

Breastfeeding in the course of history

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Abstract

Nurturing babies is an issue inextricably bound to all species in nature. In prehistoric times, breastfeeding was the first priority of mothers until later in infancy. In ancient times breastfeeding continued to be of crucial importance, and goddesses of motherhood are presented with naked breasts. Concurrently, for the first time in history, wet nurses appeared in societies as a legal profession to replace mothers when they were unable to feed their children; special utensils for artificial feeding appeared as well. In Ancient Egypt breastfeeding was first priority of mothers until infants reached six months of age and then, cow's milk was given to children. In Ancient Mesopotamia and Ancient Greece, breastfeeding was of high value and one can find numerous references in mythology. Wet nursing was also widespread in these societies. Nevertheless, great historians and philosophers, such as Aristotle and Plutarch opposed to employing wet nurses, as they strongly believed that breastfeeding was a duty of the mother. In Roman times, wet nursing began to be a choice of the majority of wealthy families. In Israel and China, breastfeeding continued until the age of two years, while in Indies, it stopped at six months, when teething starts. In Islam, breastfeeding had a religious basis and usually lasted for two years and wet nurses were selected by parents with great thoughtfulness. In Byzantine times, the duration of breastfeeding was set at around twenty months. Colostrum was considered unsuitable and for the first days of life honey was given to newborns instead. In middle Ages, objections against wet nursing reappeared as it was considered that breast milk could transmit physical and psychological characteristics of the woman and that breastfeeding was a maternal duty. In Renaissance, writings on pediatrics strongly argued mother's breastfeeding. At the end of eighteenth century, new substitutes of feeding infants appeared such as animal milk, pap and panada. In the ensuing years (19th century) mothers had to work in order to contribute to family income, and for the first time artificial feeding became the first choice. At the outset of this century, the first chemical analysis gave a vast advantage over human milk. Notwithstanding, in the twentieth century, formulas continued to be the first choice as advertising exerted its influence on public opinion. Especially in developed countries, there was a dramatic increase in the use of formulas, as it was considered to be the best nutrition for the infants. As a result, an outbreak of necrotizing enterocolitis occurred with increase in infant mortality. Mothers avoided breastfeeding as they often felt ashamed, as breast is an element of woman's sexuality. Lately, a strong movement is noticed worldwide attempting to convince societies and healthcare professionals on the innumerable advantages of breastfeeding for the mother, the infants and in the long-term for the health systems.

Keywords: breastfeeding, history, wet-nurse, infant, formula, nutrition

Introduction

During the course of human history, infants should be fed with human milk in order to assure survival; this could be a product of their mothers (breastfeeding), or of another woman (adoptive breastfeeding). From antiquity until today, the importance of breastfeeding has been well appreciated. This is reflected in its depiction in mythology, philosophy, art and religion all around the world. It was in the early 20th century when there was a change in this practice, attributed to the profound commercialization of artificial milk. Fortunately, breastfeeding has recently regained its pivotal role in human well-being, from the beginning of life through adolescence and adulthood. Ancient scriptures refer to the importance of breastfeeding. Use of artificial food was attempted throughout the entire course of history, but without much success. In periods of declining ethical and social standards, the rate of breast feeding historically declines as well. However, in times of social stability, breastfeeding rate increases. Recent data shows that health in childhood, adolescence and adulthood is strongly associated with the diet at the beginning of life. With the present review we aim at looking into the history

of breastfeeding and at outlining some milestones on the issue from ancient times until today.

Prehistoric era

Little is known about the breastfeeding habits of other primates, and much less about those of prehistoric humans; what is known derives mainly from assumptions and indications considered close to reality, despite clear evidence of what was really the case. The first humanoids, the Neanderthals, the hunter-gatherers and the farming Stone Age people are believed to have raised their children, the way other higher primates did, i.e. by breastfeeding them on demand for several years. The fossils records provide little indication of weaning times, so the best evidence we have comes from our closest relatives in the animal kingdom. Chimpanzees and bonobos wean their Youngs at the age of 4 or 5 years, while gorillas do so about a year earlier. The emergence of adult teeth and the growth of the offspring to about four times its original birth weight are considered to be the milestones coinciding with the cessation of nursing in the great apes. However, it is tricky to translate all these in human years, as humans are unique

among the primates with several particularities.¹ Anthropological studies show that the diet of people around 10,000BC resembled that of contemporary primitive tribes, such as Papua New Guinea and the people of Kalahari Desert. Breast feeding habits, were probably similar, with mothers nursing their babies until the age of 2-6years.²

Arota and co-workers analyzed prehistoric tooth and attempted to accurately detect when babies were weaned. They hypothesized that it might be possible to detect the weaning time from the amount of barium in the growing teeth. Molars of a 100.000 year old Neanderthal child found at Scladina Cave in Belgium were scanned by laser and revealed that the barium levels increased immediately after birth, due to exclusive breastfeeding, then they decreased to intermediate levels for another 7 months, indicating that maternal milk was supplemented by other food, and finally they fell to very low levels after 1,2 years of life, pin-pointing the time of weaning. However, it is not possible to draw firm conclusions about Neanderthal breastfeeding habits from this data. The Scladina Cave child died quite young, at about 8 years of age, which might also present a bias in the interpretations. Moreover, there are still questions if Neanderthal children grew up faster, as some earlier studies had suggested so.³ The Venus of Willendorf, a high statuette of a female figure, was excavated in 1908 from a Paleolithic site near Willendorf village in Austria. It is estimated that it was carved around 28.000 and 25.000 BC. Several similar statuettes were discovered, and are collectively referred to as Venus figurines, such as the Venus of Laussel (23.000-20.000 BC). These figures are not considered to be realistic portraits, but rather an idealization of the female figure, emphasizing the significance of fertility and childbearing.⁴

Ancient era

In ancient times, breast milk was considered sacred and essential for the survival of the infant, and for that reason the dairy gods were represented with their breasts exposed naked. A mother should nurse her child, but if maternal milk was not available for whatever reason or it was of insufficient volume for the baby's requirements, the Babylonians, Egyptians, Greeks and Romans used to employ wet nurses in order to take over. Law regulated this profession and contracts used to consolidate this association, and there are reports on the issue as early as 2.000BC.⁵ When babies were artificially fed, evidence exists that a variety of cups and other utensils were used to do so.⁶

Mesopotamia

In ancient Mesopotamia, people glorified breast milk through their myths. The Babylonian goddess Astarte is considered as the Mother of fertile breast, the Queen of Heaven, the Creator of human beings and the Mother of the Gods. According to Babylonian scriptures, breastfeeding used to last for 2-3 years. Wet nurses were an alternative solution. In 1800BC the Baby IONIAN King Hammurabi issued laws formalizing the relationship between the wet nurse and the employer.⁷

Ancient Egypt

Ancient Egyptians recognized the vital importance of breastfeeding, attributing sacred role to it as well. Images depict goddess Isis breast feeding her son Horus, granting him spiritual food and immortality through her milk. Wet nurses would also be the primary alternative in Ancient Egypt, in case a problem with breastfeeding existed. There is evidence that highly esteemed wet nurses nursed Pharaoh's children.⁸ The Papyrus Ebers, in Egypt of 1.500 BC, is the earliest medical encyclopedia, and includes a small pediatric section with a short account on breastfeeding: "To get a supply of milk in a woman's

breast for suckling a child: Warm the bones of a sword fish in oil and rub her back with it. Or: Let the woman sit cross-legged and eat fragrant bread of soured durra, while rubbing her breasts with the poppy plant." This brief reference also reports that failure of lactation was considered a definite problem, and the use of wet nurses or adoption of artificial food was not the entire solution to it. Later, in the Ptolemaic period, Greek influence resulted in an increased use of slaves as wet nurses, whose responsibility was to breastfeed children for about six months and then they gave cow's milk using nursing flasks as one can see in the museum of Cairo (Alexandrian period).⁹

Ancient Greece

The role of breastfeeding in ancient Greece is equally important and this is depicted in numerous sculptures or statuettes of goddesses like Hera, Gaea and Demeter breastfeeding their children. Artemis of Ephesus, protector of child birth and the puerperium, was depicted as having multiple breasts in dozens of copies of the original statue. According to Greek mythology, Zeus was born in the Dikte on Cave in the Mount Dicte in East Crete and survived by drinking the milk of a goat. Cronus, Zeus' father, used to swallow all of his children immediately after birth. Rhea, Zeus' mother, deceived Cronus by giving him a stone wrapped to look like a baby instead of Zeus, and she sent her son to be nursed by a 'wet nurse', a goat-shaped nymph called Amalthea. Heracles created Milky Way, a crowd of stars that forms a distinctive bright streak across the night sky, when he was a baby.¹⁰ His father, Zeus, was very proud of his son, who was born of a mortal woman named Alcmene, and he let him suckle on his divine wife Hera's breast while she was asleep, an act which he believed would endow the baby with godlike qualities. When Hera woke up and realized that she had an unknown infant on her breast, she pushed him away and the spurting milk became the Milky Way.⁹ The Amazons, a martial women tribe, used to cut one of their breasts rather in order to facilitate archery. They did not consort with men, but to ensure reproduction. The Amazons raised their female children and breastfed them by their unique breast, whereas they sent to Gargles, neighboring people, their male children to be raised. Alternatively they caused them disabilities and held them as slaves.¹¹

In Greece of Homer (950 BC) wet nurses were in frequent demand, particularly by women of higher socioeconomic background, in whose households they came to hold a position of great responsibility with authority over the slaves and often with prolonged care of the children they nursed, up to their adolescence.⁹ In the *Odyssey* there is, for the first time, a written reference to wet nurses, as Odysseus was nursed by Evriklia.¹² In ancient Sparta queens exclusively nursed their eldest sons who were the heir to the throne. In Athens of 5th and 4th century BC, aristocrats preferred wet nurses from Sparta believing that their strict discipline and well being would be transferred to the children through the milk intake.⁶ Hippocrates (460 - 370 BC) believed that the fetus learned to suck *in-utero* and that this accounted for the passage of the meconium and the presence of the suckling reflex at birth.¹³ He assumed that fertility and lactation were affected by the winds and waters of each place. In places with stagnant water, women gave birth with difficulty and children lost weight and became weak while breastfeeding. Women who lived in places with coldwater, had a laborious delivery and were unable to feed their children, because their milk dried up.¹⁴ According to Hippocrates, if milk overflowed by the breasts of a pregnant, the fetus was weak. On the contrary, if the breasts were congested and hard, the fetus is in a good condition.¹⁵ When the fetus moved *in-utero*, the milk started to be produced. At the time of delivery, the milk was transferred via common vessels from the uterus to the breasts, if the infant breastfed.¹³ He advised that

infants should be given wine diluted with water to lessen the liability to convulsions.¹⁶

Plato (428/427 or 424/423 - 348/347 BC) in his "Republic" argued that obedience to the state should be strengthened by the concentration of all infants in public nurseries where they would be breastfed by wet nurses.⁶ On the other hand, Aristotle (384 - 322 BC) considered breastfeeding a maternal duty and opposed to the use of wet nurses. He asserted that the quality of food exerted maximum effect in the organism and breast milk was the best food for the babies, as it was more familiar to them. Breast milk before the seventh month of pregnancy was useless. In his works, he mentioned that the heat of the mother's milk contributed to earlier teething. He also referred to breastfeeding as a contraceptive method.¹⁷ Plutarch (46 - 120 AD) in his work "On children's education" encouraged mothers to breastfeed their children themselves, saying: *"It is necessary that mothers breast feed their own children, because they will indulge them with more love and kindness".*¹⁸ Instead, nannies' affection was fake, as their only motive was the remuneration. He says that the very nature attests that mothers should breastfeed their children. Therefore, nature endowed them with milk immediately after childbirth, and with a pair of mammary glands, in case of at win gestation. Praise was substantial for proper parenting. As an example, he cited the nurses who offered their breast for comfort every time the kids cried.¹⁹ Xenophon (427 - 355 BC), an Athenian historian and philosopher, mentioned that God created he woman's body so that it can nourish the newborn and gave her more affection for babies than to the man.²⁰ In the works of Aeschylus,^{21,22} (525or524BC), Evripides²³ (480-406 BC), Aristophanes²⁴ (450 - 385BC) and Lysias²⁵ (459 -377 BC), there are references both for breastfeeding and for we nursing. Alternatively to breastfeeding from the mother, or to adoptive breastfeeding, ancient Greeks use to feed their children with a mixture of wine and honey in special pots.⁵

Roman era

According to the legend, a wolf nursed the twin brothers-founders of Rome, Romulus and Remus, in order for them to survive, after their mother Rhea had put them in a basket and set it floating down the river Tiber, hoping that they would be found by someone.²⁶ Roumilia the goddess of breastfeeding and protector of all nursing mothers and infants, used to be worshiped in ancient Rome. At the height of the Roman Empire, between 300 BC and 400AD, detailed written contracts with wet nurses were formed, to nourish abandoned babies. These infants were usually unwanted baby-girls thrown in the trash, bought by the rich and fed by nannies until the age of 3 years. That was a cheap way of acquiring slaves.²⁷ From about 100 AD to 400AD, physicians such as Soranus of Ephesus, Galen of Pergamum, and Oribasius, described the required qualifications of a wet nurse.²⁸ Soranus of Ephesus (98 AD -117 AD) produced an obstetric and gynecological text of 23 chapters, setting the criteria of a good wet nurse, the regimen for nurses, salting of the newborn and many other topics. He was also the first to describe the nail test, used to assess the quality and consistency of breast milk: When a drop of breast milk was placed on a nail and the finger was moved, the milk should not be so watery to run across the surface of the nail. When the finger was turned downwards, the milk should not be thick enough to adhere to the nail. The consistency of the milk should be in-between the two extremes. This criterion would be used for the next 1.500 years to assess the quality of breast milk.⁹ He advised that mothers should avoid breastfeeding their infants for two days after labor, as he thought that the colostrum is of poor quality, thick and indigestible. He advocated that the mother's milk was more familiar to the child.

However, the baby would be more robust, if fed by different women. The hired nurse should be Greek, so the newborn would learn the best of all languages. The infant had to breast feed exclusively for the first six months, while gradual weaning was attempted the third or fourth semester of life.²⁹

Galen of Pergamum (130 AD-200AD) advised the wet nurses how to comfort infants with swaddling, rocking, and lullabies. His conception of the fundamental principles of the natural world or elements- air, fire, earth and water- which were respectively cold, hot, dry and moist, dominated medicine for many centuries. A combination of one quality from each pair produced a complexion (sanguine, phlegmatic, choleric, melancholic) and each had its appropriate humor (Blood, phlegm, yellow bile, black bile). Children were considered to be phlegmatic at first, becoming sanguine and choleric with growth, and they had to be treated accordingly.⁹ According to Galen, the nature forecasted and made a liquid diet for the children, the mother's milk, which was a "remedy" to the baby. The "excellent" milk had a pleasant taste and odour, was white, homogeneous, and moderately thick.³⁰ The Roman physician Oribasius (320 AD-403AD) wrote that the wet nurse should incorporate chest and shoulder movements to enhance milk flow. He advised against giving meat to infants because it "creates phlegm".⁸ The medical writings of Paulus Aegineta (625 - 690 BC) comprised of seven books, the first of which elaborated with infant feeding. In choosing a wet nurse, he recommended that, her age should between 25 and 35 years, with well-developed breasts and chest and had recently delivered a male child. She should avoid salty and spicy foods, venery and debauchery and she should exercise regularly her arms and shoulders, by grinding or working at a loom.⁹ In Rome, the rich families employed Greek mothers and later Christians laves to breastfeed their children. The use of wet nurses was criticized by personalities such as Cicero (106 - 43 BC) and Tacitus (56 - after 117 AD) who believed that breastfeeding was the first family bond of love that would turn into love for the motherland. There fusal of the mother to breast feed her children, was a sign of decadence and jeopardized the stability of society.¹⁸

Israel

In ancient Palestine, since 2.000BC, children were considered a blessing, and breastfeeding a religious obligation. Breastfeeding used to last long enough, almost up to two to three years and provided the infant with protection from various diseases, and above all from dysentery which was common and often fatal. The moment of weaning was celebrated with a joyous meal originating from as a sacrifice; all that ritual was in commemoration of the great banquet that was given the day that Isaac, Abraham's son, had ceased to nurse Sarah. In 536BC Talmud, a central text of Rabbinic Judaism, recommended newborns to be placed immediately on the mother's breast and breastfeed for about two years.⁹

Indies

The first Indian scriptures, the Vedas, represent the primary sacred texts (1800 BC), and stated that the milk and the breast are symbols of longevity and have the sweetness of nectarines. The chest is designed as a pitcher full of nectar (Atharva Veda). The ancient Ayurveda texts like CharakSamhita (400-200BC), the SushrutaSamhita (400BC), and KashyapSamhita, illustrated the importance of breastfeeding, and described the value of breast milk, considered to have vivifying power. As to the duration of breastfeeding it is reported in these medical texts that it should last until the eruption of teeth, for at least six months. The SushrutaSamhita clearly indicated the introduction of solid foods at the age of six months, when teething starts. Early

weaning may result in swollen belly.³¹ The SushrutaSamhita also recommended that breastfeeding continued until the mother became pregnant again.³² Beliefs about the colostrum varied. Many mothers discarded colostrum, as they considered it to be harmful to the child and they gave babies cow's milk, water and honey during this initial and very important period for the establishment of lactation.³³

China

Chinese scriptures seemed to be closer to contemporary medical advice, approaching breastfeeding from a more natural and supportive perspective. A Chinese work from SunSimiao (581 - 682 AD), described human milk as a product of vital energy.⁶ Instructions for breastfeeding in Chinese medical texts dated from the 10th century AD. "A thorough discussion on the hygiene of young children", published during the dynasty of the Song (960 – 1279 AD), contained information about what was considered an appropriate method for feeding a child, requirements and restrictions placed by the mother based on the current knowledge about the composition of breast milk, and the conditions that may affect the child's ability to breastfeed. Emphasis was put on the correct procedures and on the quality, temperature and freshness of the milk. The restrictions placed on nursing mothers in nutrition, emotion, temperature and health were often repeated, and warnings against breast feeding immediately after sexual intercourse or while the mother was intoxicated were widespread. Breastfeeding in China usually lasted at least two years.³⁴

Islam

Breastfeeding had a religious basis in Islam. The Holy Qur'an recommended, that if possible, the mother should breastfeed her offspring for two years, and declared that every new born infant had the right to breastfeed. It described the need for continuity between intrauterine environment, in which food was transferred from the mother's blood through the placenta, and extra-uterine environment, in which the infantified with breast milk. So after birth the infant remained attached and dependent on its mother for food for 24months. If the mother was unable to breastfeed, she and the father could mutually agree to employ a wet nurse. That demonstrated the preference of Islam in infant feeding with human milk instead of animal milk. The choice of wet nurse was considered to be the key to the health of babies that could not be fed by their biological mother. The Prophet Muhammad instructs Muslims to protect their children from drinking the milk of "adulterous and insane", considering their milk "infectious". Children who were breastfed by the same woman were considered siblings and therefore were prohibited to marry each other.⁶ The physician IbnSina (known in the West as Avicenna, 980 – 1037AD) described breast milk as "white blood".^{35,36} The Hadith stated that the mother received a reward for every drop of breast milk given to her child. An important aspect of breastfeeding in Muslim culture is the emphasis on the mother's privacy when breastfeeding and this comes from the Islamic faith that there are body parts of men and women which should be covered at all times in front of those who are not close relatives.^{6,37}

Byzantine times

In Byzantine times physicians described the art of breastfeeding and deemphasized its advantages, especially for low body weight newborns. They did not encourage the early introduction of solid foods in the infant's diet and determined the optimal duration of breast feeding at 20-24months with gradual weaning. If the baby got sick shortly after weaning, they advised return to breastfeeding until full recovery, as the role of breastfeeding to the strengthening of infant's

immunity against infections was well appreciated.³⁸ Aetius (2nd century BC) and Oribasius (320 – 403 BC), considered colostrum to be unsuitable for newborns, therefore, Byzantines fed newborns with honey during the first days of life. They believed that breastfeeding should ideally start between the 3rd and 5th day of life. In Byzantium breastfeeding was associated with the socioeconomic status of the mother. Women of the aristocracy recruited one or more wet nurses to breastfeed their children.³⁹ Physicians did not reject the employment of wet nurses, but defined rigorous rules about nursing and set strict selection criteria. Traditionally, they preferred healthy women from Thrace or Egypt, aged between 20-40 years, and if possible with age matching that of the mother. Previous experience in parenting was essential. Their clothes should be clean, they should be calm and in happy mood and strict in morals.³⁸

Middle ages

This account could proceed straight to the Renaissance period, as there is no surviving work from the Middle Ages relevant to infant feeding; it is also unlikely that anything of importance was written. In Medieval West, women of the working class breastfed their children, as they could not afford to employ a wet nurse, but also because their domestic and agricultural work could be combined with breastfeeding. At the same time, the first objections against the use of wet nurses arose. During the middle Ages, society considered childhood as a special time of instability and vulnerability. Breast milk was believed to have magical properties, and it was thought that breast milk could transmit both physical and psychological characteristics of the woman. This belief led to objections against the use of nurses, and thus it was considered a holy duty of a mother to breastfeed her own child.⁸

Renaissance

The year 1472 marks the beginning of the output of printed works on pediatrics; all the earlier ones were written in Latin, and nearly 100 years were to pass before the first book in English on the subject appeared. Paul Bagellardu (? - 1492), in his book printed in Padua in 1472, described the nail test and the characteristics of a good nurse. Hiccup, diarrhea and vomiting were all attributed to over-feeding, while viscous milk gave rise to constipation, which was treated with a suppository made from powdered mouse excrement.⁴⁰ Thomas Phayer (1510-1560), wrote the first English textbook on the issue entitled the "Book of Children", where he described the criteria for choosing a wet nurse, the nail test and remedies for increasing breast milk. He also believed that the milk of a nurse conveys temperament and morals, in addition to diseases.⁹ Thomas Muffett (1553-1604) in his book "Health's Improvement" (1584) drew attention to the medicinal use of breast milk, claiming that woman's milk is not only beneficial for the infant, but also for sick adults, men and women. He believed that breast milk was 'converted from the superfluity of the blood' and 'seemed to be nothing but white blood'.⁹

Simon de Vallambert, recommended the use of cow's horn with cow's or goat's milk after the third month of life, in his text entitled "De la Manière de Nourir et Gouverner les Infants des leur Naissance" (1565). He was also the first to mention the possibility of the transmission of syphilis from the nurse to the infant. He additionally attacked the prevalent custom, dated from Avicenna's days, of the nurse chewing the food before giving it to the child, as he believed that this generated worms.⁹ The "De Arte Medica Infantum", published in 1577, written by the Italian Omnibonus Ferrarius, emphasized that the mother was the best option for infant feeding, with the wet nurse being the second best if the mother was ill or could not breastfeed. Ferrarius worried that babies would get" flavor of the

nature of the person from which they fed" or in other words, would love the nurse, because they were nurtured by her, more than their mother. It is interesting that his work contains the first picture of a breast pump consisting of a receptacle with an opening for the nipple and a long spout reaching up to the mother's mouth.⁹ During the Renaissance, in Europe, there had been an assessment of the role of breastfeeding, and this is reflected in art as well; the "suckler Lady" ("Maria Lactans") and the "suckler Eve", depicted in churches and in public areas, suggested respect to this aspect of maternity. "Maria Lactans" was a dominant feature in paintings of Virgin Mary from the first century until Renaissance. The popularity of images of "Maria Lactans", in times of war and bubonic plague, thought to be the objectification of a greater personal and collective anguish of the time, which was none other than the efficient and safe feeding.³⁹

16th -18th Century

In Europe of the 16th -18th century, wet nursing was still the rule, mainly for wealthy families, which could employ more than one wet nurse. Mother was responsible for the selection of the wet nurse, who was under her strict surveillance.⁴¹ Nevertheless, wet nurses enjoyed many privileges, like living under the same roof with the family for several years. That was a great benefit especially for poor women, who often had neglected, or even killed their own children. Contrarily to wealthy families, poor mothers who could not breastfeed their children gave them to large groups of wet nurses. At the same period, a movement in favor of breastfeeding of infants from their natural mother's arose.⁴² M. Etmuller (1644-1683) with his "Etmuller Abridged", published in 1703, was the first to advocate that babies should be put on their mother's breast during the colostrum period, a practice that was usually forbidden in the preceding era. Etmuller also believed that breast milk could not be assessed by its thickness or taste, but rather by the transmission of the nurse's character and temperament.⁴³ In the 17th century, Jacques Guillemeau (1550-1613) also advocated that babies must be put on their mother's breast. In his work "The Nursing of Children", there was a long preface, in which he emphatically supported breastfeeding. He also referred to four main objections against wet nursing. The first was the possibility of the child to be exchanged for another child, the second was that the love between mother and child might be reduced, the third was the possibility of the child adopting an undesirable trait from the nurse, and finally that the child might inherit the wet nurse's bad physique.⁴⁴

Nevertheless, if maternal milk was not available, the wet nurse was the next best option; she should be 20 - 30 years old, of good health and character and good mannered. Finally, she shouldn't be redhead, because women of that complexion had hot temperament, and it was believed that this trait might be harmful to their milk. It is though worth mentioning that for periods of time when wet nurses did not live in the same house with the family, and therefore the infants lived with them in their place, infant mortality increased. This led governments to set strict legislation about wet nursing.⁴² In the mid-18th century, Jacque Rousseau (1712-1778), also objected to wet nursing as the concurrent, growing popularity of maternal breast-feeding was associated with a significant decline of infant mortality.⁵ During the French Revolution, it was emphasized once again the value of breastfeeding by the natural mother and the refusal of this was marked as an indication of aristocracy and decadence. At the end of 18th century in Europe the dilemma 'mother versus wet nurse' was by-passed by the new controversy that emerged, 'bottle versus the breast'.⁴⁰ Brouzed was the first to discuss the problem of feeding a baby by posing 3 questions; the first one was whether infants should be nourished with milk, the second one was whether milk should be human and finally

if it should be their own mother's milk. At the end of the century, four methods of infant feeding were available, breast-feeding by the mother, by wet nurses, with animal milk, and with pap and panada. Pap consisted of hot water and flour or bread soaked in water or milk and egg. Panadas were cereals which were cooked in broth. Pap and panada were given as a supplement to infants fed by animal milk.

19th century

During the Industrial Revolution the majority of people settled in urban areas, in order to find work. Mothers had to work outside from home, in order to supplement their family income. As the women were separated from their infants for several hours daily, breastfeeding was impossible and artificial nutrition became the first choice.⁴⁵ Indeed, in order to satisfy the demand in the changing societies, some centers set up breast milk banks where breast milk from several women was pooled and pasteurized before distribution. The first ones to open were in Boston in 1910 and in London at Queen Charlotte's Hospital and since then several more were established all over Europe. During this period, when artificial feeding became more or less the rule, one may evidence the evolution in the field of feeding bottles. These had been used since the earliest historical times and many of them were discovered, in a variety of forms and shapes. The danger of using these vessels was associated with their unhygienic nature, with overfeeding and injudicious feeding. It was not until the 19th century when glass bottles were first manufactured, and the modern feeding bottle evolved. This was of high importance, because the cleaning was easier and the hygiene markedly improved.⁴⁶ Initially these bottles tended to be over-elaborated; for example the 'biberon', which was imported from France in the year of great Exhibition (1851), was made of glass with a cork nipple and spiral air inlet with ivory pins to regulate the flow. Later, Routh devised a pear-shaped vessel that could be strapped to the mother's chest called a 'mamma'. Before the 19th century the only alternatives to breast milk were either animal milk or some form of supplement, made with water, milk and flour like pap and panada. The first step towards the production of dehydrated milk was made by Newton in 1835 and it was put in 'tin boxes' for the first time in 1866. By 1902, dried milk became increasingly widely used and its popularity was firmly established. This rapid development was a mixed blessing, as many firms produced a wide number of formulas based upon variations in their composition of fat, protein and carbohydrate.⁴⁷

In parallel with the evolution of dried milk the development of numerous infant foods occurred. Professor von Liebig devised a formula in 1863 for the perfect infant food consisting of cow's milk, flour, potassium bicarbonate and malt. By 1883 there were 27 brands of infant foods available; this of course created confusion among healthcare professionals and parents, who did not know the composition and relative benefits of these products and to what extent, these were unsuitable for babies under 6 months of age. Unfortunately, these dried milks and starchy foods became the first nutrition for the infants. This led to an increase of the incidence of scurvy and rickets, as these foods were insufficient in vital vitamins.²⁸ At the outset of the nineteenth century the first chemical analysis of human and other mammalian milk gave advantage to scientist, because it was widely known that human milk was the best for infants. Besides, it was revealed that cow's milk required modification in order to be "humanized".⁴⁸ The fall in infant mortality, which occurred during the second half of the 18th century, was carried over into the 19th, but for the major part of the century it remained static, or even sustained a slight increase in the 1890s. It is generally accepted that this rise was due to the high incidence of gastroenteritis, which was a result of faulty

feeding and bad hygiene.⁴³ This period, Simon and Chadwick offer a great benefit to the safety of infant feeding, with their movement, which lessened the danger of the transmission of diseases by milk and water and gradually raised the general standard of living conditions. In addition to this progress, at the outset of this century, Pasteur and Koch drew attention to the danger of microorganisms in milk and for this reason it was preferred the use of sterilized undiluted cow's milk when breast milk was not available.⁴⁹

20th century

A steady reduction in infant mortality was noticed during this period. A vital role for this played the establishment of welfare clinics and the education of the mothers about the great value of breastfeeding and the right use of dried milks. In 1892 Pierre Budin was the first who founded a welfare clinic, the Consultation de Nourrissons, where breast-feeding was encouraged and sterilized cow's milk was provided in sealed bottle, for single use. In these clinics infants were examined and cards with record of the date of examination, the quality of feeding and the infant's weight were given to the mothers. This movement spread rapidly through France and England. In England the first clinic was set up at Battersea Milk Depot by Dr McCleary in 1905; thereafter the movement rapidly developed so that by 1913, 200 voluntary societies were functioning, that increased to 650 by 1915, and to 1278 at the end of World War I, a remarkable growth for war time. During this century, a high percentage of babies were fed by formulas, mainly because of advertising; large companies tried to convince healthcare professionals and parents that artificial feeding was the safest option for the babies. Milk suitable for allergic infants was produced from soya bean flour, during the same period, in an attempt to feed allergic infants, and it was commercially available by 1929. Furthermore, many physicians in the United States aimed at providing a formula with a composition close to that of human milk, by taking into account the digestive capability of the individual infant.⁴³ Data from the National Fertility Study indicated that from 1931 to 1935, a high percentage of infants (of 40-70%) were initially breast-fed, while by 1946-1950, this percentage declined to 20-50%.

Gradually, the composition of formulas improved, with their enrichment with vital ingredients, such as basic vitamins and metals. The United States launched new regulations concerning safety of infant formulas. In 1938 new Food and Drug Act included reference to foods for special dietary purposes, including infant formulas.⁴⁸ In 1941, the FDA declared that a food sold for use by infants should include a label declaration for moisture, energy, protein, fat, carbohydrates, fiber, calcium, phosphorus, iron and vitamins A, B1, C and D. So, the better quality of formulas and the better conditions of hygiene convinced the population that formula feeding was as safe and beneficial as breast-feeding. As the years passed by, FDA requested the committee of Nutrition of the American Academy of Paediatrics to recommend levels of nutrients in infant formulas. The report of the Committee on Nutrition (1967) was used as a basis, and the final regulation, published in 1971 included minimum requirements for protein, fat, linoleic acid and 17 vitamins and minerals.⁴⁷ During the 1950s and 1960s, breast-feeding steadily decreased and by the early 1970s, only about 25% of infants were breast-fed at the age of 1 week and only 14% at 2 and 3 months of age.⁵⁰ Another factor that played a vital role was that mothers often felt ashamed of breast-feeding, as the breast appeared as a clue of their sexuality.⁴²

The same period, the role of advertising played a significant role in the dramatic increase of condensed milk use in developing countries. The low socioeconomic status along with the dubious hygiene had a devastating result in infant mortality in these countries, as the rate

of necrotizing enterocolitis had an impressive increase.⁵¹⁻⁵³ The most impressive aspect, though, of this issue is that mothers from these countries tended to believe that breast milk and especially colostrum was harmful for their babies.⁵⁴

21th century

Breast-feeding increased over the last years, beginning in the 1970s. Especially, in later years paediatric clinics informed mothers about the advantages of breast-feeding. This movement sprawls worldwide and healthcare professionals are very sensitive now on the issue. Fortunately, at present, physical mother's milk is considered as the best nutrition for the baby and this movement sprawls widely as the years go by. It is widely accepted now, that breastfeeding decrease the risk of many serious diseases as acute otitis media, non-specific gastroenteritis, severe lower respiratory tract infections, atopic dermatitis, asthma, obesity, type 1 and 2 diabetes, childhood leukemia, sudden infant death syndrome (SIDS) and necrotizing enterocolitis.^{51,55,56} The great impact of breastfeeding is obvious for the world health and economy, as the rates of hospitalization and morbidity had decreased. Finally children who fed with breast milk during infancy are reported to present with a higher IQ.⁵⁷

Conclusion

Through human history, until the industrialization of societies, mothers had recognized the vital importance of breastfeeding. Hence, they fed their offspring breast milk, or if they were unable to do so, they delegated other women, the so called wet-nurses, to take over, even though this remained a privilege mainly of wealthy families. Wet-nursing was a legal profession had great believers and great opponents, such as Aristotle and Plutarch or Jacques Guillemeau and Jacque Rousseau, in later years. One can appreciate the importance and vitality of breast milk by the numerous references in mythology, art and writings scientific or philosophical. By the end of the 18th century, the dilemma between breastfeeding and wet-nursing was passed by the choice between substitutes and human milk. During the 19th century, infant formulas were created and managed to convince public opinion and healthcare professionals that they were a better choice for children than maternal milk. Fortunately, in the 1970s, research revealed the advantages of breastfeeding and nowadays it's gained the role it deserves.

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Conflicts of interest

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