



Journal of Nursing

Revista de Enfermagem

UFPE On Line

ISSN: 1981-8963

ORIGINAL ARTICLE

EVALUATION OF THE INFLUENCE OF THE POSITION OF THE SYRINGE DURING THE MANAGEMENT OF PASTEURIZED HUMAN MILK

AVALIAÇÃO DA INFLUÊNCIA DA POSIÇÃO DA SERINGA DURANTE A ADMINISTRAÇÃO DE LEITE HUMANO PASTEURIZADO

EVALUACIÓN DE LA INFLUENCIA DE LA POSICIÓN DE LA JERINGA DURANTE LA ADMINISTRACIÓN DE LA LECHE HUMANA PASTEURIZADA

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ABSTRACT

Objective: evaluating if the position of the syringe during administration of pasteurized human milk through gastroclisis interfere in final concentrations of macronutrients, especially in fat concentrations. **Method:** controlled clinical essay, blind, where there were compared concentrations of fat, proteins and carbohydrates of pasteurized human milk after its administration, via gastroclisis. Samples of 20 ml of pasteurized human milk were homogenized and separated into two aliquots of 10 ml each. There was calculated a n sampling of 49 samples, and the concentrations of macronutrients were compared using the t-paired test and expressed in measures of central tendency. There was used the statistical package SPSS 16.0. The research was approved by the Research Ethics Committee of HUAP/UFF, under Protocol nº 189/2011. **Results:** the concentrations of fat obtained after gastroclisis held with syringes in a horizontal position were significantly lower than the syringes in vertical position. **Descriptors:** Human Milk; Macronutrients; Newborn.

RESUMO

Objetivo: avaliar se a posição da seringa durante a administração do leite humano pasteurizado por gastróclise interfere nas concentrações finais dos macronutrientes, principalmente nas concentrações de gordura. **Método:** ensaio clínico controlado, cego, onde foram comparadas as concentrações de gordura, proteínas e carboidratos do leite humano pasteurizado após sua administração, via gastróclise. Amostras de 20 ml de leite humano pasteurizado foram homogeneizadas e, separadas em duas alíquotas de 10 ml cada. Foi calculado um n amostral de 49 amostras e as concentrações dos macronutrientes foram comparadas por meio do teste t-pareado e expressas em medidas de tendência central. Foi utilizado o pacote estatístico SPSS 16.0. A pesquisa foi aprovada pelo Comitê de Ética e Pesquisa do HUAP/UFF, sob protocolo nº 189/2011. **Resultados:** as concentrações de gordura obtidas após a gastróclise realizada com seringas em posição horizontal foram significativamente menores do que com as seringas em posição vertical. **Descritores:** Leite Humano; Macronutrientes; Recém-Nascido.

RESUMEN

Objetivo: evaluar si la posición de la jeringa durante la administración de la leche humana pasteurizada para gastróclise interfiere en concentraciones finales de macronutrientes, especialmente en concentraciones de grasa. **Método:** ensayo clínico controlado, ciego, donde se compararon las concentraciones de grasas, proteínas e carboidratos de la leche humana pasteurizada después de su administración, a través de gastróclise. Las muestras de 20 ml de leche humana pasteurizada se homogeneizaron y se separaron en dos alíquotas de 10 ml cada una. Se calculó un n de muestra de 49 muestras y las concentraciones de macronutrientes se compararon mediante la prueba t-pareada y expresadas como medidas de tendencia central. Se utilizó el paquete estadístico SPSS 16.0. La investigación fue aprobada por el Comité de Ética en Investigación del HUAP/UFF, protocolo nº 189/2011. **Resultados:** las concentraciones de grasa obtenidas después de gastróclise realizada con jeringas en posición horizontal fueron significativamente menores que las jeringas en posición vertical. **Descriptores:** La Leche Materna; Los Macronutrientes; Recién Nacido.

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INTRODUCTION

The maternal and child health policy in Brazil has prioritized promotion, protection and support of breastfeeding, as a key strategy for reducing child morbidity and mortality and improving the quality of health. However, prevalence rates are far from meeting the recommendations of the World Health Organization (WHO) recommends exclusive breastfeeding (EBF) for six months and complementary breastfeeding up to two years old or more, initiative favor of reducing mortality, and in line with WHO recommendations on goal No 4 to reduce child mortality.¹

Breastfeeding is to breastfeed; suckle; breastfeeding; lactate; feed, nourish. Have breastfeeding is synonymous with breastfeeding, from the point of view of its definition, coated with the same functional impact of breastfeeding or raise the child with the milk it produces. Therefore, the meaning of both words is not restricted to purely biological aspect of the action; rather exceeds it by translating the emotions surrounding the woman's relationship with her son, family and the world around them.²

Breastfeeding is a natural act between nurturing woman and her baby. In this form of relationship is established an affective bond starting a relationship of trust between mother and infant. The practice of breastfeeding provides numerous benefits for both the growth and development of infants for its nutritional properties and anti-infective to the woman's biological and psychosocial point of view contributes to uterine involution, returning to the body weight before pregnancy, and contribute as contraception - lactational amenorrhea when offered exclusively on demand.³

Breastfeeding is ideal source of nutrition for the baby and should be unique up to six months. The difficult period for breastfeeding occurs in the first two weeks in residence of the woman, because the inexperience of postpartum women facing a new situation, different from all her experience, leaving the mother frightened and often the feeling of impotence endures. Thus, some problems related to the initial difficulty breastfeeding, or ignorance about the breastfeeding practice, can cause complications and lead to early weaning.³

Human milk is recognized as the best food for the nutrition of infants, including premature newborns in Neonatal Intensive Care Units (NICU).^{4,5,6}

When pasteurized, HM is used as an alternative to nourish infants, particularly very low birth weight, when mothers cannot keep a good milk production during hospitalization of their babies in the NICU.^{4,5}

Some devices are required to administer human milk to the newborn who cannot suck directly the breast, such as cup, gavage and gastrolisis.^{7,8,9,10}

Even with all these precautions, data in the medical literature indicate that preterm infants in use of human milk pasteurized exclusively present insufficient weight gain^{8,9}. One explanation for this is the possibility of the pasteurization process interfere with the physicochemical properties of human milk macronutrients, ie carbohydrates, lipids and proteins.¹¹

OBJECTIVE

- Evaluating the position of the syringe during administration of PHM, by gastrolisis interfere with final concentrations of macronutrients, mainly in fat concentrations.

METHOD

Controlled clinical essay, blind, where there were compared concentrations of fat, proteins and carbohydrates pasteurized HM after administration via gastrolisis in 30 minutes, with the syringes positioned horizontally and vertically. There were used syringes of 10 ml RMDESC® mark, perfusates 120cm BBRAUN® mark; probes No. 06 EMBRAMED® mark and SANTRONIC® syringe pump.

Samples of 20 ml of pasteurized HM, donated by the Human Milk Bank (HMB) of the Antonio Pedro University Hospital (HUAP) of the Fluminense Federal University (UFF), were homogenized and then separated into two samples of 10 ml each, stored glass test tubes with screw cap Lab-Brax® 20ml mark. These were then allocated to each study group, packed in 10 ml syringes with own perfusor and submitted to gastroclisis process for 30 minutes. The milk, after gastroclisis, was collected in a glass jar and submitted for analysis.

After the process of gastroclisis, the concentrations of HM pasteurized, the macronutrients were evaluated using the MilkoScan¹²⁻³ apparatus for professional did not know which samples were from the group with the syringe positioned vertically or horizontally.

The MilkoScan¹² is a physical-chemical analysis instrument for milk that provides quick analysis, simplified and safe milk and

cream composition by refractive technique of infrared light. This technique is commonly used to evaluating milk cattle, sheep, buffalo, goat, however, changes were made to its use in human milk.¹¹ The technique consists of a light beam passing through a device containing the milk sample to be analyzed and detects the macronutrient concentrations by refraction each component causes the light. For the analysis of macronutrients a volume of around 08 ml of milk is required.^{11,12,13}

The n of sample (49 samples) was calculated taking into account a difference between the averages of protein, carbohydrates and fats 0.5 mg%, a power of 80%, alpha error of 5% and 20% beta. The protein concentrations, carbohydrates and fats obtained were compared using the t-

paired test. Their concentrations were expressed as average and standard deviation and the significance was 95%. There was used SPSS 16.0 statistical package for Windows. The study was approved by the Research Ethics Committee of HUAP / UFF under No. 189/2011, in accordance with Resolution 466/12 of the National Health Council.

RESULTS

Fat concentrations obtained after gastroclisis conducted with syringes in horizontal position were significantly smaller than with the syringes in vertical position. There was no difference between the concentrations of protein and carbohydrates after gastroclisis performed with syringes in both positions (Figure 1).

Macronutrients (mg%)	Horizontal Position	Vertical Position	Correlation	p-value
	Average ± SD	Average ± SD		
Carbohydrates	6,66 ± 1,11	6,65 ± 1,11	0,955	0,795
Proteins	0,68 ± 0,28	0,71 ± 0,27	0,952	0,096
Fats	0,75 ± 0,58	0,92 ± 0,58	0,936	0,000

Figure 1. Comparison of concentrations of macronutrients of pasteurized human milk after gastroclisis with syringes placed in horizontal and vertical position.

DISCUSSION

The concentration of fat of pasteurized HM was clearly lower after gastroclisis with syringe in a horizontal position, compared to the vertical. The concentrations of other macronutrients, carbohydrates and proteins did not present difference after these processes.

Before being offered to the baby, pasteurized HM goes through several stages: pre-storage, defrosting, pasteurization, refreezing, re-defrosting and heating.¹⁴⁻¹⁶ The freezing and thawing cause the rupture of the membranes of the fat globules, resulting in coalescence.^{11,12,16-19} This may be the main reason for the finding of this work.

The coalescence of fat globules facilitates its adherence to the walls by storage flasks and hospital equipment used for the administration of pasteurized HM to infants; especially those consisting of plastic material (syringes, and perfusates probes). Thus, pasteurized HM fat cannot be fully administered to infants, especially when it is administered via gastroclisis where the time of pasteurized HM is in contact with the plastic material necessary for the administration is greater.^{11,20}

The syringe used to administer HM is usually pasteurized in a horizontal position, which increases the contact surface of fat

droplets coalesced to the plastic wall, facilitating adherence.^{11,19,20}

Another factor that can affect this dynamic is that when the syringe is positioned horizontally, the coalesced fat globules begin to constitute a supernatant in pasteurized HM sample to be administered to the newborn. This supernatant is usually the last fraction of milk to be administered, ie, to be "pushed" by syringe into the stomach of the newborn, and therefore can stay in perfusates path and probes usually used in gastroclisis.

There is a decrease in the fat content of pasteurized HM samples that are offered by gastroclisis.⁸ However; all samples were analyzed after gastroclisis horizontally. One way to counteract this effect can be to position the syringe vertically or inclined only way to maintain the supernatant, consisting of coalesced fat, as an early fraction to be injected in the probes into the stomach of the newborns. This may ensure that coalesced fat stay too long in contact with plastic materials required for the administration of pasteurized HM, or it's the last fraction to be injected and be retained in groups, perfusates and probes before it can even reach the stomach of the NB.

There is no mention about the effect of pasteurization in the composition or concentration of human milk of other macronutrients, ie carbohydrates and proteins. This may explain another finding of

this study, ie not influence the syringe position in gastroclisis process in concentrations of these macronutrients.¹¹

HM is without doubt a nutritionally complete food and therefore the best to feed infants; however, the frequent observation that weight gain of premature infants, especially premature infants fed exclusively with pasteurized HM, is unsatisfactory, it can generate an increase in the use of artificial milk instead of pasteurized HM.^{10,11}

All efforts to clarify the factors that can interfere with the nutrition of the population of newborns, especially of premature infants, which present great risk if not nurtured properly, should be performed in order to maintain HM as the main choice for newborn nutrition that cannot suck the breast directly.

CONCLUSION

The administration of pasteurized human milk via gastroclisis with syringe horizontally decreases the supply of fat when compared to gastroclisis with syringe in a vertical position.

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Submission: 2014/01/16

Accepted: 2015/01/24

Publishing: 2015/04/01

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