

Influence of Breastfeeding on The Early Aged Children's Health and QI Indicators

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Research

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Abstract

Background: Promotion and coverage of breastfeeding are considered to be the cost-effective public health measures in terms of Healthcare System. The aim of the research is to assess an influence of breastfeeding on infants' health and quality of life (QL) parameters.

Methods: This observational prospective study included 1790 newborns selected from Yerevan State Medical University's Polyclinics ("Mouratsan" (sample=746) and "Heratsi" (sample=1044)). Data collection took a period between January 2016 and December 2017. Evaluation of children's quality of life was performed with the help of the validated and adapted QUALIN questionnaire. The data related to child's health condition were collected from the "Child Development History" cards available at the polyclinics of the investigated area.

Results: Among 1770 one year old children 1681 were ever breastfed, 1224 (69.1%) were exclusively breastfed up to 3 months, the median duration of breastfeeding was 6-7 months, 45% \geq 6 months, 15% \geq 1 year. There is a significant difference between the QL scores of the ever breastfed and the never breastfed subgroups. Duration of the breastfeeding also have an influence on QL scores.

Conclusions: The given study's results confirm that breastfeeding among the early aged Armenian children is of great importance in their health, influencing on quality of life and morbidity rates.

Background

Early contact between a child and the mother has considerable effect on the child's neuropsychological development. It particularly exerts children's rapid social adaptation and reduces stress [21, 25, 28]. Based on the results of experiments on animals it is more likely that owing to breastfeeding the hypothalamic-pituitary-adrenal system (HPAS) reacts to stress in more active way providing adaptation easily due to the feedback mechanism [16].

Functional interconnection between the breastfeeding, immune system development and the further susceptibility to autoimmune diseases is quite interesting. The breast milk is a rich source of immunological defences, which helps the infants to stimulate their own immune system, and so, may have an important role in the establishment of the gut flora and local defence against infection [12].

Researches on breastfeeding show its potential feasibility to reduce the risk of the common infections among newborns, of such illnesses, like atopic dermatitis, asthma, obesity, type 1 or type 2 diabetes, leukemia, the necrotizing enterocolitis, as well as the sudden infant death syndrome, etc. [11, 14, 15].

Promotion and coverage of breastfeeding are considered to be the cost-effective public health measures in terms of Healthcare System, which is of great importance on maternal health and the infant morbidity and mortality rates decrease [20, 31]. Particularly it is important in the developing countries [10, 22, 23].

Exclusive breastfeeding in the first six months of life and its duration up to 11 months is an optimal strategy to improve a child survival in the developing countries and to prevent morbidity of children under

five years of ages by 13% [13].

In Cox regression analyses the duration of breastfeeding showed a positive association with mother's schooling ($p = 0.002$), her intention to breastfeed ($p = 0.001$), previous experience with breastfeeding ($p < 0.001$), self-efficacy with respect to breastfeeding ($p < 0.001$), her confidence in breastfeeding ($p = 0.012$) and knowledge about breastfeeding ($p = 0.001$). The effect of the mother's knowledge depended on the parity of the child [8].

The importance of breastfeeding in low-income and middle-income countries is well recognised, but less consensus exists about its importance in high-income countries. In low-income and middle-income countries, only 37% of children younger than 6 months of age are exclusively breastfed. With few exceptions, breastfeeding duration is shorter in high-income countries than in those that are resource-poor. [5, 34].

Breast milk is considered the best source of nutrition for infants, but for a variety of reasons many parents choose to supplement breastfeeding with some formula-feeding or to provide feedings exclusively with infant formula [30].

Mothers rated partners as a powerful influence on their attitudes toward the obesity-related behaviours of their pre-school children, suggesting that partners could be an important target of obesity-prevention initiatives [1].

A large number of books and researches is available regarding to breastfeeding and life and health of infants and children. However, the data related namely to the problems of breastfeeding and the quality of life and wellbeing of children are relatively few [9, 18].

A baby-led weaning approach may encourage greater satiety-responsiveness and healthy weight-gain trajectories in infants. However, the limitations of a self-report correlational study are noted. Further research using randomized controlled trial is needed [4].

Despite attention and improvement priority given to breastfeeding, the latter still remains as a goal that is difficult to achieve for both the developed and the developing countries [3, 17, 27].

The national program of breastfeeding in the Republic of Armenia has been started since 1993 [24].

The aim of the research is to assess an influence of breastfeeding on infants' health and morbidity rates, as well as on the QL parameters.

Methods

Recruitment and data collection

This observational prospective study included 1790 newborns selected from Yerevan State Medical University's Polyclinics ("Mouratsan" (sample = 746) and "Heratsi" (sample = 1044)). Data collection took a

period between January 2016 and December 2017. Inclusion criteria was eligible birth during 2016 year. Exclusion criteria were parental refusal and preterm birth. 1029 practically health children were formed I Group (Healthy) and 761 children with chronic or acute illness formed II Group (Risk). Every Group consists of subgroups according feeding type (exclusively breastfed, ever breastfed and never breastfed).

The study project had been discussed previously and recommended at the meeting of the Ethics Committee of Yerevan State Medical University. Baseline demographic and clinical characteristics were compared between heal

thy and risk groups and their subgroups using non-parametric descriptive statistics.

For every newborn up to one year were collected information about feeding type and duration based on "Child Development History" cards. Were also collected data related to child's health condition from same cards available at the polyclinics of the investigated area.

Assessment Of Quality Of Life

Validation and cultural adaptation of QUALIN questionnaire

Many different researchers have evaluated children's quality of life with the help of the applied and adapted QUALIN questionnaire [19]. The questionnaire was translated from French into Armenian. It was then checked up for consistency by back-translation to French by language experts. Pretest was conducted two weeks prior to the survey for 100 children (Cronbach's α was 0.8 for parent and 0.9 for pediatrics report). Based on the pretest, the questionnaire was corrected to ensure clarity, wording, and logic sequence.

Evaluation

QUALIN consists of 4 subscales (34 questions), which describe the four basic aspects of child's life activity:

1. Behavior and Communication (14 questions) (BC)
2. Ability to Stay Alone (5 questions) (ASA)
3. Family Environment (4 questions) (FE)
4. Neuropsychological Development and Physical Health (11 questions) (NbDPH)

The total evaluation of QL was given with the help of the total cumulative magnitude scale. Every item with 6 possible answers, scored from 0 (quite false) to + 5 (entirely true). Thus, the mean score ranges from 0 (poor QL) to + 5 (excellent QL)

Data Analysis

For analyzing and evaluating of the statistical material the following statistical methods were applied: calculation of medium and relative indicators, reliability evaluation applying Independent Sample Test.

The database was created with the help of SPSS Statistics. The quantitative numbers describing the observation unit were converted to average arithmetic (M), for average veracity evaluation the arithmetic's average error was calculated (m). Differences in proportions were compared by the Chi-square test or Fisher Exact Test and differences of means were compared by the Student's t-test. Module t equals to 2 (95%, veracity $p < 0.05$).

Results

The study involved boys (52,2%) and girls (47,8%). Among 1770 one year old children 1681 were ever breastfed, 1224 (69.1%) were exclusively breastfed up to 3 months, the median duration of breastfeeding was 6–7 months, 45% ≥ 6 months, 15% ≥ 1 year.

In the I Group 752 (73.7%) children were exclusively breastfed up to 3 months and in II Group 472 (62.9%) ($p < 0.001$).

The percentage index of ever breastfeeding among I Group was 96.1% and in II Group 93.5% ($p < 0.001$). Never breastfed children in I Group were made up 3.9% in II Group 6.5% ($p < 0.001$) (Table 1).

In II Group were analyzed morbidity rates for frequently detected neonatal disease according feeding type. It is noteworthy that difference of morbidity between the ever breastfed and the never breastfed children in II Group is of importance (Table 2).

The iron-deficient anemia indicator made up 39,2 in the subgroup of the never breastfed children and 21,2 – among the ever-breastfed children. The atopic dermatitis indicator was 37,9 in the subgroup of never breastfed children and 21,4 - among the ever-breastfed children.

Table 1
The demographic characteristics of investigated 1 year old children

Sample 1770	I Group	II Group	P value
N (%)	1020 (57.6)	750 (42.4)	
YSMU, "Mouratsan" Children's Polyclinic (n = 738)	432 (58.5)	306 (41.5)	
YSMU, "Heratsi" Children's Polyclinic (n = 1032)	588 (57.0)	444 (43.0)	
Male, n (%) 846	500 (49.0)	346 (46.1)	
Female, n (%) 924	520 (51.0)	404 (53.9)	
Exclusively breastfed up to 3 months	752 (73.5)	472 (62.9)	$p < 0.001$
Ever breastfed	980 (96.1)	701 (93.5)	$p < 0.001$
Never breastfed	40 (3.9)	49 (6.5)	$p < 0.001$

Table 2
The morbidity rates of 1 year old children in II Group stratified by breastfeeding

Morbidity P(m)*	Ever breast fed	Never breast fed	P value (ever vs never breasts fed)
Fe-deficient anemia	21.2 (0.05)	39.2 (0.05)	< 0.001
Rickets	3.6 (0.07)	4.5 (0.07)	< 0.001
Atopic dermatitis	21.4 (0.05)	37.9 (0.05)	< 0.001
Hypertrophy	7.1 (0.04)	10.6 (0.06)	< 0.001
CNS perinatal lesion	7.1 (0.07)	10.6 (0.06)	< 0.001
Acute intestinal infections	17.1 (0.05)	29.2 (0.05)	< 0.001
Digestive system disorders	19.5 (0.07)	35.7 (0.08)	< 0.001
Acute respiratory infections	54.5 (0.05)	35.7(0.05)	< 0.001

***the morbidity rate has been calculated for 1000 children**

Acute respiratory infections were exceptions the indicator of which was 35,7 among the ever-breastfed children and 54,5 – among the never-breastfed children. However, it should be stated that treatment of acute respiratory infections lasted for 3 days among 75,5% of the ever-breastfed subgroup and 30,5% of the never breastfed children. The treatment lasted from 3 to 7 days among 24,0% of the ever-breastfed subgroup and 33,6% among the never breastfed children. Treatment got lasted for more than 7 days among 0,5% of the ever-breastfed children and 25,9% of the never breastfed children.

There is a significant difference between the QL scores of the ever breastfed and the never breastfed subgroups for both groups (Table 3).

Table 3
 QL scores of one year old children stratified by breastfeeding

Quality of life scores* M (m)	Group I		P value (ever vs never breastfed)	Group II		P value (ever vs never breastfed)
	Ever breastfed	Never breastfed		Ever breastfed	Never breastfed	
«Behavior and Communication»	4.55(0.02)	3.68(0.05)	< 0.001	3.65(0.02)	3.08(0.05)	< 0.001
«Ability to stay alone»	3.96(0.02)	3.59(0.04)	< 0.001	3.26(0.02)	2.59(0.04)	< 0.001
«Family environment»	4.47(0.02)	3.91(0.04)	< 0.001	3.77(0.02)	3.25(0.04)	< 0.001
«Neuropsychological development and physical health»	4.16(0.02)	3.71(0.04)	< 0.001	3.56(0.02)	2.89(0.04)	< 0.001
Total score	4.25(0.02)	3.79(0.04)	< 0.001	3.42(0.02)	2.83(0.04)	< 0.001
<i>* the average score of quality of life subscales has been calculated in 6 scoring system in which 0 is the minimum possible value and 5 is the maximum possible one.</i>						

For both groups in never breast-fed subgroups most affected subscale was ASA.

Duration of breast feeding also have an influence on QL. Duration of the breastfeeding period and the QL scores for each group presented in the Table 4 and Table 5.

Table 4
 QL scores according to the duration of breast-feeding in I Group

Characteristic	< 3 months	≥ 3 and < 6 months	≥ 6 months
QL scores* M(m)			
«Behavior and Communication»	3.8 (0.03)	4.3 (0.04)	4.5 (0.02)
«Ability to stay alone»	3.7 (0.04)	4.0 (0.04)	4.3 (0.02)
«Family environment»	4.0 (0.03)	4.5 (0.05)	4.7 (0.02)
«Neuropsychological development and physical health»	3.9 (0.05)	4.1 (0.05)	4.5 (0.02)
Total score	3.9 (0.04)	4.3 (0.04)	4.5(0.02)

The average score of quality-of-life subscales has been calculated in 6 scoring system in which 0 is the minimum possible value and 5 is the maximum possible one.

Table 5
 QL scores according to the duration of breast-feeding in II Group

Characteristic	< 3 months	≥ 3 and < 6 months	≥ 6 months
QL scores* M(m)			
«Behavior and Communication»	3.2 (0.05)	3.5 (0.08)	3.7 (0.02)
«Ability to stay alone»	2.8 (0.04)	3.3 (0.04)	3.5 (0.02)
«Family environment»	3.4 (0.04)	3.7 (0.05)	4.0 (0.02)
«Neuropsychological development and physical health»	3.0 (0.05)	3.5 (0.05)	3.8 (0.02)
Total score	3.2 (0.04)	3.6 (0.04)	3.8(0.02)

The average score of quality-of-life subscales has been calculated in 6 scoring system in which 0 is the minimum possible value and 5 is the maximum possible one. In II Group the total score of quality of life was significantly different ($p < 0.001$) depending on whether the child had ever been breastfed or not (Table 6), except for the cases of gastro-esophageal reflux disease ($p = 0.0556$).

Table 6
Total Score of Quality of Life for some diseases ever versus never breastfed

Characteristic	II Group	Ever breastfed	Never breastfed	P value
Total Score of Quality-of-Life M(m)*				
Rickets	3.2(0.03)	3.5(0.02)	3.1(0.02)	< 0.001
Certain conditions originating in the perinatal period	3.5(0.03)	3.9(0.03)	3.2(0.03)	< 0.001
Anemia	3.1(0.03)	3.4(0.03)	2.7(0.03)	< 0.001
Hypertrophy	3.3(0.03)	3.7(0.02)	3.0(0.02)	< 0.001
Ambulatory pneumonia	3.2(0.04)	3.6(0.03)	2.9(0.02)	< 0.001
Severe acute respiratory syndrome (SARS)	3.3(0.03)	3.7(0.03)	2.9(0.03)	< 0.001
Atopic dermatitis	2.7(0.02)	2.9(0.02)	2.6(0.02)	< 0.001
Gastritis	3.5(0.02)	3.9(0.03)	3.3(0.03)	< 0.001
Gastro-esophageal reflux	2.9(0.02)	3.0(0.03)	2.7(0.03)	0.0456
Biliary dyskinesia	3.1(0.02)	3.5(0.02)	2.9(0.03)	< 0.001
<i>* the average of quality-of-life total score has been calculated in 6 scoring system in which 0 is the minimum possible value and 5 is the maximum possible one.</i>				

Particularly, in case of anemia the QL total score for the ever breastfed was 3.5 and for the never breastfed – 2.7. In case of ambulatory pneumonia, the QL total score was 3.6 for the ever breastfed and 2.9 – for the never breastfed children. In case of rickets the total score of QL for the ever-breastfed children was 3.5 and for the never breastfed children – 3.1.

Discussion

The study conducted is important since it enriches the limited literature data devoted to breastfeeding and the quality of life. More common is the literature related to the influence of breastfeeding on mother's QL [6], while studies devoted to the influence of breastfeeding on children's QL are quite rare [9].

Manificat and Dazord [19] examined quality of life among 105 infants (mean age 5.7 months) as a function of feeding, and stated that the duration of breastfeeding for more than 3 months was associated with a higher total quality of life. Our study results were quite similar. There was no significant difference in

QL scores between never breastfed and ever breastfed (up to 3 months) children ($p = 0.14$), however, the difference is significant in case of children who had been breastfed for 3 months and longer ($p < 0.001$). In terms of public healthcare resolution, it is necessary to continue breastfeeding at least until 6 months, since the quality of life is significantly higher among the children who breastfed for 6 months and longer ($p < 0.001$), i.e. the duration of breastfeeding influences on the QL scores. According to WHO counseling the optimal duration of exclusive breastfeeding is making 6 months, therefore breastfeeding is recommended to be continued along with complementary feeding [32].

Data obtained from the given study support the assumption that breastfeeding protects the baby by reducing the morbidity rate. At the same time, it is necessary to conduct some additional studies in order to clarify the underlying mechanisms of the breastfeeding effects. Some literature data referring to the breastfeeding influence on duration and the whole process of different diseases are represented in the related articles [2, 7, 26, 29, 33].

Results of the study are of importance as they show that in case of many diseases among early aged children there is a significant difference of QL total scores between the ever breastfed and the never breastfed groups ($p < 0.001$), excluding the gastro-esophageal reflux ($p = 0.0556$).

Strength of this study is to be one of the first studies to explore the relationship between the early aged children breastfeeding and QL in a country with low income.

Conclusion

The given study's results confirm that breastfeeding among the early aged Armenian children is of great importance in their health group, influencing on the morbidity rate and quality of life.

Abbreviations

QL

Quality of life

QUALIN

Qualité de vie du Nourisson

WHO

World Health Organization

Declarations

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Authors' contributions: **MAM (CA)** conceptualized the analyses for this paper, prepared the literature review and conducted the coding and statistical analyses. **SAM** interpreted the results and drafted the paper prepared the literature review, conducted the coding and statistical analyses. **RAD** contributed to coding the data, interpreting the results and drafted the paper. **KHS** contributed to the data coding, interpreting the results and revising the manuscript for important intellectual content. **HVH** participated in the paper editing in addition to a supervision of the whole work.

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Availability of data and materials

The datasets generated during the current study are not publicly available [due to the order of the YSMU Ethics Committee and the agreement signed with the patients who participated in the examination] but are available from the corresponding author on reasonable request.

Conflict of Interest

The authors declare that they have no competing interests.

Ethics approval and consent to participate

The study was conducted in accordance with the ethical principles stated in the Declaration of Helsinki. The study project was discussed and approved by the Ethics Committee of Yerevan State Medical University after M. Heratsi.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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