RESULTS

A total of 259 child (156 males and 103 females) ranging from six months to ten years of age with jaundice were enrolled in this study extending from June to November 1990. A total of 44 samples were taken as control (14 from children with fever and respiratory disease NO jaundice and 31 from apparently healthy children from brothers and sisters of jaundiced patients who were enrolled in this study). They were of the same age group. The acute and control male/female ratio according to age is shown in table 10 and graph 1.

The acute cases were followed-up. There were 19 patients with three follow-ups, 14 with two follow-ups and 25 single follow-up.

There was no relation between type of hepatitis and water supply or sewage disposal. Several cases had past history of jaundice six months to one year before and were admitted to fever hospital. None had a history of blood transfusion. Several had history of vaccination with a previously used syringe in health care unit.

Table 10

Study subjects according to age and sex

Age*	Male	Female	Total
1	12	7	19
2	36	14	50
3	32	12	44
4	24	24	48
5	16	12	28
6	15	11	26
7	8	9	17
8	14	8	22
9	7	13	20
10	13	16	29
Total	177	126	303

* Age in years

Acute Cases and Follow-up Results

1-Hepatitis A virus:-

Among the 259 children ,247 (95.4 %) were positive for total-HAV antibodies (IgG and IgM); 86 (33.2 %) were positive for IgM-HAV antibodies. The prevalence of IgM-HAV antibodies according to age and sex is presented in table 11 and graph 2. Antibodies were present at one year of age and the prevalence increased markedly to reach maximum of 29.1 % among the two years of age patients. The prevalence of antibody declined thereafter until all patients were negative by age 10. This indicated that most children were infected with HAV at an early age.

Twelve were retested at 2 ,4 and 6 months. At the first follow-up, 5 samples were positive for IgM-HAV antibody and 7 were negative. At 4 and 6 months all samples were negative for IgM-HAV antibody. Eight patients were followed-up at 2 and 4 months. In the first follow-up (2 month), 3 patients had IgM-HAV antibody, while 5 were negative. Fourtine patients were followed-up once at 2 month. Six patients had IgM-HAV antibody and 8 were negative. All the follow-up samples were positive for IgG-HAV antibody (Table 12).

Table 11

Prevalence of IgM-HAV antibodies
according to age and sex

Age (years)	Male	Female	Total/86 (%)
1	2	5	7 (8.1)
2	**15**	**10**	**25 (29.1)**
3	15	3	18 (20.9)
4	8	7	15 (17.4)
5	3	6	9 (10.5)
6	5	2	7 (8.1)
7	1	0	1 (1.2)
8	3	0	3 (3.5)
9	0	1	1 (1.2)
10	0	0	0
Total	52	34	86

Table 12
HAV
Follow-up Results

anti-HAV	Acute	2 mon	4 mon	6 mon
3 follow-up				
IgM	12	5	0	0
IgG	12	12	12	12
2 follow-up				
IgM	8	3	0	
IgG	8	8	8	
1 follow-up				
IgM	14	6		
IgG	14	14		

2-Hepatitis B virus

A total of 51 patients (19.7 %) were positive for HBV antigen /antibodies. The different hepatitis markers tested and number of positives are shown in table 13. The distribution of HBV infection according to age and sex is presented in table 14 and graph 3. One patient died 3 days after the sample was taken from fulminant hepatitis (male , 18 months old).

Data indicated that HBV infection occured as early as one year of age, then increased slightly by age 2 and 3 and remained at approximately the same level till age 8 and then increased to 17.6% at 10 years of age. Also, by the age of ten, three male chidren were immune to HBV i.e., had antibodies to HBs and HBc.

Eight patients were followed-up. All the samples were tested for all HBV markers. The results were presented according to the different hepatitis markers.

a: HBsAg

The results for HBsAg are shown in table 15. There were 4 Patients still positive in the first follow-up sample. In the 4 month follow-up , only two patients were positive and one sample in the 6 month follow-up. There were two interesting cases. The first was negative for HBsAg, positive for anti-HBs only in the acute sample. The follow-up samples were negative for HBsAg untill the 6 month follow-up which showed sero-conversion. In the second case HBsAg was demonstrated in the acute sample, negative at 2 month follow-up, positive at 4 month and again negative at the 6 month follow-up.

b: HBs antibody

All the patients were negative for HBs antibody except one in the acute sample. In the 2 month follow-up all samples were negative. At 4 month, HBsAb began to appear. One of the two intesting cases mentioned before had no HBsAb till the 6 month follow-up although HBsAg was positive and in the other case antibody was present at the 4 and 6 month follow-up. The results are shown in table 16.

c:HBcAb

All subjects were negative for IgM-HBc antibody in the three follow-up samples.

d:HBeAg

Three of the subjects followed-up were positive for HBeAg in the acute stage. One subject was positive at the three follow-up samples. One subject was positive at the first follow-up sample only while the other was negative in the first follow-up.

e:HBeAb

All patients were negative at the three follow-up samples although two were positive in the acute stage.

Follow-up results are shown in table 17 according to the number of follow-up samples.

Table 13
Hepatitis markers positives

Hepatitis marker	#POS	%
HBsAg	51	19.7
HBsAb	5	1.9
HBcAb-total	37	14.3
IgM	18	6.9
HBeAg	12	4.6
HBeAb	16	6.2

Table 14
Distribution of HBV infection
according to age and sex

Age(years)	Male	Female	Total	(%)
1	1	0	1	(2)
2	4	0	4	(7.8)
3	5	1	6	(11.8)
4	2	2	4	(7.8)
5	1	4	5	(9.8)
6	3	4	7	(13.7)
7	1	2	3	(5.9)
8	4	2	6	(11.8)
9	5	1	6	(11.8)
10	5	4	9	(17.6)
Total	31	20	51	

Table 15
HBsAg follow-up results

Acute	2 month	4 month	6 month
POS	POS	POS	
NEG*	**NEG**	**NEG**	**POS**
POS	POS	NEG	
POS	POS	NEG	
POS	POS	NEG	NEG
POS	NEG		
POS	**NEG**	**POS**	**NEG**
POS	NEG		

* HBsAb was positive in the acute sample.

Table 16
HBsAb follow-up results

Acute	2 mon	4 mon	6 mon
NEG	NEG	NEG	
POS	**NEG**	**NEG**	**NEG**
NEG	NEG	NEG	
NEG	NEG	POS	
NEG	NEG	NEG	NEG
NEG	NEG		
NEG	**NEG**	**POS**	**POS**
NEG	NEG		

Table 17
HBV
Follow-up Results

Hepatitis marker	Acute	2 mon	4 mon	6 mon
3 follow-ups				
HBsAg	3	1	1	1
HBsAb	1	0	0	0
HBcAb(IgM)	3	0	0	0
HBeAg	3	2	1	1
HBeAb	2	0	0	0
2 follow-ups				
HBsAg	3	3	1	
HBsAb	0	1	1	
HBcAb(IgM)	3	0	0	
HBeAg	0	0	0	
HBeAb	0	0	0	
1 follow-up				
HBsAg	2	0		
HBsAb	0	0		
HBcAb(IgM)	0	0		
HBeAg	0	0		
HBeAb	0	0		

3-Hepatitis A and B

A total of 31 (12 %) patients were positive for IgM-HAV antibodies as well as HBsAg alone or with IgM-HBc antibodies, HBeAg or/and HBeAb. Two of these patients were also positive for HDV. The distribution of HAV and HBV infection according to age and sex are presented in table 18 and graph 4. Table 19 shows the hepatitis positive markers and total positives. Data indicated that combined infection were present as early as one year and reached a peak at two years. Combined infection declined slowly till the age of five, and then rapidly to zero by ten years of age. One patient was followed-up for 6 months, one for 4 months and 4 for 2 months only. All the samples were positive for total HAV antibody. One sample with a single follow-up had IgM-HAV antibody. All samples were negative for HBsAg, one sample was positive for HBsAb (6 month follow-up).

Table 18

Distribution of HAV and HBV infection according to age and sex

Age (years)	Male	Female	Total	(%)
1	2	1	3	(9.7)
2	7	2	9	(29)
3	2	2	4	(12.9)
4	3	3	6	(19.4)
5	3	1	4	(12.9)
6	0	1	1	(3.2)
7	1	1	2	(6.5)
8	1	0	1	(3.2)
9	0	1	1	(3.2)
10	0	0	0	
Total	19	12	31	

Table 19

Hepatitis POS markers

Hepatitis marker	#POS	%
IgM-HAV antibody	31	12
HBsAg	21	8.1
HBsAb	3	1.2
HBcAb -total	13	5
-IgM	2	0.8
HBeAg	5	1.9
HBeAb	3	1.2
HDV	2	0.8

4-HDV

Three patients were positive for HDV antibody as well as HBsAg. One of the patients was positive for HBeAg and two were positive for IgM-HAV antibody.

5-HCV

One patient was positive for HCV by EIA method and RIBA supplementary test. The sample was from a boy 10 years old.

6- Negative samples

Eighty-six patients were negative for HAV, HBV, HCV and CMV. These study patients are presented according to age and sex in table 20 and graph 5. Fourteen had antibodies for HBc. Study patients negative for HAV, HBV and HCV with HBc-IgG antibody only are presented according to age and sex are in table 21.

The highest number of patients negative for to HAV, HBV and HCV were the three and four year old groups and declined afterwards and then increased again at the age ten.

Table 20

Study patients negative to HAV, HBV and HCV according to age and sex

Age(years)	Male	Female	Total(%)
1	3	1	4 (4.7)
2	8	1	9 (10.5)
3	9	4	13 (15.1)
4	7	7	14 (16.3)
5	7	2	9 (10.5)
6	3	2	5 (5.8)
7	2	4	6 (7)
8	2	4	6 (7)
9	0	7	7 (8.1)
10	4	9	13 (15.1)
Total	45	41	86

Table 21
Study patients negative to HAV, HBV and HCV with HBc antibody according to age and sex distribution

Age (years)	Male	Female	Total
1	0	0	0
2	0	0	0
3	1	2	3
4	1	2	3
5	0	0	0
6	1	0	1
7	0	1	1
8	0	0	0
9	0	3	3
10	1	2	3
Total	4	10	14

The prevalence of HBc antibody was higher among ages three, four, nine and ten for females (table 21). Three patients were followed-up for 6 months, 2 for 4 months and 5 for 2 month. All the samples were negative for HCV antibody.

6-CMV

The 86 negative patients for HAV, HBV and HCV were tested for CMV antibodies, both total and IgM. Seventy-five (88 %) were positive for total CMV antibodies but only one (1.2%) was positive for IgM-CMV antibodies (graph 6).

The results for patients with IgG-HAV antibody and different types of hepatitis are summarized according to sex in table 22. Data showed that 86 patients had HAV infection besides having IgG-HAV antibody. Seventy-four of the patients negative for HAV, HBV and HCV had past infection with HAV.

Table 22
Sex distribution of study patients
with IgG-HAV antibody
according to type of hepatitis

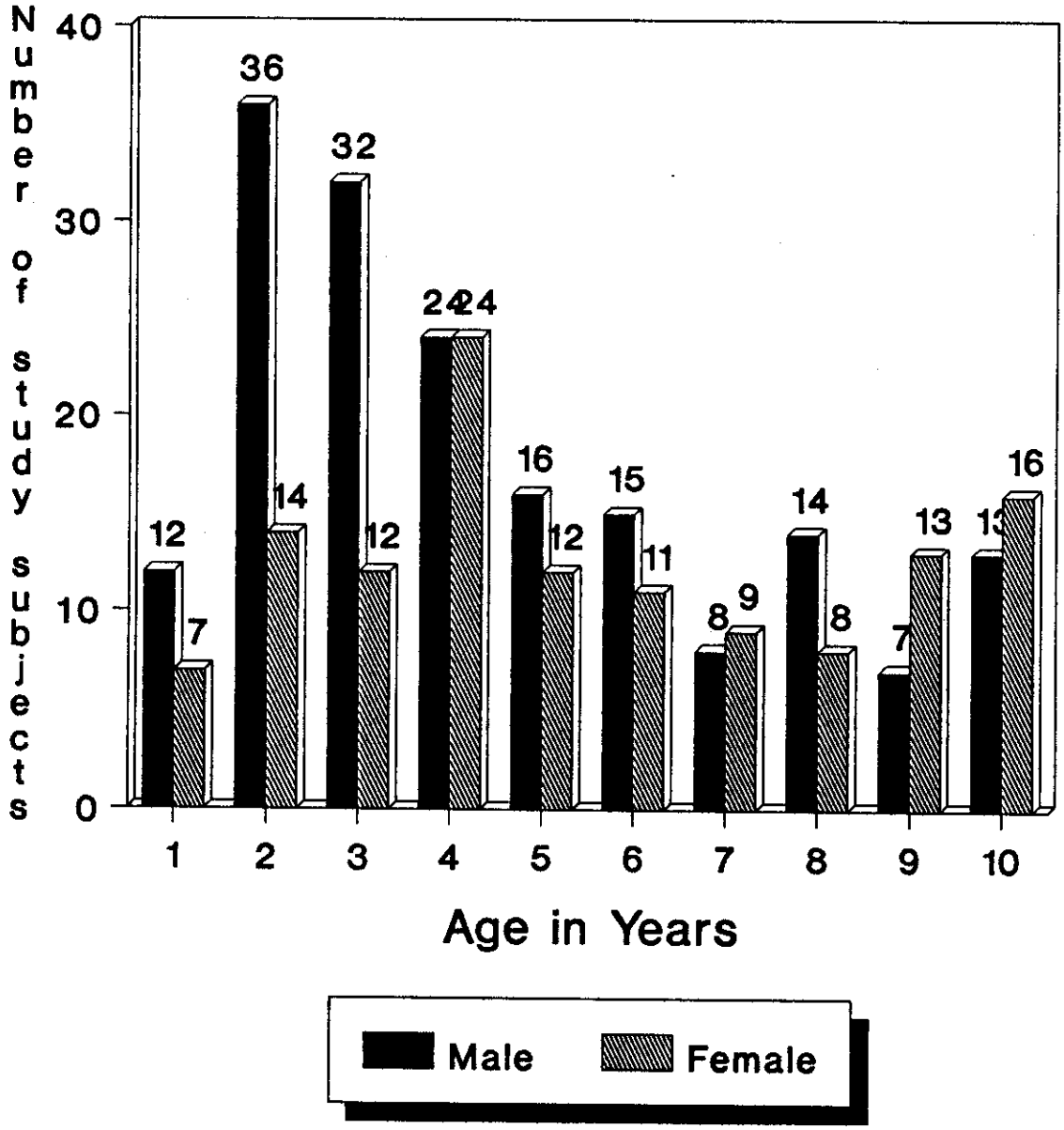
Type of hepatitis	Male	Female	Total
HAV	54	32	86
HBV	32	21	51
HAV & HBV	19	12	31
Neg HAV,HBV & HCV	37	37	74
HBV immune	3	0	3

Summary of the etiology of acute hepatitis among the study patients (Table 23, graph 9):

Table 23
Distribution of hepatitis viral markers among 259 jaundiced children, Cairo, Egypt

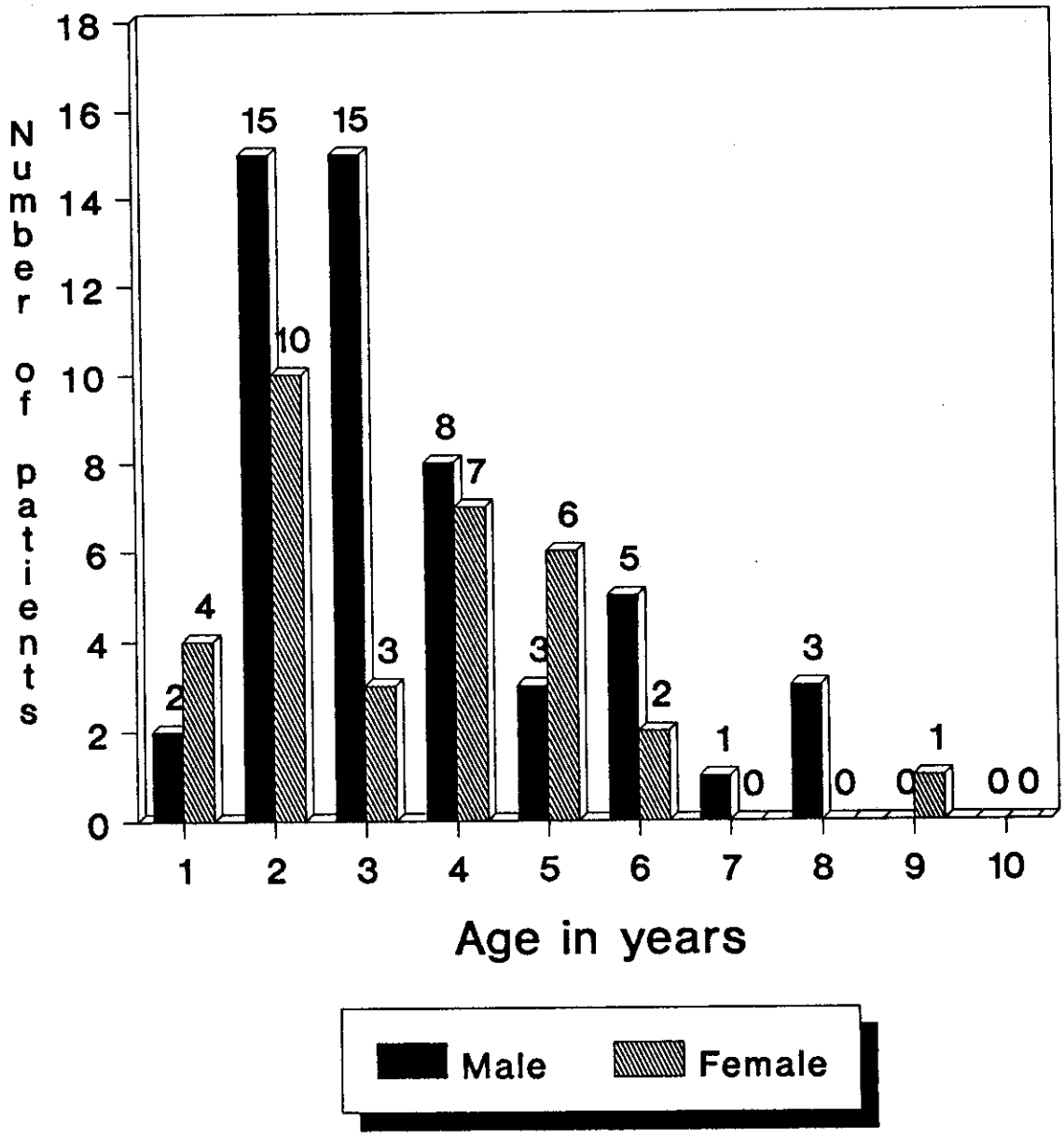
	#POS	%
Total-HAV antibody	247	95
IgM-HAV antibody	86	33.2
HBV	53	19.7
HDV	3	1.2
HBV-immune	3	1.2
HAV & HBV	31	12
HCV	1	0.4
Neg for HAV, HBV &HCV	86	33.2
CMV	1	0.4

Study subjects
According to age and sex



Graph 1

IgM-HAV antibody
Age and sex distribution



Graph 2

HBV Infection
Age and Sex Distribution

Graph 3

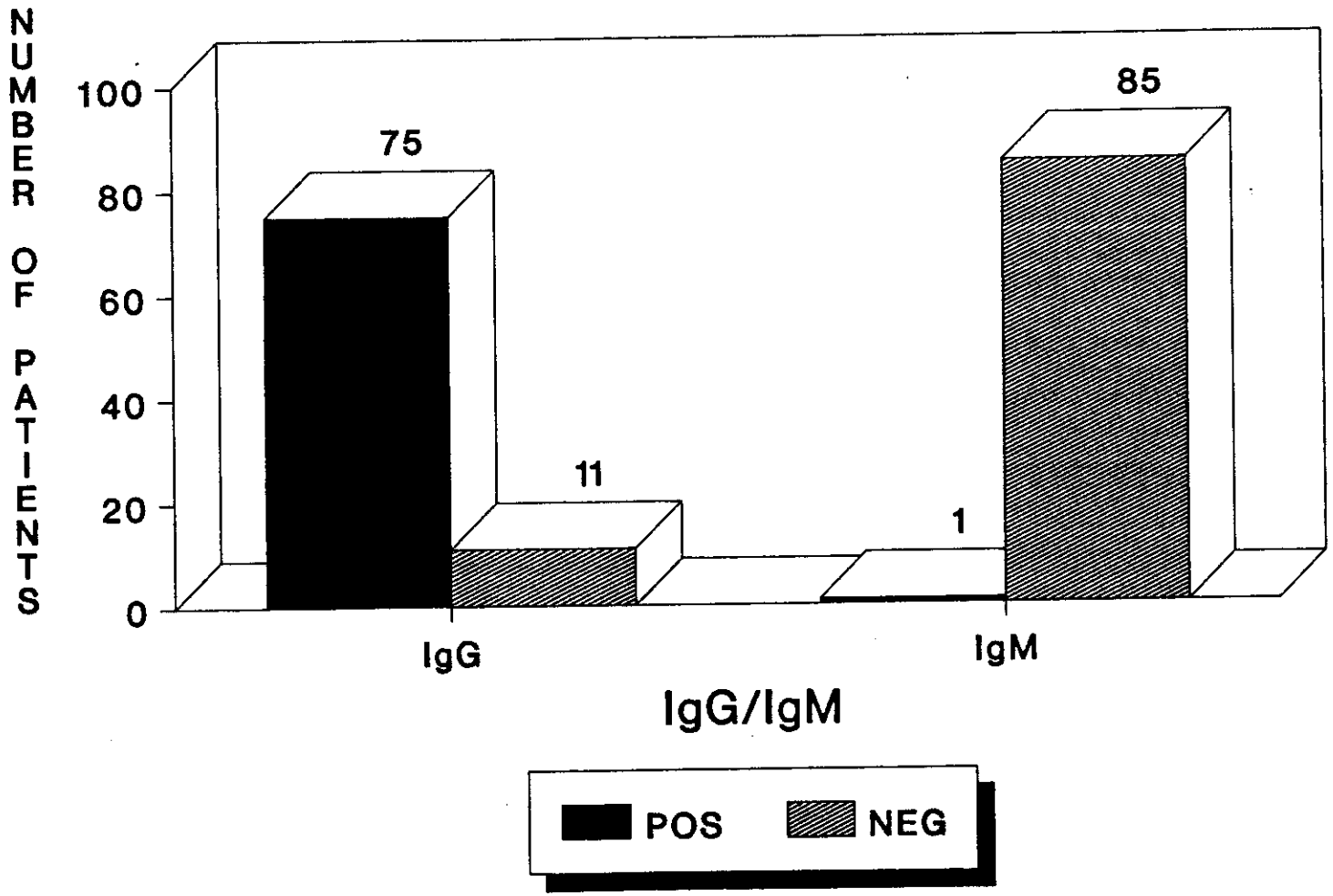
HAV and HBV Infection
Age and Sex Distribution

Graph 4

Neg HAV, HBV and HCV
Study Subjects According to Age & Sex

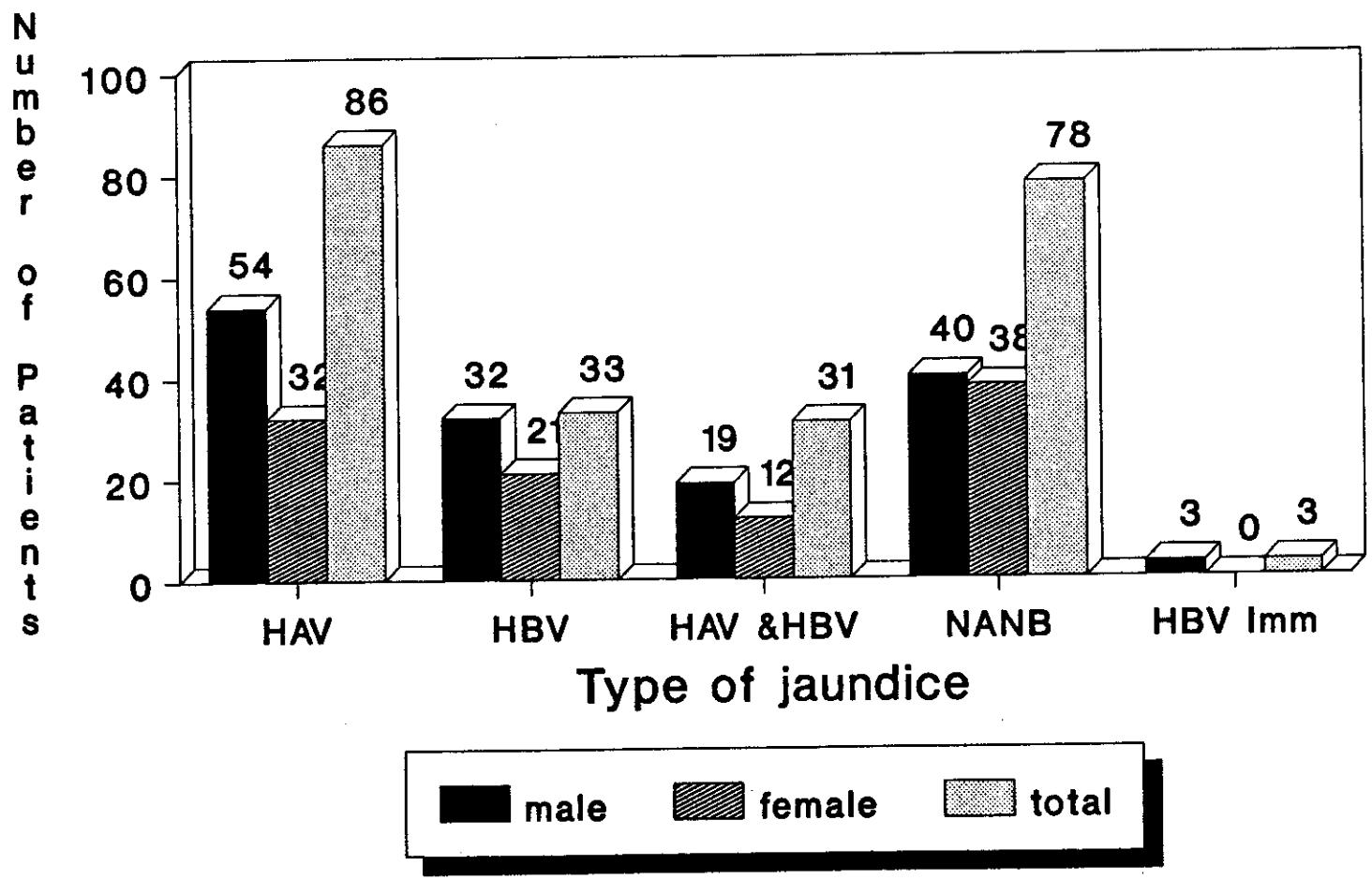
Graph 5

CMV Results



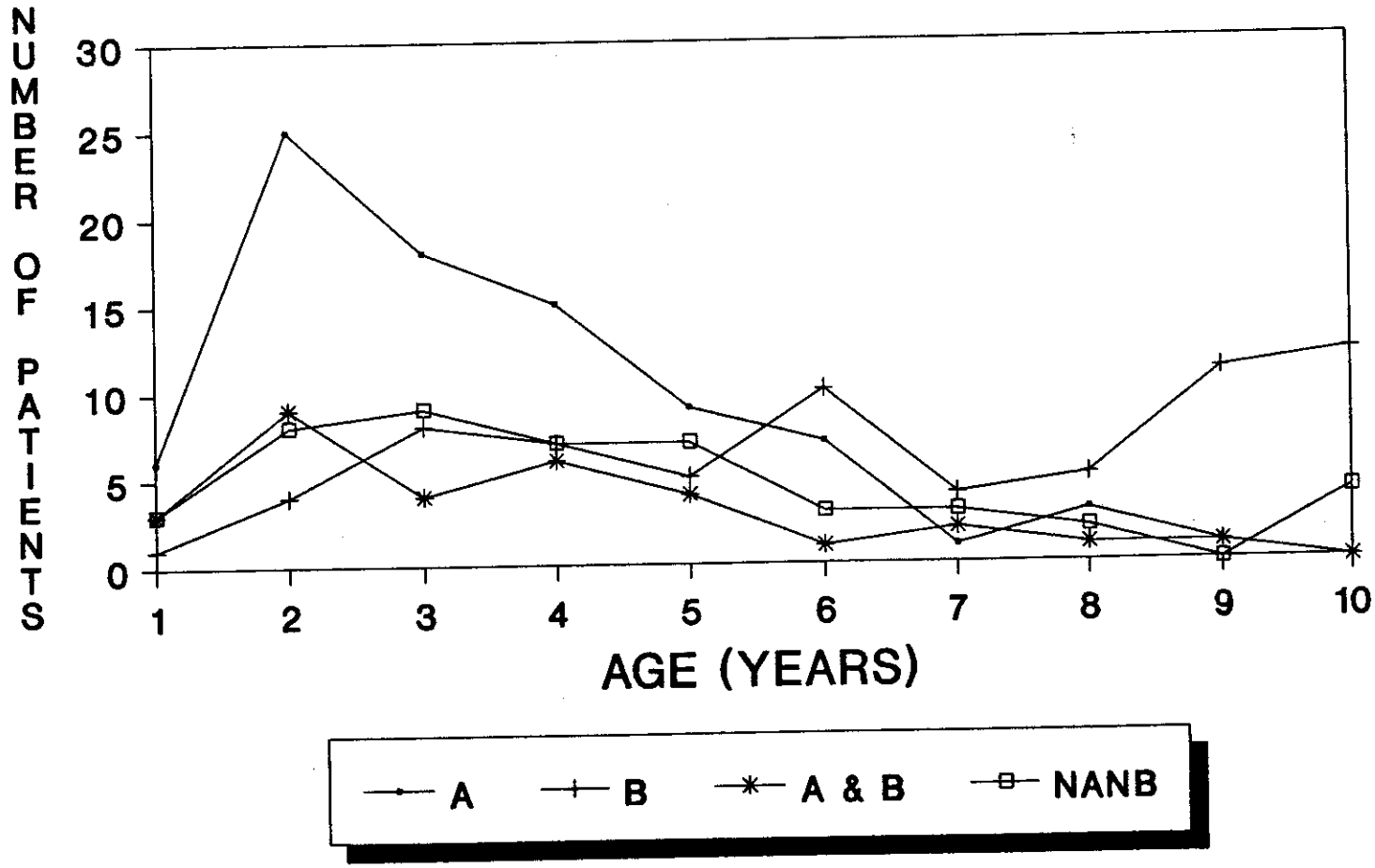
Grapg 6

Sex Distribution of HAV-IgG Antibody With Different Types of Hepatitis



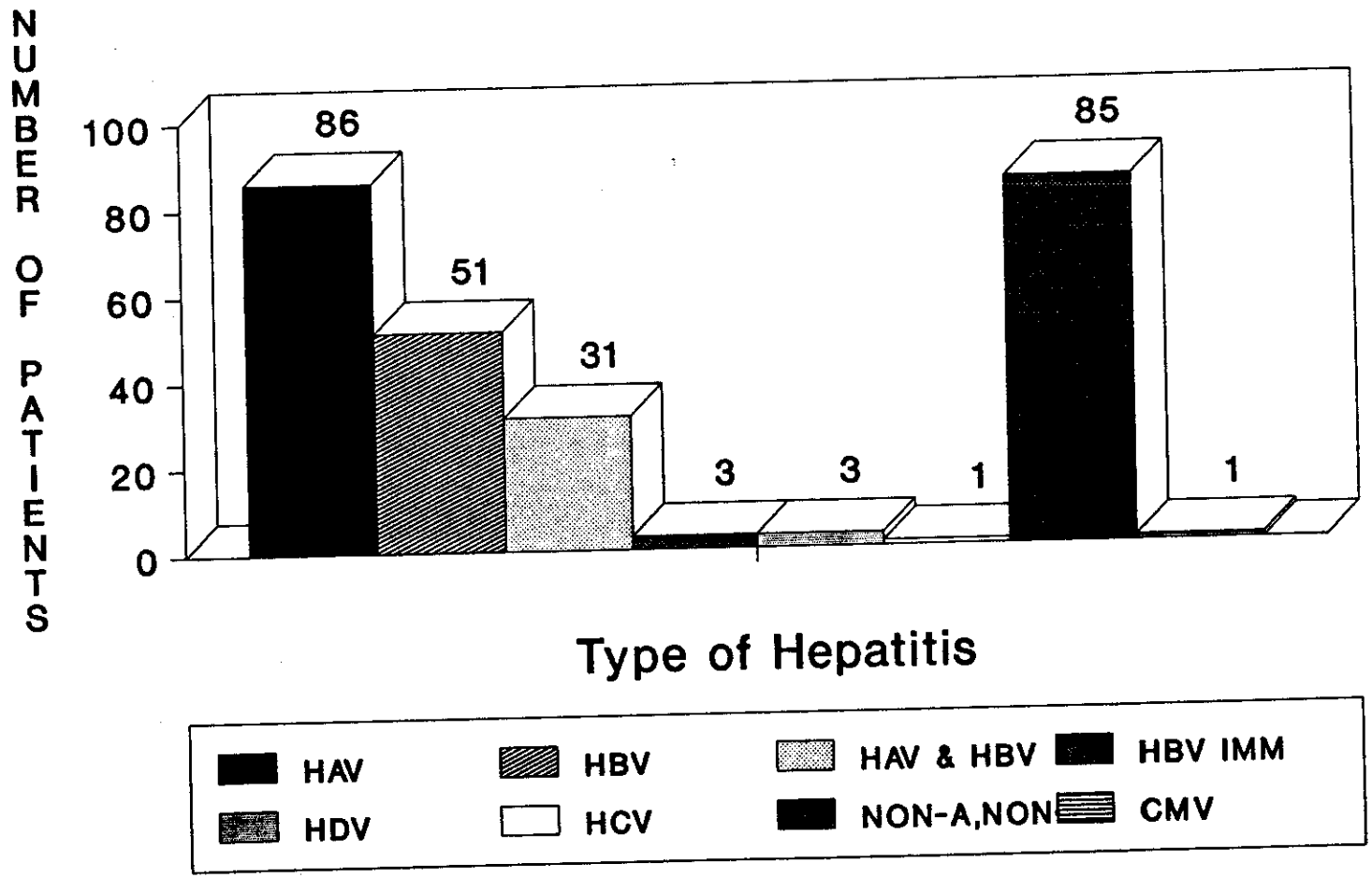
Graph 7

RATE OF HEPATITIS INFECTION
According to age



Graph 8

SUMMARY OF RESULTS
TOTAL POSITIVE



Graph 9

Control Results

The control subjects (total # 44) were divided into two groups according to disease and /or no disease. The first group included 13 subjects with acute respiratory disease (fever and no jaundice), and the second consisted of 31 subjects; brothers and sisters of jaundiced patients.

First Group

Nine subjects were positive for total-HAV antibody (69%) but only 4 were positive for IgM-HAV antibody (Table 24). One subject was HBV immune and two were positive for total HBc antibody.

Second Group

Thirty subjects were positive for total-HAV antibody (96.7%) and two were positive for IgM-HAV antibody. Four subjects were positive for HBV (three had a jaundiced brother or sister with HBV); two had HBeAg and two patients were HBV immune (Table 25).

Table 24
Prevalence of hepatitis viral antibody among
the first group of control subjects

Age	Sex	Hepatitis markers				
	Male/Female	T-HAVAB	M-HAVAB	HBsAg	HBsAb	HBcAB
11 MON	FEMALE	NEG	POS	NEG	NEG	NEG
6 MON	MALE	NEG	POS	NEG	NEG	NEG
9 MON	MALE	NEG	POS	NEG	NEG	NEG
12 MON	MALE	NEG	POS	NEG	NEG	NEG
6 MON	MALE	POS	NEG	NEG	POS	POS
5 YR	FEMALE	POS	NEG	NEG	NEG	POS*
7 MON	MALE	POS	NEG	NEG	NEG	POS*

* IgM-HBc antibody was negative

Table 25
Prevalence of hepatitis viral antibody among
the second group of control subjects

Age	Sex	Hepatitis Marker						
		T-HAVAB	M-HAVAB	HBs Ag	HBs Ab	HBcAb T[1]/IgM	HBe Ag	HBe Ab
6YR	MALE	POS	POS	NEG	NEG	NEG/NEG	NEG	NEG
4 YR	FEMALE	POS	POS	NEG	NEG	NEG/NEG	NEG	NEG
3[2]YR	MALE	POS	NEG	NEG	NEG	POS/NEG	POS	POS
6 YR	FEMALE	POS	NEG	NEG	POS	POS/NEG	POS	NEG
7 YR	MALE	POS	NEG	NEG	POS	POS/NEG	POS	NEG
10YR	FEMALE	POS	NEG	NEG	NEG	POS/NEG	NEG	NEG
10YR	MALE	POS	NEG	POS[3]	NEG	NEG/NEG	NEG	NEG
9 YR	FEMALE	POS	NEG	POS[3]	NEG	POS/NEG	NEG	NEG
10YR	FEMALE	POS	NEG	NEG	POS	POS/NEG	NEG	NEG

1- Total HBcAb
2 - Brother died with fulminant hepatitis (HBV).
3 - Subclinical infection

Table 26
Distribution of hepatitis viral markers
among 44 control children,
Cairo, Egypt

		#POS	%
Total-HAV antibody		39	88.6
IgM-HAV antibody		6	13.6
HBV	HBsAg	2	4.5
	HBcAb	8	6.8
	HBeAg	3	6.8
	HBeAb	1	2.3
	Immune	1	2.3