RESULTS

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This study was conducted in NICU in Benha University Hospitals. The subjects were divided into two groups.

Group I (Neonates group): 175 neonates compromised all neonates attended NICU during the period of the study. They were subdivided into three subgroups according to the results.

Group I (A) : This group comprised 10 neonates with intrauterine (congenital) CMV infection. They were 5 males and 5 females. Their age ranged from one to three days with a mean of 1.3 ± 0.68. They were positive for CMV-DNA in their PBLs by PCR and their sera were positive for CMV IgM by ELISA.

Group I (B) : This group comprised 12 neonates with perinatal (acquired) CMV infection. They were 5 males and 7 females. Their age ranged from one to ten days with a mean of 3.2 ± 3.16. They were positive for CMV-DNA in their PBLs by PCR and their sera were negative for CMV IgM by ELISA.

Group I (C) (Control Group) : This group comprised 153 neonates without evidence of CMV infection. They were 74 males 79 females. Their age ranged from one to ten days with a mean of 2.81 ± 2.52. They were negative for CMV-DNA by PCR and their sera were negative for CMV IgM by ELISA.

Group II (NICU Employee Group): This group comprised 19 employee at NICU. They were 16 females and 3 males. Their age ranged from 19 to

38 years with a mean of 24.56 ± 6.1. They were investigated twice, one at start and another one at its end.

All results of the study are shown in the following tables and figures.

Table (2) : Distribution of the studied groups according to the results of investigations to CMV.

Investigations / Studied groups	CMV PCR		CMV IgM		CMV IgG	
	No.	%	No.	%	No.	%
* Group I (175)	22	12.57	10	5.71	147	84.0
* Group II (19)	2	10.53	0	0.00	19	100.0

Table (3) : Classification of group I

Percent / Group (I)	No	%
Group I (A) (Congenital CMV)	10	5.71
Group I (B) (Perinatal CMV)	12	6.86
Group I (C) (Control)	153	87.43
Total	**175**	**100.0**

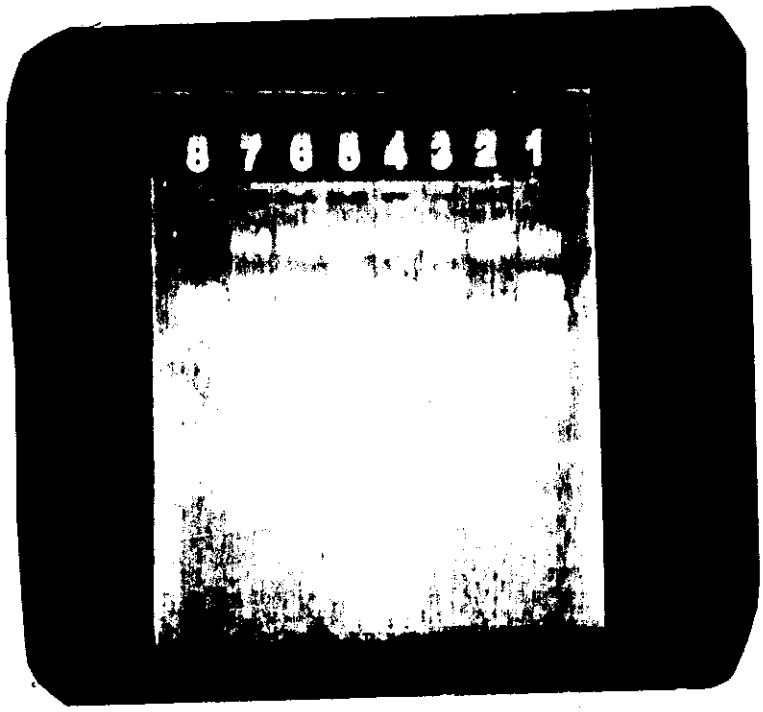

Fig. (7) : CMV-DNA after PCR amplification : Amplified DNA was electrophoresed on agarose gel containing 2.5ul ethedium bromide and visualized on ultraviolet transilluminator :

- Lane I shows positive control (CMV – AD 169).
- Lane II shows negative cotnrol.
- Lanes 3,5,6 and 7 show positive CMV-DNA.
- Lanes 4 & 8 show negative CMV-DNA.

Fig. (11) : Investigations of CMV in the studied groups

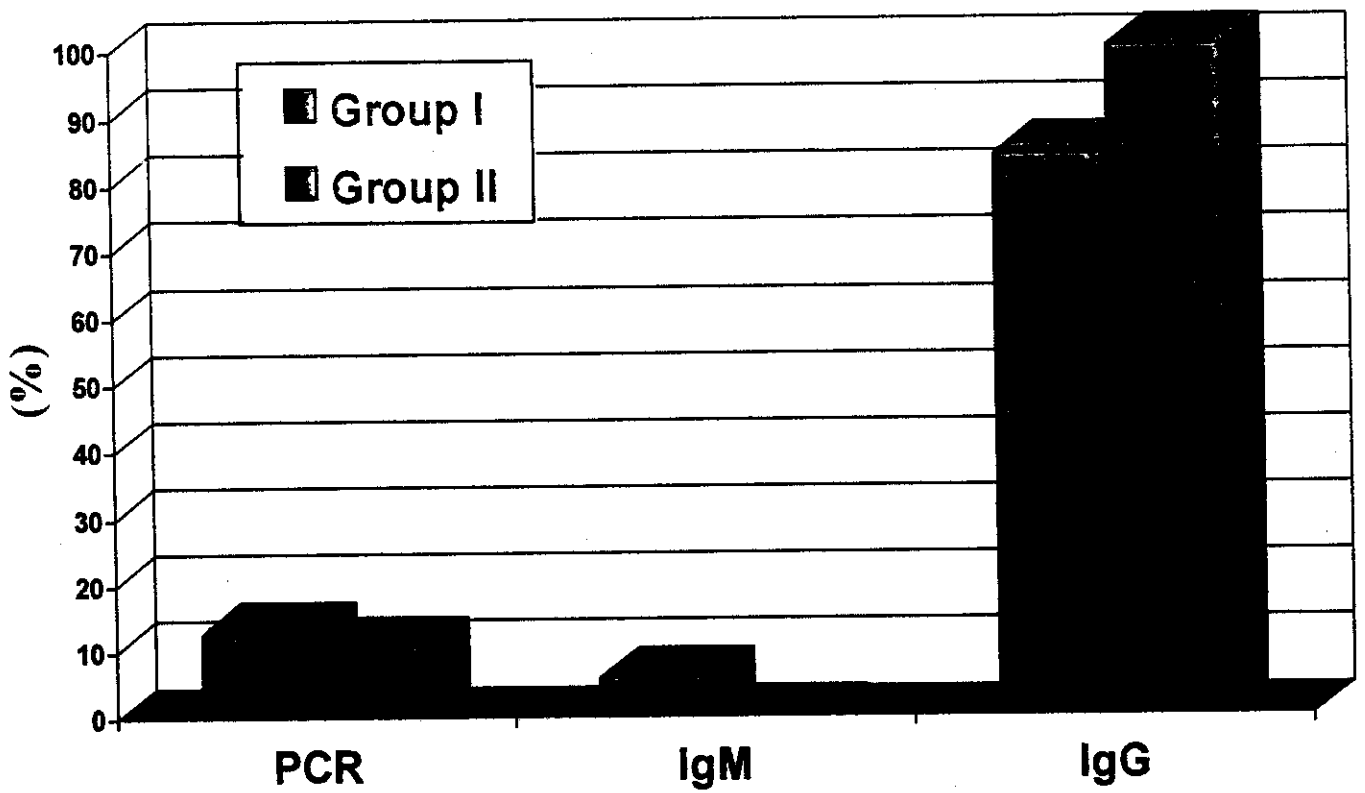

Fig. (12) : CMV among group I

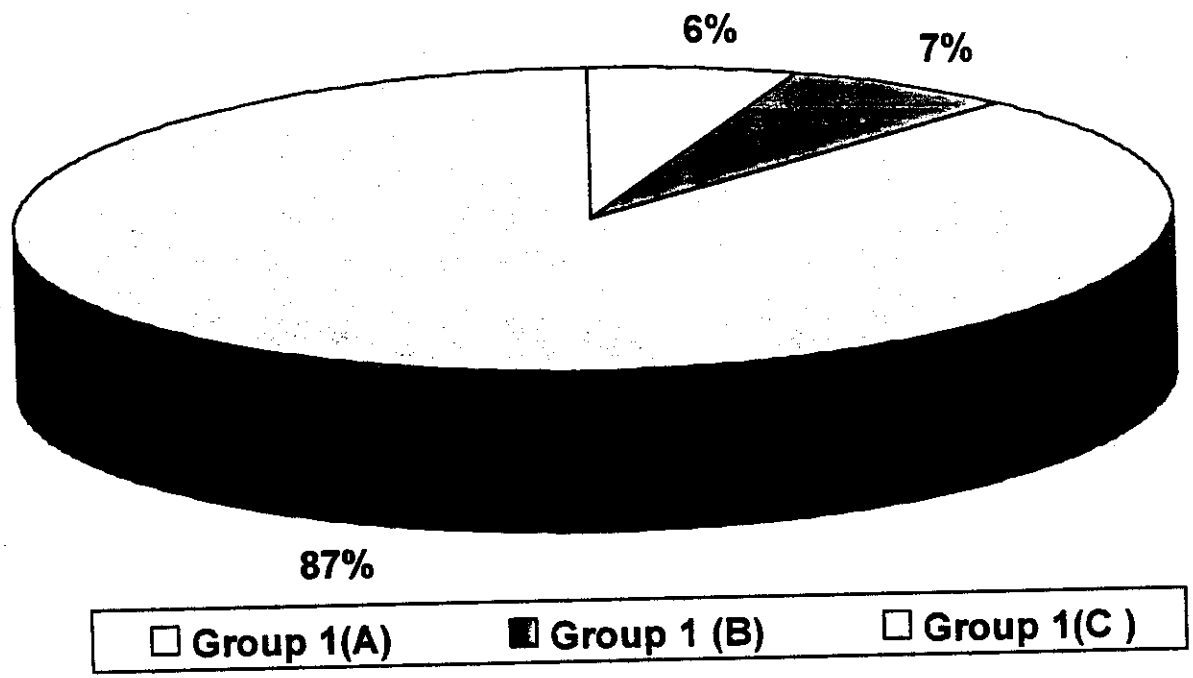

Table (4): Mean and range of age among Group I at the time of admission :

Age (days) / Studied groups	No	$\bar{X}$	± SD	Range		Significance against group I (c)	
				Mini-mum	Maxi-mum	t	P
Group I (A)	10	1.3	± 0.675	1	3	5.122	<0.001 (H.S)
Group I (B)	12	3.2	± 3.155	1	10	0.416	> 0.05 (N.S)
Group I (C)	153	2.812	± 2.522	1	10	-	-

$\bar{X}$: Arithmatic mean.

SD: standard deviation.

P : Probability of error.

P < 0.001 (highly significant) (H.S)

P > 0.05 (Non significant) (N.S)

P < 0.05 (significant) (S)

* Group I (A) is significantly lower than control group

* There is no significant differences between group I (B) and control group.

Fig. (8) : Mean age among group I

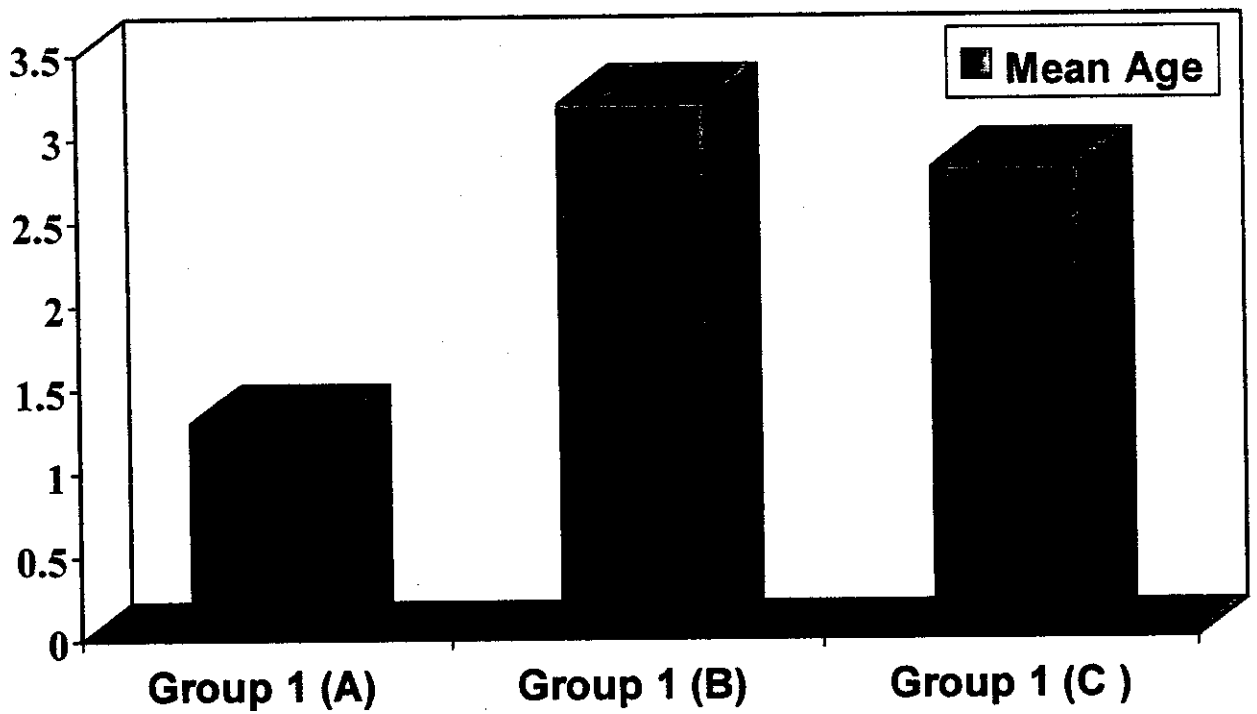

Table (5) : Sex distribution among group I :

Sex / Studied groups	Male		Female		Total	
	No.	%	No.	%	No.	%
Group I (A)	5	5.95	5	5.49	10	5.71
Group I (B)	5	5.95	7	7.69	12	6.86
Group I (C)	74	88.10	79	86.82	153	87.43
Total	**84**	**100.0**	**91**	**100.0**	**175**	**100.0**

$\chi^2 = 0.217$

$P > 0.05$

Group I (A): congenital CMV infection.

Group I (B): perinatal (acquired) CMV infection.

Group I (C): No evidence of CMV infection.

$\chi 2$: Chi square

i.e.: No significant difference in the sex among the studied groups and control group.

Table (6): Mean gestational age among Group I:

Gestational age in weeks / Studied groups	$\bar{X}$	± S.D.	Significance against group I (C)	
			t	P
1- Group I (A) (n=10)	35.5	± 1.169	4.652	< 0.05 (S)
2- Group I (B) (n=12)	35.9	± 1.383	3.364	< 0.05 (S)
3- Group I (C) (n=153)	37.29	± 1.319	_	_

* Prematurity in neonate born before 37 weeks of gestation.

S: Significant.

Group I (A) and group I (B) are significantly lower than control group.

Fig. (9) : Sex distribution among group I

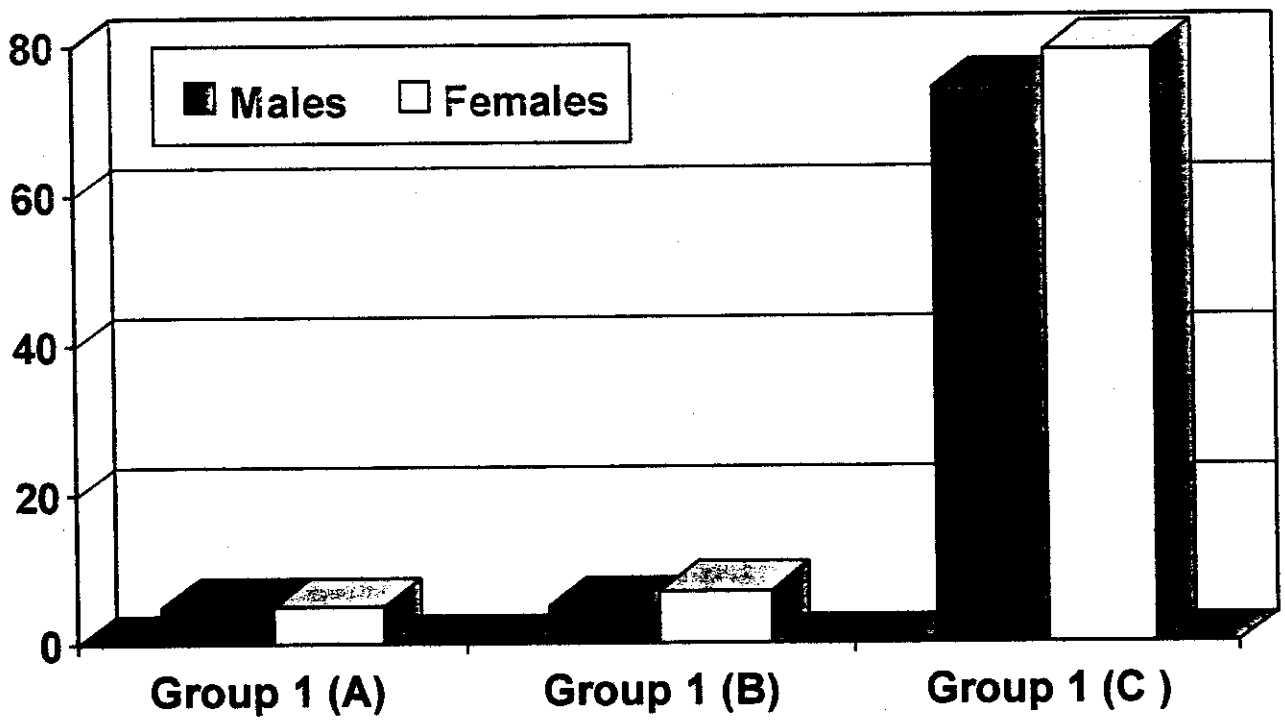

Fig. (10) : Gestational age among group I

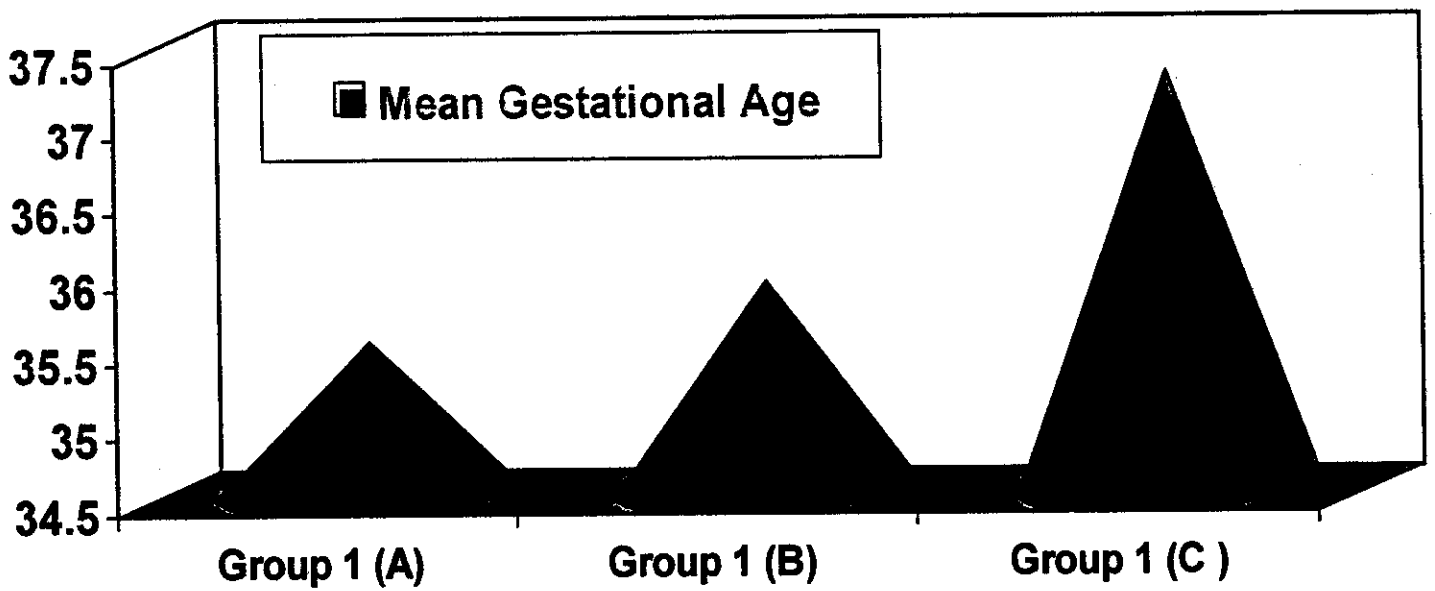

Table (7): Distribution of breast Milk Feeding among Group I:

Variable / Studied Groups		Neonates with Breast Milk Feeding		Neonates without Breast Milk Feeding	
		No.	%	No.	%
Group I (A) (No. =10)		8	80.0	2	20.0
Group I (B) (No. = 12)		9	75.0	3	25.0
Group I (C) (No. 153)		46	30.07	107	69.93
Significance Versus Group I (C)	Z1	3.185		1.744	
	Z2	2.819		1.769	
	P	< 0.001	(HS)	< 0.001	(HS)

- **Z1:** test of significance between percent of positive in group I (A) and control.
- **Z2** : test of significance between percent of positive in group I (B) and control

Group I (A) and group I (B) are significantly higher than control group.

Table (8): Distribution of low birth weight neoborns among group I:

Variable / Studied Groups		Neonates with low Birth weight		Neonates with Normal Birth Weight	
		No.	%	No.	%
Group I (A) (No. =10)		8	80.0	2	20.0
Group I (B) (No. = 12)		9	75.0	3	25.0
Group I (C) (No. 153)		65	42.48	88	57.52
Significance Versus Group I (C)	Z1	3.185		1.744	
	Z2	2.819		1.769	
	P	< 0.05 (S)		< 0.05 (S)	

N.B.: Low birth weight was diagnosed if the body weight at the time of delivery was less than 2500 gram.

Group I (A) and group I (B) are significantly higher than control

Fig. (13) : Breast milk feeding among group I

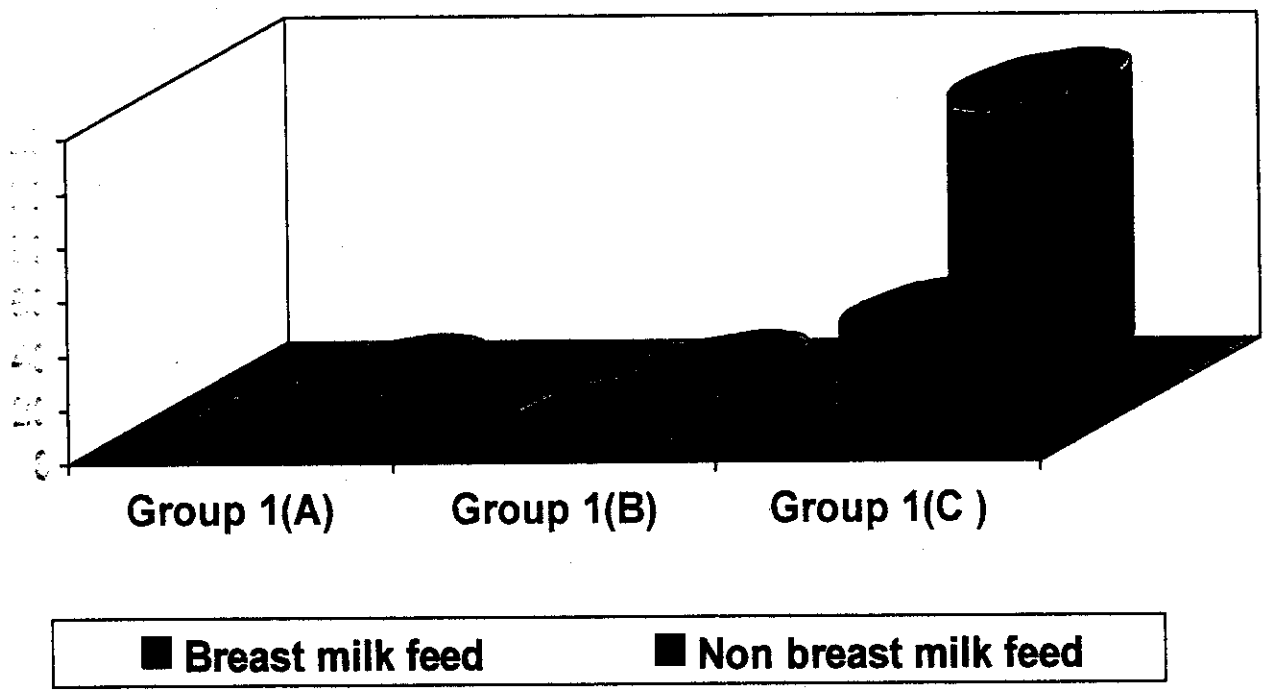

Fig. (14) : Distribution of low birth weight among group I

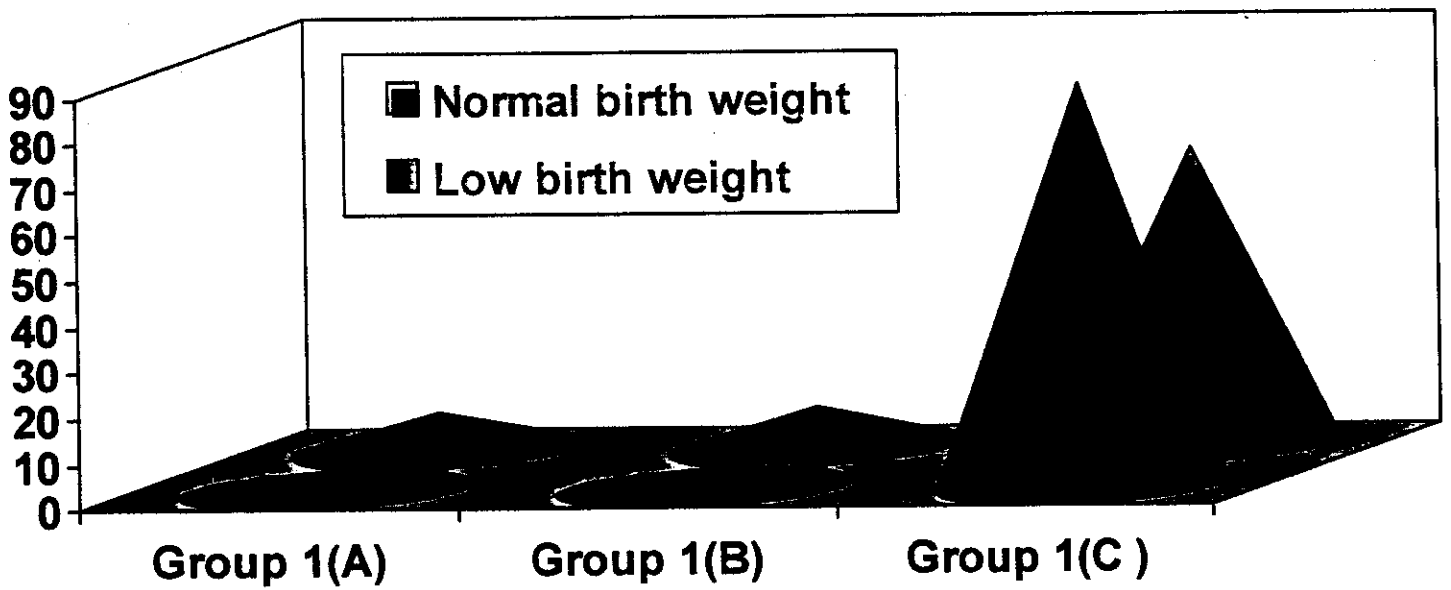

Table (9): Period of stay in NICU among group I:

Period of stay in days in NICU / Studied groups	$\bar{X}$	± S.D.	Significance compared to group I (C)	
			t	P
1- Group I (A) (n=10)	15.0	± 5.011	3.056	< 0.001 (HS)
2- Group I (B) (n=12)	13.5	± 5.104	2.277	< 0.05 (S)
3- Group I (C) (n=153)	10.097	± 3.901	_	_

* Group I (A) and group I (B) are significantly higher than control group.

Table (10) : Distribution of congenital anomalies in group I:

Variable / Studied Groups		Neonates with Congenital Anomalies		Neonates without Congenital Anomalies	
		No.	%	No.	%
Group I (A) (No. =10)		3	30.0	7	70.0
Group I (B) (No. = 12)		2	16.67	10	83.33
Group I (C) (No. 153)		4	2.61	149	97.39
Significance Versus Group I (C)	Z1	2.489		2.175	
	Z2	1.138		1.664	
	P	< 0.001 (HS)		< 0.05 (S)	

- Group I (A) and group I (B) are significantly higher than control group.
- Congenital anomalies in group I (A) was one had microcephaly, one had cleft pallet and the last one had congenital heart disease.
- Congenital anomalies in group I (B) was: one had sinus inversus totalis and one had cleft palat.
- Congenital anomalies in group I (C):
  - Two congenital heart disease.
  - One hare lip.
  - One imperforate anus.

Fig. (15) : Distribution of congenital anomalies among group I

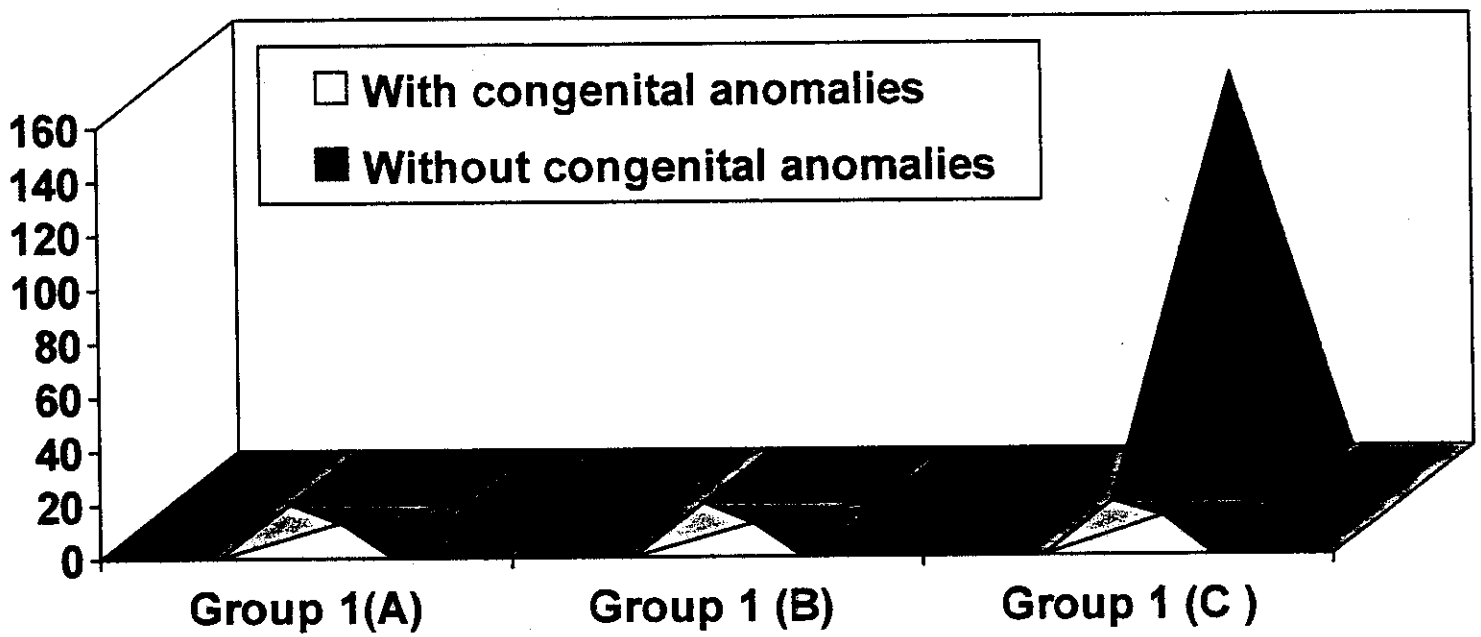

Table (11): Distribution of fever in group I:

Variable / Studied Groups		Neonates with Fever		Neonates without Fever	
		No.	%	No.	%
Group I (A) (No. =10)		4	40.0	6	60.0
Group I (B) (No. = 12)		3	25.0	9	75.0
Group I (C) (No. 153)		15	9.81	138	90.19
Significance Versus Group I (C)	Z1	3.512		2.518	
	Z2	2.718		2.491	
	P	< 0.005 (S)		< 0.05 (S)	

* Group I (A) and group I (B) are significantly higher than control group.

Table (12): Distribution of jaundice among group I:

Variable / Studied Groups		Neonates with Jaundice		Neonates without Jaundice	
		No.	%	No.	%
Group I (A) (No. =10)		5	50.0	5	50.0
Group I (B) (No. = 12)		2	16.67	10	83.33
Group I (C) (No. 153)		47	30.72	106	69.28
Significance Versus Group I (C)	Z1	0.826		0.845	
	Z2	0.517		1.114	
	P	< 0.001 (HS)		< 0.05 (S)	

* There is no significant difference between the studied groups and control group.

Fig. (16) : Distribution of jaundice among group I

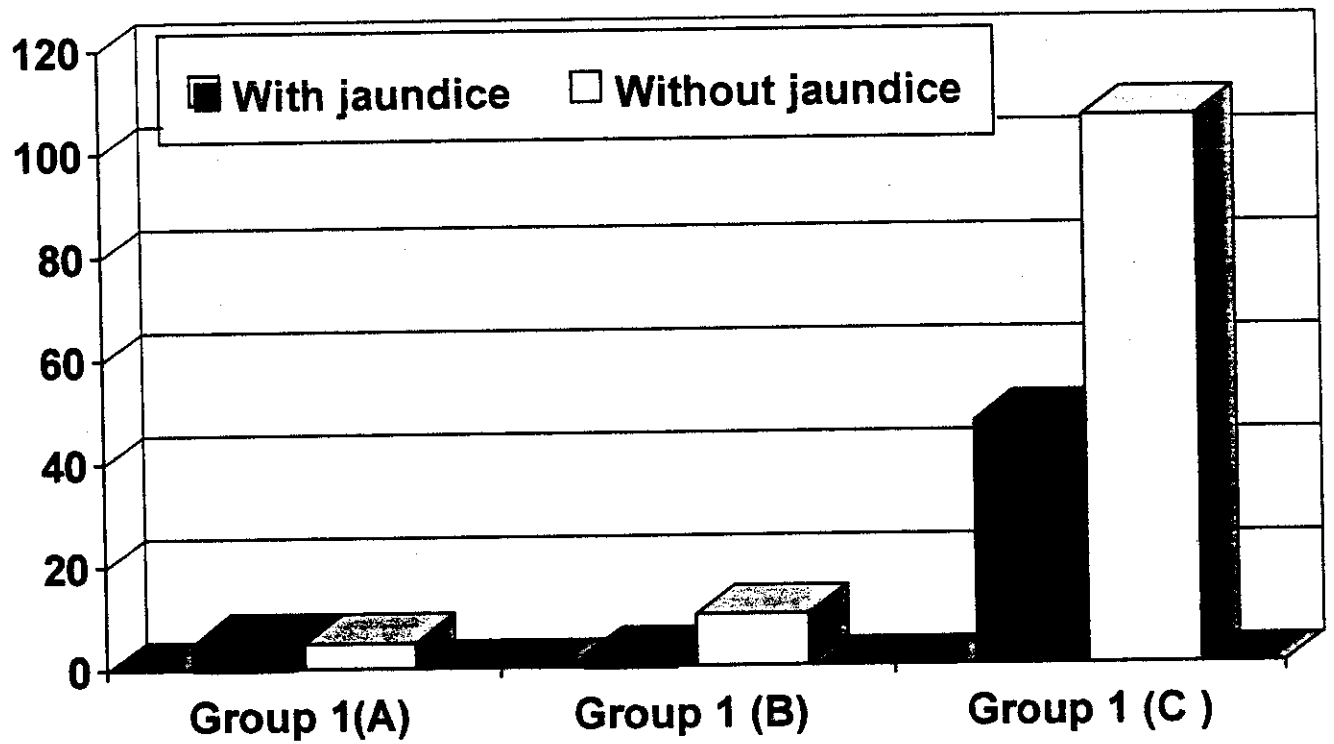

Table (13): Hepatosplenomegaly among group I:

Variable / Studied Groups		Neonates with Hepatosplenomegaly		Neonates without Hepatosplenomeglay	
		No.	%	No.	%
Group I (A) (No. =10)		5	50.0	5	50.0
Group I (B) (No. = 12)		7	58.33	5	41.67
Group I (C) (No. 153)		10	6.54	143	93.46
Significance Versus Group I (C)	Z1	2.023		2.146	
	Z2	2.779		2.553	
	P	< 0.05 (S)		< 0.05 (S)	

- Group I (A) and group I (B) are significantly higher than control group.

Table (14): Distribution of anemia among group I:

Variable / Studied Groups		Neonates with Anemia		Neonates without Anemia	
		No.	%	No.	%
Group I (A) (No. =10)		8	80.0	2	20.0
Group I (B) (No. = 12)		10	83.33	2	16.67
Group I (C) (No. 153)		27	17.65	126	82.35
Significance Versus Group I (C)	Z1	2.69		2.189	
	Z2	4.384		2.472	
	P	< 0.05 (S)		< 0.05 (S)	

* Group I (A) and group I (B) are significantly higher than control group.

Fig. (17) : Distribution of anemia among group I

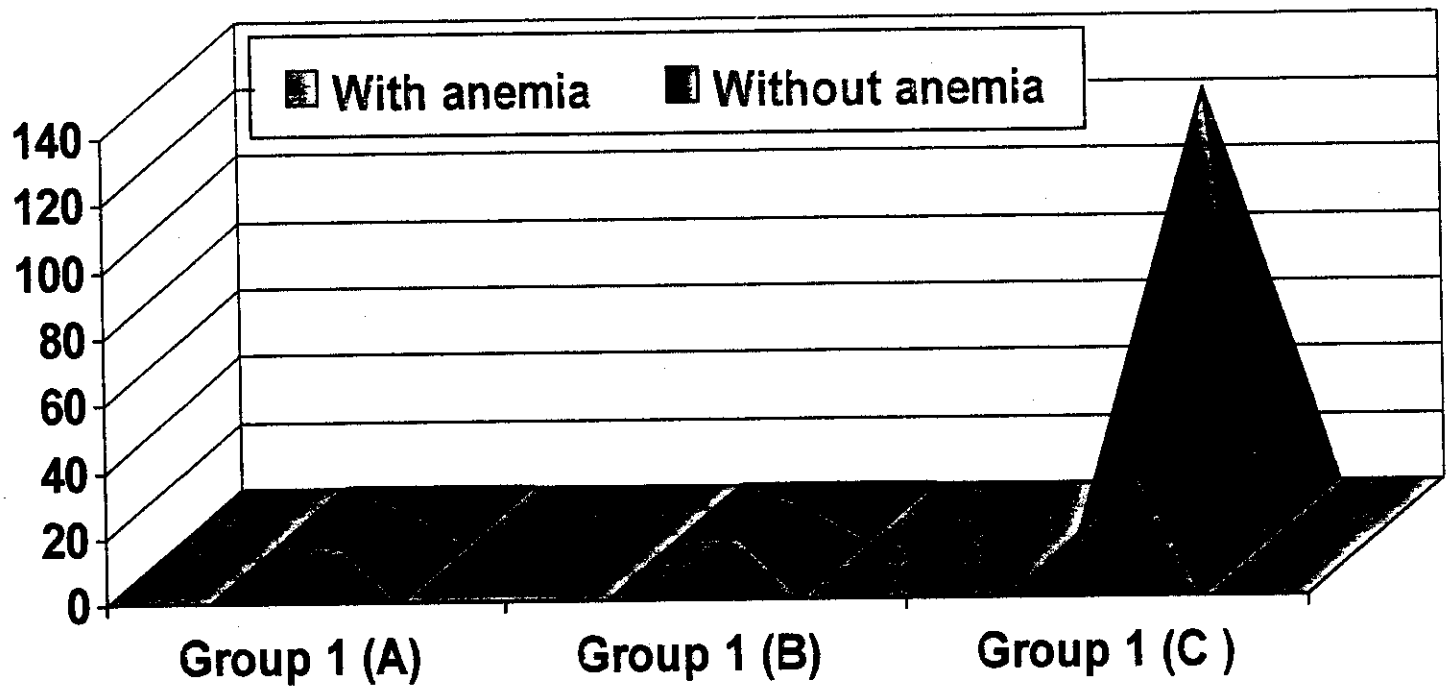

Table (15): Distribution of thrombocytopenia among group I:

Variable / Studied Groups		Neonates with Thrombocytopenia		Neonates without Thrombocytopenia	
		No.	%	No.	%
Group I (A) (No. =10)		7	70.0	3	30.0
Group I (B) (No. = 12)		7	58.33	5	41.67
Group I (C) (No. 153)		28	18.30	125	81.69
Significance Versus Group I (C)	Z1	3.469		2.493	
	Z2	2.687		2.461	
	P	< 0.05 (S)		< 0.05 (S)	

N.B.: Thrombocytopenia: Platelets < 100.00/ml.

*Group I (A) and group I (B) are significantly higher than control group.

Table (16): Neonates received blood transfusion among group I:

Variable / Studied Groups		Neonates Received Blood Transfusion		Neonates not Received Blood Transfusion	
		No.	%	No.	%
Group I (A) (No. =10)		6	60.0	4	40.0
Group I (B) (No. = 12)		6	50.0	6	50.0
Group I (C) (No. 153)		26	16.99	127	83.01
Significance Versus Group I (C)	Z1	2.608		2.285	
	Z2	2.104		2.51	
	P	< 0.05 (S)		< 0.05 (S)	

*Group I (A) and group I (B) are significantly higher than control group.

Table (17): Distribution of congenital anomalies, fever, Jaundice, hepatosplenomegaly, anemia, thrombocytopenia & blood transfusion in group I

Studied groups % / Variable	Group I (A) (No 10)	Group I (B) (No 12)	Group I (C) (No 153)	Z_1	p	Z_2	I
Congenital Anomalies	30.0	16.67	2.61	2.489	<0.001 (HS)	1.138	< 0.0
Fever	40.0	25.0	9.81	3.512	<0.05(S)	2.718	< 0.0
Hepatosplenomegaly	50.0	58.33	6.54	2.023	<0.05(S)	2.779	< 0.0
Anemia	80.0	83.33	17.65	3.690	<0.05(S)	4.384	< 0.0
Thrombocytopenia	70.0	58.33	18.30	3.469	<0.05(S)	2.687	< 0.0
Jaundice	50.0	16.67	30.72	0.826	>0.05(N.S)	0.517	>0.05
Blood Transfusion	60.0	50.0	16.99	2.608	<0.05(S)	2.104	< 0.0

- HS : Highly significant
- S: significant.
- NS: Non significant.

Table (18): Mortality in group I:

Variable / Studied groups		Deaths Among Neonates	
		No.	%
Group I (A) (No. = 10)		**2**	**20.0**
Group I (B) (No. = 12)		**2**	**16.67**
Group I (C) (No. = 153)		**10**	**6.54**
Significance	Z_1	**1.996**	**P < 0.001 (HS)**
Versus Group I (C)	Z_2	**2.163**	**P < 0.001 (HS)**

*Group I (A) and group I (B) are significantly higher than control group.

Table (19): Mean age among group II:

Age Years / Studied groups	No.	$\bar{X}$	SD	Range		Test of significance	
				Mini-mum	Maxi-mum	t	P
CMV-DNA positive by PCR	2	33.0	±4.583	31.0	35.0	2.763	<0.05(S)
CMV-DNA Negative by PCR	17	24.563	±6.099	18.0	36.0	-	-

* The age among CMV positive employee is significantly higher than CMV negative employee.

Table (20) : Sex distribution among group II :

Sex / Studied Groups	Male		Female		Total	
	No.	%	No.	%	No.	%
CMV-DNA positive by PCR	0.0	0.0	2	12.5	2	10.53
CMV-DNA negative by PCR	3.0	100.0	14	87.5	17	89.47
Total	**3.0**	**100.0**	**16**	**100.0**	**19**	**100.0**

$\chi 2 = 0.839$

$P < 0.001$

* CMV- DNA is signficiantly higher in females more than males among employee.

Table (21) : Employment period among group II :

Employment Period (years) / Studied Groups	$\bar{X}$	S.D	Range		Test of significance	
			Mini-mum	Max-imum	t	P
CMV-DNA Positive by PCR No.=2	12.75	±2.15	11.5	14.0	1.572	<0.001 (H.S)
CMV-DNA Negative by PCR No. =17	7.63	±3.61	2.5	10.5	-	-

* Employment period among CMV positive employee is significantly higher than CMV negative employee.

Table (22) : Correlation coeffecient (r) between CMV infection among neonates in NICU and CMV infection of employee working in the same unit :

CMV in neonates	r	P
CMV in personnel	0.0183	> 0.05 (N.S)

There is no statistical correlation between both groups.

Table (23) : Distribution of history of blood transfusion, S. IgG, S. IgM and PCR for CMV in group II starting and at the end of study:

Personnel / Variables	Starting		At end of study		Z	P
	No.	%	No.	%		
Blood transfusion	4	21.05	4	21.05	0.0	> 0.05 (NS)
CMV - IgG	19	100.0	19	100.0	0.0	> 0.05 (NS)
CMV- IgM	0	0.0	0	0.0	0.0	> 0.05 (NS)
PCR for CMV	2	10.53	2	10.53	0.0	> 0.05 (NS)

All variables of personnel in group II were statistically insignificant.

Table (24): Regression variables related to congenital CMV infection among neonates in NICU :

Variable	Reg. Coeff.	S.E.	F value	P
Congenital anomalies	+ 1.663	0.769	4.639	< 0.05
Low birth weight	+ 1.119	0.429	6.557	< 0.05
Constant	**22.269**			

*** SE = Standard Error**

R = 0. 503

* The most predictor regressions variables related to congenital CMV in the study were congenital anomalies and low birth weight.

* **NB:** Other variables such as gestational age, breast milk feeding, fever, jaundice, anemia … etc are not related statistically by regression analysis.

Table (25) : Regression variables related to acquired CMV infection among neonates in NICU :

Variable	Reg. Coeff.	S.E.	F value	P
Low birth weight	+ 1.584	0.287	5.188	< 0.05
Breast milk feeding	+ 0.519	0.189	4.989	< 0.05
Constant	24.289			

R = 0.289

* The most predictor regression variables among acquired CMV in the study were low birth weight and breast milk feeding.

Table (26) : Regression variables related to CMV infection among neonates in NICU (both congenital and acquired) :

Variable	Regression coefficient	S.E	F. value	P
- low birth weight	+ 1.394	0.477	6.713	< 0.05
- Congenital anomalies	+ 1. 261	0.713	3.851	< 0.05
- Breast milk feeding	+ 1.193	0.372	4.152	< 0.05
Constant	20.142			

R= 0. 681

* The most predictor regression variables among neonates in NICU were low birth weight, congenital anomalies and breast milk feeding.

Table (27) : Regression variables related to CMV infection among employee in NICU.

Variable	Regression coefficient	S.E	F. value	P
Blood transfusion	+ 1.251	0. 679	4.128	< 0.05 (s)
Employment period (years)	+ 1.087	0.438	6.334	< 0.05 (s)
Constant	**21. 057**			

R = 0.283

* The most predictor regression variables related to CMV infection in employees in NICU were blood transfusion and employment period.