were aiming towards the implementation of an intervention in primary care in an attempt to decrease the social inequalities of health. By consensus, the working group decided to use the following index terms in this study:

- For breastfeeding: Breast feeding [Majr]

We also reviewed reference lists of related systematic reviews using the general population for additional studies.\textsuperscript{22–25}

Study selection

The inclusion criteria were studies of developed countries and populations, which were free from associated pathologies, studies conducted in the primary care setting and studies written in English or French. Participants in these trials were either pregnant women intending to breastfeed their child or women already BF. A programme that can be implemented at the primary care level was defined as follows:

1. The programme must have been implemented by a health care professional. The exact type of professional was purposefully not limited to GPs in order to widen the field of eligible studies and to reduce any bias related to the specific way in which health care systems are organized in various countries.
2. The programme must be feasible in general practice in terms of frequency and duration, i.e. special appointments or visits consisting of 4- to 6- × 10- to 20-minute appointments (at a rate of one pre- or postnatal appointment per month), 2- to 4- × 20- to 40-minute appointments or 1- to 2- × 40- to 60-minute appointments.
3. Any technical equipment had to be suitable for use in a GP’s office.

We excluded all uncontrolled trials and cross-sectional studies. Of the RCTs, we excluded studies in which the intervention programmes were not likely to be implemented by a GP (as defined previously), in which the intervention programmes were implemented by a non-health care professional (peer counselling, father of the child) or were carried out just once, following the birth in maternity wards.

Outcomes assessed

BF outcomes were categorized as initiation, short-term duration (6 weeks to 2 months) and long-term duration (3–6 months). The definition of BF included any form of BF (partial or exclusive BF). This was described in each study. The article selection progress is illustrated in the diagram below (Fig. 1).

Validity assessment

The methodological quality of the studies was assessed using the methods adapted from the French National Authority for Health (HAS) criteria. This was included using specific criteria to define the study participants, outcome measures, type of study, sample size calculation, representative patient sample, confounding factors, statistical methods, intention-to-treat analysis, results corresponding to the primary outcome and interpretation and generalizability of the results (Table 1).
**Data abstraction**

Articles were selected by two people (CdR and GI), who were working independently. By choosing the articles individually, these people were able to discuss any disagreements that arose. The intervention, baseline characteristics of the groups and outcome of studies included in the meta-analysis were extracted and presented in Table 2.

**Quantitative data synthesis**

We conducted separate meta-analyses of RCTs on rates of three outcomes measures: initiation of BF, short-term duration and long-term duration, using random effect if heterogeneity was present. The pooled relative risks (RRs) along with their 95% confidence interval (CI) were assessed, using the STATA 10 software.

**Results**

**Trials characteristics**

Of the 343 articles originally selected, 10 were chosen for the final analysis. These 10 articles covered a total of 1445 'mother and child' pairs. The selected studies were published between 1985 (Jones) and 2009 (Petrova) and three date from after 2000. Of these studies, nine were conducted in the USA and one in England. The number of individuals included in each study ranged from 48 to 583. Four studies were conducted prepartum, two postpartum and four both pre- and postpartum. Five studies were interested in the initiation and the duration of any form of BF, two in the initiation and the duration of exclusive BF, two in the initiation of any form of BF, two in the initiation of exclusive BF.
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<tr>
<th>Study details</th>
<th>Study population and setting</th>
<th>BF definition</th>
<th>Description of programme used</th>
<th>Main statistical results for any form of BF</th>
<th>Main statistical results for exclusive BF</th>
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<tr>
<td>1. Brent et al.,26 USA</td>
<td>Low-income: 90% of participants were eligible for WIC (women, infant and children) programmes</td>
<td>BF initiation at hospital. BF duration at 2 weeks, 2-month and 6-month postpartum</td>
<td>A: Treatment group, N = 51. 2–4 individual 10- to 15-minute pre- and postnatal appointments with lactation consultant. Telephone support 48 hours after birth. Contact with lactation consultant at each health supervision visit until weaning or 1 year B: Control group, N = 57. Standard care and control groups were offered optional prenatal BF classes and postpartum BF instruction by nurses and physicians and out-patient follow-up by nurses and physicians in the paediatric ambulatory department</td>
<td>Initiation: RR: 1.80 (95% CI: 1.16–2.81). At 2-month postpartum: RR: 4.25 (95% CI: 1.71–10.55). At 6-month postpartum: RR: 1.96 (95% CI: 0.61–6.30)</td>
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<td>2. Coombs et al.,27 USA</td>
<td>Low income: women eligible for WIC programme services</td>
<td>BF initiation: exclusive BF at hospital discharge or, if BF began later, within 1 week of hospital discharge. BF duration: up to 3-month postpartum</td>
<td>A: Treatment group, N = 73. Self-help manual designed to motivate low-income mothers to breastfeed and standard BF information. Two pre- and postnatal appointments with a health care professional B: Control group, N = 78. Standard care</td>
<td>Initiation: RR: 1.38 (95% CI: 1.01–1.89). Duration at 3 months: data not shown</td>
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<td>3. Finch and Daniel,28 USA</td>
<td>Low income: (urban WIC programme), African American and Hispanic women</td>
<td>BF initiation at hospital</td>
<td>A: Treatment group, N = 19. Prenatal education in BF from a trained person in small groups B: Control group, N = 29. Standard care</td>
<td>Initiation: RR: 1.15 (95% CI: 0.82–1.60)</td>
<td>Initiation: RR: 2.75 (95% CI: 1.09–6.95)</td>
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<td>4. Grossman et al.,29 USA</td>
<td>Low income: women eligible for WIC programme services</td>
<td>BF: any daily BF. BF duration: at 6-week, 3-month and 6-month postpartum</td>
<td>A: Treatment group, N = 49. A 30- to 40-minute postnatal appointment with a BF counsellor (nurse). Information leaflet given out. Telephone call on Days 2, 4, 7, 10 and 21+. Additional support from paediatric consultant or nurse B: Control group, N = 48. Standard care</td>
<td>At 6-week postpartum: RR: 0.89 (95% CI: 0.65–1.21). At 3-month postpartum: RR: 0.79 (95% CI: 0.48–1.31). At 6-month postpartum: RR: 0.69 (95% CI: 0.28–1.65)</td>
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<td>Study details</td>
<td>Study population and setting</td>
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<td>5. Hill, 30 USA</td>
<td>Low income (&lt;$12,999/year)</td>
<td>BF initiation at hospital. BF duration: at 6-week postpartum</td>
<td>A: Treatment group, N = 31. 40-minute prenatal presentation with 5–10 minutes for questions. Information leaflet given out. B: Control group, N = 33. Standard care</td>
<td>Initiation: RR: 1.35 (95% CI: 0.85–2.15). At 6-week postpartum: RR: 1.28 (95% CI: 0.65–2.52)</td>
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<td>6. Jones and West, 31 England</td>
<td>Socio-economic status defined by UK census categories (I and II 22%, III 46%, IV and V 13%)</td>
<td>BF duration: at 1-month, 3-month, 6-month and 12-month postpartum</td>
<td>A: Treatment group, N = 228. Individual postnatal support at the maternity unit and at home on Day 15 from a trained nurse. B: Control group, N = 355. Standard care</td>
<td>At 4-week postpartum: RR: 1.17 (95% CI: 1.07–1.27). At 3-month postpartum: RR: 1.16 (95% CI: 0.99–1.35). At 6-month postpartum: RR: 1.37 (95% CI: 1.08–1.73). At 12-month postpartum: RR: 0.56 (95% CI: 0.27–1.18).</td>
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<td>7. Kistin et al., 32 USA</td>
<td>Black urban low-income women</td>
<td>BF: one or more BF per day. BF initiation at hospital</td>
<td>A: Individual sessions, N = 36. Individual prenatal support from a trained nurse or a paediatrician (15 minutes) + one postnatal session at Day 4 postpartum (15 minutes). Periodic follow-up by phone and preaddressed cards. B: Control group, N = 56. Standard care</td>
<td>Initiation: RR: 2.15 (95% CI: 1.21–3.84). At 2-week postpartum: RR: 2.02 (95% CI: 0.99–4.11). At 6-week postpartum: RR: 1.56 (95% CI: 0.64–3.77). At 3-month postpartum: RR: 1.56 (95% CI: 0.23–10.56).</td>
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<td>8. Petrova et al., 33 USA</td>
<td>Low-income (WIC program participants)</td>
<td>Exclusive BF (breast milk only or breast milk and vitamins). Partial BF (breast milk and any amount of formula per day). BF initiation: within 1-week postpartum. BF duration: at 1-month, 2-month and 3-month postpartum</td>
<td>A: Treatment group, N = 52. 2 individual 15- to 20-minute prenatal appointments, 2-4 weeks apart, with a BF consultant. Postnatal telephone call lasting at least 15 minutes on Day 7 or Day 14 and at 1 month, and a home visit if any problems arise. B: Control group, N = 56. Standard care</td>
<td>Initiation: RR: 1.04 (95% CI: 0.95–1.15). Duration at 1 month: RR: 1.07 (95% CI: 0.93–1.22). Duration at 2 months: RR: 1.16 (95% CI: 0.94–1.44). Duration at 3 months: RR: 1.21 (95% CI: 0.94–1.56)</td>
<td>Initiation: RR: 1.60 (95% CI: 0.95–2.69). Duration at 1 month: RR: 1.50 (95% CI: 0.74–3.03). Duration at 2 months: RR: 1.22 (95% CI: 0.55–2.70). Duration at 3 months: RR: 1.40 (95% CI: 0.48–4.13).</td>
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<td>9. Ryser, 34 USA</td>
<td>90% of the patients were eligible for Medicaid benefits</td>
<td>BF initiation: within 1-week postpartum (exclusive or partial BF)</td>
<td>A: Treatment group, N = 26. Advice, videotapes, written material specifically designed to address the common BF barriers perceived by low-income women. 4 prenatal appointments. B: Control group, N = 28. Standard care</td>
<td>Initiation of BF: RR: 2.11 (95% CI: 1.24–3.62)</td>
<td>Initiation of BF: RR: 2.11 (95% CI: 1.24–3.62)</td>
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### Table 1  Continued

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<th>Study details</th>
<th>Study population and setting</th>
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<th>Main statistical results for any form of BF</th>
<th>Main statistical results for exclusive BF</th>
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<tr>
<td>10. Serwint et al.,35 USA</td>
<td>Low income (mother on WIC benefits)</td>
<td>BF initiation at hospital.</td>
<td>A: Treatment group, N = 74. One prenatal appointment between weeks 32 and 36 with a future paediatric consultant trained in advice and techniques for encouraging BF. Telephone support if needed</td>
<td>Initiation: RR: 1.33 (95% CI: 0.86–2.07). Duration at 1 month: RR: 1.32 (95% CI: 0.63–2.78). Duration at 2 months: RR: 1.26 (95% CI: 0.46–3.45)</td>
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### Table 2  Details of programmes used in the studies

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<th>Authors</th>
<th>Description of study outcome</th>
<th>Comparative study</th>
<th>Prospective study</th>
<th>Retrospective study</th>
<th>Sample size</th>
<th>Representative patient sample</th>
<th>Appropriate outcome(s) and confounding factors</th>
<th>Adequate statistical methods</th>
<th>Intention-to-treat analysis</th>
<th>Results corresponding to primary outcome</th>
<th>Interpretation of results</th>
<th>Generalizability of the study results</th>
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<td>Brent et al.26</td>
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and one in the duration of any form of BF.\textsuperscript{31} Seven studies designed a programme involving multiple visits or appointments for the treatment group.\textsuperscript{26,27,29,31–34} Five studies gave a brochure to the treatment group.\textsuperscript{27,29,30,32,34} Four studies provided telephone support for the treatment group\textsuperscript{26,29,32,33} and one for both the treatment and control groups.\textsuperscript{35} One study showed a video to the treatment group.\textsuperscript{34}

**Meta-analysis**

Figures 2–5 show the success of these programmes, measured using pooled RR, in promoting the initiation and duration of BF in low-income women. The studies that assessed ways of encouraging the initiation of any form of BF showed that educational programmes are effective (RR of starting BF, 1.46, 95% CI: 1.03–2.08). In a similar way, the studies that assessed ways of...
encouraging the initiation of exclusive BF showed that programmes implemented at the primary care level were effective (RR of starting BF, 1.72, 95% CI: 1.34–2.21).

As regards to the studies involving ways to encourage mothers to continue any form of BF, the programmes used showed no significant success rates before 3 months of BF (RR: 1.15, 95% CI: 0.97–1.37) but significant success rates after 3-month postpartum (RR: 1.15, 95% CI: 1.01–1.30). The pooled RR of exclusive BF could not be calculated due to the small number of studies on the topic.

The successful programmes usually involved multiple ‘short’ follow-up appointments (<20 to 30
Some studies revealed the importance of the programmes being carried out by trained professionals. A successful BF self-help manual could be a cost-effective alternative in situations in which specialized counselling is not readily available.

Ongoing trials
Searches of ClinicalTrial.gov identified one ongoing trial (identifier: NCT00619632), which is evaluating the effect of a primary care-based intervention in increasing the intensity of BF up to 6 months in low-income multiethnic women. This trial may be eligible for inclusion in a future review.

Discussion

Principal findings
This systematic review summarizes the effects of interventions, which can be implemented by a GP and are designed to promote and support BF among low-income women. The evidence suggests that educational programmes in the context of ongoing personal contact with a health professional are effective in promoting the initiation and duration of BF. Arguments have been made in favour of multiple appointments over a prolonged period with trained professionals. The way in which the information was given out seemed to have little effect on programme success. Similarly to other topics that have been studied (i.e. programmes to help women to stop smoking during pregnancy), specific methods, such as a brochure aimed at low-income women, could be useful.

Limitations
This review has several limitations. Although a large number of RCTs have recently been published, very few of them concern low-income women and programmes that could be implemented by a GP. RCTs may still be susceptible to bias, including a loss of follow-up and residual confounding factors. The studies all differed in their definitions of BF, the type of population studied (in terms of age, social status, initial intention to breastfeed etc.) and in the outcomes that they measured (exclusive BF, partial BF, initiation or duration). In addition, we found a significant level of heterogeneity among the interventions, and it was difficult to control for ‘publication’ bias. Finally, the feasibility of getting a GP to implement each programme was assessed by the working group, and they did not necessarily take into account the possibilities that have been confirmed in practice in each country considered.

Meaning of study and implications
However, this review is a unique project, insofar as there has been no similar review (to our knowledge) of programmes that can be implemented by a GP in order to promote BF among low-income women. Other reviews have insisted on the benefits of programmes that combine pre- and postnatal action with both professional and non-professional support with regard to increasing the rate of BF in the general population. For low-income women, other actions have been shown to be effective, such as educational programmes including the father of the infant or peer counselling. In order to better promote BF among these underserved communities, it is also important to understand the factors that have an impact on infant-feeding practices. According to Chapman et al., low-income women recognize BF as the best method for feeding an infant. However, ambivalence occurs as a result of concerns that breast milk may be dangerous because of maternal sickness, smoking, drinking or poor nutrition.

Conclusions
Prenatal care presents a unique opportunity to contribute to the elimination of health disparities among low-income women. This review provides encouraging evidence that educational programmes delivered in the context of ongoing personal contact with a health professional can improve BF initiation and duration rates in low-income women. Further studies on this topic should make every attempt to adhere to high-quality methodological standards. Moreover, it has yet to be shown whether or not specific programmes would reduce the gradient caused by social inequality in health, as no clear results have yet been found with regard to treatment education programmes.

Acknowledgements
The authors thank Matthias Lochard for his comments on the paper. CdR, GI, VR, AMM, MJSC and MD conceived and designed the study. CdR and GI analysed the data and drafted the manuscript. GI takes responsibility for the paper as a whole. VR, AMM, MJSC and MD supervised CdR and GI in the conduct of the trial and data collection.

Declaration
Funding: none.
Ethical approval: none.
Conflicts of interest: none.

References

4 Cancer CGoHFIB. Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50302 women with breast cancer and 96973 women without the disease. *Lancet* 2002; **360**: 187–95.


20 IHAB and IBCLC certifications. [Internet]. http://coordinationallaitement.org/old/communique-ihab.html.


