

Linear Growth of infants with neonatal and early infantile meningitis

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Background

Meningitis frequently occurs in neonates and can lead to a number of acute, severe complications and long-term disabilities.

Although, long term growth delay and abnormal weight gain appear to be risk factors following an acute attack of both bacterial and aseptic meningitis in children, especially during the fast phase of infantile growth, the long-term effects of acute meningitis occurring during the neonatal and early infantile periods on linear growth (length, weight and head growth) have not fully reported.

The objective of this study is to describe the clinical presentation of neonates and young infants with acute meningitis with different etiologies and to determine the clinical impact of the effect of acute meningitis on growth parameters.

Patients and Methods

We analyzed the clinical data and the growth parameters of 50 newborns and young infants (age: 1.6 ± 0.9 months) admitted to our hospital (Al Wakhra Hospital, Department of Pediatrics, Doha, Qatar), between 1-1-2016 to 1-1-2017, with acute meningitis.

Anthropometric measurements included weight, length, and head circumference. Length SDS (L-SDS) and body-mass-index (BMI) were calculated and recorded at every clinic visit, every 3 months for 8 ± 2 months.

Results

In this age group of neonates and young infants with acute meningitis fever (84%) and hypoactivity (64%) were the major presenting manifestations.

Acute bacterial meningitis (n: 10) was associated with: higher morbidity [shock (n: 1), subdural empyema (n: 1) and hydrocephalus (n: 1)]. Cerebrospinal fluid (CSF) examinations showed that infants with bacterial meningitis had significantly higher pleiocytosis of mainly polymorphic leukocytes and protein levels, compared to those with aseptic meningitis.

Diagnosis	CSF WBC /mm ³	CSF lymphocytes %	CSF Neutrophils %	CSF protein mg/dl	CSF glucose mmol/l	WBC ANC /mm ³	Antibiotic duration days
Aseptic	581	26	33.8	82	3.56	4.98	6.27
n = 40	732	22.5	27.5	35	1.1	3.08	3.88
Bacterial	873	15.6	67.9*	136*	3.2	4.87	18.25*
n = 10	893	20.4	29.6	54	0.8	3.72	5.91

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I declare that I have no potential conflict of interest.

All had normal length standard deviation scores (LSDS) (-0.2 ± 0.9) and none of them had LSDS < -2 . All infants had a normal BMI (16.7 ± 1.8 kg/m²).

Head circumference growth was normal in 49/50 infants (43.8 ± 1.8 cm) at 8 ± 2 months.

One infant developed hydrocephalus after group B streptococcus (GBS) meningitis.

There was no statistical difference in linear growth between infants with aseptic and bacterial meningitis

Symptoms/signs	Number (50)	%
Fever	42	84%
Hypothermia	4	8%
Hypo-activity	32	64%
Poor feeding	10	20%
Irritability	10	20%
Disturbed consciousness	4	8%
Shock	1	2%
Seizure	2	4%
Hyponatremia (Na < 135)	10	20%
Hypernatremia (Na > 149)	0	0%
SIADH	1	2%
High CSF protein > 1.4 g/dl	5	10%
CSF Neutrophil/Total Cell count > 60%	11	22%

Diagnosis	AGE 1	Wt SDS 1	BM I1	L SDS 1	HC 1	AGE 2	Wt SDS 2	BMI 2	HC 2	AGE 3	LSDS 2	BMI 3	GV 3	HC 3
	mon			cm	cm	mon				mon			cm/y	cm
Aseptic	1.49	-0.50	15.5	-0.50	36.5	4.88	0.29	17.38	41.5	8.27	-0.04	16.98	25.5	43.6
n = 40	0.87	1.07	1.88	1.07	2.94	1.68	1.08	2.04	2.03	2.86	0.93	2.36	3.89	1.72
Bacterial	1.18	-0.66	14.4	-0.66	36.0	3.94	-0.62	16.1	40.6	8.88	-0.70	16.4	24.7	43.2
n = 10	0.66	1.39	1.28	1.39	1.92	1.01	2.70	2.16	1.92	2.76	0.93	1.20	1.89	1.25
Controls	1.25	-0.25	14.6	-0.12	36.8	4.50	0.19	16.5	41.2	8.90	-0.20	17.1	25.7	44.2
n=50	0.52	0.50	1.20	0.50	1.00	0.70	0.70	1.50	1.20	1.50	0.40	1.80	2.30	1.10

All infants showed normal linear growth and weight gain during the follow-up period (1 year).

The annualized growth rate of infants was 25.3 ± 3.5 cm per year.

Interpretation and Conclusion

Infantile linear growth appears to be normal in all newborns and young infants with both bacterial and aseptic meningitis. However, acute bacterial meningitis in newborns and young infants is still associated with considerably high morbidity and complications.

