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BREASTFEEDING: BOON TO GROWTH AND DEVELOPMENT IN INFANTS

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ABSTRACT-

In India, though breastfeeding is universally practiced, exclusive breastfeeding rates are low in both urban and rural areas. In India, only 56% of Indian mothers practice exclusive breastfeeding for the recommended six months. As India leads the world in the number of preterm births, malnutrition and neonatal mortality, understanding regarding breast milk and its *doshas* can help improve the nutritional status for millions of infants which in turn helps in growth and development of infant.Therefore, to assess the effect of *Stanya Dosha* (vitiated breast milk) on Growth and Development in Infants study conducted. The whole study was divided in three phases and 2 groups 'A' & 'B' on the basis of parameters and techniques utilized for breast milk examination. . In 'A' group both objective and subjective parameters were used for breast milk test whereas in 'B' group milk was tested on the basis of subjective parameters. Infant's gain in growth especially weight and length and achievement of reflexes and milestones were compared with the standard parameters, i.e. percentile table of *Nelson SE et al 1989*. The result showed the positive trends of growth and development, and it was proven that relation exist between the morbidity and Dosha-specific vitiation of breast milk.

Keywords- Breast milk, infant growth, nutrition

INTRODUCTION

During infantile period, the growth and development of a baby mainly depend upon the breast milk. The human breast milk is uniquely composed so that the nutritional requirement for physical and neural development of infants is compltete. Pure or non-vitiated milk has normal color, smell, taste and touch; dissolves homogenously in water (*C.Sh.8/54)* and effect of pure milk are manifested in the form of unobstructed development of strength, body organs, longevity and disease free state. Pure milk does not cause any abnormality in children and mother *(K.Su.29/26*). Breast milk may be vitiated by different substances, few of them which are excreted in the breast milk are found harmful in the infants such as pesticides, pollutant, drugs and few foods. Due to vitiation of breast milk, infant may develop serious diseases (*K.Su.29/27).*

As per ***Kashyapa, Sushruta*** and ***Bhavprakasha,*** the ***Stanya Prasruti*** (milk secretion) occurred like the semen. Milk is also secreted by thought, sight or touch of the child and also with his physical contact. For proper flow of milk, uninterrupted affection for the child is mainly responsible.

Amount of milk is two *Anjali*.The volume of milk secretion goes from a mean of about 50 ml. per day on day two of lactation to about 500 ml. on day 4. After this time there is a gradual volume increase to about 850ml/day by three months postpartum.

Lactogenesis, or the onset of copious, milk secretion, occurs just prior to parturition in most species. However, in humans the process is delayed for about 40-48 hours due to a delay in the fall of progesterone levels that no longer inhibit lactation. Continued milk secretion depends on milk removal from the breast. The involutional process sets in after 3-4 days if breast feeding is not initiated.By 10 days postpartum the milk has assumed the composition characteristic of mature milk.

Composition of milk:

Breastmilk contains 3%- 5 % fat, 0.8% - 0.9% protein, 6.9% - 7.2% carbohydrate calculated as lactose, and 0.2% mineral constituents. Protein content is markedly higher and carbohydrate content lower in colostrum than in mature milk.

Disorders of milk –

*Acharya Charka*has mentioned eight disorders of milk which is caused due to vitiation with three Dosha.

Vataja - (3) *Vairasya* (Tasteless) *Phena-samghata* (Frothy), *Ruksha* (Non-unctuous)

Pittaja – (2) *Daurgandhya* (putrefied), *Vaivarnya* (discoloration)

Kaphaja – (3) *Atisnigdha* (Very unctuous), *Picchila* (slimy), *Guru* (not easily digestible and/or heavy by weight)

According to Ayurveda, mother's food, mental health and activities affect the quality of breastmilk which in turn affect child health.

AIM: To study effect of vitiated breastmilk on growth and development of infants.

Material and Method

The samples for the present study were collected from I.P.D. and O.P.D. of *Kaumarbhritya* section of Department of *Prasuti Tantra*, IMS, BHU,Varanasi.

The present study was carried out in 3 phases (Each phase comprises the span of 30 days) and 2 groups(In 'A' group both objective and subjective parameters were used for breast milk test whereas in 'B' group milk was tested on the basis of subjective parameters).

Initially 26 cases in group A and 36 cases in group B were registered. All the babies registered were of age 10 days. Maternal age, parity, type of delivery, SES, habitat, blood groups of both mother and infant, educational status of mother, sex of baby, anthropometry were noted at the time of registration. After 30 days i.e. at the age of 40 days, infant's growth and development along with morbidity status in the past one month were recorded. Mother's milk was also examined at 40th day.

In IInd phase infants of 40 day age were categorized into subgroups according to their mother's milk nature. After 30 days i.e. at the age of 70 days, infant's growth and development were assessed. Morbidity incidence in past 1 month was also noted.

In IIIrd phase infants of 70 day age were categorized into subgroups as per their mother's milk *Doshika* dominance. After 30 days, at age of 100 days, infant's anthropometric measurement and developmental milestones were assessed along with morbidity in the last one month.

Anthropometric parameters taken into account:

1. Weight
2. Head circumference
3. Chest circumference
4. Mid-arm circumference (MAC)

5. Crown heel length (CHL)

Developmental Assessment: To assess the development of each infant more fully and more accurately,the milestones part of *Hammersmith Infant Neurological Examination* was adopted.As the aim of the present study was to assess the effect of *Stanya Dosha* on growth and development in infants hence various aspects of milk were tested as follows.

S.No.	***Properties***	***Parameters/Technique***
1.	Snigdhta-Rukshta	Fat% (Milko-tester),Touch test
2.	Tanu/Sandra	Total solid%(Milko tester) Organoleptic test
3.	Guru/Laghu	Water test
4.	Color	Organoleptic test (Sight)
5.	Smell	Organoleptic test (Odour)
6.	Taste	Organoleptic test (tonuge)

Organoleptic test –

- ***Color of milk*** – It was assessed in day light by naked eyes viz. white, off white, bright white, yellowish white, yellow color, etc.
- ***Smell of milk*** – It was assessed by nose whether it is natural or altered viz. smell like pus, blood, fish, fat, marrow etc.
- ***Taste of milk*** – Taste of milk was assessed by offering few drops of milk to the mother. Mother after licking told the taste of milk. Taste was not assessed by myself as per safety norms.
- ***Touch test of milk*** – 1-2 drops of milk was taken between thumb and index finger and by this *Snigdhata–Rukshata* and *Tanuta-Sandrata* property of breast milk was assessed.
- **Water Test –**
- Very brief knowledge about water test of milk is present in ancient Ayurvedic texts. For this, a glass container of 500ml capacity (height 10cm. and diameter 8cm.) filled with distilled water was taken. One drop of breast milk was dropped just above the water surface and assessed viz.,

characteristics of dissolution, time taken to reach the first thread to bottom, settles at bottom or suspended between water columns. By water test *Guru-Laghu* property of breast milk was assessed.

Fat and total solid percentage:

This was performed in milk samples of group 'A' only. The samples were carried to the PARAG dairy where with the help of *milko-tester automatic* machines fat and total solid percentage was measured. In this process no other chemical is utilized because it acts on the *VHFS (very high frequency sound)* technology.

In group-A on the basis of fat percentage, *Snigdha-Ruksha* property and with the help of total solid, *Sandra-Tanu* property of breast milk was determined.

On the basis of above tests following parameters were developed.

- Fat % - less than 2% - *Ruksha – Vatika*

  2% - 4% - *Snigdha* – Normal

More than 4% - *Ati-snigdha – Kaphaja*

- Total Solids % - Less than 11% - *Ati-Tanu – Vatika*

  11% - 12%% - *Tanu* – Normal

  12% - 15% - *Sandra – Kaphaja*

- Time taken to reach first thread to the bottom in water test

  Less than 11 seconds – *Guru – Kaphaja*

  11-15 seconds – *Laghu* – Normal

  More than 15 seconds – *Ati-laghu – Vatika*

A scoring system was created with the above parameters to evaluate the Doshika configuration of breast milk as follows –

Criteria	Vatika	Paittika	Kaphaja	Normal
Subjective Tests-				
Color of milk	2 Score	2	2	2
Smell	1	9	1	1
Taste	1	2	1	1
Objective Tests-				

Tanu/Sandra	3	-	3	3
Guru/Laghu	3	-	3	3
Snigdha/Ruksha	3	-	3	3
Total Score	**13**	**13**	**13**	**13**

INTERPRETATION

(a) If there is no smell in milk or undefined smell it is Vatik; Pittaj milk smells like pus, blood, putrified flesh, Kaphaj milk smells as fat, oil, marrow whereas natural milk smells naturally.

(b) Taste of Vatik milk is Tikta Kasaya (anurasa), Pittaj as katu, tikta, amla, Kaphaj has very sweet taste, Natural milk has light sweet taste.

(c) Vatik milk has off white colour, yellowish colour in milk is present in Pittaj milk even after transitional period, Kaphaj milk has bright white colour, and Natural color of milk is white or yellowish white. (Conch- shell like, pandura).

(d) In water test if milk drop settles at bottom it is Kaphaj, if mixes uniformly it is natural, remain suspended in water column in form of threads even after few minutes it is Vatik dosha dominant.

We have given 3 scores to each Guru/Laghu, Snigdha/Ruksha, Sandra/Tanu properties because these are based on objective finding whereas smell and taste have been given 1 score each because taste was told by mother and smell was not clearly identifiable in ‘v’, ‘k’ and natural milk. Color of milk has given 2 score because it seen by naked eye in day light and was easily differentiable.

Our ancient Ayurvedic texts have differentiated Pittaj milk on the basis of smell and taste mainly so we have given 9 score to pittaj smell (puti, puya, rudhir, kudap-gandhi) and 2 score to pittaj taste (katu, amla, tikta after taste).

Morbidity incidence: Morbidity incidence in terms of common disorders during last one month was noted at end of each phase.

Inclusion criteria

1. Normal full term neonates
2. Infants without perinatal complications

3. Mothers of gravida 1-4
4. Mothers age between 20-30 years
5. Exclusively breast fed infants.

Exclusion criteria

The following conditions (maternal and newborn) if present, were excluded from the study.

1. Maternal age below 20 years and above 30 years.
2. Elderly primigravida.
3. More than four gravida.
4. Mother with inadequate lactation and lactation failure.
5. Preterm babies (G.A. < 37 weeks)
6. Very low birth weight babies
7. Twins
8. Perinatal complications viz. HIE, Birth Asphyxia, forcep delivery.
9. Congenital malformation

Statistical analysis:

It was done with the calculation of Mean ($\overline{X}$), Standard deviation (SD), Standard Error (SE) and students "t" test.

OBSERVATION

On 10^{th}, 40^{th}, and 70^{th} days of life, the breast milk fed infants of mother were registered and classified in different sub group (V,P,K,VP,VK,PK,VPK & Normal or ideal milk fed baby) of Group-'A' & 'B' according to the nature or quality of breast milk of mother, which was assessed by different parameter. Thereafter, each case was examined & monitored as per preformed case sheet and the recorded data were analyzed statistically.

Group A

Table No. 1 Intra group comparison of mean difference of WEIGHT (gm)in different vitiated milk fed sub-group at different interval.

Milk Type	Phase-I		Phase-II		Phase-III	
	At 10th day	***At 40th day***	***At 40th day***	***At 70th day***	***At 70th day***	***At 100th day***
V			3733.33 ± 570.09	4666.67 ± 782.62	4570.00±394.55	5645.00±498.02
			(n=9) d = 933.33±382.43 t = 7.32 p<0.001		(n=10) 1075.00 t=15.2 p<0.001	
P						

K	2800.00 ± 228.22	3734.62 ± 463.40	3616.67 ± 115.47	4433.33 ± 305.51	5600.00	6300.00
	(n=13) d = 934.61±335.65 t = 10.04 p<0.001		(n=3) d=816.67±305.51 t = 4.63 p<0.05		(n=1)	
VP	2800.00	3600.00	3325.00±610.04	4575.00±247.49		
	(n=1)		(n=2)			
VK	2640.91 ± 418.82	3622.73 ± 588.80	3483.33±456.80	4283.33±453.50	5000.00±888.82	5700.00± 818.50
	(n=11) d=981.82±266.71 t = 12.21 p<0.001		(n=6) d=800.00±258.84 t=7.57 p<0.01		(n=3) d=700.00±100.00 t=12.12 p<0.01	
PK	2300.00	3550.00	4200.00	5000.00		
	(n=1)		(n=1)			
VPK			4750.00	6000.00		
			(n=1)			
N			3600.00	4000.00	4750.00±1767.77	5650.00± 1626.35
			(n=1)		(n=2)	

Table No. 2 Intra group comparison of mean difference of Head Circumference (cm) in different vitiated milk fed babies sub-group at different interval.

Milk Type	**Phase-I**		**Phase-II**		**Phase-III**	
	At 10th day	***At 40th day***	***At 40th day***	***At 70th day***	***At 70th day***	***At 100th day***
V			36.17±1.73	37.78±2.03	37.57±1.14	39.30±1.01

			(n=9) d=1.61±0.74 t=6.53 p=<0.001		(n=10) d=1.73±0.91 t=6.01 p<0.001	
P						
K	33.92±0.93	36.12±1.37	36.77±0.75	37.90±0.85	40.50	41.00
	(n=13) d=2.19±1.01 t=10.04 p<0.001		(n=3) d=1.13±0.71 t=2.77 p>0.05		(n=1)	
VP	34.00	35.00	35.50±2.12	38.25±1.06		
	(n=1)		(n=2)			
VK	33.64±1.25	36.50±1.43	35.92±0.80	37.37±0.75	38.90±2.01	40.83±2.02
	(n=11) d=2.86±0.75 t=12.75 p<0.001		(n=6) d=1.45±1.09 t=3.25 P<0.05		(n=3) d=1.93±0.11 t=29.00 p<0.01	
PK	32.50	36.80	37.00	39.50		
	(n=1)		(n=1)			
VPK			39.00	41.00		
			(n=1)			
N			35.00	35.50	38.00±4.24	39.25±3.89
			(n=1)		(n=2)	

Table No. 3 Intra group comparison of mean difference of Chest Circumference (cm) in different vitiated milk fed babiessub-group at different interval.

Milk Type	**Phase-I**		**Phase-II**		**Phase-III**	
	At 10th day	***At 40th day***	***At 40th day***	***At 70th day***	***At 70th day***	***At 100th day***
V			34.11±1.73	36.17±2.41	36.50±1.63	38.55±2.15
			(n=9) d=2.06±0.74 t=5.74 p=<0.001		(n=10) d=2.05±1.21 t=5.35 p<0.001	
P						

K	31.15±1.07	33.87±1.27	34.10±1.01	36.17±1.61	38.00	39.00
	(n=13) d=2.71±0.91 t=1.76 p=<0.001		(n=3) d=2.07±0.90 t=3.97 p>0.05		(n=1)	
VP	31.00	33.00	33.50±0.71	37.50±0.71		
	(n=1)		(n=2)			
VK	31.14±1.60	34.23±1.33	33.67±1.29	34.83±1.72	37.83±32.25	39.67±2.57
	(n=11) d=3.09±0.77 t=13.34 p=<0.001		(n=6) d=1.17±0.52 t=5.53 p<0.01		(n=3) d=1.83±0.76 t=4.16 p>0.05	
PK	30.00	35.00	35.50	38.50		
	(n=1)		(n=1)			
VPK			36.00	40.00		
			(n=1)			
N			33.00	34.00	36.00±5.66	37.25±5.30
			(n=1)		(n=2)	

Table No. 4 Intra group comparison of mean difference of MAC (cm) in different vitiated milk fed babiessub-group at different interval.

Milk Type	**Phase-I**		**Phase-II**		**Phase-III**	
	At 10th day	***At 40th day***	***At 40th day***	***At 70th day***	***At 70th day***	***At 100th day***
V			10.84±0.89	11.76±0.85	11.85±0.82	12.93±0.85
			(n=9) d=0.91±0.54 t=5.07 p<0.01		(n=10) d=1.08±0.75 t=4.56 p<0.01	
P						
K	9.77±0.56	10.84±0.75	10.93±0.12	11.80±0.53	12.30	13.00
	(n=13) d=1.07±0.61 t=6.38 p<0.001		(n=3) d=0.87±0.42 t=3.61 p>0.05		(n=1)	
VP	10.00	11.50	10.75±1.06	12.75±0.35		
	(n=1)		(n=2)			

VK	9.59±0.86	10.65±0.90	10.37±0.74	11.42±0.97	12.40±0.53	12.93±0.40
	(n=11) d=1.05±0.53 t=6.65 p<0.001		(n=6) d=1.05±0.75 t=3.45 p<0.02		(n=3) d=0.53±0.25 t=3.67 p>0.05	
PK	8.50	11.00	10.40	11.50		
	(n=1)		(n=1)			
VPK			12.20	13.00		
			(n=1)			
N			11.50	12.00	11.75±1.77	12.50±2.12
			(n=1)		(n=2)	

Table No. 5 Intra group comparison of mean difference of CHL (cm) in different vitiated milk fed babies sub-group at different interval.

Milk Type	**Phase-I**		**Phase-II**		**Phase-III**	
	At 10th day	***At 40th day***	***At 40th day***	***At 70th day***	***At 70th day***	***At 100th day***
V			53.78±2.12	56.94±2.27	57.15±2.11	60.20±1.74
			(n=9) d=3.17±1.25 t=7.60 p<0.001		(n=10) d=3.05±0.73 t=13.31 p<0.001	
P						
K	48.50±1.83	54.04±2.11	53.00±2.65	56.33±4.16	60.00	63.00
	(n=13) d=5.54±1.52 t=13.14 p<0.001		(n=3) d=3.33±1.53 t=3.78 p>0.05		(n=1)	
VP	49.00	52.00	50.50±7.10	58.00±2.83		
	(n=1)		(n=2)			
VK	48.36±1.85	52.50±2.33	53.17±2.64	56.58±3.20	57.17±3.33	61.67±4.62

	(n=11) d=4.14±1.69 t=8.12 p<0.001		(n=6) d=3.42±1.80 t=4.65 p<0.01		(n=3) d=4.50±1.32 t=5.89 p<0.05	
PK	47.00	52.00	55.00	58.00		
	(n=1)		(n=1)			
VPK			54.00	61.00		
			(n=1)			
N			52.00	54.00	58.00±4.24	60.50±4.95
			(n=1)		(n=2)	

Group B

Table No. 6 Intra group comparison of mean difference ofWEIGHT (gm) in different vitiated milk fed babies sub-group at different interval.

Milk Type	**Phase-I**		**Phase-II**		**Phase-III**	
	At 10th day	***At 40th day***	***At 40th day***	***At 70th day***	***At 70th day***	***At 100th day***
V	2750.00±609.64	3687.50±864.46	3500.00±393.70	4405.00±443.75	4375.00±513.94	5271.86±581.31
	(n=5) d=937.50±363.72 t=5.16 P<0.02		(n=10) d=855.00±208.77 t=12.95 P<0.001		(n=14) d=842.86±274.46 t=11.49 P<0.001	
P						
K	2652.78±298.76	3405.56±435.18	3100.00±424.26	4050.00±212.13		
	(n=18) d=752.78±279.95 t=11.41 P<0.001		(n=2)			
VP						
VK	2736.36±260.86	3627.27±346.67	3337.50±512.14	4450.00±412.31	4550.00±70.71	5050.01±212.13

	(n=11) d=890.91±253.79 t=11.64 P<0.001		(n=4) d=1112.50±366.00 t=6.08 P<0.01		(n=2)	
PK			3100.00±565.69	4150.00±494.97		
			(n=2)			
VPK			2700.00	3250.00		
			(n=1)			
N	2700.00±424.26	3300.00±848.53	3775.00±448.14	4475.00±464.58	4240.00±450.56	5110.00 ±510.39
	(n=2)		(n=4) d=700.00±40.83 t=34.29 P<0.001		(n=5) d=870.00±192.35 t=10.11 P<0.01	

Table No. 7 Intra group comparison of mean difference of Head Circumference (cm) in different vitiated milk fed babies sub-group at different interval

Milk Type	**Phase-I**		**Phase-II**		**Phase-III**	
	At 10th day	***At 40th day***	***At 40th day***	***At 70th day***	***At 70th day***	***At 100th day***
V	33.70±2.63	36.00±1.87	36.25±0.89	38.35±0.86	37.96±1.23	39.82±1.05
	(n=5) d=2.30±1.12 t=4.10 P<0.05		(n=10) d=2.10±0.45 t=14.93 P<0.001		(n=14) d=1.860±0.75 t=9.33 P<0.001	
P						
K	33.37±1.37	36.29±1.37	35.75±0.35	37.50±0.71		
	(n=18) d=2.92±1.08 t=11.51 P<0.001		(n=2)			
VP						
VK	34.45±1.39	36.95±1.39	36.25±1.26	38.30±0.81	39.01±0.14	40.15±1.20
	(n=11) d=2.50±1.03 t=8.09 P<0.001		(n=4) d=2.05±1.33 t=3.08 P>0.05		(n=2)	
PK			35.00±0.71	36.50±0.00		

			(n=2)			
VPK			33.20	35.00		
			(n=1)			
N	33.50±2.12	35.75±1.77	36.63±1.03	38.50±1.08	38.14±0.93	39.24±1.04
	(n=2)		(n=4) d=1.87±0.85 t=4.39 P<0.05		(n=5) d=1.10±0.65 t=3.77 P<0.02	

Table No. 8 Intra group comparison of mean difference of Chest Circumference (cm) in different vitiated milk fed babies sub-group at different interval.

Milk Type	**Phase-I**		**Phase-II**		**Phase-III**	
	At 10th day	***At 40th day***	***At 40th day***	***At 70th day***	***At 70th day***	***At 100th day***
V	31.63±2.87	34.38±2.02	34.45±1.32	37.00±1.70	36.57±1.40	38.87±1.73
	(n=5) d=2.75±1.19 t=4.62 P<0.02		(n=10) d=2.55±0.60 t=13.47 P<0.001		(n=14) d=2.30±1.57 t=5.49 P<0.001	
P						
K	30.99±1.53	33.78±1.44	33.25±1.06	36.25±0.35		
	(n=18) d=d=2.78±1.28 t=9.24 P<0.001		(n=2)			
VP						
VK	32.09±1.45	34.80±1.74	34.13±0.85	36.50±0.58	38.00±1.41	38.50±1.41
	(n=11) d=2.71±1.38 t=6.52 P<0.001		(n=4) d=2.37±1.38 t=3.45 P<0.05		(n=2)	
PK			33.00±0.71	36.00±0.00		
			(n=2)			
VPK			30.00	33.00		
			(n=1)			

N	31.50±1.41	34.00±2.12	34.36±1.25	37.50±1.29	37.10±1.67	38.40±1.29
	(n=2)		(n=4) d=3.14±1.42 t=4.43 P<0.05		(n=5) d=1.30±0.67 t=4.33 P<0.02	

Table No. 9 Intra group comparison of mean difference of MAC (cm) in different vitiated milk fed babies sub-group at different interval.

Milk Type	**Phase-I**		**Phase-II**		**Phase-III**	
	At 10th day	***At 40th day***	***At 40th day***	***At 70th day***	***At 70th day***	***At 100th day***
V	10.38±1.31	11.00±1.47	10.58±0.63	11.54±0.78	11.39±0.98	12.10±0.93
	(n=5) d=0.63±0.25 t=5.00 P<0.02		(n=10) d=0.96±0.67 t=4.55 P<0.01		(n=14) d=0.71±0.53 t=4.97 P<0.001	
P						
K	9.72±0.58	10.31±0.55	10.15±0.21	10.85±0.21		
	(n=18) d=0.59±0.31 t=8.00 P<0.001		(n=2)			
VP						
VK	9.90±0.74	10.76±0.56	10.03±0.71	11.50±1.16	12.25±1.06	12.65±0.49
	(n=11) d=0.86±0.52 t=5.51 P<0.001		(n=4) d=1.48±1.07 t=2.76 P>0.05		(n=2)	
PK			10.15±0.64	10.60±0.85		
			(n=2)			
VPK			9.50	10.00		
			(n=1)			
N	10.25±1.06	10.35±0.92	11.13±0.98	11.50±1.08	10.98±0.55	11.94±0.64

	(n=2)	(n=4) d=0.38±0.15 t=5.00 P<0.002	(n=5) d=0.96±0.27 t=7.95 P<0.01

Table No. 10 Intra group comparison of mean difference of CHL (cm) in different vitiated milk fed babies sub-group at different interval.

Milk Type	Phase-I		Phase-II		Phase-III	
	At 10th day	*At 40th day*	*At 40th day*	*At 70th day*	*At 70th day*	*At 100th day*
V	48.63±2.43	51.88±3.07	51.45±1.26	54.40±1.15	54.37±1.98	57.57±1.69
	(n=5) d=3.25±1.19 t=5.46 P<0.02		(n=10) d=2.95±1.04 t=8.97 P<0.001		(n=14) d=3.20±1.54 t=7.78 P<0.001	
P						
K	48.03±1.59	51.67±1.42	51.00±0.00	53.00±0.00		
	(n=18) d=3.64±1.27 t=12.16 P<0.001		(n=2)			
VP						
VK	48.73±1.57	52.05±1.68	50.25±1.26	53.75±1.50	55.00±0.00	57.25±1.06
	(n=11) d=3.32±1.15 t=9.60 P<0.001		(n=4) d=3.50±1.00 t=7.00 P<0.01		(n=2)	
PK			50.00±1.41	54.00±2.83		
			(n=2)			
VPK			49.50	52.00		
			(n=1)			
N	49.00±2.83	51.00±2.83	53.38±1.11	56.00±2.71	53.90±1.82	56.30±2.64

	(n=2)	(n=4) d=2.63±1.60 t=3.28 P<0.05	(n=5) d=2.40±1.29 t=4.15 P<0.02

GROUP A

Mean length gain (mm/day) in different subgroups in different phases.

PHASE - I : Mean length gained (mm/day) during phase-I observation ranged from 1.00 to 1.84 in different subgroups which corresponds to the length gain range from > 5^{th} to >95^{th} percentile in male and >10^{th} to > 95^{th} percentile in female. However, maximum gain in subgroups 'K' corresponds to mean length gain (mm/day) >95^{th} percentile in both sex.

PHASE - II : Mean length gained (mm/day) during phase-I observation ranged from 0.66 to 2.5 in different subgroups which corresponds to the length gain range from < 5^{th} to > 95^{th} percentile in both sex. However, maximum gain in subgroups 'VP' corresponds to mean length gain (mm/day) >95^{th} percentile in both sex.

PHASE - III : Mean length gained (mm/day) during phase-I observation ranged from 0.83 to 1.5 in different subgroups which corresponds to the length gain range from < 5^{th} to >95^{th} percentile in male and > 5^{th} to > 95^{th} percentile in female. However, maximum gain in subgroups 'VK' corresponds to mean length gain (mm/day) >95^{th} percentile in both sex.

GROUP B

Mean length gain (mm/day) in different subgroups in different phases.

PHASE - I : Mean length gained (mm/day) during phase-I observation ranged from 0.66 to 1.21 in different subgroups which corresponds to the length gain range from < 5^{th} to > 25^{th} percentile in both sex. However, maximum gain in subgroups 'K' corresponds to mean length gain (mm/day) >25^{th} percentile in both sex.

PHASE - II : Mean length gained (mm/day) during phase-I observation ranged from 0.66 to 1.66 in different subgroups which corresponds to the length gain range from < 5^{th} to > 95^{th} percentile in both sex. However, maximum gain in subgroups 'VK' corresponds to mean length gain (mm/day) >95^{th} percentile in

both sex.

PHASE - III : Mean length gained (mm/day) during phase-I observation ranged from 0.75 to 1.06 in different subgroups which corresponds to the length gain range from < 5^{th} to > 25^{th} percentile in male and <5^{th} to > 50^{th} percentile in female. However, maximum gain in subgroups 'V' corresponds to mean length gain (mm/day) >25^{th} percentile in male and > 50^{th} percentile in female.

ACHIEVEMENT OF MILESTONES IN DIFFERENT SUBGROUPS PHASE WISE -

PHASE – I : Observation of reflexes during phase-I (between 10^{th} day to 40^{th} days of life) shown that a total of 83.87% 'K' 100% 'N', 68.18% 'VK', 20% 'V' & 100% 'VP' subgroup (n=1) infants achieved auditory reflexes, whereas 64.51% 'K', 50% 'N' and 18.18% 'VK' subgroup infants achieve visual relaxes.

PHASE – II Observation of reflexes during phase-II study (between 40^{th} - 70^{th} day of life) shown that a total of 36.84% 'V', 20% 'K', 30% 'VK', 33.33% 'PK', 50% 'VPK' and 20% N subgroup infants achieved auditory reflexes and 57.89% 'V' 40% 'K', 40% 'VK', 100% 'VP' 100% 'PK' and 80% 'N' subgroup infants achieved visual reflexes during the same duration.

PHASE-III Observation of milestones shown that 95.83% 'V' 100% 'K', 100% 'N' subgroup infants achieve Head control (Wobbles).

a. Observation of milestones shows that 4.16% 'V' and 42.85% 'N' subgroup infants were able to sit with support.

b. Observation of milestones shows that 83% 'V', 100% 'N' 60% 'VK' subgroup infants were able to kick legs upwards vertically in phage-III.

c. Observation of milestones shows that 66.66% 'V' 85.71% 'N', 100% 'K' 80% 'VK' subgroup infants were able of rolling to side.

d. Observation of milestones shows that 87.5% 'V' 85.7% 'N' and 60% 'VK' subgroup infants were started crawling on elbow.

e. Observation of milestones shows that 33.3% 'V', 57.14% 'N' and 40% 'VK' subgroup infants were able to support weight on standing.

MORBIDITY INCIDENCE IN DIFFERENT SUBGROUPS –

a. A total of 34% morbidity in 'V' vitiated breast milk fed baby was observed in group A & B. Maximum (19.14%) morbidity was related to Vatik disorder followed by 10.6% Kaphaj and 4.25% Pittaja disorders.

b. A total of 51.35% morbidity in 'K' vitiated breast milk fed baby was observed in group A & B. Maximum (43.24%) morbidity was related to Kaphaj disorder followed by 5.4% Vatik and 2.7% Pittaja disorders.
c. A total of 200% morbidity in 'VP' subgroups was observed in both groups. Maximum (100.33%) morbidity was related to Pittaja disorder followed by 33.3% Kaphaj and Vatik disorders each.
d. A total of 40.54% morbidity in 'VK' vitiated breast milk fed baby was observed in group A & B. Maximum (32.43%) morbidity was related to Kaphaj disorder followed by 5.4% Vatik and 2.7% Pittaj disorders.
e. A total of 100% morbidity in 'PK' subgroup was observed of which 50% each related to Pittaja and Kaphaj disorders.
f. 7.1% morbidity was observed in 'N' subgroup whereas milk vitiated by only Pitta dosha was not found in this study.

CONCLUSION

Different studies on breast milk properties including the effect of different food, chemical, drugs, environmental pollutants, etc. are found supportive to the concept of vitiation of breast milk.

Being the preliminary study regarding the breast milk vitiation, *showing positive trends of growth and development, and relation of the morbidity with the Dosha-specific vitiation of breast milk.*

The objective parameters (modified water test, fat%, SNF, & total solute) used to assess the *Guruta- Laghuta* (by weight, not by digestion), *Snigdhata- Rukshata* and *Tanuta-Sandrata*properties, have been found effective in assessing the vitiation of breast milk.

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