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Enhancement of breastfeeding among hypertensive mothers

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Abstract. *Background:* An investigation was undertaken to determine the effectiveness of malunggay (*Moringa oleifera*)* as galactogogue among hypertensive patients. *Methods:* A total of 30 hypertensive pregnant patients with blood pressure greater than or equal to 140/90, admitted to the Perinatal Center of the Philippine Children's Medical Center from November 1994 to May 1995, on their 28th to 40th week of gestation, were included in the study. Immediately after delivery, the patients were given capsules whose contents were unknown to both the researchers and the subjects. These capsules were coded at source: 15 placebo and 15 malunggay. Prolactin determinations were done within 6 h, 48 h after, and 4 months after delivery. The baby's weights were recorded at birth, at 1 week, at 2 weeks, at 1 month, and 4 months of age. *Results:* Significantly higher prolactin levels were obtained after 4 months with the malunggay group at levels of <0.05 and <0.01 accompanied by observed gains in weights among these babies. *Conclusions:* Breastfeeding among hypertensive mothers can be enhanced by intake of malunggay capsules as evidenced by higher prolactin levels and increased of breastmilk resulting in appreciable gains in weights of their babies.

Key words: breastfeeding, malunggay (*Moringa oleifera*), galactogogue, 'milk-let-down', prolactin

Introduction

Mother's milk is the best food for the newborn. The campaign for breastfeeding is being pursued by the Philippine Department of Health, the World Health Organization (WHO), the United Nations International Children's Educational Fund (UNICEF), and all organizations involved with the improvement of the health of the mother and the infant [1].

Breastfeeding is much more beneficial to the newborn than bottle-feeding. Mothers are convinced about the advantages of breastfeeding but most often they complain about the inadequacy of milk supply from their breast. This is usually encountered among hypertensive mothers who are under stress and,

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thus, initiation of milk production may not be the same as in the normal parturient [2].

Malunggay (*Moringa oleifera*) leaves in chicken and shellfish soups have been used by generations of Filipino mothers to enhance breast milk production. The mechanism of action has not been explained but it has been effective as a galactogogue (an agent that induces or enhances the secretion of milk) [1]. Malunggay leaves have been encapsulated in the form of Natalac and one capsule is equivalent to 250 mg of malunggay leaves.

A study of the initiation and maintenance of milk production depends on several processes and involves an interplay of neurohormonal factors [2–6,14].

1. Mammogenesis or development of the mammary glands: ductal growth and lacto-alveolar growth through estrogen, progesterone, growth hormone, prolactin and glucocorticoids.

2. Lactogenesis or initiation of milk secretion: this depends on a fully developed mammary gland and the withdrawal of estrogen and progesterone on delivery of the baby and placenta.

3. Galactokinetic hormones: oxytocin is the most powerful galactokinetic hormone causing contraction of the myoepithelial cells squeezing out the milk in the lumina of the alveoli into the ducts. The stimulus for oxytocin release is the suckling of the infant. Oxytocin release is essential for milk removal. Frequent suckling and adequate milk ejection therefore promotes the production of milk. The reflex release of oxytocin is experienced as 'milk-let-down' [7,8,14].

Oxytocin released during suckling affects the uterus by causing it to contract expelling the lochia favoring involution. Oxytocin release can be inhibited by stressful situations.

4. Galactopoiesis: maintenance of established milk secretion. Prolactin is the single most important galactopoetic hormone. Hans Selye was the first to realize that suckling provides the stimulus that supports lactation. Each suckling episode is associated with rapid rise in plasma prolactin. Prolactin levels peak in 20–40 min and return near the baseline in about 3–4 h [9–11].

Frequent suckling is required to maintain the elevated prolactin levels on which continued milk secretion depends. A delay of 1–2 days in the initiation of suckling results in diminished responsiveness of the pituitary. Nicotine decreases the amount of prolactin released in response to the suckling stimulus [12–15].

Drugs that stimulate prolactin release are reserpine, metoclopromide, sulpiride, and thyrotropin-releasing hormone (TRH) [2,13].

Objective

An investigation was undertaken to determine the effectiveness of malunggay as a galactogogue among hypertensive patients.

Materials and methods

A total of 30 hypertensive pregnant patients with blood pressure greater than or equal to 140/90 admitted to the Perinatal Center of the Philippine Children's Medical Center from November 1994 to May 1995, on their 28th to 40th week of gestation, who subsequently delivered babies with Apgar scores greater than or equal to 7 at 1 and 5 min of life without congenital abnormalities were included in the study.

Antihypertensive medications were discontinued postpartum: when required, only methyldopa and hydralazine were given. Informed consent was obtained from all mothers.

Immediately after delivery, patients were given capsules, the contents of which the researchers and patients did not know. The capsules have been coded at source: 15 placebo (NATC-F) and 15 malunggay (NATC-T). The administration of these capsules was repeated every 12 h for 4 months.

Prolactin determination was done by extraction of 4 ml whole blood from the antecubital vein of the postpartum women at three stages: (1) within 6 h of delivery before infant suckling and capsule intake; (2) 48 h after delivery, 30 min after infant suckling; (3) 4 months after delivery, 30 min after infant suckling.

The blood was allowed to stand to effect separation of the serum. About 1 ml of serum was extracted thereafter and subjected to prolactin determination using the ELIZA (enzyme linked immunosorbent assay) technique.

Infant suckling was started within 6–12 h after delivery for a duration of 10–15 min to each breast, every 2.5–3 h for a total of 8–10 times a day. For premature infants, 32–34 weeks, electronic breast pumping was done in place of infant suckling and the babies were given expressed breast milk through an orogastric tube or by dropper until stabilization of vital signs and/or attainment of gestational age, 34 weeks and above, when breastfeeding was initiated. There were eight mothers who belonged to this subgroup and milk volumes were directly measured after each pumping. Values obtained were recorded for an average of 14 days for the first month, the second month, and the fourth month. Times for appearance of breast engorgement and milk let-down were recorded.

The infants' weights were recorded at birth, at 1 week, at 2 weeks, at 1 month and at 4 months of age.

Data obtained from this double-blind study were subjected to statistical tests: t-test for difference between means and F-test for differences between variances.

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Table 1. Age and parity distribution

	Mean (years)	Primipara	Multipara
Treatment group	31.46	5 (33%)	10 (67%)
Placebo group	30.8	7 (47%)	13 (53%)

Table 2. Age of gestation and incidence of IUGR

Age of gestation (weeks)	Treatment group	Placebo group
28–30	3 (20%)	3 (20%)
31–33	5 (33%)	5 (33%)
34–36	7 (47%)	6 (40%)
37	0 (0%)	1 (6%)
IUGR	11 (73%)	6 (40%)

Table 3. Route of delivery

	NSD	Abdominal route
Treatment group	3 (20%)	12 (80%)
Placebo group	4 (27%)	11 (73%)

Results

Tables 1 and 2 show the age, parity, gestational age between the treatment and placebo group. Table 3 shows the delivery route.

The desired sample size was 20. To allow for attrition, we recruited 31 subjects. Thirty mothers remained in the study at 4 months. Only one subject dropped out because of neonatal mortality.

The average maternal age was 31.46 years for the malunggay or treatment group and 30.8 years for the placebo group, 33 and 47% were primiparas while 67 and 53% were multiparas in the treatment and placebo groups, respectively (Table 1).

As to gestational age, both groups (40–47% of the population) delivered their babies at 34–36 weeks, 33% at 31–33 weeks, and 20% at 28–30 weeks. One baby from the placebo group was delivered at 37 weeks. Intrauterine growth retardation was present in 73% of the treatment group and 40% of the placebo group (Table 2).

Twenty and 27% were delivered spontaneously while 80 and 73% among the treatment and placebo groups, respectively, underwent Cesarean section.

Breast engorgement occurred after more than 48 h in seven mothers in the placebo group and in 24 h in eight mothers in the treatment group (Table 4). Milk let-down was likewise earlier with the treatment group (Table 5).

Table 6 shows the mean levels of serum prolactin at first, second and third extractions between the two groups. Prolactin values were higher in the treatment group and are significant at a P level of <0.01 for the second (t value = 3.0296) and third (t value = 5.867) extractions. There were also significant increases of prolactin values during the latter two extractions in the treatment group as compared to the placebo group at a P level of <0.01. t values obtained were 4.522 and 4.0711 for differences between the baseline or first extraction with the second and third extractions, respectively.

Table 4. Breast engorgement

	24 h	48 h	>48 h
Treatment group	8 (53%)	7 (47%)	0 (0%)
Placebo group	6 (40%)	2 (13%)	7 (47%)

Table 5. Milk let-down

	48 h	72 h	96 h
Treatment group	8 (53%)	5 (34%)	2 (13%)
Placebo group	4 (26%)	7 (47%)	4 (27%)

Table 6. Statistical analysis of serum prolactin levels (ml/l)

	Treatment group		Placebo group		t value
	Mean	S.D.	Mean	S.D.	
1st extraction	4,302.27	2,815.49	5,804.562	2,522.8	−1.56
2nd extraction	5,669.33	1,577.98	3,478.13	2,314.3	3.0296
3rd extraction	3,304.07	1,579.87	810.11	463.17	5.867
Differences between					
1st and 2nd	1,367.07	2,329.15	−2,345.07	2,163	4.522
1st and 3rd	−998.2	2,922.76	−5,013.08	2,458	4.0711

Table 7. Statistical analysis of infant's weights (kg) and percentage weight gain

	Treatment group		Placebo group		t value
	Mean	S.D.	Mean	S.D.	
Birth weight	1.48	0.514	1.54	0.608	−0.2478
1 week	1.39	0.462	1.45	0.563	−0.2392
2 weeks	1.572	0.565	1.659	0.641	−0.3969
1 month	1.955	0.909	1.899	0.864	0.1729
4 months	3.184	1.087	2.746	1.245	1.0281
Percentage weight gain					
B.W. to 1 week	−5.84%	4.454%	−9.014%	4.664%	1.91
B.W. to 2 weeks	5.52%	3.19%	5.554%	4.66%	−0.0231
B.W. to 1 month	28.44%	15.94%	18.496%	10.668%	2.0083
B.W. to 4 months	114.67%	27.64%	72.06%	20.67%	4.7816

Table 7 contains statistical analysis of infants' weight at 1, 2 weeks and 1 and 4 months and reveals significantly higher weight gains among the babies from the treatment group at a P level of <0.01 (t value of 4.7816 at 4 months).

Table 8 is a statistical analysis of the values of breastmilk volume pumped by mothers of premature babies of less than 34 weeks gestation in the treatment and placebo groups. There is a significant difference between the two groups

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Table 8. Statistical analysis of volume of expressed breastmilk (ml/24 h)

	Treatment group		Placebo group		*t* value
	Mean	S.D.	Mean	S.D.	
1 month	324.09	18.35	245.95	37.7	3.7215
2 months	485.65	33.5	335.48	26.06	7.0758
4 months	495.388	27.89	355.27	42.13	5.5461

at a P level of <0.01 based on t values of 3.7215, 7.0758 and 5.5461 at 1, 2, and 4 months, respectively.

Discussion

Lactagogues or galactogogues are special foods, drinks or herbs which people believe can increase a woman's milk supply. In many parts of the Philippines, women take malunggay (*Moringa oleifera*) leaves in chicken or shellfish soups to help them have adequate milk production. The mechanism of action has not been explained but it was effective as a galactogogue and has been used by generations of nursing mothers, specially those with inadequate lactation [1].

A comparison between the treatment group and the placebo group regarding time of occurrence of breast engorgement, and 'milk let down', shows a significant number occurs earlier in the treatment group than in the placebo group.

Analysis of the serum prolactin levels during the first extraction (initial levels) do not show a statistical difference between the treatment group and placebo group (Table 7). In comparing the 2nd (48 h after delivery) and third extraction (4 months after delivery) there is a statistical difference between the treatment group and the placebo group. There is marked increase in the serum prolactin levels in the treatment group during the second extraction. The serum prolactin levels declined during the second extraction in the placebo group. The serum prolactin at 4 months in the treatment group, although lower than the initial extraction, was still high compared to that of the placebo group which had declined to almost 1/6 of the initial levels. This is correlated with the volume of the milk expressed at 1, 2 and 4 months. The volume of milk was much lower in the placebo group than in the treatment group.

These findings connote that the malunggay leaves (*Moringa olifera*) not only act as lactogogues as evidenced by the earlier occurrence of breast engorgement in the treatment group, but also stimulate prolactin production as evidenced by the higher serum prolactin levels in the treatment group as well as the higher volume of expressed milk in the treatment group.

'Milk-let-down' occurred earlier in the treatment group (48 h) while it occurred at 72 h in the placebo group. It is the suckling that initiates oxytocin release from the pituitary. Oxytocin causes contraction of the myoepithelial cells squeezing out the milk in the lumina of the alveoli into the ducts. Breast engorgement and milk secretion usually begins after the third postpartum day in majority of lactating mothers. Earlier occurrence of this process in the treatment group can be explained by the lactogogue effect and galactogogue effect of malunggay (*Moringa oleifera*).

A comparison of the weight gain between the placebo and treatment group cannot be made since they are all prematures, some are growth retarded and hence have to take more time to catch-up, and there are other factors that inhibit or alter optimal milk intake and adequate growth in the baby. There is, however, a significant weight gain among babies at a P level of <0.01 in the treatment group as well as in the placebo group at 4 months. The babies in the treatment group had higher weight gain than the placebo group. Taking the expected gain in weight at 4 months as two-times birth weight [18], the treated groups at 4 months should weigh 2,960 g, instead the mean weight was 3,184 g, 224 g more than expected. In the placebo group the expected weight at 4 months should be 3,080 g, instead the mean weight was 2,746 g, 230 g short of the expected weight.

Summary

An investigation was undertaken to determine the effectiveness of malunggay (*Moringa oleifera*) leaves as a galactogogue among hypertensive mothers. A total of 30 hypertensive pregnant patients with blood pressure greater than or equal to 140/90, admitted to the Perinatal Center of the Philippine Children's Medical Center from November 1994 to May 1995, on their 28th to 40th week gestation, were included in the study. Immediately after delivery, the patients were given capsules whose contents were unknown to both researchers and subjects. These capsules were coded at source: 15 malunggay and 15 placebo. Prolactin determinations were done within 6 h, 48 h, and 4 months after delivery. Infant suckling was immediately started after the first extraction for prolactin. The baby's weights were recorded at birth, at 1 week, 2 weeks, 1 month and at 4 months of age. Data obtained were subjected to statistical tests: t-test for difference between means and F-test for differences between variances.

Significantly higher prolactin levels were obtained after 48 h and 4 months compared to first or initial extraction among the treatment (malunggay) group at a P level of <0.01 accompanied by significant weight gain among the babies at a P level of <0.01. Breast engorgement and 'milk-let-down' occurred earlier in the treatment group.

In conclusion, breastfeeding among hypertensive mothers can be enhanced by intake of malunggay capsules as evidenced by higher prolactin levels and increased production of breast-milk resulting in appreciable gains in weights of their babies.

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