Report

Selected haematological and lipid profiles of Libyan children up to two years of age in Benghazi

N.N.Mohamed,[1] N.M. Shembesh[2] and R. Singh[3]

Introduction

In recent years haematological and lipid profiles, particularly during childhood have become of increasing interest to health research workers, epidemiologists and clinicians [*1–8*]. These profiles can enhance our understanding of the biochemical basis of nutrition, growth and health as well as our ability to assess risks of diseases. For example, childhood obesity and hypercholesterolaemia have been found to be major precursors of both atherosclerosis and coronary heart disease [*1*].

The need to establish local population-based reference values for haematological and serum lipid parameters has been emphasized [*2–4*]. Such values have been estimated in various industrialized countries. However, in light of known racial, geographical and nutritional influences on the values, local figures are desirable. Thus, in the absence of reference values for these parameters for Libyan children, this preliminary study was undertaken in Benghazi to measure the values. The figures are compared with those available from industrialized countries.

Subjects and methods

The study investigated 200 Libyan babies aged 1 month to 24 months consecutively attending Al-Fateh Paediatric Hospital over a 3-month period. The eligibility criteria for inclusion were: singleton, full-term, normal births, mild to moderate severity of illness and short duration of illness (less than 7 days). Those who were preterm, low birth weight, seriously ill, congenitally malformed and any with chronic disease were excluded from the study.

Information on age, sex and method of feeding was uniformly recorded from the mothers. A sample of 4 ml venous blood was routinely withdrawn (without fasting) and preserved in the tube containing EDTA. The estimation of haemoglobin, haematocrit, mean corpuscular volume, serum cholesterol and various fractions of lipoproteins was carried out in pairs and mean values were calculated.

Established standard procedures were followed for the determination of haemoglobin, haematocrit and mean corpuscular volume. Serum cholesterol was measured

by a modified Zlatk's method after Chiar-mori and Henery [9] and triglyceride by an enzymatic method described by Bucolo and David [10]. Serum cholesterol was categorized as high-density lipoprotein and low-density lipoprotein

Arithmetic mean and standard deviation were calculated for each variable under study. Frequencies lying within and outside the standard reference values were determined.

Results and discussion

A total of 200 babies were included in the study. Biosocial characteristics are shown in Table 1, haematological values in Table 2, serum cholesterol and lipids in Table 3 and the effect of feeding practices on some haematological and lipid profiles in Tables 4–6.

In all, 63% of the babies were males and 37% females (Table 1). By age, 78% were

< 1 year and 22% were between 1 year and 2 years.

Haemoglobin ranged from 8.5 g/dL to 15.5 g/dL with a mean value of 11.4 ± 1.3 g/dL (Table 2). When compared with international standard references, 94% of the babies had values within the normal range (13 g/dL to 20 g/dL), 4% had lower and 2% had higher values. Thus, haemoglobin distribution in Libyan babies largely conformed with international standards.

The haematocrit value of Libyan babies varied from 29% to 47% with a mean of 34.6 ± 3.1% (Table 2). Mean corpuscular volume in the study subjects ranged from

Table 1 **Distribution of Libyan children (< 2 years) in Benghazi by sex, age and feeding practice, 1992 (*n* = 200)**

Characteristics	No.	%
Sex		
Male	126	63.0
Female	74	37.0
Age (months)		
1–3	30	15.0
4–6	47	23.5
7–9	39	19.5
10–12	40	20.0
13–14	44	22.0
Feeding		
Breast	39	19.5
Bottle	27	13.5
Mixed (breast and bottle)	134	67.0

Table 2 **Distribution of Libyan children (< 2 years) in Benghazi by haematological values, 1992 (*n* = 200)**

Variable	No.	%	Mean ± *s*
Haemoglobin (g/dL)			
8.5	8	4.0	
9.5	46	23.0	
10.5	60	30.0	
11.5	48	24.0	11.4 ± 1.3
12.5	25	12.5	
13.5	9	4.5	
14.5 to < 15.5	4	2.5	
Haematocrit (%)			
29	49	24.5	
32	82	41.0	
35	37	18.5	24.6 ± 3.1
41	29	14.5	
44–47	3	1.5	
Mean corpuscular volume (fL)			
72–76	75	37.5	
77	44	22.0	
82	42	21.0	80.3 ± 6.6
87	23	11.5	
92	11	5.5	
97–101	5	2.5	

s = *standard deviation*

Table 3 Distribution of Libyan children (< 2 years) in Benghazi by cholesterol, triglycerides and lipoproteins, 1992 (n = 200)

Variable	No.	%	Mean ± s
Cholesterol			
<69	19	9.5	
69–121	48	24.0	
122–174	50	25.0	161.8 ± 71
175–227	47	23.5	
228–280	19	9.5	
281–333	15	7.5	
334–387	2	1.0	
Triglycerides			
<10	11	5.5	
10–69	115	57.5	
70–129	51	25.5	70 ± 52
130–189	15	7.5	
190–249	6	3.0	
250–310	2	1.0	
High-density lipoproteins			
<14	74	37.0	
14–43	101	50.5	
44–73	22	11.0	31.6 ± 17
74–103	2	1.0	
104–144	1	0.5	
Very low-density lipoproteins			
<6	50	25.0	
6 15	78	39.0	
16–25	47	23.5	13.8 ± 8.6
26–35	14	7.0	
36–45	5	2.5	
46–55	6	3.0	

s = standard deviation

Table 4 Haemoglobin, haematocrit and mean corpuscular volume and feeding practices among children < 2 years in Benghazi, 1992

	Haemoglobin (g/dL)				Haematocrit values (%)				Mean corpuscular volume (fL)			
	Standard values	Breast-fed	Bottle-fed	Mixed	Standard values	Breast-fed	Bottle-fed	Mixed	Standard values	Breast-fed	Bottle-fed	Mixed
Mean	12	11	11	36	34	33.5	35	84	81	81	80	
Range	9.5–14.5	9.5–14.5	8.5–14.5	9.5–14.5	31–42	38–52	38–52	70–98	70–98	77–91	77–91	77–91
Within normal range No. (%)		25 (93)	39 (100)	124 (92.5)		6 (22)	4 (10)	22 (16.5)		8 (30)	28 (72)	80 (60)
Above the normal range No. (%)		0	0	2 (1.5)		0	0	0		5 (18)	3 (8)	7 (5)
Below the normal range No. (%)		2 (7)	0	8 (6)		21 (78)	35 (90)	112 (83.5)		14 (52)	8 (20)	47 (35)

72 fL to 101 fL with a mean of 80.3 with ± 6.6 fL (Table 2).

Serum cholesterol ranged from < 69 mg/dL to > 334 mg/dL with a mean of 161.8 ± 71 mg/dL (Table 3). Triglyceride values ranged from < 10 mg/dL to > 250 mg/dL with a mean of 70 ± 52 mg/dL (Table 3). When compared with reference values

Table 5 Serum cholesterol and triglyceride values and feeding practices among Libyan children (< 2 years) in Benghazi, 1992

	Serum cholesterol (mg/dL)				Serum triglycerides (mg/dL)			
	Standard values	Breastfed	Bottle-fed	Mixed	Standard values	Breastfed	Bottle-fed	Mixed
Mean (mg/dL)	200	143.6	164.6	160		66	79	63
Range (mg/dL)	107–320	69–174	69–174	69–174		10–69	10–69	10–69
Within normal range No. (%)		13 (48)	17 (44)	68 (51)		19 (70)	17 (43.5)	79 (59)
Above the normal range No. (%)		13 (48)	17 (44)	53 (39)		7 (26)	21 (54)	46 (34)
Below the normal range No. (%)		1 (4)	5 (12)	13 (10)		1 (4)	1 (2.5)	9 (7)

Table 6 High-density, low-density and very low-density lipoprotein values and feeding practices among Libyan babies (< 2 years) in Benghazi, 1992

	High-density lipoproteins (mg/dL)				Low-density lipoproteins (mg/dL)				Very low-density lipoproteins (mg/dL)			
	Standard values	Breast-fed	Bottle-fed	Mixed	Standard values	Breast-fed	Bottle-fed	Mixed	Standard values	Breast-fed	Bottle-fed	Mixed
Mean	–	21	78	25	36	117	117	123		13	19.5	13
Range	37–73	37–73	37–73	37–73	66–145	66–145	66–145	66–145	6–15	6–15	6–15	6–15
Within normal range No. (%)		3 (11)	7 (19)	28 (21)		13 (48)	17 (44)	54 (40.5)		16 (59)	15 (38)	47 (35)
Above the normal range No. (%)		1 (4)	1 (2.5)	2 (1.5)		8 (30)	13 (33)	49 (36.5)		6 (22)	21 (54)	45 (33.5)
Below the normal range No. (%)		23 (85)	31 (79.5)	104 (77.5)		6 (22)	9 (23)	31 (23)		5 (19)	3 (8)	42 (31.5)

elsewhere, 87% of babies had triglyceride levels within the normal range (80 mg/dl to 180 mg/dl) and 13% had lower values.

The level of high-density lipoproteins varied from < 4 mg/dL to > 104 mg/dL with a mean of 31.6 ± 17 mg/dL (Table 3). The level of low-density lipoproteins ranged from < 6 mg/dL to > 46 mg/dL with a mean of 13.8 ± 8.6 mg/dL (Table 3).

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