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ABSTRACT

Background: The World Health Organization recommends exclusive breastfeeding as the main source of nutrition for infants during their first six months of life. However, despite this well-known recommendation, not all mothers breastfeed, whether partly or fully, during this time.

Objective: The aim of this systematic literature review was to compile evidence regarding sociodemographic, physical, mental, and social factors that influence breastfeeding mothers to stop breastfeeding before the infant reaches six months.

Search method: A systematic search was conducted in four databases.

Selection criteria: Studies with quantitative research were included.

Data collection and analysis: Totally, 186 abstracts were read, 83 seemed relevant but 18 were found to be duplicates. Finally, 27 articles met the inclusion criteria and were included. The quality assessment was done with a quality assessment template from the Swedish Council on Technology and Assessment and the grading of the result was carried out according to GRADE

Results: The association of breastfeeding cessation between the mother's young age, low level of education, return to work within 12 weeks postpartum, caesarean birth and inadequate milk supply was found to have a low level of evidence. The link found between depressions among the mothers with the cessation of breastfeeding was found to have a very low level of evidence.

Conclusions: Sociodemographic factors appeared to have caused cessation of breastfeeding in some of the included articles. The preventive work should focus on how to improve the knowledge of health-care professionals and targeted interventions must address mothers who are at risk of ceasing breastfeeding before the recommended time.

Keywords: breast feeding, review, risk factors, weaning

26

27 INTRODUCTION

28 According to World Health Organization [1], exclusive breastfeeding is recommended for
29 infants during their first six months of life. This should be continued in conjunction with the
30 appropriate complementary food for up to two years or beyond.

31 Studies have shown that breast milk protects against obesity later in life [2, 3]. The
32 mechanism underlying this protection could be related to a greater sensitivity to the amount
33 of food given to the child. It could also be the result of breast milk containing lower levels of
34 insulin compared to infant formula [2]. Studies showed that breast milk contains protection
35 against several infections such as gastroenteritis, upper respiratory infections, and ear
36 infections [4, 5]. Another study showed that infants who were not breastfed at four months,
37 had increased odds of needing health-care [6] . Furthermore, as the child grows, breast milk
38 has been found to offer protection against some forms of cancer [7], and breast milk has also
39 been associated with better cognitive development of the child [8]. Exclusive breastfeeding
40 among mothers has shown to be associated with postpartum maternal weight loss [9] as well
41 as reduced rates of ovarian cancer, reduced premenopausal breast cancer, type 2 diabetes and
42 heart disease [10].

43 Despite all the aforementioned health advantages, breastfeeding is sometimes ceased before
44 the recommended time. There are several possible reasons for this, such as difficulties with
45 lactation, inadequate infant weight gain, medical indications regarding the mother, or due to
46 the great effort it takes expressed out milk [11].

47

48 OBJECTIVE

To the best of our knowledge, no earlier systematic reviews have focused on evidence grading related to sociodemographic (e.g. mother's age, and level of education), physical (e.g. birth complications, and obesity), mental (i.e. depression), and social factors (e.g. intimate partner violence and support) and its' contribution to the cessation of breastfeeding before six months. Since the recommendation is exclusive breastfeeding until the infant is six months of age, reasons why mothers stop breastfeeding earlier must be considered to be important. Therefore, the aim of this systematic literature review was to compile evidence regarding sociodemographic, physical, mental, and social factors that influence breastfeeding mothers to stop breastfeeding before the infant reaches six months.

METHOD

The method for this literature review followed the protocol of the Swedish Council on Technology and Assessment [12] and the researchers adhered to PRISMA guidelines for systematic reviews [13].

Inclusion and exclusion criteria's

Inclusion criteria concerned studies in English or a Scandinavian language (i.e. Swedish, Norwegian and Danish) and studies containing sociodemographic, physical, mental, and social factors relating to the cessation of breastfeeding before the child reached six months were included. Studies containing any kind of breastfeeding, both partly and exclusive breastfeeding as well as breast milk given after expression were included. Studies with quantitative research such as cross-sectional studies, case-control studies, and cohort studies were included. Criteria for exclusion were those studies examining chronic diseases regarding

the mother (e.g. Diabetes, heart failure) and studies focusing on factors relating to the child, such as prematurity or low birth weight.

Search strategy

The search was performed in Medline, CINAHL, and PsycINFO and the Cochrane Library. Three blocks were built into the search: “breastfeeding”; “factors that contributed to cessation”; and lastly, “cessation”; (see Table 1). The main search was done in September 2015 and an updated search in May 2016. There were no limits selected for publication dates of the studies. The search in the Cochrane Library did not result in any systematic reviews or trials.

Insert Table 1.

Selection process

The total amount of articles in the three databases was 1,159; (See Figure 1). First, the titles were screened, and if they were in line with the aim, the abstract was read (n=186). Eighty-three articles appeared to be relevant, and 18 articles were found to be duplicates. All the authors reached agreement on which studies should be included. In this third phase, 57 papers were excluded after scientific appraisal, as they did not meet the inclusion criteria; In the end, 27 papers were included, and quality assessments were made concerning these.

Insert Figure 1

Quality assessment

The remaining 27 papers were assessed for the quality of the method and the credibility of the results. The scientific quality was examined independently by two of the authors. In this examination, a quality assessment template from SBU [12] was used by the authors. The

questions in the template concerned the selection process for the participants for the study, the loss of participants, and how the loss of participants was taken into account. Thereafter, the assessment bias and reporting bias were considered. A general appraisal of the study quality on a three-grade scale was also performed and graded for: high scientific quality, moderate scientific quality, and low scientific quality [12]. Criteria for the quality assessment can be found in Table 2. The authors met on a regular basis to discuss methodological quality, validity, and applicability of the chosen articles and discussions were conducted until consensus was reached in the quality assessment.

Insert Table 2.

Analysis process

The 27 papers included in this systematic review were categorized according to factors presented in the studies. In some of the articles, several factors for the cessation of breastfeeding were assessed, and as a result, some of the papers are presented by a variety of factors. The grading of the result was carried out according to GRADE [14], as was the criteria for assigning grades of evidence. The grading resulted in one evidence table (see Table 3), and the grading was done by decreasing or increasing the evidence level of different outcomes measured across the studies. Aspects that affected the evidence level of each outcome were related to limitations, inconsistency, indirectness, imprecision, publication bias, and quality across the studies [14]. All included studies were observational studies, which according to GRADE meant that the evidence level for each outcome measure started on low level and if none of the increasing or decreasing aspects mentioned above were identified across the studies, the evidence level for the actual outcome remained on low level. Observational studies that only were presented with prevalences were not included in the

grading of evidence. The result with summary measures and information about the included studies can be found in Table 4.

Given the wide variation in the methodology of studies, we decided against a quantitative analysis of the data in the form of meta-analysis and limited this report to a qualitative synthesis of available evidence.

Insert Table 3.

RESULTS

Insert Figure 2.

A total of 26 studies presented in 27 papers were included in the result, and the following areas were represented: United States (n=7), United Kingdom (n=6), Australia (n=6), Hong Kong (n=2), Nicaragua (n=1) Taiwan (n=1), Denmark (n=1), Sweden (n=1), Brazil (n=1), and Canada (n=1). The included studies were published between the years 1982 and 2013. The articles and factors are sorted into the following headings: sociodemographic factors, physical factors, mental factors, and social factors. A figure for all the factors and the number of papers included in the result as well as the quality assessment can be found in Figure 2. In accordance with the different factors, an evidence table is presented (see Table 3). With every factor presented, the studies with the highest scientific quality are presented first, and thereafter, the studies with moderate quality are presented.

Sociodemographic factors

Sociodemographic factors include the following outcomes *mother's age, level of education, employment status and income, primipara, and ethnicity.*

147 *Mother's age*

148 The high quality study by Taveras et al [15] and the following four studies Hauck et al [16],
149 Ayton et al [17], Avery et al [18], Tarrant et al [19] with their moderate quality, focused on
150 the association between young maternal age and the cessation of breastfeeding before 12
151 weeks. All five studies showed a significant association between the mother's young age and
152 the cessation of breastfeeding. However, the evidence level regarding this association was
153 considered to be low, since it only included observational studies and no aspects that
154 increased or decreased the evidence level were identified across these studies (see Table 3).

155

156 *Level of education*

157 Taveras et al [15] with their high-quality study, and the moderate quality studies by Avery et
158 al [18], Ayton et al [17] and Hauck et al [16] examined the association between mother's low
159 level of education and the cessation of breastfeeding before six months. All four studies
160 showed a significant association between low maternal educational level and cessation of
161 breastfeeding before six months. However, the evidence level of this association was also
162 considered to be low, since it was only observational studies and no increasing or decreasing
163 aspects were identified across the studies (see Table 3).

164

165 *Employment status and Income*

166 Six studies investigated the association between returning to work within 12 weeks post-birth
167 and the cessation of breastfeeding before six months. The high quality study by Taveras et al
168 [15] and moderate quality studies by Bick et al [20], McCarter-Spaulding et al [21], Schwartz
169 et al [22], Tarrant et al [19], and Cameron et al [23] found a significant association between
170 the mother's return to work and the cessation of breastfeeding, and the evidence level was

considered to be low here as well, since it was only observational studies and no increasing or decreasing aspects were identified across the studies (see Table 3).

Thereafter, one study of moderate scientific quality showed that being a working mother during the first six months of the infant's life increased the odds of early cessation of breastfeeding [24]. This assumption has also been described by a prevalence study [25]. In the high quality study by Taveras et al [15] a mother's enrolment in doing part-time studies post-birth showed a significant association with the cessation of breastfeeding before six months. This was also the case, in the study with moderate quality by Lindenberg et al [26]. In the study by Taveras et al [15], two significant predictors for a mother's discontinuation of breastfeeding at two and twelve weeks were studying and low income. Another study of high quality showed that being unemployed prior to giving birth increased the odds for the cessation of breastfeeding, but this association was not significant [27].

Primipara

In two studies of moderate scientific quality by Agboado et al [28] and Hauck et al [16], primiparae were more likely to stop breastfeeding than multiparae, and the association was significant in this case.

Ethnicity

In one study of moderate quality from the UK [28], white mothers were more likely to stop breastfeeding compared to non-white mothers. In two studies of moderate quality from Hong Kong, weaning from breastfeeding was significantly associated with a longer residential stay in Hong Kong [19, 24]. Further, in a high quality study by Taveras et al [15], women of Asian

origin had significantly increased odds for the cessation of breastfeeding at two and twelve weeks post-birth.

Regarding the sociodemographic factors and their association with the cessation of breastfeeding, low evidence was found for the cessation of breastfeeding before six months and being a young mother. Also, low evidence was found, with the mother having a low level of education and her employment status 12 weeks post-birth. More studies are needed in regard to primiparae and the cessation of breastfeeding as well as with regard to ethnicity and its association with the cessation of breastfeeding.

Physical factors

The group physical factors included the following outcomes *birth complications, breastfeeding problems, and overweight/obesity.*

Birth complications and anesthesia during labor

In the British study of high quality, a planned caesarean birth increased the odds for the cessation of breastfeeding before three months, and after adjustments were made, the association was significant [29]. In three studies of moderate scientific quality, birth complications such as caesarean births were considered as a determinant for the early cessation of breastfeeding [16, 17, 28]. Together, these three studies were considered to have a low level of evidence relating to the association between caesarean birth and the cessation of breastfeeding, since it was only observational studies and no increasing or decreasing aspects were identified across the studies (see Table 3). In the study by Brown and Jordan [30], postpartum hemorrhage was also considered a birth complication which significantly

affects the early cessation of breastfeeding. In addition, having epidural anesthesia during labor was shown to be significantly associated with the early cessation of breastfeeding in one study of high quality [27] and in one study with moderate quality [31]. Being given other kinds of anesthesia during labor was also shown to be significantly associated with early cessation [27].

Breastfeeding problems

Several studies covered the fact that breastfeeding problems were a factor associated with the cessation of breastfeeding before six months. To perceive or to experience inadequate milk supply was one of the common reasons for cessation. Also, the delayed onset of lactogenesis II was significantly associated with the cessation of breastfeeding before four weeks in the study by Brownell et al [32]. In the study by Cooke et al [33], inadequate milk was significantly associated with cessation at 2–6 weeks. In the study by Avery et al [18] there was also a significant association between perceived insufficient milk and the early cessation of breastfeeding. These three studies were judged to have moderate scientific quality and the evidence level was considered to be low regarding the association between inadequate milk supply and cessation of breastfeeding before six months, since it was only observational studies and no increasing or decreasing aspects were identified across the studies (see Table 3). Two prevalence studies confirm the result that inadequate milk supply is a common reason for the early cessation of breastfeeding [25, 34].

Several studies have reported that sore or painful nipples have an association with the early cessation of breastfeeding, and a significant association was found in the moderate quality studies by Avery et al [18] and Cooke et al [33]. In the American study comparing women

from Nebraska and Michigan, they found an association between sore nipples and cessation before six months, but the result was non-significant [22]. A prevalence study strengthens the assumption that sore nipples have an association with cessation of breastfeeding [25].

How physical factors such as mastitis affect cessation is unclear because the included studies concerning this factor are small and diverse. A moderate quality study by Schwartz et al [22] showed a significant association between mastitis and cessation in women from Michigan during weeks 1-3 but was non-significant regarding the women from Nebraska during weeks 4-12 post-birth. In the prevalence study by Rousseau et al [25], mastitis was given as the reason for 12 % of the women weaning their infant within the first four months.

Predictors for discontinuation at two and twelve weeks due to the experience of having problems breastfeeding at work or school were found to be significant in a study of high quality by Taveras et al [15]. This assumption is confirmed by the prevalence study of Chuang et al [34] regarding the same factor.

In the moderate quality study by Avery et al [18] the association between cessation and lack of comfort was significant. Further, engorged or leaking breasts were nonsignificant factors associated with cessation [18, 22, 33].

In the moderate quality study by Almqvist-Tangen et al [35], a significant association between breastfeeding problems and the cessation of breastfeeding at one month post-birth was found. In the moderate quality study by Cooke et al [33], breastfeeding problems in general showed increased odds for cessation, but were nonsignificant.

Overweight/Obesity

In the high quality study by Kronborg et al [17, 36] and in the moderate quality study by Ayton et al [17], there were a significant association between high BMI among mothers and the cessation of breastfeeding. In the moderate quality study by Bartok et al [37], a significant association was found between being an obese mother and having ceased breastfeeding before six months, and the association remained after adjustments for confounding factors. Together, these three studies were considered to have a low level of evidence relating to the association between overweight/obesity and the cessation of breastfeeding since it was only observational studies and no increasing or decreasing aspects were identified across the studies (see Table 3).

Regarding physical factors and its association with cessation of breastfeeding before 6 months, there was low evidence for the association between cessation of breastfeeding and caesarean birth, having inadequate milk supply and overweight/obesity. Regarding sore nipples, mastitis, engorgement, and breastfeeding problems in general, there were diverse and contradictory results.

Mental factors

The mental factor that was derived from the studies with the outcomes *depression/anxiety*.

Depression/Anxiety

Having symptoms of depression were significantly associated with the cessation of breastfeeding before six months in the study of high quality by Taveras et al [15] and also in the studies of moderate quality by Bick et al [20] and Ayton et al [17]. However, in the moderate quality studies by Schwartz et al [22] and Cooke et al [38], no association between

depression and cessation of breastfeeding were found. This inconsistency in the association between depression regarding the mother and cessation before six months led to very low evidence (see Table 3). In the high quality study by Clifford et al [27], having a high level of anxiety increased the odds of cessation, and the association was significant.

The result was contradictory regarding the mental factor of depression symptoms and the cessation of breastfeeding before six months. Two studies showed an association with the cessation of breastfeeding, and two studies did not. Therefore, the evidence level regarding this association is very low.

Social factors

Social factors included the outcomes of *intimate partner violence, smoking and support*

Intimate Partner Violence

The moderate quality study by Moares et al [39] focused on the impact that intimate partner violence can have on the duration of breastfeeding. It reveals that severe physical violence during pregnancy was positively associated with the cessation of breastfeeding before five months, but after adjusting for confounders, the association became nonsignificant.

Smoking

In the moderate quality study by Giglia et al [40], the increased odds for cessation were observed concerning women who smoked during pregnancy. The association was significant between two weeks and six months, even after adjustment for confounders. In another study of high quality by Clifford et al [27], a significant association was seen between the early cessation of breastfeeding and a smoker residing in the home. In addition, in the moderate quality study by Almqvist-Tangen et al [35], there was a significant association between

maternal smoking and the cessation of breastfeeding at one month post-birth was found. In the moderate scientific quality study by Liu et al [41], early weaning was significantly associated with persistent smoking and postpartum relapses of smoking. This was significant for >10 cigarettes per day, but was nonsignificant for mothers who smoked fewer cigarettes (1-9 per day). In the moderate quality study by Ayton et al [17], mothers currently smoking increased the odds for cessation of breastfeeding.

Support

In the high quality study by Bick et al [20], it was shown that women who received regular child-care support from female family members were significantly more likely to cease breastfeeding. In the high quality study by Oakley et al [29], non-attendance at baby cafe increased the odds for cessation but became nonsignificant after adjustments were made. Further, having no feeding help or advice from parents or a peer group increased the odds for cessation and remained significant after adjustments were made. The same study showed that having no feeding help or advice from voluntary organizations increased the odds for cessation and remained significant after adjustments were made. In the moderate quality study by Lindenberg et al [26], it was found that having only occasional support from others had a significant association with cessation before four months. Taveras et al [15], in their high quality study, found a significant association between perceiving a lack of support from the father and ceasing breastfeeding at two weeks. In the moderate quality study by Cameron et al [23], the mothers were divided into groups. Among the group that consisted of a high percentage of women who ceased breastfeeding, lack of support from the father significantly increased the odds for the cessation of breastfeeding between six weeks and six months.

Regarding social factors and their association with the cessation of breastfeeding before six months, a few studies were found which focused on smoking and its association with cessation of breastfeeding but at different times during pregnancy and after birth. As a result, it was difficult to grade the evidence level concerning this association.

Regarding the association between support and the cessation of breastfeeding, the result was inconsistent because the studies were looking at different kinds of support. Therefore, more studies are needed for the accurate assessment of the evidence. Only one study was found regarding the association between intimate partner violence and cessation of breastfeeding; therefore, more studies are needed.

Insert Table 4.

DISCUSSION

Considering the sociodemographic factors and their association with the cessation of breastfeeding before six months, low evidence was found for the association regarding the mother's young age, low level of education, and return to work within 12 weeks post-birth.

The evidence was low taking into account the effects of physical factors such as a caesarean birth, overweight/obesity and inadequate milk supply and its association with the cessation of breastfeeding before six months. Regarding mental factors, the evidence was very low concerning depression among the mothers and its association with the cessation of breastfeeding. However, since the possibility to perform any other study design than observational studies for this topic might be seen unethical, we consider our result to be based on the highest possible level of evidence.

369 The result also shows that mothers who are young and have a low level of education are
370 significantly associated with the cessation of breastfeeding before six months. This is
371 confirmed in another study by Dubois and Girard [42] where the combined effects of the
372 mother's age and level of education was so strong that family income, family type, and
373 employment status became nonsignificant in the adjustment model [42]. The reason behind
374 low maternal educational level and cessation of breastfeeding could be explained by both
375 motivational and social influences. Therefore, the support given should be done through
376 reliable and practical advice, tailored to existing parent motives and varying child
377 characteristics and framed in motivating ways [43].

378

379 Six studies focused on returning to work within 12 weeks post-birth and the association of
380 this with the cessation of breastfeeding before six months [15, 19-23]. One explanation for
381 this could be practical issues related to working and continuing to breastfeed at the same
382 time. According to the study by Tarrant et al [19], women who start working early in the
383 postpartum period introduce formula at an early stage so the child can get used to it, and that
384 could explain the cessation of breastfeeding. In light of this, health-care advisors and nurses
385 could advise women on how best to continue breastfeeding when returning to work.

386

387 Birth complications, such as caesarean births, were considered to be a determinant for the
388 early cessation of breastfeeding in several studies [16, 17, 28, 30]. The reason behind this
389 association could be related to operative deliveries possibly having a detrimental effect on
390 breastfeeding and may be explained by a delayed breastfeeding initiation [28]. A study by
391 Grassley et al [44] showed that formula was more common among babies delivered by
392 caesarean birth and according to Parry et al [45] delayed initiation of breastfeeding along
393 with early and frequent introduction of formula could explain why caesarean birth is

associated with early cessation of breastfeeding. Another study by Hung et al [46] showed that early skin to skin contact between baby and mother after cesarean birth could reduce the amount of formula given after the surgery. Nurses and midwives should be leaders in incorporating this practice as routine care after cesarean birth.

To perceive or to experience inadequate milk supply was one of the common reasons for cessation before six months [18, 32, 33]. According to the study by Kent et al [47], the problem with the experience of having insufficient milk supply is that it's common for people to harbor misconceptions. The misconceptions can be such things as using the baby's satiety as a parameter and whether the women's breasts feel softer after a few weeks. Other misconceptions include, the baby being unsettled and then settling better after formula given and a decrease in growth after three months. However, these signs are not accurate indicators of milk supply. Better parameters of whether or not milk supply is adequate are the number of wet nappies produced, infant alertness, skin color, muscle tone, and consistent growth and weight gain. This information and knowledge needs to be given from the nurses working within child health care as well as the midwives working in the maternity ward.

The contradictory result regarding depression and cessation of breastfeeding resulted in a very low quality of evidence and more studies are needed. However, another study conducted by Schmied and Barclay [48] found that breastfeeding was central to a woman's maternal identity. But only a few women interviewed in this study thought breastfeeding was a pleasurable activity. Most of the women described breastfeeding with ambivalent feelings and disappointment and this could explain the contradictory result [48]. Breastfeeding could be an emotionally loaded experience and maternal depression could be either a cause or a consequence of decisions to cease breastfeeding. Health care professionals should assist

women by considering the psychosocial context of women`s lives when supporting them in their infant feeding [49] .

Methodological considerations

Additional search terms, search blocks, or inclusion as well as exclusion criteria could have been used. The preassigned search terms is a limitation, since some risk factors could have been unknown or only partially studied (eg. alcohol or drug use, severe psychiatric illnesses (psychosis), breastfeeding confidence as a mental factor, support)

For this study, low birth weight and prematurity were exclusion-criteria. This resulted in many articles being excluded from this study because many of the studies found had included these populations. However, earlier studies have shown a significant association with the early cessation of breastfeeding and low birth weight as well as prematurity [50, 51]. As a result, the studies including these infants were excluded. The fact that the inclusion and the exclusion criteria have been firm from the beginning and were followed closely and strictly throughout the data collection process could be seen as an asset in this study. Many duplicates were found in the three databases and suggests that the search area was wide. The quality assessment of the studies has been undertaken by the first and the last author, and agreement has been reached between the authors. Many of the included articles were judged to have medium quality. The reasons for this were i) it was rare to find studies with information about the loss of participants, ii) what the characteristics concerning these looked like and iii) what kind of selection bias that could have resulted in. In many cases, observational study is the only possible design for the topics, since you cannot perform trials of eg. caesarean section, depression, or employment to study the effect on breastfeeding. Therefore, the review presents the highest possible evidence level.

Conclusions

Sociodemographic factors were seen to have caused cessation of breastfeeding in some of the included articles, and a focus should be placed on how to improve the knowledge of health-care professionals as it is clear that sociodemographic factors have an effect on health behavior. Physical, mental, and social factors could be seen more as a result of health and behavior which is affected by the sociodemographic factors. These factors should be considered through targeted interventions focusing on mothers who are at risk of ceasing breastfeeding before the recommended time. The focus should be on identifying both mothers who are at risk because of known factors and behavior that can be prevented. To prolong the breastfeeding period, targeted attention and suitable interventions should be directed towards mothers who are at risk of early cessation of breastfeeding.

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