

Comparison of Maternal Absenteeism and Infant Illness Rates Among Breast-feeding and Formula-feeding Women in Two Corporations

Rona Cohen, Marsha B. Mrtek, Robert G. Mrtek

Abstract

Purpose. A comparison was made between breast-feeding and formula-feeding among employed mothers. Absenteeism directly related to child care was examined.

Design. This quasi-experimental study followed convenience samples of breast-feeding and formula-feeding mothers until their infants were weaned or reached 1 year of age.

Setting. Two corporations with established lactation programs were used. One had approximately 100 births annually among 2400 female employees, and the other had approximately 30 births annually among 1200 female employees.

Subjects. A sample of 101 participants, 59 feeding breast milk and 42 using commercial formula, was composed of employees returning from maternity leave for a medically uncomplicated birth.

Intervention. The programs provided counseling by a lactation professional for all participants and facilities to collect and store breast milk.

Measures. Confidential participant diaries provided descriptive data on infant illnesses and related absenteeism that the lactation consultant verified with health care providers and employer attendance records.

Analysis. Attribute counts of illnesses and absenteeism were reported as percentages. Single degree of freedom χ^2 tests were used to compare rates between nutrition groups.

Results. Approximately 28% of the infants in the study had no illnesses; 86% of these were breast-fed and 14% were formula-fed. Men illnesses occurred 25% of all 1-day maternal absences were among breast-fed babies and 75% were among the formula-fed group.

Conclusions. In this study fewer and less severe infant illnesses and less maternal absenteeism was found in the breast-feeding group. This was not an experimental study. Participants were self-selected, and a comparison group was used rather than a true control group. Corroboration of these findings from larger experimental studies is needed to generalize beyond these groups. (*Am J Health Promot* 1995;10[21]:148-53)

Key Words: Corporate Lactation Program, Breast-feeding Duration, Maternal Absenteeism

INTRODUCTION

In American society the mother has traditionally borne the responsibility for the health care of her children. The dramatic increase in the participation rate of women in the work force, from 28% in 1940 to 56.6% in 1988, has not significantly altered that tradition.^{1,2} By 1990, 71% of the women employed in the civilian labor force had children, with 53% returning to the workplace before their children reached 1 year of age.³

At the same time the number of employed women has been increasing, the tradition of the extended family has been waning. As a consequence, most children of employed mothers are cared for by nonfamily members either in group care or in-home arrangements. Day-care providers who are not family members seldom assume responsibility for a child's health care. Even in group care situations in which one sick child can pose a serious threat to the health of all the children, the family is called on to deal with an episode of illness. In these circumstances, it is usually the mother who handles any emergencies—often to the detriment of her attendance record at work.⁴

This parenting "fact of life" has fiscal implications for companies. Permitting employees to take time off for family responsibilities may result in lower productivity, but the consequences of not doing so can be expensive as well. An employee who is required to remain at the worksite while worried about a sick child may be less productive than one whose

Rona Cohen, RN, MN, FPNP, CLE, is Assistant Clinical Professor, Maternal Child Health Division, School of Nursing, University of California, Los Angeles, California. Marsha B. Mrtek, PhD, is Research Consultant for Medela, Inc., McHenry, Illinois. Robert G. Mrtek, PhD, is Professor, Medical Education, College of Medicine, University of Illinois, Chicago, Illinois.

Send reprint requests to Rona Cohen, RN, P.O. Box 6241, Beverly Hills, CA 90212.

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entire attention can be focused on the job. To the extent that an employee finds no available compromise in making choices on the basis of concern either for family or for employment, job satisfaction may be eroded. By displaying a lack of concern about the family needs of employees, the employer may sacrifice a measure of loyalty that might eventually result in increased employee turnover and the attendant upheavals and expenses.

It has frequently been demonstrated that infants who are fed breast milk rather than formula for the first 5 to 6 months of life exhibit more robust health.⁵⁻⁷ In addition to other health advantages, breast milk has been shown to decrease the incidence of gastrointestinal illnesses and otitis media.^{5,8-10} These are common illnesses among infants that, if left untreated, can lead to hospitalization.

At least 50% of women who are employed when they become pregnant return to the labor force by the time their children are 3 months old.¹¹ Continuation of breast-feeding among these women after the time they return to work could have important consequences for infant health. National norms, however, indicate that only 10% of employed mothers continue feeding their infants breast milk for the recommended first 6 months of life.¹²

Because infant illness is a frequent cause of absenteeism among employed mothers, programs that aim to improve infant health may also bring about a reduction in maternal absenteeism. An important component of the evaluation of corporate lactation programs is an assessment of their direct and indirect costs and benefits. A previous study conducted in the same setting as this one demonstrated that corporate lactation programs can be effective in enabling participants to feed their infants breast milk for the first 6 months at the same rate as women not employed outside the home.¹³ The purpose of this study is to examine the possibility that feeding breast milk can alter the frequency and/or severity of infant illnesses and therefore reduce that portion of absenteeism among employed mothers directly attributable to the necessity of caring for a sick child.

METHODS

Design

A descriptive longitudinal study of quasi-experimental design was used to investigate the relationship between maternal absenteeism necessitated by infant illness and the use of commercial formula or breast milk as the infant's nutritional source. The dependent variables were infant illness episodes, incidence and length of maternal absences from work, illness diagnosis, and severity of the disease. The independent variable was the infants' source of nutrition, either commercial formula or breast milk. Each mother and infant was observed until weaning or for 1 year after birth to provide comparable data.

Sample

The study was conducted at two corporations with on-site lactation programs. One was a utilities company with 11,000 employees, 22% of whom were female. Approximately 100 births per year occur in this company. The second was an aeronautics corporation with 3,900 employees, 31% of whom were female. Approximately 30 births per year occur in this company.

All participants had medically uncomplicated deliveries between June 1988 and June 1990. One group of women breast-fed either fully or partially with no more than two supplementary bottles of formula per day. While at work, these women collected and stored breast milk through the lactation program at their company. A second nonequivalent group of women fed their infants commercial formula. Convenience samples were obtained from these two employee cohorts. Volunteers completed a questionnaire on return from maternity leave and were assigned to groups sequentially as questionnaires were returned.

A total of 101 mothers were studied in the two companies; 59 fed breast milk, and 42 used commercial formula. Fifty-six women from the utility company volunteered; 28 fed breast milk, and 28 fed formula. At the aeronautics company, 31 breast-feeding and 14 formula-feeding mothers volunteered.

The participants closely matched

the profile described by Ryan and Martinez¹² for individuals most likely to combine full-time employment and breast-feeding: women older than 25 years of age, well-educated (college), in a higher income group (>\$25,000), and living in the western portion of the United States. Two of the women (one in each nutrition category) were younger than 25 years of age. All but one participant had at least a high school diploma. More women with higher education (college and advanced degrees) were found in the breast-feeding group. More than 80% of the participants who chose breast-feeding earned at least \$30,000 annually; 26% earned more than \$60,000. Among formula-feeding participants, 40% earned \$30,000 or more, and 15% earned more than \$60,000. The formula-feeding group was 74% Asian or Hispanic and 26% white, African-American, and others. The breast-feeding group included 28% Asian or Hispanic and 72% white, African-American, or others. The birth order was almost evenly divided between first or second. All but two of the women were married.

Measurement

Demographic data, including age; ethnic background; income level; education; marital status; number, age, and gender of children; and family members' smoking habits, were obtained from the questionnaires used to identify the study sample. The questionnaires also provided information specifically related to the pregnancy such as prematurity, gestational age of the infant, medical problems encountered, length of maternity leave, use of breast milk or formula, infant's age when the mother returned to work, and type of child care.

Descriptive data regarding infant illnesses were reported retrospectively from confidential diaries maintained by the women as a condition of participation. For the purpose of this study, an illness episode was defined as the occurrence of one or more symptoms lasting for more than 1 day. Unusual patterns of infant behavior (such as "fussiness") lasting for 1 day or less, without other accompanying symptoms, were not counted.¹⁴ Infant illness information was verified by a health

care provider in all except 21 of the 205 episodes reported during this study. Six of these were in the breast-feeding group, and 15 were in the formula-feeding group. Data were gathered for breast-fed babies until they stopped using breast milk or until they reached 1 year of age, whichever period was shorter. Formula-fed babies were followed up until 1 year of age. The following definitions were applied.^{15,16}

- Upper respiratory infections were specified as cold, cough, bronchitis, or ear infection when it occurred as part of a cold.
- Gastrointestinal infections referred specifically to diarrhea.
- Otitis media was limited to a moderately severe ear infection without an accompanying cold.

The severity of an illness episode was characterized as mild, moderate, or severe using the definitions below.

- Mild: Characteristic symptoms of an illness were present but were not sufficiently severe to warrant a physician's visit.
- Moderate: Symptoms led to a confirmed diagnosis after a visit to a health care professional.
- Severe: Symptoms were so serious that hospitalization was necessary.

A medical follow-up visit to confirm a continuing illness or recovery was considered to be a part of the same illness episode. An illness episode was deemed resolved when the baby no longer had symptoms and returned to its normal activity level.

Instances of maternal absenteeism directly attributable to infant illness

were self-reported. Each participant was assured confidentiality to avoid possible employment complications regarding the use of time away from work to provide child care. The lactation consultant contacted each participant at least once a month to ensure that records were maintained in a timely and accurate manner. Independent verification of absence dates was obtained from department records. Absences were recorded there as "sick" or "personal time." These data were used to calculate absence rates and make comparisons across nutritional sources.

Intervention

On-site study management, including recruitment of participants and data collection and verification, was the responsibility of the lactation consultant for the two corporate lactation programs where the study was conducted. The corporate lactation programs maximized the opportunity for employed mothers to continue breast-feeding after their return to work by providing the physical facilities and equipment needed within the framework of a management-supported program. The employees collected and stored breast milk using a pump room provided at the worksite at scheduled times during their work shift. A lactation professional managed the program, provided prenatal classes, maintained the equipment and schedules, and provided individual counseling for employees and their families as needed. These programs were described in specific detail in a previous publication.¹³

Counseling by the lactation professional was available for both nutritional groups throughout the study. The only obligation accepted by the mothers participating in this study was to maintain a confidential diary of infant illnesses and directly related absenteeism and to clarify the data submitted when necessary.

Analysis

The data collected in this study were attribute counts summarized as percentage rates: number of ill babies, number of illness episodes, days of maternal absenteeism, diagnostic category of illnesses, severity of illnesses. Results from this study are reported with both the infant and the individual illness episode as units of analysis, with statistical comparisons being made across the nutritional source groups. The frequency and severity of illness episodes were compared separately between nutritional sources within each company. Data from the two companies were combined after no significant differences were found between the companies. In each instance the significance of the observed differences in percentage rates between nutritional groups was assessed using single degree of freedom χ^2 tests corrected by Yates' method for continuity in small samples.¹⁷ Null hypotheses were tested across the nutritional groups for equivalent percentage rates among disease prevalence, severity of illness episodes, and maternal absence days per illness episode. Statistical analyses were conducted using the SPSS analysis package (SPSS, Inc., Chicago).

Table 1

Distribution of Well and Ill Babies by Nutritional Groups*

Illness Episode	Breast Milk				Formula				Total	$\chi^2(p)^\dagger$
	Number Observed	Number Expected*	Column (%)	Row (%)	Number Observed	Number Expected	Column (%)	Row (%)		
Well babies	24	16.35	41	86	4	11.65	10	14	28	10.398 (<.005)
Ill babies	35	42.65	59	48	38	30.35	90	52	73	
Total	59	—	—	—	42	—	—	—	101	

*Well babies experienced no illness episodes during the study; ill babies displayed one or more episodes of one or more symptoms lasting more than 1 day.

†Expectancies for χ^2 based on Null hypothesis of equivalent prevalence rates in each nutritional group.

‡ χ^2 with 1 degree of freedom; p, two-tailed probability that the percentage rates are the same.

RESULTS

The study was composed of 101 babies, 59 breast-fed and 42 formula-fed. Other than ethnoracial composition of the groups, no significant differences were found among the two nutritional groups for any of the demographic variables. Approximately 28% (28 of 101) of the infants were "well babies," who experienced no illnesses during the study. The "well babies" group was composed of 24 breast-fed babies (86%) and 4 formula-fed babies (14%). The sixfold difference between rates of occurrence in the two nutritional groups is statistically significant ($p < .005$). This proportion did not differ significantly between the two companies. Table 1 and Figure 1 summarize these results.

Counting only the number of babies who were sick can be misleading. One infant may experience a greater number of illness episodes than another. Each episode of infant illness is a potential cause of maternal absenteeism. Therefore individuals are the measurement units only for well babies. All other results are reported

using illness episodes as the unit of analysis.

All the breast-fed babies in this study received breast milk exclusively (or not more than two bottles of supplement daily) until at least 6 months of age. When babies received more than two supplement bottles daily, they were considered as being weaned from breast milk and were excluded from the study. Sixteen of the 59 breast-fed babies remained in the study for 12 months, but others were weaned sooner. The average length of time in the study for the breast-fed babies was 9 months.

Nonuniform time periods in this study do not adversely affect comparisons of percentage rate of illnesses within each group. Percentages of illnesses categorized in some way, for each group separately, are not affected by unequal numbers of illness episodes in the groups. For this reason it is possible, for example, to compare the percentage of illness episodes that resulted in maternal absenteeism in the breast-feeding group with the similarly calculated percentage in the formula-feeding group.

A total of 205 illness episodes occurred among 73 babies during the period of this study: 88 occurred in 35 breast-fed babies and 117 in 38 formula-fed babies. The rates are significantly different from expecta-

Figure 1
Distribution of Well and Ill Babies by Nutritional Groups

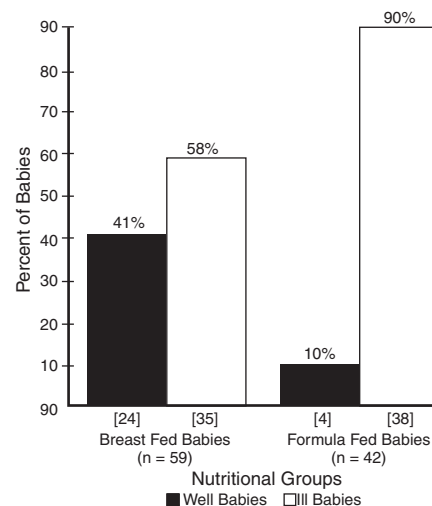


Table 2

Distribution of Infant Illness and Maternal Absences Between Nutritional Groups

Illness Episode	Breast Milk				Formula				Total	$\chi^2(p)^\dagger$
	Number Observed	Number Expected*	Column (%)	Row (%)	Number Observed	Number Expected	Column (%)	Row (%)		
Diagnosis										
Upper respiratory infection	58	60.92	66	41	84	81.08	72	59	142	0.168 (<0.7)
Gastrointestinal infection	9	—	10	53	8	—	7	47	17	N.C.‡
Otitis media	20	18.02	23	48	22	23.98	19	52	42	0.212 (<0.7)
Hospitalized for any reason	1	—	1	N.C.	3	—	3	N.C.	4	N.C.
Total	88		(100)		117		(101) [§]		205	
Severity										
Mild	29	21.88	33	57	22	29.12	19	43	51	3.508 (<0.1)
Moderate	58	64.35	66	39	92	85.65	79	61	150	0.932 (<0.4)
Severe	1	—	1	N.C.	3	—	3	N.C.	4	N.C.
Total	88		(100)		117		(101) [§]		205	
Maternal absence (days/illness)										
0	65	56.63	74	49	67	75.37	57	51	132	1.916 (<0.2)
1	10	17.16	11	25	30	22.84	26	75	40	4.527 (<0.05)
>1-4	11	—	12	42	15	—	13	58	26	N.C.
>4	2	—	2	N.C.	5	—	4	N.C.	7	N.C.
Total	88		(99) [§]							

*Expectancies for χ^2 based on Null hypothesis of equivalent prevalence rates in each nutritional group.

† χ^2 with 1 degree of freedom; corrected for continuity (Yates); p , two-tailed probability that the percentage rates are equivalent.

‡N.C., not calculated.

§ Does not total 100% because of rounding.

tion ($p < .05$), assuming equal illness rates in both groups after adjusting for group size. These results are summarized in Table 2. Upper respiratory tract infections and otitis media were the two diagnoses occurring frequently enough to be tested reliably. The rates of occurrence of each diagnosis among the illness episodes in the two nutritional groups were not statistically different.

Among the illnesses reported, 51 were labeled mild, 150 moderate, and 4 severe. Within each severity category, the differences between rates of occurrence in the two nutritional groups were not significant. The statistical test for mild illnesses, however, is suggestive of a real difference. Among breast-fed babies, 33% of all illness episodes (29 of 88) were “mild,” 66% (58 of 88) were “moderate,” and 1% were “severe.” This compares with 19% (22 of 117) “mild” episodes, 79% (92 of 117) “moderate”

episodes, and 3% (3 of 117) severe episodes for the formula-fed babies.

Absenteeism was reported only when directly attributable to infant illness. “Well babies,” by definition, were never ill. Thus the 24 mothers of well babies in the breast-feeding group and 4 in the formula-feeding group were not absent from work during the course of the study.

Table 2 and Figure 2 show that some documented illness episodes were sufficiently mild in nature that no maternal absenteeism was necessary. In the breast-feeding group 74% of all episodes reported (65 of 88) were “zero-absence” illnesses, as were 57% (67 of 117) of all episodes reported in the formula-feeding group. Forty-nine percent of all “zero-absence” illnesses occurred in breast-fed babies and 51% in formula-fed babies. These results are not statistically different from expectation on the basis of an assumption of equal

percentage (50%) distribution in the two groups.

Of 40 illnesses causing 1 day’s absence, 25% occurred in breast-fed babies and 75% in formula-fed babies. This rate difference is significant ($p < .05$) on the basis of an expectation of equal percentage occurrence in the two groups (see Figure 2). Absences lasting more than one 8-hour day up to 4 full workdays were reported for 11 episodes in the breast-feeding group and 15 in the formula-feeding group. The remaining illnesses, regardless of cause, were complicated and often required hospitalization. Absences caused by these seven episodes ranged from 5 to 25 days.

DISCUSSION

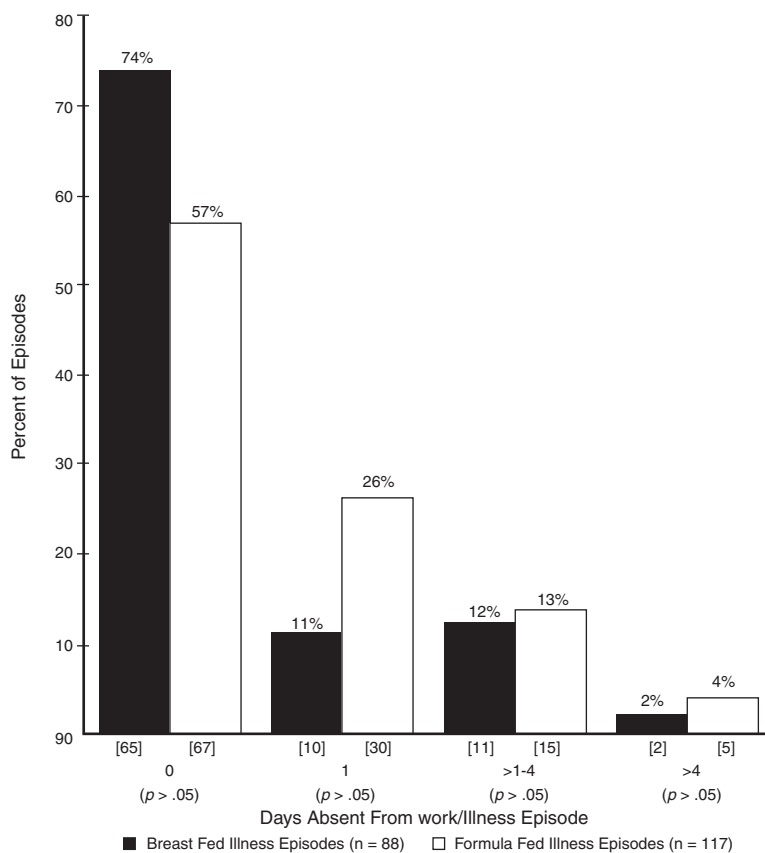
Results of this study support widely published findings that, when compared with formula-fed babies, infants receiving breast milk have lower rates and less severe episodes of the common illnesses studied.⁵⁻¹⁰

The data support the assumption that infants in each nutritional group had a similar risk of acquiring the specific illnesses studied. Similar percentages of each diagnostic category were found. Also, the difference in percentage rates of illness occurrence at each level of severity across the nutritional groups is not significant.

An employee in this study was not absent if her infant was never sick or had only mild illnesses that did not require her to remain at home to provide care. In the breast-feeding group “well babies” were six times more prevalent, a difference that is statistically significant. This proportion did not differ significantly between the two companies. In the breast-feeding group 74% of illness episodes did not cause maternal absenteeism, compared with 57% in the formula-feeding group. The observation that 1-day absences occurred more than twice as often among formula-feeding mothers was significant (26% versus 11%, $p < .05$). Fewer than 20% of all infant illnesses regardless of nutritional source resulted in absences longer than 1 day. Once babies became ill enough to require medical intervention, the absence pattern of all

Figure 2

Distribution of Illness Episodes and Maternal Absenteeism by Nutritional Groups



mothers was similar with no apparent nutritional source influence.

Increasing awareness that feeding babies breast milk is beneficial and compatible with the mother's return to work is an important health promotion goal. Preliminary evidence supports the assertion that activities such as corporate lactation programs can influence infant health by promoting and supporting breast-feeding continuation. This study also suggests that corporate lactation programs can partially offset their expense by reducing maternal absenteeism and health care costs.

This study was limited in that it did not use an experimental design. Participants were self-selected on the basis of nutritional choice and were a convenience sample from programs already in place. A comparison group with similar demographic characteristics was used rather than a true control group. Equal group sizes could not be achieved within the constraints of this nonrandomized study because of the prevalence of breast-feeding. Observations based on these relatively small groups indicate trends, but should not be used for predictions regarding other groups. These results must be viewed within this limited context and

should be corroborated using true experimental methods before attempts are made to generalize the findings.

SO WHAT? Implications for Health Promotion Researchers and Practitioners

This study shows that women who breast-feed their babies are less likely to be absent from work because of baby-related illnesses and less likely to have long absences when they do miss work compared with women who feed their infants formula. These findings should be considered preliminary because of limitations of the study methods and the lack of other studies on this issue. If these findings are replicated, programs to help women breast-feed their babies may be beneficial for employers.

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