BREASTFEEDING OPINIONS OF MEDICAL STUDENTS AT THE OKLAHOMA STATE UNIVERSITY COLLEGE OF OSTEOPATHIC MEDICINE

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Bachelor of Science in Public Health Nutrition

The University of North Carolina

Chapel Hill, North Carolina

1984

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
MASTER OF SCIENCE
May, 1990

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ACKNOWLEDGMENTS

I would like to express my sincere appreciation to my major adviser, Dr. Bernice Kopel, for her advice and encouragement throughout this research project. Her guidance was invaluable in the development and completion of this study. I would also like to thank Dr. Barbara Stoecker and Dr. Elaine Jorgensen for their suggestions and support. Their input was very helpful throughout the study.

Special thanks go to Dr. Martin Banschbaugh of the Oklahoma State University College of Osteopathic Medicine. Dr. Banschbaugh was extremely helpful in arranging for my survey of medical students at the College of Osteopathic Medicine. I am grateful for his assistance with the scheduling and arrangements for the study.

I am also grateful for the assistance of Dr. William Warde in the compilation and analyses of my data. His input and guidance were much appreciated.

My husband, Steve, was very supportive and encouraging throughout my Masters program. To him I express my sincere thanks for seeing me through this experience.

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CHAPTER I

INTRODUCTION

Breastfeeding has been recognized by most major health organizations as the superior form of infant feeding. Benefits of breastmilk over infant formula include superiority of nutrient composition and the provision of immunological factors to the infant, which gives the newborn increased protection against infection in the first months of life (Worthington-Roberts, Vermeersch, & Williams, 1985). Psychological benefits, including increased maternal/infant bonding, have also been cited (Baronowski, Rassin, Richardson, Brown, & Bee, 1986). The American Academy of Pediatrics (1978), in endorsing breastfeeding, cites nutritional, immunologic, and economic advantages. The American Dietetic Association, in its position paper on breastfeeding (1986) states:

> The American Dietetic Association advocates breast feeding because of the nutritional and immunologic benefits of human milk and the physiological, social, and hygenic benefits of the breast feeding process for the mother and infant. (p. 1580)

The past decade has seen an upswing in the incidence of breastfeeding in the United States. In 1984, 65 percent of white women and 33 percent of black women chose breastfeeding (Martinez & Krieger, 1985). The United States Surgeon General's "Health Promotion/Disease Prevention Objectives for the Nation" (1980) includes that by 1990, the total number of women breastfeeding their infants at hospital discharge

should be increased to 75 percent, with 35 percent still breastfeeding their infants at six months postpartum.

Medical professionals can play a significant role in motivating a mother to breastfeed (Baranowski et al., 1986). Physicians, in their role as primary care providers, have the opportunity to actively promote breastfeeding when working with pregnant patients. Specifically, obstetricians who follow the patient in the course of pregnancy have numerous opportunities to educate and support the woman in her decision to breastfeed. Medical students of today, as future physicians, need to be aware of the importance of breastfeeding and of their role in providing education and support in breastfeeding to their future patients.

Purpose

The purpose of this study was to determine opinions of breastfeeding among medical students at the Oklahoma State University College of Osteopathic Medicine, and the relationship of selected variables to the opinions expressed by the medical students. The objectives of the study were expressed as research questions. These were:

1. Is there a significant relationship between opinions of breastfeeding and the subjects' year in medical school?

2. Is there a significant relationship between opinions of breastfeeding between subjects with children who were breastfed compared with subjects who did not have breastfed children?

3. Is there a significant relationship between the opinions of breastfeeding and the gender of the subjects?

4. Is there a significant relationship between the opinions of breastfeeding and the subjects' level of nutritional knowledge of breastfeeding?

Hypotheses

The hypotheses for this study were as follows:

H_1: There is no significant relationship between opinions of breastfeeding and the subjects' year in medical school.

H_2: There is no significant relationship between opinions of breastfeeding for subjects with children who were breastfed compared with subjects who did not have breastfed children.

H_3: There is no significant relationship between opinions of breastfeeding and the gender of the subject.

H_4: There is no significant relationship between opinions of breastfeeding and the subjects' level of nutritional knowledge of breastfeeding.

Assumptions

One assumption made in this study is that the subjects were honest in answering the questionnaire. The assumption is also made that opinions identified in the study will reflect the level of education and support of breastfeeding that these students will bring into their future professional practice.

Limitations

One limitation of this study is that the population of medical students polled was limited to first, second, and third year medical

students who are enrolled at the Oklahoma State University College of Osteopathic Medicine. Hence, the findings cannot be extrapolated to the general population of medical students.

A second limitation of the study is that the sample was limited to medical students who were in attendance at the Oklahoma State University College of Osteopathic Medicine during the two days of the survey. Therefore, the findings cannot be extrapolated to the entire population of osteopathic medical students at the Oklahoma State University College of Osteopathic Medicine.

The third limitation is that the pretest group consisted of students in a graduate level course entitled Health Promotions, hence did not emulate the medical students.

Definition of Terms

The following terms are defined for this study:

Medical Student: An individual currently enrolled as a first, second, or third year medical student at the Oklahoma State University College of Osteopathic Medicine in Tulsa, Oklahoma.

Opinion: "A view, judgment, or appraisal formed in the mind about a particular matter." (Webster's New Collegiate Dictionary, 1974, p. 805)

CHAPTER II

REVIEW OF THE LITERATURE

Breastfeeding has been recognized as the superior choice for the nutrition of newborn infants. However, bottlefeeding is still widespread in use for infant feeding in our country (Martinez & Krieger, 1985). This review of literature will discuss advantages of breastfeeding, current trends in breastfeeding in the United States, and the support of breastfeeding by health professionals. In addition, influences which impact on the mothers' decision to breastfeed and methods to support breastfeeding will be discussed.

Advantages of Breastfeeding

Most health professionals recommend breastfeeding for reasons which impact on the improved health status of the newborn infant. Benefits of breastfeeding include nutritional, immunologic, physiologic, and psychological factors.

Nutritional

Human breastmilk contains all of the nutrients needed by the rapidly growing infant. Breastmilk is a species-specific form of nutrition, and although artificial milks closely mimic human breastmilk, none have been able to match its exact nutrient composition (Worthington-Roberts, Vermeersch, & Williams, 1985). In particular, the

American Academy of Pediatrics (1978) has pointed to several significant differences between human breastmilk and commercial infant formulas. One difference is that the cholesterol content of human milk is higher than commercial infant formulas. Although the reason for the higher cholesterol content in human milk is unclear, it has been speculated that the cholesterol may be used for the infant's growing central nervous system or may assist the infant in developing enzymes used later in life for cholesterol degradation (Worthington-Roberts, Vermeersch, & Williams, 1985).

Other differences noted, the implications of which are unclear, include a higher level of polyunsaturated fatty acids in commercial infant formulas, and slight differences in the amino acid composition between commercial formulas and human milk.

Immunologic

Human breastmilk contains immunologic components, which the newborn infant acquires from breastmilk while his/her own immune system is in the process of development. These immunologic components, which include IgA, IgG, and IgM, help to protect the infant against bacterial invasion of the mucosa or gut. Colostrum, the first secretions produced by the human mammary glands in the first days after childbirth, is rich in immunological factors. One component of colostrum is bifidus factor, which facilitates the growth of "bifidus flora" in the infant's sterile intestinal tract (Worthington-Roberts, Vermeersch, & Williams, 1985). Because of the benefits of immunological factors provided by breastmilk, the breastfed infant may be less likely to have gastroenteritis, intestinal, and respiratory infections (American Academy of Pediatrics, 1978).

Physiologic

Formula fed infants tend to gain weight at a faster rate than breastfed infants, particularly after the first three to four months of age (American Academy of Pediatrics, 1978; American Dietetic Association, 1986; Worthington-Roberts, Vermeersch, & Williams, 1985). One explanation is that the breastfed infant will feed until satiety is reached, whereas the formula fed infant may be encouraged to consume the remaining formula in the bottle after satiety is reached. The process of feeding from the breast also requires more physical exertion by the infant (American Dietetic Association, 1986). The slower pattern of growth for infants over four months of age may represent a more ideal growth pattern (Worthington-Roberts, Vermeersch, & Williams, 1985).

Because the sucking movements of the breastfed infant strengthens oral muscles (American Dietetic Association, 1986), breastfeeding may encourage enhanced jaw muscle development in infants. Orthodontic problems may occur at higher rates in bottle fed infants (Worthington-Roberts, Vermeersch, & Williams, 1985).

The woman who chooses to breastfeed also receives physiologic benefits. The nursing mother expends extra calories each day through milk production, which promotes an increased loss of the additional weight gained during pregnancy. In addition, the stimulus of suckling triggers the pituitary gland to secrete the hormones oxytocin and prolactin. "One function of oxytocin is involution of the uterus, which assists the return of the prepregnancy uterine tone" (Public Health Service, 1984, p. 13). Prolactin acts in the supression of ovulation, which provides a natural contraceptive effect.

Psychologic

The physical closeness and skin-to-skin contact between mother and infant during breastfeeding may strengthen maternal-infant bonding (Winikoff & Baer, 1980). The extended physical contact of breastfeeding may enhance the mother's behavior with her infant, including ". . . greater soothing contact," and ". . . more eye-to-eye contact" (American Academy of Pediatrics, 1978, p. 596).

Other Advantages of Breastfeeding

Other advantages of breastfeeding include economic and convenience considerations. Parents do not have to purchase formula or the equipment necessary to bottlefeed an infant. There is also a savings associated with lessened medical costs due to reduced incidence of infections. Breastfeeding also can be more convenient as the milk is always ready for feeding, warm and sanitary.

Trends in Breastfeeding

The United States has recently seen an upswing in the incidence of breastfeeding. In 1984, a total of 61 percent of infants were breastfed, compared with 54 percent in 1980, and 24.9 percent in 1970 (Martinez & Krieger, 1985). The incidence of breastfeeding in 1984 was highest in the western pacific portion of the country (77.7%), and the lowest in the east south central portion of the country (45.9%) (Martinez & Krieger, 1985). Breastfeeding was selected more often in the population of women who are white, college educated, with upper income levels. The lowest incidence of breastfeeding has been seen

among women who are black, less educated, at low income levels, and younger than 20 years of age (Martinez & Krieger, 1985).

A recent trend has been a plateau in breastfeeding incidence among college educated women with upper income levels. The incidence of breastfeeding in this group increased by less than one percent between 1983 and 1984. However, in this same time period breastfeeding increased by 3.5 percent among black women in the United States (Martinez & Krieger, 1985).

The incidence of breastfeeding for employed women (whom many assume breastfeed less often), was slightly higher in 1984 than breastfeeding incidence among unemployed women (Martinez & Krieger, 1985). However, duration of breastfeeding was shown to be longer for unemployed women.

Support of Breastfeeding by Health Professionals

Breastfeeding has been cited as the optimal choice for infant feeding by organizations representing health professionals, including the American Academy of Pediatrics (1978) and the American Dietetic Association (1986). In the 1990 Objectives for the Nation (1980) the U. S. Surgeon General established the following goal:

> By 1990, the proportion of women who breastfeed their babies should be increased to 75 percent at hospital discharge and to 35 percent at six months of age. (n.p.)

In 1982, the American Academy of Pediatrics published their policy statement Promotion of Breastfeeding. Within this policy statement was announced the primary goal,

> . . . to encourage optimal nutrition through the promotion of breastfeeding, stressing the superiority of human milk and the proper use of nutritionally appropriate breastmilk substitutes for infants who cannot breastfeed. (p. 660)

In 1986 the American Dietetic Association, (ADA), published the position paper, "Promotion of Breastfeeding." In the position paper, the ADA noted that "dietitians have a vital role and responsibility in identifying and removing the barriers that prevent successful breastfeeding" (p. 1583). Recommendations include the encouragement of member dietitians to involve themselves in nutrition education campaigns that support breastfeeding, assist breastfeeding support groups, and work with other groups of health professionals to promote a multidisciplinary approach that encourages breastfeeding.

Influences

The decision whether or not to breastfeed is usually made before or early in pregnancy (Sarrett, Bain, & O'Leary, 1983), and a variety of factors impact upon the decision, including demographics, social factors, the attitudes of health care providers, and hospital influences (Black, Blair, Jones, & DuRant, 1990; Ekwo, Dusdieker, & Booth, 1983; Gabriel, Gabriel, & Lawrence, 1986; Martinez & Krieger, 1985). A review of factors which impact upon the mothers' choice of infant feeding method can help to identify areas for future breastfeeding education and support.

Demographics

The 1984 Milk-Feeding Patterns survey by Martinez and Krieger indicates that the selection of infant feeding method was associated

with several demographic factors, such as race, education, income level, age, and area of the country. Characteristics of the population more often choosing to breastfeed include being white, college educated, an upper income level, and residing in the western United States.

The population of women who are least likely to breastfeed tends to be black, less educated, lower income level, and reside in the southern portion of the country. It is this population of women who are also less likely to receive timely prenatal care and are therefore less likely to have regular contact with physicians during the entire course of their pregnancies. Often, medical care is sought during the latter portion of pregnancy when the infant feeding decision may already be made. Complicating this is the example set by family and friends.In a population which has a large proportion choosing bottle-feeding over breastfeeding. Health care professionals can pay special attention to this population group in overcoming obstacles to breast-feeding. Because of the health and economic benefits of breastfeeding, this population group especially will benefit from increased breast-feeding support and guidance.

One recent study found the demographic factors of age, education and marital status associated with the decision to breastfeed among the population surveyed (Gabriel, Gabriel, & Lawrence, 1986). Women in their study who were over age 24 when their first child was born, and who had more than a high school education had the highest incidence of breastfeeding. A lower incidence of breastfeeding was seen among women who were less than 19 years of age when their first child was born, and had less than a high school education. Additionally, the authors noted an increased incidence of breastfeeding among married women in the study.

Social Influences

Social influences are strongly associated with the mother's infant feeding decision. Both immediate family and other family members influence the infant feeding decision (Black et al., 1990; Ekwo, Dusdieker., & Booth, 1983). In particular, the infant's father has impact on the infant feeding decision. In one recent study (Black et al., 1990), the feeding method preferred by the father and how the infant's father had been fed were highly associated with influencing the feeding decision. Also associated with the infant feeding decision was how the expectant mother had been fed by her mother. One study (Gabriel, Gabriel, & Lawrence, 1986, p. 503) found that a higher rate of breastfeeding occurred among women who themselves were breastfed. These authors state that "It is possible that this association is caused by mothers influencing their daughters to repeat their own feeding practice." Friends who have breastfed, the expectant mother's own mother or mother-in-law, other relatives, and women at work who breastfed have all been shown to influence women who chose to breastfeed (Ekwo, Dusdieker, & Booth, 1983).

Health Care Professionals

Health care professionals, including physicians and nurses, generally advocate breastfeeding for the newborn infant. One survey (Lawrence, 1982) found that of health care professionals surveyed, 72 percent of obstetricians, 92 percent of pediatricians, and 68 percent of nurses surveyed advocated breastfeeding if a mother in their practice were undecided as to infant feeding method. Physicians and nurses who see patients regularly in prenatal clinics are in the ideal

position to reinforce breastfeeding as the preferred method of infant feeding and to address the expectant mothers' concerns and questions regarding infant feeding. In one survey addressing factors which influence breastfeeding initiation, 15 percent of the primigravida respondents and 18 percent of the multigravida respondents indicated that physicians or nurses influenced their decision to breastfeed (Ekwo, Dusdieker, & Booth, 1983).

Although physicians who see patients prenatally are in an ideal position to counsel their patients on the benefits of breastfeeding, some do not initiate the topic with their patients, or they discuss breastfeeding only if the expectant mother initiates the topic (Lawrence, 1982). The importance a physician places on breastfeeding may impact the amount of encouragement that he/she gives regarding breastfeeding to patients in his/her practice. Although obstetricians are generally a woman's first contact with a physician during her pregnancy, some obstetricians may not be as convinced of the importance of breastfeeding as pediatricians, who often see the patient after the infant feeding decision has been made. One recent study (Reames, 1985) found that only 44 percent of the obstetricians surveyed indicated that they considered breastfeeding to be very important, as compared with 74 percent of the pediatricians surveyed who considered breastfeeding to be very important.

Although pediatricians typically see mothers shortly before or after the infants' birth and therefore may have less of an impact on the initiation of breastfeeding, pediatricians can offer important education and guidance to the breastfeeding mother which can influence duration of breastfeeding. Mothers experiencing one or more of the

common problems associated with breastfeeding, such as engorgement or sore nipples, may be more likely to discontinue breastfeeding in the first month or two. Other factors which may discourage mothers include anxiety over the quantity of milk produced or concern regarding the quality of the milk (Worthington-Roberts, Vermeersch, & Williams, 1985). These problems and concerns may be alleviated with adequate breastfeeding education and support. The obstetrician, pediatrician, or family practitioner can assist the mother in support and guidance during breastfeeding.

One factor that may influence a physician's support of breastfeeding in his/her practice may be that physician's knowledge of breastfeeding. Many physicians surveyed either reported that they discouraged women from breastfeeding for reasons not usually considered to contraindicate breastfeeding (such as cesearean section), or promoted practices (such as supplemental bottles for breastfed infants) that could affect duration of breastfeeding (Reames, 1985). In this same study 62 percent of the responding physicians reported that they received insufficient information on breastfeeding in medical school. Because of the medical professionals' influence in successful breastfeeding, the American Academy of Pediatrics (1978) has recommended ". . . better education about breastfeeding and infant nutrition should be provided in the curriculum of physicians and nurses" (p. 598).

Hospital Influences

Hospital influences and infant formula manufacturers' promotional practices influencing duration of breastfeeding have been investigated. An association between hospital discharge packets of infant formula and

a shorter duration of breastfeeding was found (Bergevin, Dougherty, & Kramer, 1983). A recent study found that use of formula supplements in the hospital was the only significantly related factor in shortened duration of breastfeeding among black women in the study (Kurinij, Shiono, & Rhoads, 1988). Another study investigating hospital influences on mothers' feeding choices concluded that:

> The hospital staff and routines exerted a stronger influence on mothers' infant feeding practices by nonverbal teaching (the hospital "modeling" of infant formula products) than by verbal teaching (counseling, supporting, breastfeeding). (Reiff, & Essock-Vitale, 1985, p. 15)

However, one study which investigated hospital formula supplementation and breastfeeding duration addressed the observation that hospital supplementation is more often given to infants delivered by cesearean section or those associated with maternal or infant health problems. This study concluded that:

> . . . supplementation is not the cause of breastfeeding discontinuation . . . it may be merely an associated finding in mothers who are less strongly committed to breastfeeding or those in whom postpartum problems interfere with the successful establishment of breastfeeding. (Gray-Donald, Kramer, Munday, & Leduc, 1985, p. 517)

These authors further state that hospital supplementation should be viewed as a "marker," rather than a cause, of decreased duration of breastfeeding.

The above studies indicate a need to further address the issue of whether hospital dispensing of free formula sample discharge packets and/or the use of formula supplements for breastfeeding mothers in the hospital serve to influence the mothers' choice to breast or bottlefeed. Reducing the infants' consumption of breastmilk by replacing feedings with formula supplements can, in turn, reduce the woman's production of breastmilk and therefore lead to increased dependence on formula.

In addition, the American Academy of Pediatrics, 1978 suggested the following recommendations to increase successful breastfeeding in hospitals:

1. Decrease the amount of sedation and/or anesthesia given to mother during labor and delivery because large amounts can impair suckling in the infant.

2. Avoid separation of the mother from her infant during the first 24 hours.

3. Breastfeed infants "on demand" rather than on a rigid three-to-four hour schedule, and discourage routine supplementary formula feedings.

4. Reappraise physical facilities to provide easy access of the mother to her infant. Rooming-in of mother and infant is important to successful lactation. (p. 597)

In addition, the American Academy of Pediatrics, 1978 suggests that:

> Attitudes and practices in prenatal clinics and in maternity wards should encourage a climate which favors breastfeeding. The staff should include nurses and other personnel who are not only favorably disposed toward breastfeeding but also knowledgeable and skilled in the art. (p. 598)

Physicians can play an influential role in determining hospital policies that influence the breastfeeding decision. Physicians who advocate and support breastfeeding may choose to review hospital policies in regards to free formula packets, hospital supplementation for breastfed infants, and hospital routines that may impact on breast-feeding. The authors of one study suggest ". . . designing hospital routines to model breast-feeding rather than infant formula" (Reiff, & Essock-Vitale, 1985, p. 878).

Methods to Support Breastfeeding

Numerous intervention programs have been designed to assist in successful breastfeeding education and support in the United States.

Successful programs have been cited which contain one or more of the following elements: education of health care providers, community education, implementing changes in health care delivery systems (hospitals or prenatal clinics) which facilitate breastfeeding, and continued support of the mother after breastfeeding initiation (Lewis, 1982; Public Health Service, 1984).

Education of Health Care Providers

Educating health care providers to promote breastfeeding and support the breastfeeding mother can be a cost effective and successful intervention strategy. One seminar devoted to breastfeeding education among a nursing staff was associated with an increased proportion of mothers breastfeeding at hospital discharge (Sloper, McKean, & Baum, 1975). Health care providers who are aware of the benefits of breastfeeding may be more likely to promote breastfeeding to their clients and may be more helpful to the woman experiencing breastfeeding difficulties. Health care providers who are aware of potential barriers to breastfeeding may more readily recognize these within their own health care delivery system and work to change them. One report on a New York City approach to breastfeeding education (Public Health Service, 1984) noted:

> Since many pediatricians, obstetricians, and even some nurses had never during their training seen a baby being breastfed, they will not necessarily be as informed as they should in order to provide assistance to a lactating woman. (p. 37)

This intervention program enlisted a professional education task group which developed a slide presentation for use in New York City hospitals.

One Special Supplemental Foods Program for Women, Infants, and Children (WIC) in Vermont held a professional education seminar on breastfeeding for all community health care providers who work with pregnant women (Lewis, 1982). As noted by Lewis (1982, p. 4), "education of the educators" can be an important component to successful breastfeeding programs.

Community Education

Community education can play an important role in assisting population groups to overcome social or cultural barriers to breastfeeding and can impart needed information to correct misconceptions about breastfeeding. Three independent variables were found to be strong predictors of the decision to breastfeed: maternal beliefs, worries about breastfeeding, and maternal education (Dusdieker, Booth, Seals, & Ekwo, 1985).

Community education should provide culturally appropriate information for their clients and should address the issues or concerns about breastfeeding that may exist within that particular community. One review of successful breastfeeding programs (Lewis, 1982) noted that:

> Nearly every program that has succeeded in increasing the incidence of breastfeeding among low-income mothers includes education in a language and mode that are acceptable and understandable by the specific target population. (p. 4)

One researcher reporting on a breastfeeding education program in Rhode Island (Public Health Service, 1984) suggested that future community intervention include targeting husbands and grandmothers, who can provide support to the breastfeeding mother. A report on

breastfeeding promotion in three rural indigent populations (Public Health Service, 1984) discussed a program in which participants benefited from unhurried general discussion groups in which women were able to voice their questions or anxieties about breastfeeding. This program also educated participants on the role of breasts as nutritive rather than sexual organs.

One lay organization, the La Leche League International, provides a valuable public service by providing practical and easily understood breastfeeding information and support to the general public (Public Health Service, 1984). This group consists of volunteers experienced in the art of breastfeeding and has a support network which extends to many cities in the United States and abroad.

Health Care Settings

Successful breastfeeding intervention programs in health care settings include educating health care personnel in the benefits and techniques of breastfeeding as well as structuring hospital and clinic routines to facilitate breastfeeding (American Academy of Pediatrics, 1982; Ferris, McCabe, Allen, & Pelto, 1987; Lawrence, 1982; Reames, 1985).

Hospitals seen as facilitating breastfeeding may include in their protocol the following components as summarized by Scrimshaw (Public Health Service, 1984): staff support and reassurance for the breastfeeding mother, allowing the infant to breastfeed in the delivery or recovery room, and rooming-in of the infant and mother. Making literature on breastfeeding available and posting pictures displaying breastfeeding women were also cited as being encouraging. Clinic or

hospital routines that can be detrimental to breastfeeding and could be changed include rigidly scheduled feeding times, providing supplementary bottles for breastfed infants, and free infant formula kits.

Changing hospital or clinic routines to facilitate breastfeeding can be a highly successful and cost-effective intervention for promoting breastfeeding. Winikoff and Baer (1980) summarized:

> Changes in hospital practices . . . generally can be accomplished in a short period of time, need be done only once, do not require continued efforts, and often end up saving money. (p. 114)

Support of the Breastfeeding Mother

The first several weeks after childbirth can be a critical time for the newly breastfeeding mother to receive support and guidance in lactation. A mother breastfeeding for the first time may encounter a breastfeeding difficulty, such as sore nipples or engorgement, which can be discouraging if advice is not obtained to help solve the problem. A breastfeeding mother may also have anxiety over the quantity of milk produced, as newborn infants often desire to suckle frequently and the mother does not physically see the amount of milk the infant ingests. Duration of breastfeeding can be positively influenced by a support system available for the breastfeeding mother (Ferris et al., 1987).

Some successful breastfeeding support programs include follow-up visits with the breastfeeding mother after hospital discharge. Lewis (1982) notes that such support systems can play an important role in successful lactation and discusses the concept of a "doula" or support person who "mothers the mother." A support person who visits the mother and offers advice on common breastfeeding problems or concerns

can assist the mother in developing the confidence and skills to breastfeed successfully. Various breastfeeding support programs have utilized visiting nurses or midwives, trained breastfeeding consultants affiliated with a local hospital, or specially trained members of the community (Lewis, 1982). The La Leche League International also provides educational materials and experienced volunteers to assist in the community.

Women, Infants and Children's Special Supplemental Foods Program

In 1973, the Women, Infants and Children's Special Supplemental Foods program (WIC) was initiated by court order (Worthington-Roberts, Vermeersch, & Williams, 1985). This federal program provides nutrition education and nutritious foods to low income pregnant or lactating women, infants, and children ages five and under. To enroll in the program, participants must be within the low income guidelines set by WIC, and must be certified by their local WIC program to have a nutritional risk factor. Nutritional risk factors recognized by WIC include iron deficiency anemia, inadequate intake from the basic four food groups, premature birth, or an abnormal growth pattern.

WIC program participants receive food vouchers which can be redeemed at grocery stores for food items such as milk, eggs, beans, fruit juice and iron fortified breakfast cereals. Infants participating in the WIC program are provided commercial infant formula if they are formula fed, and all infants over six months of age are allowed iron fortified infant cereals and infant fruit juices.

Historically, the incidence of breastfeeding in the WIC program has been low, with one source reporting a nationwide WIC program

breastfeeding rate of 13 percent (Food and Nutrition Service, 1988). This may be due to the demographics of WIC program participants, all of whom are low income and many are from minority population sub-groups. Another factor may be the fact that infant formula is available for infant participants. Parents of infant participants are allowed to select commercial infant formula over breastfeeding for the infant, even when there is no medically documented reason not to breastfeed. A recent study (Canfield, 1987) found that 36 percent of mothers surveyed in a WIC program reported being influenced to use formula because it was supplied by WIC.

Because of the low incidence of breastfeeding among participants, the WIC program has made efforts to identify and create more widespread use of breastfeeding promotion strategies within the program (Food and Nutrition Service, 1988). However, one strategy which has not been implemented would be to require medical evaluation of the infants' inability to be breastfed or the mothers' inability to breastfeed before providing the infant with commercial infant formula. A factor in need of further investigation is the recently implemented formula rebate system within the WIC program and its impact on program breast-feeding rates.

Osteopathic Medicine

Osteopathic medicine was founded by Andrew Taylor Still (1828-1917) (Dorland's Illustrated Medical Dictionary, 1981). The osteopathic physician, D.O., receives medical training similar to that of an allopathic physician, M.D., and is licensed to practice medicine in the same manner as a M.D.

The osteopathic physician receives additional medical training in the skills of diagnosing and treating disturbances in the body structure through manipulative therapy (American Osteopathic Association, 1987). The osteopathic philosophy emphasizes the musculoskeletal system and the interrelationships between body systems in the maintenance of health and treatment of disease. The osteopathic physician approaches medical care in a holistic manner, seeking to diagnose and treat illness but also examine the environmental, emotional, and nutritional factors which play a role in the patients' health status. Osteopathic physicians also utilize all accepted methods of modern medicine including medicinal and surgical interventions.

There are currently 15 colleges of osteopathic medicine and 195 osteopathic hospitals in the United States (American Osteopathic Association, 1987). Approximately 55 percent of osteopathic physicians are involved with primary health care, with two-thirds of all D.O.s practicing in communities with less than 50,000 people. An estimated 45 percent of osteopathic physicians specialize in fields such as internal medicine, surgery, or obstetrics (American Osteopathic Association, 1987).

Located in Tulsa, Oklahoma, the College of Osteopathic Medicine was founded in 1972 to educate and train physicians for small towns and rural areas of Oklahoma. The first students began study in 1972 and graduated in 1977. To date, the College of Osteopathic Medicine has graduated 770 students. Currently, the entering class limit is 88 students. In 1988, the Oklahoma Legislature passed a bill making the College of Osteopathic Medicine an agency of Oklahoma State University.

Contraindications to Breastfeeding

Although medical contraindications for breastfeeding are quite rare, conditions can exist in which breastfeeding of the infant is not advisable (Worthington-Roberts, Vermeersch, & Williams, 1985). In these cases the woman should be supported in selecting acceptable breastmilk substitutes, and in no way should be made to feel guilty about being unable to breastfeed her newborn infant. Medical conditions which contraindicate breastfeeding include infants with galactosemia or phenylketonuria (PKU), or mothers with breast cancer or a contageous infectious disease such as tuberculosis or acquired immune deficiency syndrome (AIDS). Commercial infant formulas designed for the infant with an inborn error of metabolism are currently available. Commercial infant formulas are an acceptable substitute for human breastmilk in cases where breastfeeding is unsuccessful or contraindicated.

Summary

Breastfeeding has important advantages for maintaining the good nutrition and health of infants. Although the incidence of breastfeeding in the United States has increased in recent decades, the rates of women choosing to breastfeed are still lower than desirable, particularly among population subgroups which can benefit from the increased health benefits which breastfeeding provides. Increased breastfeeding education and support from health professionals and in the community can facilitate better understanding of barriers to successful breastfeeding and assist in implementing strategies to promote breastfeeding.

CHAPTER III

PROCEDURES AND METHODS

Introduction

The assessment of opinions towards breastfeeding among medical students and the relationship of selected variables which may impact on these opinions may help to identify areas for breastfeeding education among medical students. Effective breastfeeding education in medical school curriculum may help enhance the level of breastfeeding support and guidance the future physician brings into his/her practice. This study assessed the opinions of breastfeeding and factors which may impact on breastfeeding opinions among medical students at the Oklahoma State University College of Osteopathic Medicine in Tulsa, Oklahoma.

Research Design

A descriptive research design was employed, with use of a questionnaire, to assess opinions of breastfeeding and the relationship of selected variables to the opinions expressed by the medical students. Descriptive research is defined as being ". . . directed toward determining the nature of a situation as it exists at the time of the study. . . to describe 'what exists' with respect to variables or conditions in a situation" (Ary, Jacobs, & Razavieh, 1985, p. 322).

Population and Sample

Subjects were medical students attending the Oklahoma State University College of Osteopathic Medicine in Tulsa, Oklahoma. The population consisted of 200 first, second, and third year medical students, of whom 158 subjects (79%) participated in the survey. Subjects who did not participate were absent from class when the survey was administered. Fourth year medical students were not included in the survey because they were participating in off campus clerkship experiences.

As incentives for participation, first year students were awarded two bonus points on their biochemistry final exam, second year students were awarded credit for attending a one hour laboratory period, and third year students were awarded credit for attending a one hour lecture period.

Instrumentation

The instrument used was a questionnaire (see Appendix). The questionnaire was developed by the researcher based on the objectives of the study, with reference to the instrument used by Lawrence (1982). The questionnaire was comprised of three sections: opinions of breastfeeding, nutritional knowledge of breastfeeding, and background information. The opinions section of the questionnaire utilized a Likert-type scale, where subjects ranked their responses on a scale of one (low) to five (high).

Content validity was determined by three faculty members of the College of Home Economics at Oklahoma State University: two faculty members of the Department of Food, Nutrition, and Institution

Administration, and the interim Dean of the College of Home Economics. Clarity of the questions was obtained by administering the questionnaire to 15 Master of Science students enrolled in a Health Promotions class at the Oklahoma State University-University Center at Tulsa. The questionnaire was then reviewed and revised to ensure clarity of questions in response to feedback from the M.S. students.

Prior to administering the survey, the instrument was reviewed and approved by the Institutional Review Board of Oklahoma State University, which assured the protection of subjects.

Method of Collecting Data

Permission to administer the questionnaire was obtained by College of Osteopathic Medicine faculty member Martin Banschbach, Ph.D., who received verbal approval from the Dean of the College of Osteopathic Medicine.

Before completing the questionnaire, students received verbal instructions for completing the questionnaire. Students were verbally assured of confidentiality and were informed that their participation in the survey was completely voluntary. Students were instructed not to write their names on the questionnaire. The same information was also provided on the questionnaire.

The questionnaire was administered during class time for first, second, and third year medical students at the Oklahoma State University College of Osteopathic Medicine. Classes were surveyed over a two-day period in November 1989.

Analyses of Data

The data obtained were first compiled and presented in table form, using frequencies and percentages. Chi-square analyses were employed to identify relationships between the selected variables in the study and opinions expressed by the subjects. The four hypotheses postulated in Chapter One of this study were then tested against the data obtained. In some of the chi-square tests utilized by the researcher, cell counts had expected values of less than five. This may impact on the validity of the chi-square test. When this occurred it was noted on the chi-square table for the set of data. Results are reported in table form in Chapter Four of this study, accompanied by a discussion of the findings.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this study was to determine opinions of breastfeeding among medical students at the Oklahoma State University College of Osteopathic Medicine, and the relationship of selected variables to opinions expressed by the medical students. The results of the survey are presented here, along with a discussion of the results.

Background Data

Of the 200 students currently enrolled at the Oklahoma State University College of Osteopathic Medicine, 158 students (79% of the total enrollment) participated in the survey. Of the 158 subjects, 77 (48.7%) were first year medical students, 59 (37.3%) were second year students, and 22 (13.9%) were third year students. See Table I. Of the 158 subjects, 112 (70.9%) were male, and 46 (29.1%) were female. See Table II.

A total of 95 subjects (60.1%) did not have children. One subject did not provide information as to whether or not he/she had children. Of the remaining 62 subjects (39.2%), the distribution of infant feeding method was as follows: 24 (38.7%) had children who were entirely breastfed, 20 (32.3%) had children who were entirely bottlefed, and 18 (29.0%) had children who were both breast and bottlefed. A total of 42 (67.7%) had children who were entirely or partly breastfed. This is slightly

higher than the rate of 61 percent reported in the 1984 study on infant feeding practices in the United States (Martinez & Krieger, 1985), and may reflect the higher incidence of breastfeeding among women with a college education. See Table III.

TABLE I

YEAR IN SCHOOL OF SUBJECTS ACCORDING TO FREQUENCY AND PERCENT (N=158)

Year	n	Percent
First	77	48.7
Second	59	37.3
Third	22	13.9
Total	158	99.0*

*Does not equal 100 percent due to rounding.

TABLE II

GENDER OF SUBJECTS ACCORDING TO FREQUENCY AND PERCENT (N=158)

Gender	n	Percent
Male	112	70.9
Female	46	29.1
Total	158	100.0

TABLE III

INFANT FEEDING EXPERIENCE OF SUBJECTS WHO HAVE CHILDREN ACCORDING TO FREQUENCY AND PERCENT (N=62)

Feeding Method	n	Percent
Breastfed	24	38.7
Bottlefed	20	32.3
Both Breast and Bottlefed	18	29.0
Total	62	100.0

Personal Plans for Infant Feeding

Subjects were requested to respond to the question, "If you plan to have children, do you expect your child to be breastfed, bottlefed, both, or not applicable? Of the 158 total subjects, 35 responded "not applicable." Of the remaining 123 subjects, a total of 69 (56.1%) responded that they plan to breastfeed their future children. A total of 45 subjects (36.6%) responded that they plan to both breast and bottlefeed their future children. It is well established that successful breastfeeding is compromised by supplementing with formula feeding. Hence, this finding should be a concern of health professionals. Only nine subjects (7.3%) responded that they plan to bottlefeed their future children. See Table IV.

How Subjects Were Fed in Infancy

Subjects were requested to respond to the question, "Do you know if you were breastfed or bottlefed as an infant?" Of the total 158

subjects, 14 responded "Don't know." Of the remaining 144 subjects, 23 (16.0%) responded that they were breastfed as an infant. A total of 49 subjects (34%) responded that they were both breast and bottlefed as an infant. Thus, 72 subjects (50.0%) were either entirely or partly breastfed as an infant. Although the ages of the subjects are unknown, this percentage is higher than the national average breastfeeding rates from the period 1955 to 1970, when the breastfeeding rates averaged from 29.2 - 24.9 percent (Martinez & Krieger, 1985). The remaining 72 subjects (50.0%) responded that they were bottlefed as an infant. See Table V.

TABLE IV

SUBJECTS ANTICIPATED CHOICE OF INFANT FEEDING
ACCORDING TO FREQUENCY AND PERCENT
(N=158)

Choice	n	Percent
Breastfeed	69	43.7
Bottlefeed	9	5.7
Both Breast and Bottlefeed	45	28.5
Not Applicable	35	22.2
Total	158	100.1*

*Does not equal 100 percent due to rounding.

TABLE V

HOW SUBJECTS WERE FED IN INFANCY ACCORDING TO FREQUENCY AND PERCENT (N=158)

Method	n	Percent
Breastfed	23	14.6
Bottlefed	72	45.6
Both Breast and Bottlefed	49	31.0
Don't Know	14	8.9
Total	158	100.1*

*Does not equal 100 percent due to rounding.

Background Education in Nutrition

The first and second year students had not yet taken their nutrition course at the Oklahoma State University College of Osteopathic Medicine. This course includes one class period (one hour) on the topic of breast-feeding. The nutrition course is offered in the second semester of the second year curriculum, therefore at the time of the study only the third year students had participated in the nutrition course. Of the 158 subjects, 136 (86.1%) were first and second year students, and 22 (13.9%) were third year students.

In response to the question, "What is your formal education in the area of nutrition?" 82 subjects (50.9%) indicated that they had no formal education in the area of nutrition. Eight of the subjects (5.0%) indicated that they had a nutrition class in high school, 58 subjects (36.0%) indicated that they had a nutrition class in college, and 12 subjects (7.5%) indicated that they had more than one nutrition class in

college. One subject (0.6%) reported an undergraduate degree in nutrition. Thus, these results indicate that medical students in this study had a limited background in nutrition. See Table VI.

TABLE VI

BACKGROUND EDUCATION IN NUTRITION
BY FREQUENCY AND PERCENT
(N=158)

Education in Nutrition	n	Percent
No formal education in nutrition	82	50.9
A nutrition class in high school	8	5.0
A nutrition class in college	58	36.0
More than one nutrition class in college	12	7.5
An undergraduate degree in nutrition	1	0.6
Total	161*	100.0

*Some subjects chose more than one answer, resulting in 161 total answers for 158 subjects.

Opinions

Subjects' opinions on topics related to breastfeeding were evaluated from their responses to questions numbered 1 to 26 on the survey instrument (see Appendix). Questions 1 to 25 utilized a Likert-type scale, with ratings from one (low) to five (high). Responses to the opinion-related questions are summarized as follows.

Influence of Individuals

Overall, subjects rated the physician as possessing the highest

level of influence in the woman's infant feeding decision. A total of 133 subjects (84.7%) rated the physician as moderately high to high in level of influence. Husband or Significant Other received the second highest rating, and Mother or Sister received the third highest rating in terms of influence. The dietitian was perceived as having a higher level of influence (50.3%) than the nurse (41.7%). The individuals perceived as having the least influence in the woman's infant feeding decision were friends, receiving a low to moderately low influence rating from 44 subjects (27.9%).

Although subjects perceived the physician to have the highest level of influence on the infant feeding decision, the timing of the physician's first contact with the expectant mother may impact on the physician's level of influence on the feeding decision. Because the expectant mother usually makes her infant feeding decision before pregnancy or early in the first trimester of pregnancy (Sarrett, Bain, & O'Leary, 1983), the influence of family members may impact on the infant feeding decision at a more critical time in the decision making process. Individuals ranked according to their perceived level of influence are listed in Table VII.

Responsibility for Initiating Discussion of Breastfeeding

Subjects perceived the physician as having the greatest amount of responsibility among listed health care professionals for initiating discussion of breastfeeding with the patient. Physicians were rated as having a moderately high to high level of responsibility by 155 subjects (98.1%). Physicians were the only health care professional who did not receive a rating of lower than moderate in terms of responsibility.

TABLE VII

INDIVIDUALS RANKED ACCORDING TO PERCEIVED LEVEL OF INFLUENCE ON THE INFANT FEEDING DECISION BY FREQUENCY AND PERCENT (N=158)

Ranking of Moderate to High Influence		
Individual	n	Percent
Physician	133	84.7*
Husband or Significant Other	121	76.5
Mother or Sister	105	66.9*
Prenatal Class Instructor	102	65.0*
Nutritionist or Dietitian	79	50.3*
Nurse	65	41.7**
Friends	42	26.6

*One response missing

**Two responses missing

Subjects perceived the prenatal class instructor to have the second highest level of responsibility for initiating discussion of breastfeeding, with a moderately high to high rating from 117 subjects (74.1%). The dietitian was similarly ranked with level of responsibility seen as moderately high to high (72.8%). The health care professional who was seen as having the lowest level of responsibility was the nurse, who was rated moderately high to high by 82 participants (51.9%).

Because the physician is perceived as having the highest level of responsibility for initiating discussion of breastfeeding, adequate educational background in breastfeeding is essential to provide the physician with the knowledge necessary for patient education. See Table VIII.

TABLE VIII

HEALTH CARE PROFESSIONALS RANKED ACCORDING TO PERCEIVED LEVEL OF RESPONSIBILITY FOR INITIATING DISCUSSION OF BREASTFEEDING BY FREQUENCY AND PERCENT (N=158)

Ranking of Moderate to High Responsibility		
Professional	n	Percent
Physician	155	98.1
Prenatal Class Instructor	117	74.1
Dietitian	115	72.8
Nurse	82	51.9

Promotion of Breastfeeding

Subjects were asked to rate the level of importance various factors have in the promotion of breastfeeding. Immunological factors were rated by the subjects as being the most important with ratings of moderately high to high from 149 subjects (94.3%). Nutritional superiority and psychological/emotional benefits were nearly tied for second highest rating. The factor perceived to have the least importance for the promotion of breastfeeding was convenience, rated moderately high to high by only 38 subjects (29.1%).

Similar findings have been reported in a study by Lawrence (1982), in which family practitioners ranked closeness/emotional reasons, nutritional value, and provides immunities, respectively, as the most important reasons for breastfeeding. Factors ranked according to perceived importance for the promotion of breastfeeding can be seen in Table IX.

TABLE IX

FACTORS RANKED ACCORDING TO PERCEIVED IMPORTANCE FOR THE PROMOTION OF BREASTFEEDING BY FREQUENCY AND PERCENT (N=157)

Ranking of Moderate to High Importance		
Factor	n	Percent
Immunologic	148	94.3
Nutritional Superiority	137	86.7
Psychological/Emotional Benefits for Infant	136	86.0
Psychological/Emotional Benefits for Mother	123	78.3*
Physiological Benefits for the Mother	93	58.9
Economic	61	38.6
Convenience	38	29.1

*One response missing

Responsibility in Supporting the Woman with Breastfeeding Difficulties

Subjects perceived the physician as having the most responsibility for supporting the woman with breastfeeding difficulties, with level of responsibility rated as moderately high to high by 156 subjects (98.8%). The nurse was perceived to have the second highest level of responsibility. A community group such as La Leche League received a higher rating of responsibility than the dietitian. This may reflect the fact that the dietitian is more often involved in nutritional counseling and is not generally as involved in the medical management of the lactating woman. See Table X.

TABLE X

HEALTH PROFESSIONALS RANKED ACCORDING TO PERCEIVED LEVEL OF RESPONSIBILITY/SUPPORT FOR BREASTFEEDING DIFFICULTIES BY FREQUENCY AND PERCENT (N=158)

Ranking of Moderate to High Responsibility		
Professional	n	Percent
Physician	156	98.8
Nurse	97	61.4
Community Group such as La Leche League	61	39.1*
Dietitian	33	30.9

*Two responses missing

Encouragement

Subjects were asked to rate the extent to which they would encourage a woman in their care to breastfeed if the woman had already decided to bottlefeed her infant. This question was selected by the researcher because often the infant feeding decision is made before or early in pregnancy, before the woman has entered into prenatal medical care. Only 13 of the subjects (8.3%) responded that they would offer little encouragement to breastfeed. The largest number of subjects (62.0%) responded that they would offer moderate levels of encouragement. A total of 47 subjects (29.7%) responded that they would offer high levels of encouragement to breastfeed. Because the physician is believed to be highly influential in the infant feeding decision, the fact that 71.7 percent of the medical students anticipate moderate to high levels of

encouragement was a positive finding as identified by the researcher. See Table XI.

TABLE XI

LEVEL OF ENCOURAGEMENT TO BREASTFEED
BY FREQUENCY AND PERCENT
(N=158)

Encouragement	n	Percent
Less (1 or 2)	13	8.3
Moderate (3 or 4)	98	62.0
High (5)	47	29.7
Total	158	100.0

Formula Supplementation

Subjects were asked to rate the extent to which they would favor the use of formula as an occasional replacement of breastmilk for the normal healthy breastfed infant under six weeks of age. This question was selected by the researcher because supplementation of breastmilk with infant formula has been associated with decreased duration of breastfeeding (Ferris et al., 1987). A total of 56 subjects (35.4%) indicated that they would not favor formula supplements for the breastfed infant. Eight subjects (5.1%) indicated that they would frequently favor formula supplements. The largest number of subjects, 94 (59.5%) responded that they would occasionally favor use of formula supplements.

Because formula supplementation of the breastfed infant can affect duration of breastfeeding, this finding is a concern to the researcher. See Table XII.

TABLE XII

SUPPORT OF FORMULA SUPPLEMENTATION FOR THE BREASTFED INFANT BY FREQUENCY AND PERCENT (N=158)

Extent	n	Percent
Not at all (1 or 2)	56	35.4
Occasionally (3 or 4)	94	59.5
Frequently (5)	8	5.1
Total	158	100.0

Perceived Level of Knowledge about Breastfeeding

Subjects were requested to rate their perceived level of knowledge about breastfeeding in terms of educating and guiding the lactating mother. The largest number of subjects, 92 (58.2%) believed that they had a moderate level of knowledge about breastfeeding. A total of 24 subjects (15.2%) believed they had a high level of knowledge, and 42 subjects (26.6%) believed their level of knowledge was low. Although a total of 116 subjects (73.4%) felt their level of breastfeeding knowledge was moderate to high, subjects' overall nutritional knowledge

of breastfeeding was fairly low (see nutritional knowledge section). See Table XIII.

TABLE XIII

PERCEIVED LEVEL OF KNOWLEDGE ABOUT BREASTFEEDING BY FREQUENCY AND PERCENT (N=158)

Level	n	Percent
Low (1 or 2)	42	26.6
Moderate (3 or 4)	92	58.2
High (5)	24	15.2
Total	158	100.0

Primary Method Encouraged for Infant Feeding

Subjects were requested to select the primary method that they would encourage for infant feeding: breastfeeding, bottlefeeding, or undecided. The majority of subjects, 146 (92.4%) selected breastfeeding as their preferred method for infant feeding. Ten subjects (6.3%) were undecided as to their preferred infant feeding method, and two subjects (1.3%) selected bottlefeeding. The number of subjects advocating breastfeeding were similar to a study by Lawrence (1982), in which 88.3% of family practitioners and 91.9% of pediatricians responded that they advocate breastfeeding. See Table XIV.

TABLE XIV

METHOD ENCOURAGED FOR INFANT FEEDING
BY FREQUENCY AND PERCENT
(N=158)

Method	n	Percent
Breastfeeding	146	92.4
Bottlefeeding	2	1.3
Undecided	10	6.3
Total	158	100.0

Nutritional Knowledge of Breastfeeding

Subjects' nutritional knowledge of breastfeeding was evaluated by their ability to correctly answer eight questions related to nutrient composition of human breastmilk, recommendations for nutritional supplementation, and growth patterns of breastfed infants. These questions are numbered 28 to 35 on the survey instrument. See Appendix. Question 27 was originally to be included in the knowledge evaluation, however it was discounted by the researcher due to ambiguity of wording. Therefore, subjects' responses were evaluated using the remaining eight questions.

The highest score on the knowledge portion of the survey was seven correct responses achieved by three of the subjects. The lowest score was one correct response, achieved by five subjects. The mean score on the knowledge section was 3.8 correct responses, and the modal score was three correct responses. See Table XV.

TABLE XV

CORRECT SCORES ON NUTRITIONAL KNOWLEDGE QUESTIONS
BY FREQUENCY AND PERCENT
(N=158)

Score	n	Percent
7	3	1.9
6	12	7.6
5	33	20.9
4	39	24.7
3	43	27.2
2	23	14.6
1	5	3.2
Total	158	100.1*

*Does not equal 100 percent due to rounding.

Perfect Score = 8

Individual questions were examined as to frequency and percent of correct responses for each of the topics investigated by the questions. The question most frequently answered correctly by the subjects (90.5%) related to the digestibility of human breastmilk. The majority of subjects also correctly responded to questions related to vitamin D content of human breastmilk, and growth patterns of breastfed infants.

The question most frequently answered incorrectly related to recommendations for vitamin/mineral supplementation for the lactating woman consuming a well-balanced diet. The majority of subjects (60.8%) responded that vitamin/mineral supplementation is recommended in this case, although this practice is not currently seen as necessary for the adequately nourished lactating woman (American Dietetic Association, 1986).

A question also answered incorrectly by the majority of the subjects related to recommendations for vitamin K supplementation of the breastfed infant. The majority of subjects (61.8%) responded that vitamin K supplementation is not recommended, although current recommendations are that newborn infants be given vitamin K at birth (Worthington-Roberts, Vermeersch, & Williams, 1985). The researcher recognizes that there may have been some confusion in the subjects' answering of this question. One subject who selected "not recommended" wrote next to the selected response "Only initially-once at birth." This was considered by the researcher to be a correct response. One subject verbally expressed the same comment to the researcher upon turning in the questionnaire. Frequency and percent of correct responses to knowledge questions can be seen in Table XVI.

Opinions as Related to Selected Variables

Subjects' opinions were examined in relationship to the selected variables of year in medical school, personal infant feeding experience, gender, and level of nutritional knowledge of breastfeeding. The impact of these selected variables upon opinions expressed in this study is as follows.

Year in Medical School

Year in medical school was investigated to determine its impact on subjects' opinions of breastfeeding. One significant relationship (chi-square value = 17.084, $p < 0.050$) was found between the amount of influence subjects perceived friends to have in the infant feeding decision and subjects' year in medical school. First year students

tended to perceive friends as having less influence, with 81.8% rating friends' influence at a low to moderate level. Second and third year students selected a higher level of influence than first year students, with the majority of responses in the moderate to moderately high range. Thus, second and third year students perceived friends to have a greater influence on the infant feeding decision than first year students. See Table XVII.

TABLE XVI

CORRECT RESPONSES TO KNOWLEDGE QUESTIONS BY FREQUENCY AND PERCENT

Question Number: Topic	n	Percent
28: Digestibility of human breastmilk	143	90.5
33: Vitamin D content of human breastmilk	110	69.6
35: Growth pattern of breastfed infant	102	64.6
30: Cholesterol content of human breastmilk	66	42.0*
29: Primary lipid in human breastmilk	64	40.8*
32: Vitamin K supplementation for breastfed infant	60	38.2
31: Bioavailability of iron in human breastmilk	58	36.9*
34: Vitamin/mineral supplement for lactating woman	50	31.6

*One response missing

TABLE XVII

CHI-SQUARE RESULTS FOR PERCEIVED LEVEL OF FRIENDS' INFLUENCE BY YEAR IN MEDICAL SCHOOL (N=158)

Year in School	Level of Friends' Influence Low 1	2	Moderate 3	4	High 5	Total
First	11 14.3%	15 19.5%	37 48.1%	11 14.3%	3 3.9%	77 100.1%*
Second	7 11.9%	9 15.3%	22 37.3%	21 35.6%	0 0.0%	59 100.1%*
Third	0 0.0%	2 9.1%	13 59.1%	5 22.7%	2 9.1%	22 100.0%

Chi-Square Value = 17.084

Probability = < 0.05

*Does not equal 100 percent due to rounding.

Note: 33% of the cells have expected counts of less than 5.

A second significant relationship (chi-square = 18.658, $p < 0.05$) was found between year in medical school and the level of importance placed on economics as a reason to promote breastfeeding. First year students tended to place a low to moderate level of importance on the factor of economics, compared with second and third year students who tended to select a moderately high level of importance. See Table XVIII.

Of the 26 questions (numbered 1 to 26) contained in the survey relating to opinions of breastfeeding, in only questions numbers 3 and 15 were significant relationships found between opinions of breastfeeding and year in medical school. Therefore, the researcher accepted the null

hypothesis that there was no significant relationship between opinions of breastfeeding and subjects' year in medical school. Two exceptions were perceived influence of friends on the infant feeding decision and perceived importance of economic reasons to promote breastfeeding, which showed a positive relationship.

TABLE XVIII

CHI-SQUARE RESULTS FOR PERCEIVED IMPORTANCE OF ECONOMIC REASONS TO PROMOTE BREASTFEEDING BY YEAR IN MEDICAL SCHOOL (N=158)

Year in School	Level of Importance Low 1	2	Moderate 3	4	High 5	Total
First	11 14.3%	14 18.2%	30 39.0%	14 18.2%	8 10.4%	77 100.1%*
Second	5 8.5%	10 17.0%	15 25.4%	23 39.0%	6 10.2%	59 100.1%*
Third	1 4.6%	2 9.1%	9 40.9%	3 13.6%	7 31.8%	22 100.0%

Chi-Square Value = 18.658

Probability = < 0.05

*Does not equal 100 percent due to rounding.

Previous Personal Infant Feeding Experience

The variable of whether or not the subjects had children who were

breastfed was found to have significant relationships with 9 of the 26 opinion related questions about breastfeeding. These relationships are described as follows.

Influence

A significant relationship (chi-square = 17.277, $p < 0.05$) was found between the subjects' previous personal infant feeding experience and the amount of influence friends were perceived to have in the infant feeding decision. Subjects with breastfed infants tended to rate friends as having a moderate level of influence, with responses distributed fairly evenly across the scale in a pattern similar to responses from subjects with no children. Responses from subjects with bottlefed children tended to be more concentrated at the moderate level on the scale (75%). Subjects whose children were both breast and bottlefed tended to perceive friends as having moderately high level of influence on the decision to breastfeed. Thus, subjects with bottlefed children or both breast and bottlefed children tended to place less emphasis on the influence of friends than subjects with no children or breastfed children. See Table XIX.

Factors in Promotion of Breastfeeding

Subjects' previous personal experience with breastfeeding was found to be significantly related to four of the seven factors which subjects rated in terms of importance for promotion of breastfeeding. These four factors were nutritional superiority of breastmilk, economics, convenience, and psychological/emotional benefits for the mother. Generally, subjects whose children were breastfed tended to rate these

factors as "more important" for the promotion of breastfeeding, while subjects whose children were bottlefed tended to rate these factors as having less to moderate importance for the promotion of breastfeeding. Similar findings have been reported by Reames (1985), who surveyed physicians for opinions of current breastfeeding recommendations. In Reames' study, physicians whose children were breastfed tended to respond that breastfeeding was very important, while physicians who did not have breastfed children tended to respond that breastfeeding was only somewhat important. The four factors found to be significantly related to subjects' previous personal infant feeding experience can be seen in Tables XX to XXIII.

TABLE XIX

CHI-SQUARE RESULTS FOR PERCEIVED INFLUENCE OF FRIENDS BY SUBJECTS' INFANT FEEDING EXPERIENCE (N=157)

Infant Feeding Experience	Level of Influence Less (1 or 2)	Moderate (3)	More (4 or 5)	Total
Breastfed Children	5 20.8%	10 41.7%	9 37.5%	24 100.0%
Bottlefed Children	3 15.0%	15 75.0%	2 10.0%	20 100.0%
Both Breast and Bottlefed Children	1 5.6%	10 55.6%	7 38.9%	18 100.1%*
No Children	35 36.8%	36 37.9%	24 25.3%	95 100.0%

Chi-Square Value = 17.277

Probability = < 0.05

*Does not equal 100 percent due to rounding.

TABLE XX

CHI-SQUARE RESULTS FOR PERCEIVED IMPORTANCE OF NUTRITIONAL SUPERIORITY OF BREASTMILK BY SUBJECTS' INFANT FEEDING EXPERIENCE (N=157)

Infant Feeding Experience	Level of Importance Less (1 or 2)	Moderate (3)	More (4 or 5)	Total
Breastfed Children	0 0.0%	1 4.2%	23 95.8%	24 100.0%
Bottlefed Children	0 0.0%	7 35.0%	13 65.0%	20 100.0%
Both Breast and Bottlefed Children	0 0.0%	1 5.6%	17 94.4%	18 100.0%
No Children	0 0.0%	12 12.6%	83 87.4%	95 100.0%

Chi-Square Value = 10.824

Probability = < 0.05

Note: 37% of the cells have an expected count of less than five.

TABLE XXI

CHI-SQUARE RESULTS FOR PERCEIVED IMPORTANCE OF ECONOMICS ON BREASTFEEDING PROMOTION BY SUBJECTS' INFANT FEEDING EXPERIENCE (N=157)

Infant Feeding Experience	Level of Importance Less (1 or 2)	Moderate (3)	More (4 or 5)	Total
Breastfed Children	2 8.3%	5 20.8%	17 70.8%	24 99.9%*
Bottlefed Children	6 30.0%	9 45.0%	5 25.0%	20 100.0%
Both Breast and Bottlefed Children	2 11.1%	9 50.0%	7 38.9%	18 100.0%
No Children	33 34.7%	31 32.6%	31 32.6%	95 99.9%*

Chi-Square Value = 18.516

Probability = < 0.05

*Does not equal 100 percent due to rounding.

TABLE XXII

CHI-SQUARE RESULTS FOR PERCEIVED IMPORTANCE OF CONVENIENCE ON BREASTFEEDING PROMOTION BY SUBJECTS' INFANT FEEDING EXPERIENCE (N=157)

Infant Feeding Experience	Level of Importance Less (1 or 2)	Moderate (3)	More (4 or 5)	Total
Breastfed Children	4 16.7%	7 29.2%	13 54.2%	24 100.1%*
Bottlefed Children	10 50.0%	7 35.0%	3 15.0%	20 100.0%
Both Breast and Bottlefed Children	4 22.2%	9 50.0%	5 27.8%	18 100.0%
No Children	51 53.7%	28 29.5%	16 16.8%	95 100.0%

Chi-Square Value = 22.415

Probability = < 0.05

*Does not equal 100 percent due to rounding.

TABLE XXIII

CHI-SQUARE RESULTS FOR PERCEIVED IMPORTANCE OF PSYCHOLOGICAL/ EMOTIONAL BENEFITS TO BREASTFEEDING MOTHER BY SUBJECTS' INFANT FEEDING EXPERIENCE (N=157)

Infant Feeding Experience	Level of Importance Less (1 or 2)	Moderate (3)	More (4 or 5)	Total
Breastfed Children	1 4.2%	1 4.2%	22 91.7%	24 100.1%*
Bottlefed Children	4 20.0%	5 25.0%	11 55.0%	20 100.0%
Both Breast and Bottlefed Children	1 5.6%	0 0.0%	17 94.4%	18 100.0%
No Children	7 7.5%	15 16.0%	72 76.6%	94 100.1%*

Chi-Square Value = 12.970

Probability = < 0.05

*Does not equal 100 percent due to rounding.

Note: 50% of the cells had expected counts of less than five.

Responsibility in Supporting the Woman with Breastfeeding Difficulties

Subjects' previous personal infant feeding experience was found to have a significant relationship (chi-square = 21.144, $p < 0.05$) with the perceived level of responsibility community groups such as La Leche League have in supporting the woman with breastfeeding difficulties. The majority of subjects with breastfed children (79.2%) responded that community groups have a high level of responsibility. This can be compared to subjects with bottlefed children, in which the highest percentage, (47.4%), responded that community groups have a low level of responsibility. Subjects whose children were both breast and bottlefed and subjects who did not have children had more evenly distributed responses. Thus, subjects with breastfed children were more likely to perceive community groups such as La Leche League to have high levels of responsibility. This may be due to their previous experience with breastfeeding or possible personal experience with a breastfeeding support group or organization. See Table XXIV.

Encouragement to Breastfeed

Subjects' previous personal infant feeding experience was found to have a significant relationship (chi-square = 19.367, $p < 0.05$) with the extent which subjects would encourage a woman in their care to breastfeed if she had decided to bottlefeed. The majority of subjects with breastfed children, 20 (83.3%), responded they would strongly encourage the woman to breastfeed. This can be compared with subjects who bottlefed their children, of whom 6 (30.0%) responded that they

would strongly encourage the woman to breastfeed. Subjects with bottlefed children were more likely than other subjects to offer little encouragement for the woman to breastfeed if she had decided to bottle-feed. See Table XXV.

TABLE XXIV

CHI-SQUARE RESULTS FOR PERCEIVED LEVEL OF RESPONSIBILITY FOR COMMUNITY GROUPS IN SUPPORTING WOMEN WITH BREASTFEEDING DIFFICULTIES BY SUBJECTS' INFANT FEEDING EXPERIENCE (N=155)

Infant Feeding Experience	Level of Responsibility Less (1 or 2)	Moderate (3)	More (4 or 5)	Total
Breastfed Children	3 12.5%	2 8.3%	19 79.2%	24 100.0%
Bottlefed Children	9 47.4%	4 21.1%	6 31.6%	19 100.1%*
Both Breast and Bottlefed Children	7 38.9%	6 33.3%	5 27.8%	18 100.0%
No Children	33 35.1%	31 33.0%	30 31.9%	94 100.0%

Chi-Square Value = 21.244

Probability = < 0.05

*Does not equal 100 percent due to rounding.

TABLE XXV

CHI-SQUARE RESULTS FOR ANTICIPATED EXTENT OF ENCOURAGEMENT FOR WOMAN TO BREASTFEED BY SUBJECTS' INFANT FEEDING EXPERIENCE (N=157)

Infant Feeding Experience	Extent of Encouragement Less (1 or 2)	Moderate (3)	More (4 or 5)	Total
Breastfed Children	1 4.2%	3 12.5%	20 83.3%	24 100.0%
Bottlefed Children	5 25.0%	9 45.0%	6 30.0%	20 100.0%
Both Breast and Bottlefed Children	1 5.5%	7 38.9%	10 55.6%	18 100.0%
No Children	6 6.3%	22 23.2%	67 70.5%	95 100.0%
Chi-Square = 19.367				
Probability = < 0.05				

Note: 33% of the cells had expected counts of less than five.

Formula Supplementation of the Breastfed Infant

Subjects' previous personal infant feeding experience was found to have a significant relationship (chi-square = 17.312, $p < 0.05$) with the extent to which subjects favor the use of formula as an occasional replacement of breastmilk for the normal healthy breastfed infant under six weeks of age. The majority of subjects with breastfed infants, 17 (70.8%) responded that they would not favor formula supplementation. The largest concentration of subjects with bottlefed children, 10

(50.0%) responded that they would favor occasional use of formula as a supplement for the breastfed infant. Subjects with bottlefed children were more likely than other subjects to favor frequent use of formula as a supplement. See Table XXVI.

TABLE XXVI

CHI-SQUARE RESULTS FOR EXTENT OF APPROVAL FOR FORMULA SUPPLEMENTATION OF THE BREASTFED INFANT BY SUBJECTS' INFANT FEEDING EXPERIENCE (N=157)

Infant Feeding Experience	Extent of Approval Less (1 or 2)	Moderate (3)	More (4 or 5)	Total
Breastfed Children	17 70.8%	6 25.0%	1 4.2%	24 100.0%
Bottlefed Children	4 20.0%	10 50.0%	6 30.0%	20 100.0%
Both Breast and Bottlefed Children	6 33.3%	9 50.0%	3 16.7%	18 100.0%
No Children	29 30.5%	44 46.3%	22 23.2%	95 100.0%
Chi-Square Value = 17.312				
Probability = < 0.05				

Note: 25% of the cells had expected counts of less than five.

Perceived Level of Knowledge About Breastfeeding

Subjects' previous personal infant feeding experience was found to have a significant relationship (chi-square = 27.006, $p < 0.05$) with the level of knowledge subjects believe they have about breastfeeding in terms of educating and guiding the lactating woman. The majority of subjects with breastfed children, 18 (75.0%) rated their level of breastfeeding knowledge as high. This can be compared with subjects whose children were bottlefed, of whom seven (35.0%) rated their level of breastfeeding knowledge as high. The majority of subjects whose children were both breast and bottlefed rated their level of breastfeeding knowledge as high. Thus, subjects with breastfed children tended to have more confidence in their knowledge of breastfeeding, which may impact on the amount of future education and guidance they extend to patients in their care. See Table XXVII.

As a result of the significant relationships found between opinions of breastfeeding and subjects' previous personal infant feeding experience, the researcher rejected the null hypothesis that there is no significant relationship for these nine opinion-related variables.

Gender

Of the 158 subjects, 112 (70.9%) were males, and 46 (29.1%) were females. Gender was found to have only one significant relationship with opinions of breastfeeding in this survey. This relationship, (chi-square = 10.107, $p < 0.05$) was between gender and subjects' perceived level of knowledge about breastfeeding in terms of educating and guiding the lactating woman. A larger percentage of female

subjects (28.3%) perceived their level of knowledge to be high, and a larger percentage of male subjects (35.7%) perceived their level of knowledge to be moderate. See Table XXVIII.

TABLE XXVII

CHI-SQUARE RESULTS FOR PERCEIVED LEVEL OF KNOWLEDGE ABOUT BREASTFEEDING BY SUBJECTS' INFANT FEEDING EXPERIENCE (N=157)

Infant Feeding Experience	Level of Knowledge Less (1 or 2)	Moderate (3)	More (4 or 5)	Total
Breastfed Children	0 0.0%	6 25.0%	18 75.0%	24 100.0%
Bottlefed Children	6 30.0%	7 35.0%	7 35.0%	20 100.0%
Both Breast and Bottlefed Children	2 11.1%	4 22.2%	12 66.7%	18 100.0%
No Children	34 35.8%	35 36.8%	26 27.4%	95 100.0%

Chi-Square Value = 27.006

Probability = < 0.05

Because only one significant relationship was found between these variables, the researcher accepted the null hypothesis that there is no significant relationship between opinions of breastfeeding and subjects' gender, with the exception of perceived level of knowledge about breastfeeding.

TABLE XXVIII

CHI-SQUARE RESULTS FOR PERCEIVED LEVEL OF KNOWLEDGE ABOUT BREASTFEEDING BY GENDER (N=158)

Gender	Level of Knowledge Low 1	2	Moderate 3	4	High 5	Total
Male	7 6.3%	22 19.6%	40 35.7%	32 28.6%	11 9.8%	112 100.0%
Female	4 8.7%	9 19.6%	12 26.1%	8 17.4%	13 28.3%	46 100.1%*
Total	11	31	52	40	24	158

Chi-Square Value = 10.107

Probability = < 0.05

*Does not equal 100 percent due to rounding.

Level of Nutritional Knowledge of Breastfeeding

As previously stated, subjects' nutritional knowledge of breastfeeding was evaluated by their ability to correctly answer eight questions in the survey related to nutrient composition of human breastmilk, recommendations for supplementation, and growth patterns of breastfed infants.

As a result of their responses to the eight questions, subjects were placed into two groups, those whose knowledge was rated "high" (five or more correct responses), and those whose knowledge was rated "low" (less than five correct responses). A total of 48 students

(30.4%) were placed in the "high" group, and 110 students (69.6%) were placed in the "low" group.

When responses to the opinion questions in the survey were compared with the "high" and "low" groupings on the nutritional knowledge portion of the survey, no significant relationships were found. Therefore, the researcher accepted the null hypothesis that there is no relationship between opinions of breastfeeding and the subjects' level of nutritional knowledge of breastfeeding.

Breastfeeding Topics in Which More Knowledge is Desired

In an open-ended format, subjects were requested to briefly list topics in which they desired more knowledge about breastfeeding. About 50 percent of the subjects responded to this question, some listing more than one topic. Responses fell into three general categories of breastfeeding information: nutritional aspects (82 responses), physiologic aspects (18 responses), and management aspects (39 responses). The most frequently cited topic (38 responses) was nutritional composition of human breastmilk, followed by a comparison of nutritional content of human breastmilk vs. commercial infant formulas. Other topics mentioned included how to counsel the woman with breastfeeding problems, psychological factors involving breastfeeding and nutritional requirements of the lactating woman and her infant. A summary of topics cited by the subjects is provided in Table XXIX.

Seven subjects personally responded with statements about breastfeeding. These statements, summarized in Table XXX, were unsolicited by the researcher and voluntarily submitted by the subjects.

TABLE XXIX

BREASTFEEDING TOPICS ABOUT WHICH SUBJECTS DESIRE MORE KNOWLEDGE

Topic	N
NUTRITIONAL ASPECTS	
Nutritional content of breastmilk	38
Nutritional composition of breastmilk vs commercial infant formulas	18
All aspects of breastfeeding	10
Nutritional requirements for the lactating woman and/or infant	8
Nutrient content of human breastmilk vs cows' milk	2
How mothers' diet affects breastmilk components	2
Age in which supplemental food is required for the growing child	1
Nutritional developments in pediatrics	1
Differences between commercial infant formulas	1
Total nutrition course	1
Total	82
PHYSIOLOGIC ASPECTS	
Immunological factors	6
Physiology of breastfeeding	3
Biochemistry of breastfeeding	2
Anatomy of breastfeeding	1
Histology with reference to breastfeeding	1
Long range effects of breastfeeding vs commercial formula use	1
Studies on weight/sleep/activity of infants	1
Growth patterns in infants	1
Diseases which affect milk production and composition	1
Diagnostic tests to determine a woman's ability to breastfeed (Qualitative)	1
Total	18
MANAGEMENT ASPECTS	
Counseling women with breastfeeding problems	9
Psychological factors	7
How to breastfeed	4
Benefits of breastfeeding	3
Conditions which favor one infant feeding method over another	2
Pros and cons of breastfeeding	2
Recommendations for duration of breastfeeding	2
How to increase volume of breastmilk	1
Mothers' social attitude	1
Instructions for lactating women regarding appropriate time, place, and dress for breastfeeding	1
Drugs the lactating woman should avoid	1
Why women should stop breastfeeding	1
Ways to encourage mothers to breastfeed	1
Journal article or comparison studies of benefits of breastfeeding vs bottlefeeding for use in patient education	1
Recommended journal for making the physician more knowledgeable in breastfeeding and allow for better explanation to patients	1
Comprehensive educational techniques for mothers	1
What to tell the mother to expect and how to help make it a more positive experience	1
Total	39

TABLE XXX

UNSOLICITED PERSONAL STATEMENTS
REGARDING BREASTFEEDING
(N=7)

Statement	N
Need more information about breastfeeding in the curriculum	3
Feel positively motivated already	1
More public information to encourage breastfeeding is needed	1
Have not received enough information to know which topics to ask about	1
Women who choose to formula feed their infants should not be made to feel less than perfect	1

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

A study was conducted to determine opinions of breastfeeding among medical students at the Oklahoma State University College of Osteopathic Medicine, and the relationship of selected variables to the opinions expressed by the students. Hypotheses, based on the objectives of the study, were to identify the relationship between opinions expressed by the students and the students' year in medical school, previous infant feeding methods of the subjects' own children, the gender of the subjects, or the subjects' level of nutritional knowledge of breastfeeding.

A survey was administered to 158 medical students at the Oklahoma State University College of Osteopathic Medicine in Tulsa, Oklahoma in November 1989. Data from this survey were analyzed using frequencies, percentages, and chi-square analysis to determine opinions of breastfeeding among the medical students and the relationship of selected variables to the opinions expressed by the students. Also obtained were subjects' statements of topics related to breastfeeding in which subjects desired more knowledge.

The overwhelming majority of medical students believed that breastfeeding was the optimal choice for infant feeding, and rated highly the benefits of immunological factors, nutritional superiority of breastmilk,

and psychological/emotional benefits for the mother and infant as reasons to promote breastfeeding.

Subjects perceived the physician as having the most influence in the expectant mothers' infant feeding decision. Husband or significant other was perceived as possessing the second highest level of influence, followed by Mother or Sister and Prenatal Class Instructor. The dietitian was seen as having a higher level of influence than the nurse. Subjects perceived friends as having the least amount of influence in the infant feeding decision.

Subjects rated the physician as having the most responsibility for initiating discussion of breastfeeding with the expectant mother, and the prenatal class instructor perceived as having the second highest level of responsibility. The dietitian and nurse were also perceived to have a high level of responsibility for initiating discussion of breastfeeding with the expectant mother.

The physician was perceived to have the highest level of responsibility for assisting the mother with breastfeeding difficulties. The nurse was also rated as having a high level of responsibility. Community groups such as La Leche League and the dietitian were perceived as having more moderate levels of responsibility for assisting the woman with breastfeeding difficulties.

Subjects indicated that they would offer moderate to high encouragement of breastfeeding to the woman in their care who had decided to bottlefeed. Subjects with breastfed children tended to rate higher levels of encouragement than other subjects in the study.

Occasional use of formula as a supplement for the healthy breastfed infant under six weeks of age was favored by the majority of

subjects in the study. This was felt by the researcher to be important in that use of formula during the early weeks of breastfeeding has been associated with a decreased duration of breastfeeding. Subjects with breastfed children were more likely not to favor the use of formula as a supplement compared with other subjects in the study.

Subjects tended to rate their level of knowledge about breastfeeding in terms of educating and guiding the lactating woman as moderate to moderately high. Subjects with breastfed children tended to rank their level of knowledge as higher than other subjects in the study.

Of the variables investigated in the study, the variable of whether or not the subject had breastfed children was found to have the largest number of significant relationships with opinions expressed by the subjects in the study.

Subjects' year in medical school was only found to have a significant relationship with two opinion-related variables. Compared with second and third year students first year medical students tended to believe that friends have less influence on the woman's infant feeding decision, and also tended to believe that economic factors were of lesser importance as a reason to promote breastfeeding.

Gender was found to have a significant relationship with only one opinion-related variable. A larger percentage of female subjects rated their level of knowledge of breastfeeding in terms of educating and guiding the breastfeeding mother as high compared with male subjects, although more males than females rated their knowledge as moderate to moderately high.

In terms of level of nutritional knowledge of breastfeeding, no significant relationships were found between subjects' level of nutritional knowledge of breastfeeding and opinions of breastfeeding in this study. Subjects listed numerous topics about breastfeeding in which they desired to become more knowledgeable. The most frequently mentioned was nutritional composition of breastmilk, followed by comparison of nutrient composition of breastmilk vs. commercial infant formula. Other topics cited by subjects included "all aspects" of breastfeeding, how to counsel the mother with breastfeeding difficulties, psychological factors associated with breastfeeding, and nutritional requirements for the lactating woman and her infant.

Conclusions

Through subjects' responses in this study, the researcher concluded that the medical students in this study believe breastfeeding is the optimal choice for infant feeding, and the physician is perceived to play an important role in education and guidance for the lactating woman. Although the medical students rated their level of knowledge about breastfeeding as moderately high, the medical students with previous personal experience of breastfeeding appear to be more confident in their knowledge of breastfeeding and may be more likely to offer encouragement of breastfeeding to women in their future practice.

Overall, more information is desired by the medical students in terms of basic and practical knowledge of breastfeeding. This can be especially helpful for the medical student who does not have breastfed children, and therefore may have less practical experience with breastfeeding issues. Because medical students with breastfed children were

more likely to anticipate offering greater encouragement for breastfeeding, the researcher anticipates that as more practical information regarding nutritional aspects of breastfeeding and counseling/supportive factors of breastfeeding are offered to the students, the more confident and perhaps more likely the medical students will be to utilize this information in their own future medical practice.

Based on the results of this study, suggestions for breastfeeding curriculum content in medical schools are as follows:

1. Trends in breastfeeding in the United States and sociodemographic factors associated with these trends.

2. Overall benefits of breastfeeding to include nutritional, immunologic, psychologic and physiologic factors.

3. Analysis of nutrient composition of human breastmilk and comparison with commercial infant formulas.

4. Anatomy/physiology of human lactation.

5. Common problems associated with breastfeeding and practical solutions to these problems.

6. Nutritional recommendations for the lactating woman and the breastfed infant.

7. Factors which may affect the quality of human breastmilk, such as medications to avoid.

8. Factors which may contraindicate breastfeeding.

9. Hospital or clinic influences on breastfeeding initiation and duration.

10. Societal barriers to breastfeeding.

11. Strategies for breastfeeding education and promotion.

The researcher also acknowledges a degree of confusion regarding the interpretation of several knowledge-related questions in the survey instrument. A recommendation for future researchers designing a similar questionnaire is to test the wording of questions to ensure clarity and correct interpretation by the subjects.

Recommendations for Further Study

Recommendations for further study are as follows:

1. To evaluate models for breastfeeding education in medical school curriculum.

2. To investigate models for successful breastfeeding education and promotion among socio-economic groups with lower breastfeeding rates.

3. To investigate effective policy and procedure changes in clinic and hospital maternity wards which promote breastfeeding.

4. To investigate breastfeeding opinions of medical students in other medical school settings.

5. To compare breastfeeding opinions of medical students with breastfeeding opinions of a control group.

6. To investigate the impact of the formula rebate system on WIC program breastfeeding initiation and duration.

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APPENDIX

BREASTFEEDING OPINIONS AND KNOWLEDGE SURVEY

As an important member of the health care team, the physician is influential in terms of the patients' health care practices As an individual studying to be a physician, you will be caring for women who will be making the choice whether or not to breastfeed The purpose of this study is to investigate current opinions and knowledge among medical students at the Oklahoma State University College of Osteopathic Medicine Your responses on this questionnaire will be strictly confidential

Please do not place your name or in any manner indicate your personal identity on the questionnaire Please complete each question Do not leave any blanks Follow directions carefully

Below are listed several individuals who may influence the woman deciding whether or not to breastfeed her infant Circle the number indicating the amount of **influence** you feel **each individual has**

	Influence				
	less		some		much
1 Husband or Significant other	1	2	3	4	5
2 Mother or Sister	1	2	3	4	5
3 Friends	1	2	3	4	5
4 Nutritionist or Dietitian	1	2	3	4	5
5 Nurse	1	2	3	4	5
6 Physician	1	2	3	4	5
7. Prenatal class instructor	1	2	3	4	5

Please circle the number indicating the degree of **responsibility** you feel each of the following professionals has in **initiating discussion of breastfeeding** with the patient

	Responsibility				
	less		moderate		more
8 Prenatal class instructor	1	2	3	4	5
9 Nurse	1	2	3	4	5
10 Physician	1	2	3	4	5
11 Dietitian	1	2	3	4	5

Below are listed some reasons given for breastfeeding Circle the number indicating the level of **importance** you feel each factor has in the **promotion of breastfeeding.**

	Importance				
	less		moderate		more
12 Nutritionally superior	1	2	3	4	5
13 Immunologic	1	2	3	4	5
14 Economic	1	2	3	4	5
15 Convenience	1	2	3	4	5
16 Physiological benefits for the mother	1	2	3	4	5
17 Psychological/emotional benefits for the infant	1	2	3	4	5
18 Psychological/emotional benefits for the mother	1	2	3	4	5

Please circle the number indicating the degree of **responsibility** you feel each of the following has in **supporting the woman with breastfeeding difficulties,** such as engorgement or sore nipples

	Responsibility				
	less		moderate		more
19 Nurse	1	2	3	4	5
20 Dietitian	1	2	3	4	5
21 Physician	1	2	3	4	5
22 Community group such as La Leche League	1	2	3	4	5

23 If a patient in your care told you that she has decided to bottle feed, to what extent would you encourage her to breastfeed?

Extent				
little		moderate		greatly
1	2	3	4	5

24 To what extent do you favor the use of formula as an occasional replacement of breastmilk for the normal healthy breastfed infant under six weeks of age?

Extent				
not at all		occasionally		frequently
1	2	3	4	5

25 How do you rate the level of your knowledge about breastfeeding in terms of educating and guiding the lactating mother?

Level of Knowledge				
low		moderate		high
1	2	3	4	5

26 What would be the primary method that you would encourage for infant feeding? Mark (X) your response in the blank
___ a. breastfeeding
___ b bottlefeeding
___c undecided

The following questions pertain to nutritional aspects of human breastmilk Please circle the best answer(s) to each of the following questions Answer all questions There is one best answer to each question unless otherwise stated

EXAMPLE

What is the primary carbohydrate found in human milk?
a fructose
(b) lactose
c dextrose

27 Which of the following components of breastmilk are affected by the nutritional status of the mother? (circle all that apply)
a water soluble vitamins
b fat soluble vitamins
c total protein
d total fat
e lactose

28 For infants, what is the digestibility of human milk compared to the digestibility of cows' milk?
a more digestible
b less digestible
c equally digestible

29 What is the primary lipid found in human breastmilk?
a diglyceride (diacylglycerol)
b cholesterol
c triglyceride (triacylglycerol)
d phospholipid

30 How does the cholesterol content of human breastmilk compare to the cholesterol content of commercial infant formulas?
a similar to formula
b greater than formula
c lower than formula

31 How does the bioavailability of iron in human breastmilk compare with the bioavailability of iron in iron-fortified commercial infant formulas?
a similar to formula
b greater than formula
c lower than formula

32 Current recommendations include that Vitamin K should be supplemented to breastfed infants Is this statement
a true
b false

33 The biologically active form of Vitamin D is higher in human breastmilk than in cows' milk Is this statement
a true
b false

34 Is vitamin/mineral supplementation generally recommended for the lactating woman consuming a well-balanced diet?
a recommended
b not recommended
c undecided

35 After six months of age, the breastfed infant generally exhibits a slower rate of weight gain compared with the infant consuming commercial infant formula Is this growth pattern of breastfed infants
a acceptable
b not acceptable
c undecided

The following questions will provide background information for this survey Please answer all questions Circle one response for each question

36 In what year are you currently enrolled at the Oklahoma State University College of Osteopathic Medicine?
a first
b second
c third

37 What is your gender?
a male
b female

38 If you have children, were your children primarily
a breastfed
b. bottlefed
c both
d no children

39 If you plan to have children, do you expect your child to be
a breastfed
b bottlefed
c both
d not applicable

40 Do you know if you were breastfed or bottlefed as an infant?
a breastfed entirely
b bottlefed entirely
c both breast- and bottlefed
d don't know

41 What is your formal education in the area of nutrition?
a no formal background in nutrition
b.a nutrition class in high school
c a nutrition class in college
d more than one nutrition class in college
e undergraduate degree in nutrition

Briefly list topics on which you feel you need more knowledge about breastfeeding

_____
_____
_____

Thank you for completing this questionnaire Your assistance is appreciated

VITA

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