




## Research Roundup

A review of interesting or groundbreaking literature!

Heidi E. Karpen, MD  
Claire Eden, BA, IBCLC  
Elizabeth Collins, MD, MPH

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### Disclosure Information

The following planners, faculty and others in control of content have declared no relevant financial relationships with ineligible companies:

**Faculty**  
Elizabeth Collins, MD, MPH  
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Children's Healthcare of Atlanta

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### Disclosure Information Cont.

The following planners, faculty and others in control of content ~~have declared relevant financial relationships~~ with ineligible companies:

**Planning Committee**

- Heidi Karpen, MD - Prolacta Bioscience, Inc-  
Honorarium, Research Support

*All relevant financial relationships listed for these individuals have been mitigated.*

Children's Healthcare of Atlanta

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Glycobiology, vol. 22 no. 9 pp. 1147-1162, 2012  
doi:10.1093/glycob/cwr114  
Advance Access publication on April 18, 2012

**REVIEW**

**Human milk oligosaccharides: Every baby needs a sugar mama**

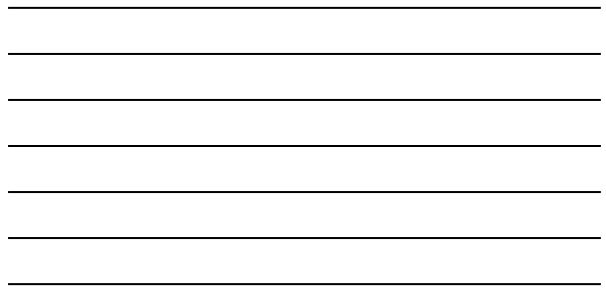
**A** Lewis-positive Hexamer (Lea-6) **B** Lewis-positive Hexamer (Leb-6) **C** Lewis-positive Hexamer (LeX-6) **D** Lewis-negative Hexamer (Lea-6) **E** Lewis-negative Hexamer (Leb-6)

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**A** Prebiotics **B** Antiadhesive/Antimicrobials **C** Intestinal Epithelial Cell Modulators **D** Immune Modulators **E** Modulators of Leukocyte Rolling and Adhesion **F** Brain Development Nutrients

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**Human milk oligosaccharides modulate the intestinal microbiome of healthy adults**

Jonathan P. Jacobs<sup>1,2,3</sup>, Martin L. Lee<sup>1,2</sup>, David J. Reichtman<sup>1</sup>, Adam K. Sun<sup>1</sup>, Chloe Auran<sup>1</sup> & Victoria Niklas<sup>1,2</sup>

**A** HMO 1 **B** HMO 14 **C** HMO 1 **D** HMO 1 **E** HMO 1

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**nutrients** MDPI

Article

### Human Milk Composition and Nutritional Status of Omnivore Human Milk Donors Compared with Vegetarian/Vegan Lactating Mothers

Nordia Utrero-Núñez <sup>1,†</sup>, Kátia Kettler <sup>1</sup>, Diana Escudéu-Vélez <sup>1</sup>, Javier Fontecha <sup>2,3</sup>, María V. Cobas <sup>2,3</sup>, Javier Magiño-Salán <sup>4</sup>, José C. E. Soriano <sup>4,5</sup>, Carmen Romero-Fernández <sup>1,6,7</sup>, Nalleli Raquel García-Lara <sup>1,2,8</sup> and Carmen K. Pallua-Alonso <sup>1,2</sup>

**Background:** Women of childbearing age in Western societies are increasingly adopting vegetarian diets. These women are sometimes rejected as milk donors, but little about the composition of their milk is known.

**Purpose:** The present study aimed to compare the intake, nutritional status, and nutritional composition of human milk from omnivore human milk donors (Donors) and vegetarian/vegan lactating mothers (Veg).

**Methods:** Milk, blood, and urine samples from 92 Donors and 20 Veg were used to determine their fatty acid profiles, as well as vitamins and minerals.

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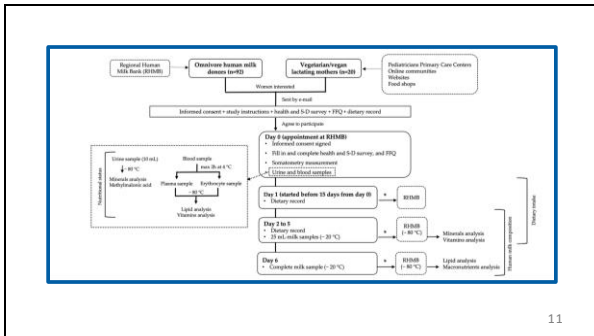
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### Infant Characteristics

Characteristic	Donors (n = 92)	Veg (n = 20)	p Value
Gender	50 (54.3%)	7 (35%)	0.116
Step	42 (45.7%)	13 (65.0%)	
Twin pregnancy	0 (0.0%)	1 (5.0%)	0.178
Gestational age (weeks)	39 <sup>a</sup> (39, 40 <sup>ab</sup> ); 32 <sup>b-1</sup> -42 <sup>b-3</sup>	39 <sup>a</sup> (38 <sup>a</sup> , 40 <sup>b</sup> ); 36 <sup>a-1</sup> -41 <sup>a-4</sup>	0.082
Birth weight (grams)	3303.4 (412.7); 2120-4640	3125.8 (412.6); 2240-3960	0.120
Birth weight percentile <sup>1</sup>			
<25	23 (25.0%)	12 (60.0%)	
25-75	62 (67.4%)	8 (40.0%)	0.007
≥75	7 (7.6%)	0 (0.0%)	
Age of breastfed child (months)			
<6	34 (37.0%)	9 (45.0%)	
6-12	34 (37.0%)	6 (30.0%)	0.776
12-50	24 (26.1%)	5 (25.0%)	
Weight percentile of breastfed child <sup>2</sup>			
<15	13 (14.1%)	7 (35.0%)	
15-85	62 (67.4%)	12 (60.0%)	0.049
>85	17 (18.5%)	1 (5.0%)	

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### Fatty Acid Profiles

Monounsaturated Fatty Acids (MUFAs)						
C14:1 cis-9 (n5)	Myristoleic	0.08 (0.00)	0.03 (0.01)	<0.001		
C16:1 cis-9 (n7)	Palmitoleic	1.25 (0.05)	1.23 (0.11)	<0.001	2.21 ± 0.64	2.3 ± 0.92
C17:1	Margaroleic	0.07 (0.00)	0.04 (0.00)	<0.001		
∑ C18:1 trans		0.27 (0.02)	0.07 (0.03)	<0.001	0.66 ± 0.35	
C18:1 cis-9 (n9)	Oleic	38.31 (0.53)	41.38 (1.22)	0.025	35.59 ± 4.17	32.6 ± 5.84
C18:1 cis-11 (n7)	Clia vaccenic	1.59 (0.03)	1.66 (0.05)	0.282	2.38 ± 0.53	
C20:1 (n9)	Godoleic	0.69 (0.06)	1.42 (0.21)	<0.001	0.38 ± 0.12	0.46 ± 0.28
n-6 Polyunsaturated Fatty Acids (n-6 PUFAs)						
C18:2 (n6)	Linoleic (LA)	15.29 (0.39)	20.02 (1.15)	<0.001	14.00 ± 4.95	15.7 ± 7.15
C20:2 (n6)	Eicosadienoic	0.27 (0.01)	0.32 (0.02)	0.063	0.26 ± 0.07	0.37 ± 0.19
C20:3 (n6)	Dihomo-γ-linolenic	0.33 (0.01)	0.36 (0.04)	0.652	0.31 ± 0.09	0.37 ± 0.18
C20:4 (n6)	Arachidonic (AA)	0.55 (0.02)	0.46 (0.03)	0.012	0.44 ± 0.12	0.50 ± 0.25
n-3 Polyunsaturated Fatty Acids (n-3 PUFAs)						
C18:3 (n3)	Linolenic (ALA)	0.52 (0.02)	0.61 (0.05)	0.044	0.94 ± 0.55	1.11 ± 1.05
C22:5 (n3)	Docosapentaenoic (DPA)	0.08 (0.01)	0.04 (0.01)	<0.001		
C22:6 (n3)	Docosahexaenoic (DHA)	0.33 (0.02)	0.15 (0.04)	<0.001	0.34 ± 0.35	0.37 ± 0.31
n-7 Polyunsaturated Fatty Acids (n-7 PUFAs)						
C18:2 cis-11 (n7)	Rumenic	0.09 (0.01)	0.04 (0.02)			

Journal of Perinatology www.nature.com/jp

**ARTICLE**

## Early pumping frequency and coming to volume for mother's own milk feeding in hospitalized infants

Deesha D. Mago-Shah<sup>1</sup>, Kamlesh Athavale<sup>2</sup>, Kimberley Fisher<sup>1</sup>, Elizabeth Heyward<sup>1</sup>, David Tanaka<sup>3</sup> and C. Michael Cotten<sup>1</sup>

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**OBJECTIVE:** To identify daily pumping frequencies associated with coming to volume (CTV; producing > 500 milliliters of milk per day by postnatal day 14) for mothers of infants in the neonatal intensive care unit (NICU).

**STUDY DESIGN:** We compared demographics and daily pumping frequencies for mothers who did and did not experience CTV.

**RESULTS:** Of 427 mothers who produced milk, 201 (50.1%) experienced CTV. Race, insurance, delivery type and birthweight were associated with CTV. For mothers who experienced CTV, average pumping episodes increased daily, stabilizing at 5 pumping episodes per day by postnatal day 5 (5 × 5). Women who experienced CTV were also more likely to have pumped between 0100 and 0500 (AM pumping). In multivariable analysis birthweight, 5 × 5 and AM pumping were each independently associated with CTV.

**CONCLUSION:** Supporting mothers of NICU infants to achieve 5 or more daily pumping sessions by postnatal day 5 could improve likelihood of achieving CTV.

*Journal of Perinatology*; <https://doi.org/10.1038/s41372-023-01662-z>

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- **CONCLUSION:** Supporting mothers of NICU infants to achieve 5 or more daily pumping sessions by postnatal day 5 could improve likelihood of achieving CTV.


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*Clinical Update*

## Keys to Coming to Volume


(producing > 500 milliliters of milk per day by postnatal day 14 for mothers of infants in the NICU)

### 5x5




Expressing milk at least  
5 times a day by day 5

### Early AM



At least one of those  
between 1 and 5 am



GEORGIA PERSONAL QUALITY COLLABORATIVE

Mago Shah, D.D., Athavale, K., Fisher, K. et al. Early pumping frequency and coming to volume for mother's own milk feeding in hospitalized infants. *J Perinatol* (2023).

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ORIGINAL ARTICLE
Maternal & Child Nutrition | WILEY

### Comparison between the for-profit human milk industry and nonprofit human milk banking: Time for regulation?

Natalie Shenker<sup>1,2</sup> | Jonathan Linden<sup>3</sup> | Betty Wang<sup>3</sup> | Claudia Mackenzie<sup>3</sup> | Alex Pueyo Hildebrand<sup>3</sup> | Jacqui Spears<sup>3</sup> | Danielle Davis<sup>3</sup> | Sushma Nangia<sup>4</sup> | Gillian Weaver<sup>2</sup>

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### Comparison between the for-profit human milk industry and nonprofit human milk banking: Time for regulation?

**Abstract**

Human milk (HM) is a highly evolutionary selected, complex biofluid, which provides tailored nutrition, immune system support and developmental cues that are unique to each maternal-infant dyad. In the absence of maternal milk, the World Health Organization recommends vulnerable infants should be fed with screened donor HM (DHM) from a HM bank (HMB) ideally embedded in local or regional lactation support services.

However, demand for HM products has arisen from an increasing awareness of the developmental and health impacts of the early introduction of formula and a lack of prioritization into government-funded and nonprofit milk banking and innovation. This survey of global nonprofit milk bank leaders aimed to outline the trends, commonalities and differences between nonprofit and for-profit HM banking, examine strategies regarding the marketing and placement of products to hospital and public customers and outline the key social, ethical and human rights concerns. The survey captured information from 59 milk bank leaders in 30 countries from every populated continent.

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### Comparison between the for-profit human milk industry and nonprofit human milk banking: Time for regulation?

#### Abstract cont.

In total, five companies are currently trading HM products with several early-stage private milk companies (PMCs). Products tended to be more expensive from PMC than HMB, milk providers were financially remunerated and lactation support for milk providers and recipients was not a core function of PMCs. Current regulatory frameworks for HM vary widely, with the majority of countries lacking any framework, and most others placing HM within food legislation, which does not include the support and care of milk donors and recipient prioritization.

Regulation as a Medical Product of Human Origin was only in place to prevent the sale of HM in four countries; export and import of HM was banned in two countries. This paper discusses the safety and ethical concerns raised by the commodification of HM and the opportunities policymakers have globally and country-level to limit the potential for exploitation and the undermining of breastfeeding.

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### Principal risks of human milk commercialization

#### Equity

- o Access based on ability to pay, companies can charge families up to £2000 per month.
- o Potential to limit donors to non-profit HMBs, with reduced availability of DHM to NICUs
- o Lack of tracking and tracing limits ability of Muslim parents to consent

#### Safety

- o Little or no safety or efficacy data for new products
- o Comprehensive screening, e.g., for travel, new medications, raised risk of prion disease may not happen.
- o Payment by volume risks milk being cut with water or other milk. Providers are penalised financially if they do not produce enough

#### Exploitation

- o Mothers may sell milk rather than feed their own infants
- o Mothers may hyperlactate, with short- and long-term risks to their health
- o Minimum volumes expected are high.

#### Disconnection from support

- o Milk banks exist within hospital or community lactation support settings, ensuring maternal breastfeeding is prioritised and DHM is not used inappropriately
- o For-profit companies do not provide lactation support for providers to manage common issues such as blocked ducts, mastitis, and medication issues.

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## Prevalence and Predictors of Breastfeeding Duration of 24 or More Months

Andrea McGowan, MPH,<sup>1,2</sup> Ruowei Li, MD, PhD,<sup>3</sup> Kristin J. Marks, PhD, MPH,<sup>4,5,6</sup> Heather C. Hamner, PhD, MS, MPH<sup>4</sup>

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**Prevalence and Predictors of Breastfeeding Duration of 24 or More Months**

- Breastfeeding is associated with reductions in morbidity and mortality among mothers and children.<sup>1-4</sup> The Dietary Guidelines for Americans, American Academy of Pediatrics, and World Health Organization recommend exclusive breastfeeding for 6 months, with continued breastfeeding for at least 1 (Dietary Guidelines for Americans<sup>5</sup>) or 2 years (American Academy of Pediatrics,<sup>6</sup> World Health Organization<sup>3</sup>), while complementary foods are introduced.
- Benefits of longer breastfeeding durations have been documented<sup>3,4</sup>; however, limited studies describe US breastfeeding duration past 18 months.<sup>2</sup> Using data from a nationally representative survey, we examined the prevalence and predictors of breastfeeding duration  $\geq 24$  months.

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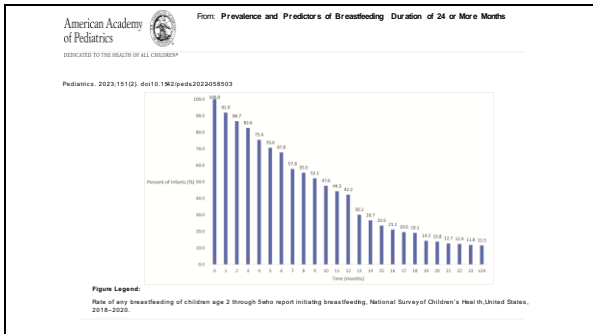
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**Prevalence and Predictors of Breastfeeding Duration of 24 or More Months**

- Only 11.5% of US children breastfed for  $\geq 24$  months. Breastfeeding rates decline sharply by child age, especially at 6 and 12 months. Results indicated significant differences in breastfeeding  $\geq 24$  months by maternal age, caregiver marital status, child race, and household income level. The strength of this analysis is the ability to assess longer breastfeeding duration among a nationally representative sample. Limitations include potential recall bias among mothers of older children and the heterogeneity of the non-Hispanic, other race group. Programmatic interventions and policies aimed at supporting breastfeeding duration could help persons who desire to breastfeed for  $\geq 24$  months.

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### Clinical Care Points

- Work collaboratively with lactation specialists and peer counselors.
- Provide patients with information about community resources for breastfeeding support.
- Inform patients about benefits available through their insurance and federal and state benefits.
- Review patients' medical history and medications and address any concerns regarding breastfeeding.
- Support patients with anticipated challenges by addressing possible problems and creating a proactive plan. When exclusive breastfeeding is not possible, educate patients about health benefits of any breastfeeding or human milk feeding.
- Promote implementation of Ten Steps to Successful breastfeeding.
- Help patients initiate breastfeeding or milk expression as early as possible and ideally in the first hour after birth.

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### Association Between State Paid Family and Medical Leave and Breastfeeding

Perry MF, Bui L, Yee LM, Feinglass J. Association Between State Paid Family and Medical Leave and Breastfeeding, Depression, and Postpartum Visits. *Obstet Gynecol.* 2024 Jan 1;143(1):14-22. doi: 10.1097/AOG.0000000000005428. Epub 2023 Nov 2. PMID: 37917931

- Cross sectional study in the "Green Journal" using 2016-2019 data from PRAMS (Pregnancy Risk Assessment Monitoring System) for 43 states and Washington, DC.
- Describes the association of state paid family and medical leave with breastfeeding rates, postpartum depression rates, and attendance at postpartum visit.
- Used logistic and Poisson regression models to control for sociodemographic factors.
- Special sensitivities were applied to Medicaid deliveries.

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### Association Between State Paid Family and Medical Leave and Breastfeeding

- Only 1 in 4 people have access to paid family and medical leave. (only 1 in 10 low-income adults)
- Paid family and medical leave is different from job protection afforded by the Family and Medical Leave Act (FMLA) which is unpaid job protection for up to 12 weeks following the birth of a child and other qualifying medical events
- Only 56% of working Americans qualify for FMLA (access is lower in marginalized, part time, private, and non-union workers)

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**Association Between State Paid Family and Medical Leave and Breastfeeding**

- PRAMS is a state-based mail and telephone interview survey on maternal behaviors, attitudes, and health conditions of a representative sample of individuals who have recently given birth, which is then linked to birth certificate data.
- PRAMS survey outreach begins 2 to 6 months after delivery; thus, *breastfeeding* was defined as the occurrence of breastfeeding at 6 months postpartum or at the time of PRAMS survey completion.<sup>14</sup> PRAMS does not specify whether breastfeeding was exclusive; therefore, this analysis was not restricted to exclusive breastfeeding.
- While studies linking beneficial health outcomes to paid medical leave have been performed, this study differed in that it compared a cross section of states with generous paid leave, some paid leave and no paid leave at the same time. Previous studies have typically looked at a single state before and after implementation of paid leave legislation.

14. Shulman HB, D'Angelo DV, Harrison L, Smith PA, Warner L. The Pregnancy Risk Assessment Monitoring System (PRAMS): overview of design and methodology. *Am J Public Health* 2008;98:1305-13. doi: 10.2195/ajph.2008.330663

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**Paid Leave and Breastfeeding- Findings**

- Breastfeeding prevalence was 7-8% higher in states with some or generous postpartum family leave
- Breastfeeding rates were highest in ages 30-34, Asian Americans, higher level of education, higher income, and most generous state paid family leave policies
- Impact was largest in Medicaid population with 17 and 32% of respondents more likely to breastfeed at 6 months with some and generous paid leave, respectively.

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**Continuous Medicaid Eligibility During the COVID-19 Pandemic and Postpartum Coverage**

Daw JR, MacCallum-Bridges CL, Kozhimannil KB, Admon LK. Continuous Medicaid Eligibility During the COVID-19 Pandemic and Postpartum Coverage, Health Care, and Outcomes. *JAMA Health Forum*. 2024 Mar 1;5(3):e240004. doi: 10.1001/jamahealthforum.2024.0004. PMID: 38457131; PMCID: PMC10924249.

- Due to the Families First Coronavirus Response Act (FFCRA), continuous Medicaid eligibility during the COVID-19 public health emergency (PHE) created a de facto national extension of pregnancy Medicaid eligibility beyond 60 days postpartum.
- This study evaluated the association of continuous Medicaid eligibility with postpartum health insurance, health care use, breastfeeding, and depressive symptoms.

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**Continuous Medicaid Eligibility During the COVID-19 Pandemic and Postpartum Coverage**

- Maternal morbidity and mortality are at high levels in the US when compared to other high resource countries
- Health insurance coverage provides important access to medical care, support services, hospital birth, mental health resources
- Federal law only requires postpartum Medicaid to be extended for 60 days after birth after which families must reapply under more stringent income and work requirements than during pregnancy
- According to the national vital statistics system 41% of births in 2022 were insured by Medicaid

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**Continuous Medicaid Eligibility During the COVID-19 Pandemic and Postpartum Coverage**

- 2020 Families First Coronavirus Response Act (FFCRA) included a maintenance of effort (MOE) requirement preventing states from disenrolling Medicaid recipients during the federal public health emergency (PHE) from January 31, 2020, to May 11, 2023. This served as a study period to assess the potential effects of Medicaid expansion to 1 year postpartum in the 2021 American Rescue Plan Act (ARPA) adopted by 43 states.
- The objective of this cohort study was to estimate the association of continuous Medicaid eligibility under the FFCRA with postpartum health insurance, postpartum visit attendance, contraception, breastfeeding, and depressive symptoms using PRAMS.

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**Continuous Medicaid Eligibility During the COVID-19 Pandemic and Postpartum Coverage-findings**

- The emergency Medicaid extension was associated with 5% increase in Medicaid insurance after the 60 days and a 6.6% decrease in uninsurance
- Breastfeeding rates did not change during this time
- Factors affecting implementation-use of emergency medicaid for delivery (not eligible for extension), lack of navigators or other information to help beneficiaries understand their coverage, rolling enrollees onto new policies after 1 year.
- Having insurance coverage may not directly translate to positive outcomes.

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**Effect of pregnancy and duration of postpartum convalescence on physical fitness of healthy women**

DeGroot DW, Stiller CA, Lustik MB, Langan KL, Hauret KG, Gotschall MH, Gehrich AP. The effect of pregnancy and the duration of postpartum convalescence on the physical fitness of healthy women: A cohort study of active duty servicewomen receiving 6 weeks versus 12 weeks convalescence. *PLoS One*. 2021 Jul 28;16(7):e0255268. PMID: 34320030; PMCID: PMC8318247.

- To assess the effects of extending postpartum convalescence from 6 to 12 weeks on the physical fitness of Active Duty (AD) soldiers as measured by the Army Physical Fitness Test (APFT) and Body Mass Index (BMI).
- This study was a retrospective study of active duty soldiers who delivered their singleton pregnancy of  $\geq 32$  weeks gestation at a tertiary medical center. Pre- and post-pregnancy APFT results as well as demographic, pregnancy, and postpartum data were collected. Changes in APFT raw scores, body composition measures, and failure rates across the 6-week and 12-week convalescent cohorts were assessed. Multivariable regressions were utilized to associate risk factors with failure.
- This cohort represents a relatively active and healthy group with paid maternity leave

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**Effect of pregnancy and duration of postpartum convalescence on physical fitness of healthy women**

- Pregnancy is associated with profound physical changes in multiple organ systems
- The period of "postpartum recovery" is poorly defined and for some organ systems, changes may take over a year to return to baseline or may never return
- Participation in physical activity during the postpartum period can be limited by fatigue, child care, finances, poor support

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**Effect of pregnancy and duration of postpartum convalescence on physical fitness of healthy women**

- An increase of postpartum leave from 6 to 12 weeks did not adversely affect raw scores on any of the APFT events nor did it decrease the ability of postpartum soldiers to meet physical fitness and body composition standards in the first year postpartum.
- Factors associated with improved performance on the postpartum test included- more likely to meet standards before pregnancy, had gestational weight gain within the IOM guidelines, and were **always breastfeeding at 2 months postpartum**.
- significantly more women who were breast feeding achieved pre-pregnancy weight in the first year postpartum.
- data indicate that the increased convalescence period instituted in February 2016 was associated with increased breast-feeding rates.

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