

# ***RESULTS***

## RESULTS

Sixty four cases presented with supraventricular tachyarrhythmias were studied. Fourty three cases presented with supraventricular tachycardia, eleven cases with atrial fibrillation, and ten cases with atrial flutter.

The results of the study are illustrated in tables (1-16) and charts (1-7).

### Supraventricular tachycardia (SVT):

Table (1) and Chart (1):

They show the significance of age at onset of SVT as regards the presence of predisposing factors, presence of congestive heart failure, response to treatment, and occurrence of single recurrence.

The patients ranged in age from 3 days to 16 years (three cases were younger than one month). SVT appeared at one year or earlier in 10 cases (23%) and after one year in 33 cases (77%).

Infants whose SVT began at one year age or less had statistically significant more presence of congestive heart failure ( $P < 0.01$ ).

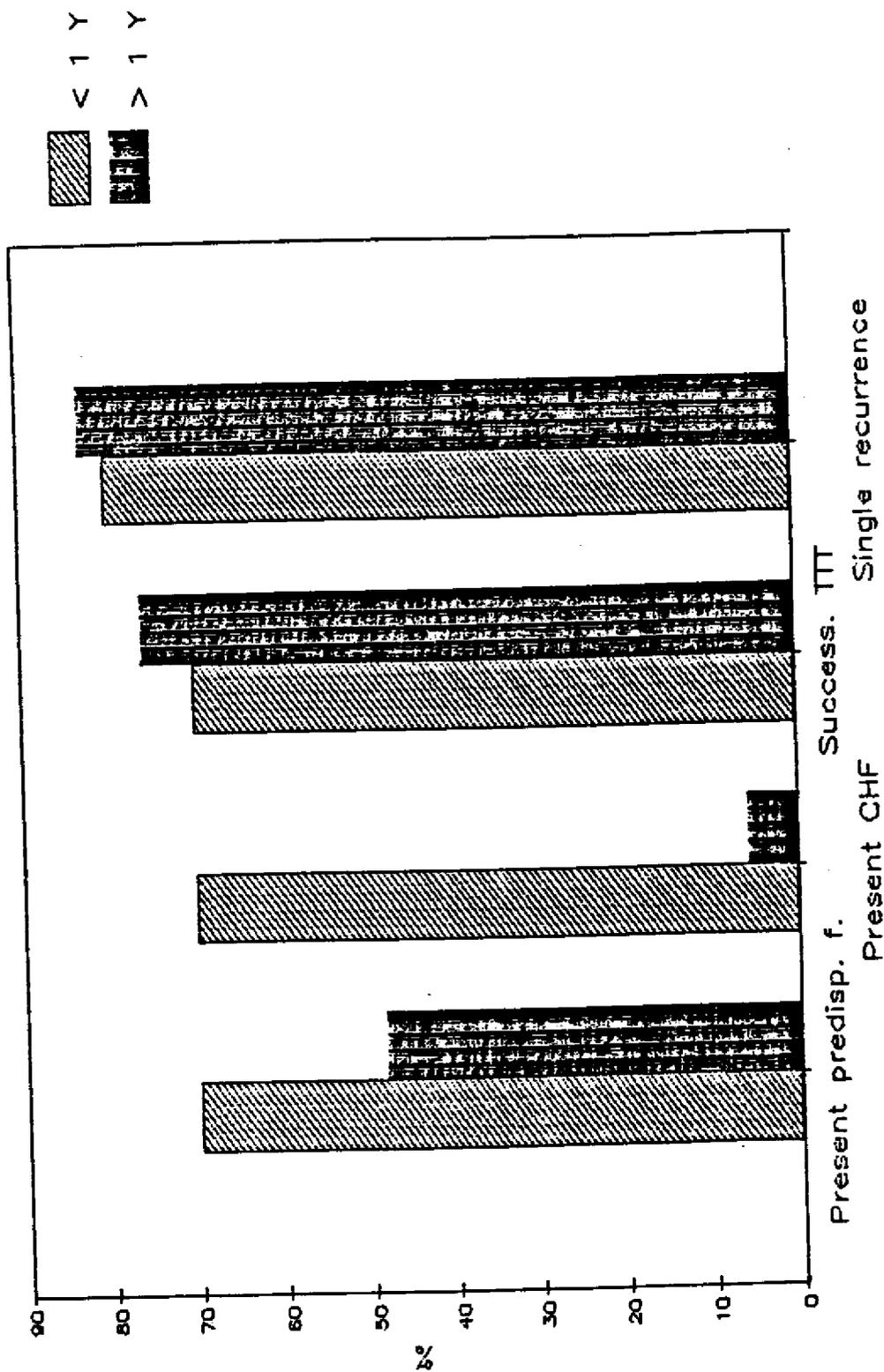
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**Table (1):** Relations between age at onset of SVT to the presence of predisposing factors, presence of CHF, response to treatment and recurrence.

Items of comparison	≤ 1 year		> 1 year		Chi-square	P
	No.	%	No.	%		
<b>Predisposing factor:</b>						
Present	7	70	16	48.5	0.69	> 0.05
Absent	3	30	17	51.5		
Total	10	100	33	100.0		
<b>Congestive heart failure:</b>						
Present	7	70	2	6	15.30	<0.001
Absent	3	30	31	94		
Total	10	100	33	100		
<b>Response to treatment:</b>						
Success	7	70	25	76	0.01	> 0.05
Failure	3	30	8	24		
Total	10	100	33	100		
<b>Single recurrence:</b>						
Recurred	8	80	24	83	0.08	> 0.05
Non recurred	2	20	5	17		
Total	10	100	29*	100		

\* 4 cases could not be followed.

CHART (1) EFFECTS OF AGE AT ONSET OF SVT



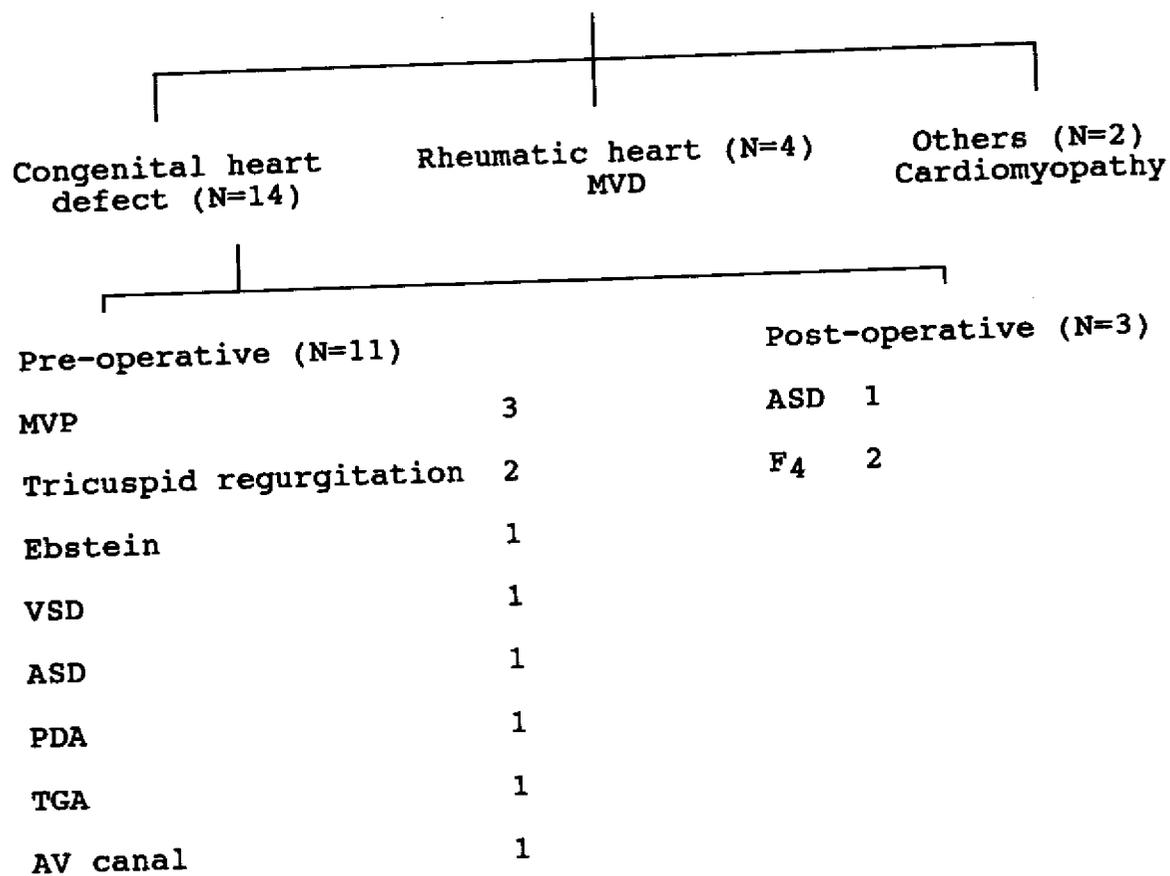
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**Table (2):** Relations between sex and presence of predisposing factors, response to treatment and recurrence.

Items of comparison	Male		Female		Chi-square	P
	No.	%	No.	%		
<b>Predisposing factor:</b>						
Present	12	52	11	55	0.03	> 0.05
Absent	11	48	9	45		
Total	23	100	20	100		
<b>Response to treatment:</b>						
Success	17	74	15	75	0.01	> 0.05
Fail	6	26	5	25		
Total	23	100	20	100		
<b>Single recurrence:</b>						
Recurred	16	80	16	84	0.01	> 0.05
Non recurred	4	20	3	16		
Total	20*	100	19*	100		

\* Three Males and one Female could not be followed.

Chart (2): Predisposing factors for SVT (N=20)



**Table (3):**

Symptomatic congestive heart failure occurred in 9 cases (21%). Table (3) and chart (3) show the effect of predisposing factors on the presence of congestive heart failure. There is no statistical significant relation ( $P > 0.05$ ).

Twenty five cases were with known family history. Positive family history of palpitations was found in 5 cases (20% of cases with known family history).

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**Table (3):** Effect of predisposing factors on the presence of congestive heart failure

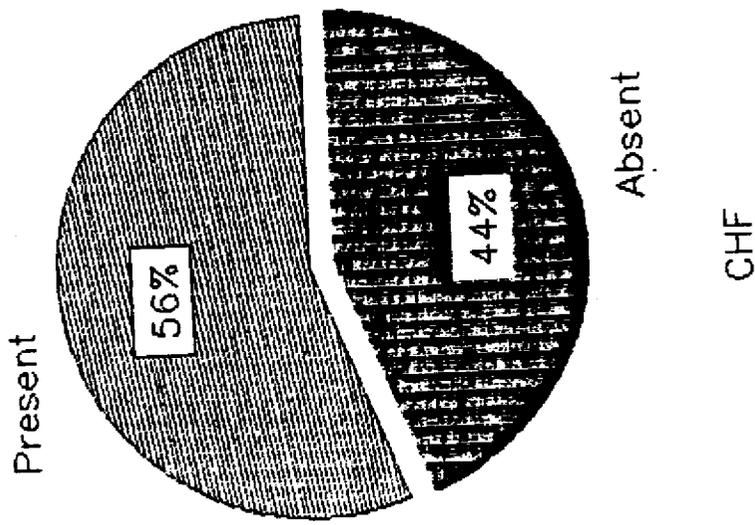
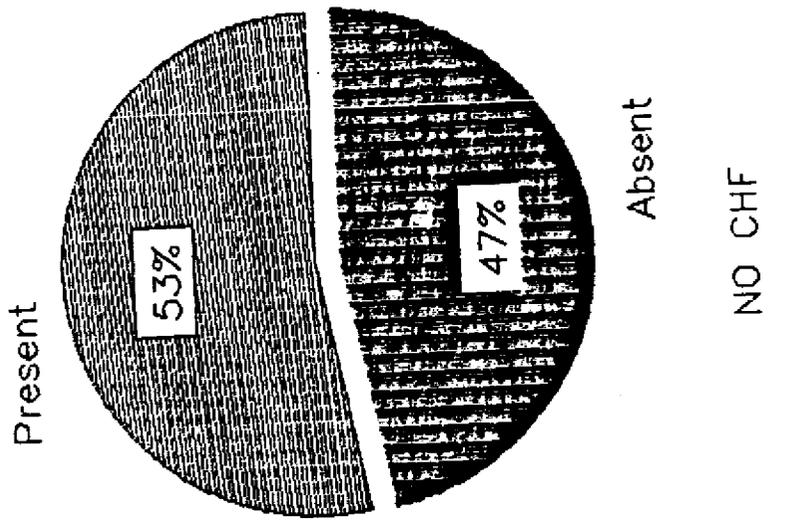
	Congestive heart failure		No congestive heart failure	
	No.	%	No.	%
Predisposing factor:				
Present	5	56	18	53
Absent	4	44	16	47
Total	9	100	34	100

Chi-square = 0.06

P > 0.05

CHART (3) EFFECT OF PREDISPOSING FACTORS ON THE PRESENCE OF CHF

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Tables (4 to 6) show ECG features of the studied cases.

**Table (4):**

It shows the mean and SD of heart rate of the studied cases in respect to age and presence of congestive heart failure. Mean heart rate during SVT was 239/minute with a range of 130 to 320. More rapid heart rates were found in younger infants and in those with congestive heart failure.

**Table (5):**

It shows P wave during SVT. P waves were visible on the surface ECG in 23 cases (53%). The most common P wave axis was 270 to 360 (12 cases). P wave axis 0° to 90° (high right atrium) was found in 10 cases. Undetermined P wave axis was found in one case.

Second degree AV block was found during the first episode of SVT in 3 cases (7%). In two patients the block was type I and in one patient the block was type II.

QRS complex during SVT had a normal duration and configuration in 40 cases (93%). In 3 patients (7%), the QRS duration was prolonged with right bundle branch block morphology. In one of the 3 patients, the morphology was identical to that recorded during normal sinus rhythm.

**Table (4):** Mean and SD of heart rate of the studied cases according to age and presence of CHF.

	Mean and SD of heart rate of the studied cases
<b>Age:</b>	
≤ 1 year	236.1 ± 61.2
> 1 year	208 ± 65
<b>Congestive heart failure:</b>	
Present	227.142 ± 66.15
Absent	203.31 ± 54.88

Table (5): P wave during SVT.

P wave	No.	%
P wave not visible	20	47
P wave axis undetermined	1	2
P wave visible axis 0° to 90° (high right atrium)	10	23
P wave visible axis 270° to 360° (low right atrium)	12	28
Total	43	100

**Table (6):**

WPW syndrome was found during sinus rhythm on surface ECG in 8 patients (19%). Table 6 shows the significance of presence of pre-excitation in prediction to age at onset of SVT and occurrence of single recurrence. There was no statistically significant difference ( $P > 0.05$ ).

Three cases were subjected to 24 hours-ECG monitoring by Holter technique. It confirmed the same diagnosis as the 12-lead ECG.

**Table (7) and Chart (4):**

They illustrate the response of SVT to different lines of initial therapy.

In 8 patients (19%), the SVT stopped spontaneously before any treatment was instituted. The other 35 patients received treatment. Treatment was successful (defined as cessation of SVT for at least one hour) in 24 patients (69%).

Intravenous digoxin (total digitalizing dose 0.04 to 0.05 mg/kg) was used in 9 cases (26%) and was successful in 6 cases (67%). Intravenous verapamil was used in 12 patients (34%) and was successful in 7 patients (58%). It was given in a dose of 0.075 mg/kg to 0.15 mg/kg slowly over a 2

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**Table (6):** Relation between pre-excitation and age at onset of SVT and recurrence

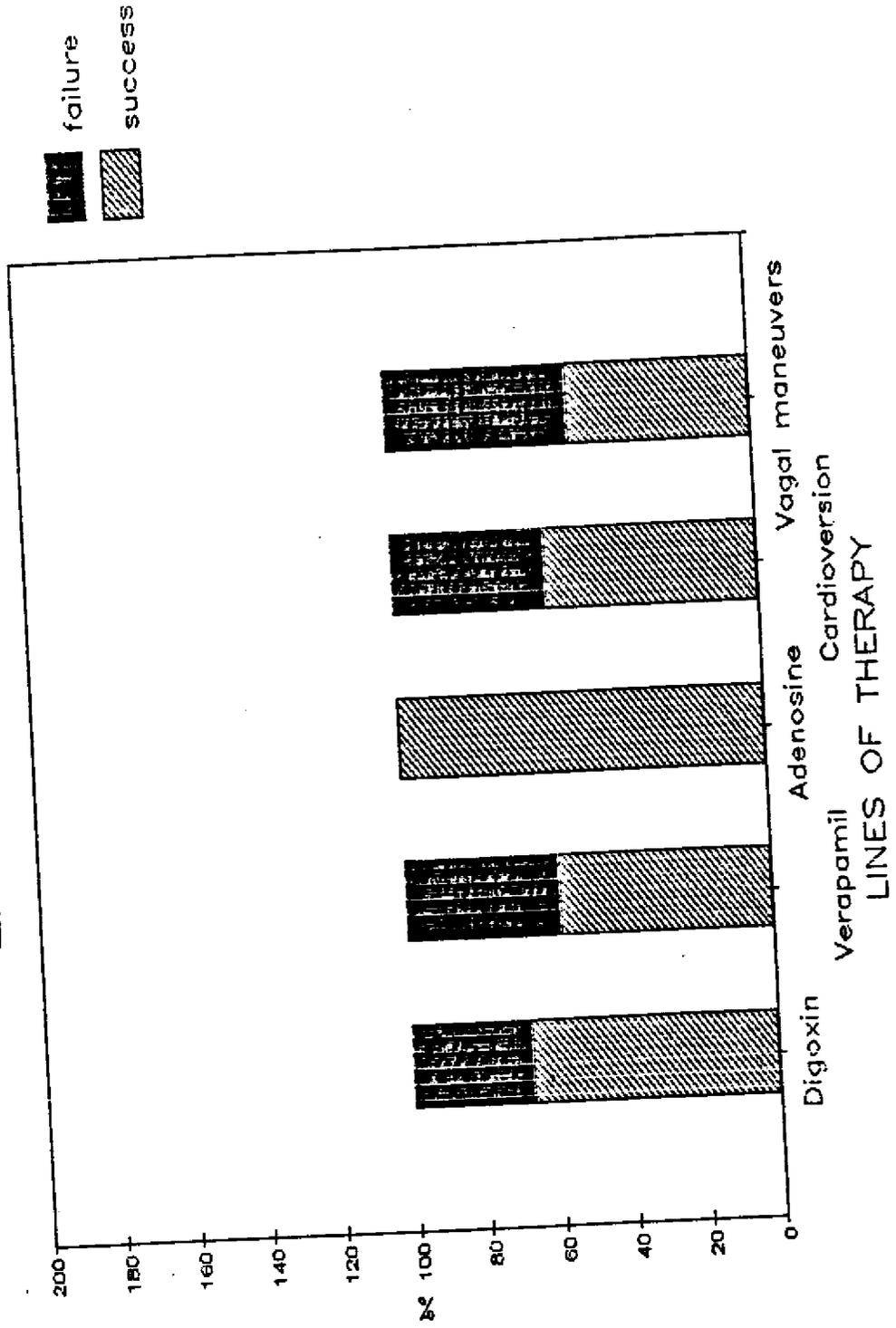
	WPW		No Pre-excitation		Chi-square	P
	No.	%	No.	%		
<b>Age at onset:</b>						
≤ 1 year	4	50.0	6	17	2.31	> 0.05
> 1 year	4	50.0	29	83		
Total	8	100.0	35	100		
<b>Single recurrence:</b>						
Recurred	5	62.5	27	77	0.17	> 0.05
Non recurred	3	37.5	8	23		
Total	8	100.0	35	100		

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Table (7): Response of SVT to different lines of therapy

Response	Digoxin		Verapamil		Adenosine		Cardioversion		Vagal maneuvers	
	No.	%	No.	%	No.	%	No.	%	No.	%
Success	6	67	7	58	2	100	7	58	2	50
Failure	3	33	5	42	-	0	5	42	2	50
Total	9	100	12	100	2	100	12	100	4	100

CHART (4) RESPONSE OF SVT TO DIFFERENT LINES OF THERAPY



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minutes period. A second injection was given in some cases 15 minutes later.

Adenosine was used in 2 cases (neonates) (6%) and was successful in both cases (100%). It was given in an initial dose of 30-40 mg/kg. This dose showed no response and a second injection of 60-80 mg/kg was administered.

Synchronized direct current electrical cardioversion was used in 12 cases (34%) and was successful in 7 cases (58%). The energy dose was (0.5 to 2.0 watt-second/kg).

Vagal maneuvers (carotid sinus massage) were used in 4 patients and were successful in 2 cases (50%).

### Table (8):

It shows the effect of age at onset of SVT, presence of congestive heart failure and presence of pre-excitation on the response of SVT to digoxin.

Digoxin was successful in 3 cases younger than one year and in three cases older than one year.

Of the 6 cases with successful digoxin therapy 3 were presenting with congestive heart failure and three without congestive heart failure.

Pre-excitation was found in 5 cases of those received successful digoxin therapy.

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Table (8): Effect of age at onset of SVT, presence of CHF, and presence of pre-excitation on response of SVT to digoxin therapy

	Success		Failure	
	No.	%	No.	%
Age at onset:				
≤ 1 year	3	50	1	33
> 1 year	3	50	2	67
Total	6	100	3	100
Congestive heart failure:				
Present	3	50	1	33
Absent	3	50	2	67
Total	6	100	3	100
Presence of pre-excitation:				
Present	5	83	-	0
Absent	1	17	3	100
Total	6	100	3	100

**Table (9):**

It shows the effect of age at onset of SVT and presence of congestive heart failure on the response of SVT to cardioversion. Cardioversion was successful in 3 patients less than one year and in 4 patients more than one year. It was successful in 3 cases with congestive heart failure and 4 cases without congestive heart failure.

**Table (10) and Chart (5):**

They show lines of therapy for long-term prophylaxis. After initial treatment, 32/43 cases (74%) were begun on long-term treatment. Digoxin was used alone in 10 cases (31%), propranolol was used alone in 9 cases (28%), combined therapy of both digoxin and propranolol was used in 13 cases (41%).

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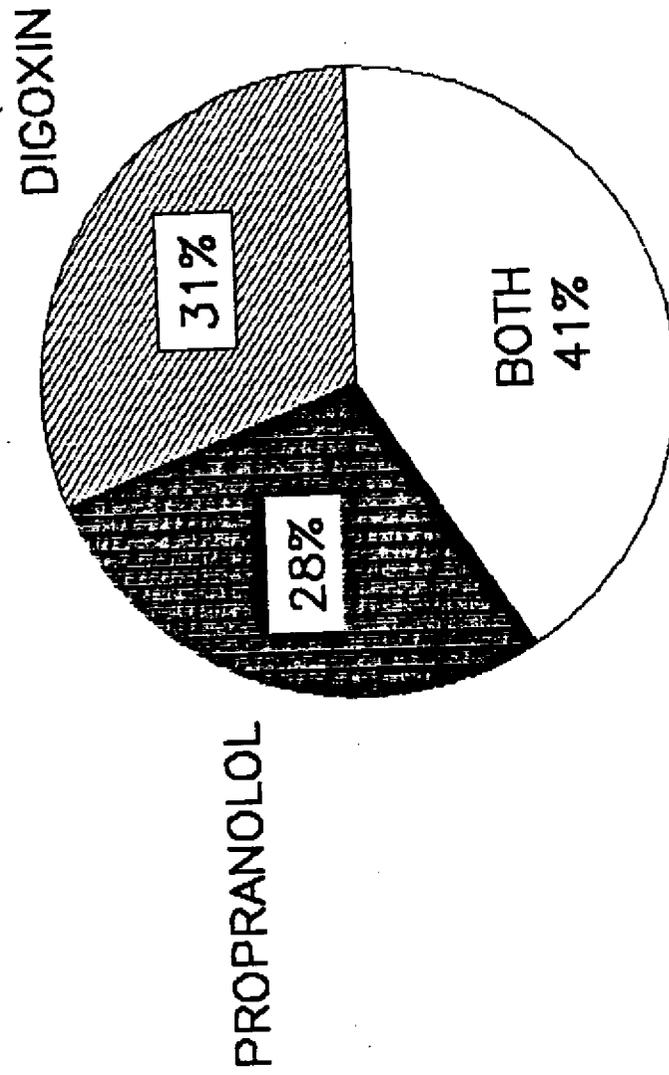
**Table (9):** Effect of age at onset of SVT and presence of CHF on response of SVT to cardioversion.

	Success		Failure	
	No.	%	No.	%
<b>Age at onset:</b>				
≤ 1 year	3	43	3	60
> 1 year	4	57	2	40
<b>Total</b>	7	100	5	100
<b>Congestive heart failure:</b>				
Present	3	43	3	60
Absent	4	57	2	40
<b>Total</b>	7	100	5	100

**Table (10):** Lines of therapy for long term prophylaxis.

Line of therapy	No.	%
Digoxin	10	31
	9	28
	13	41
	32	100

CHART (5) LINES OF THERAPY FOR LONG TERM PROPHYLAXIS



**Table (11) and Chart (6):**

They show recurrence of SVT in cases received and those none received long-term prophylaxis. Recurrence was defined as a reappearance of SVT after at least 7 days freedom from the dysrhythmia. Those patients who received no prolonged treatment had a significantly higher recurrence rate than those who received such treatment ( $P < 0.05$ ).

**Table (12) and Chart (7):**

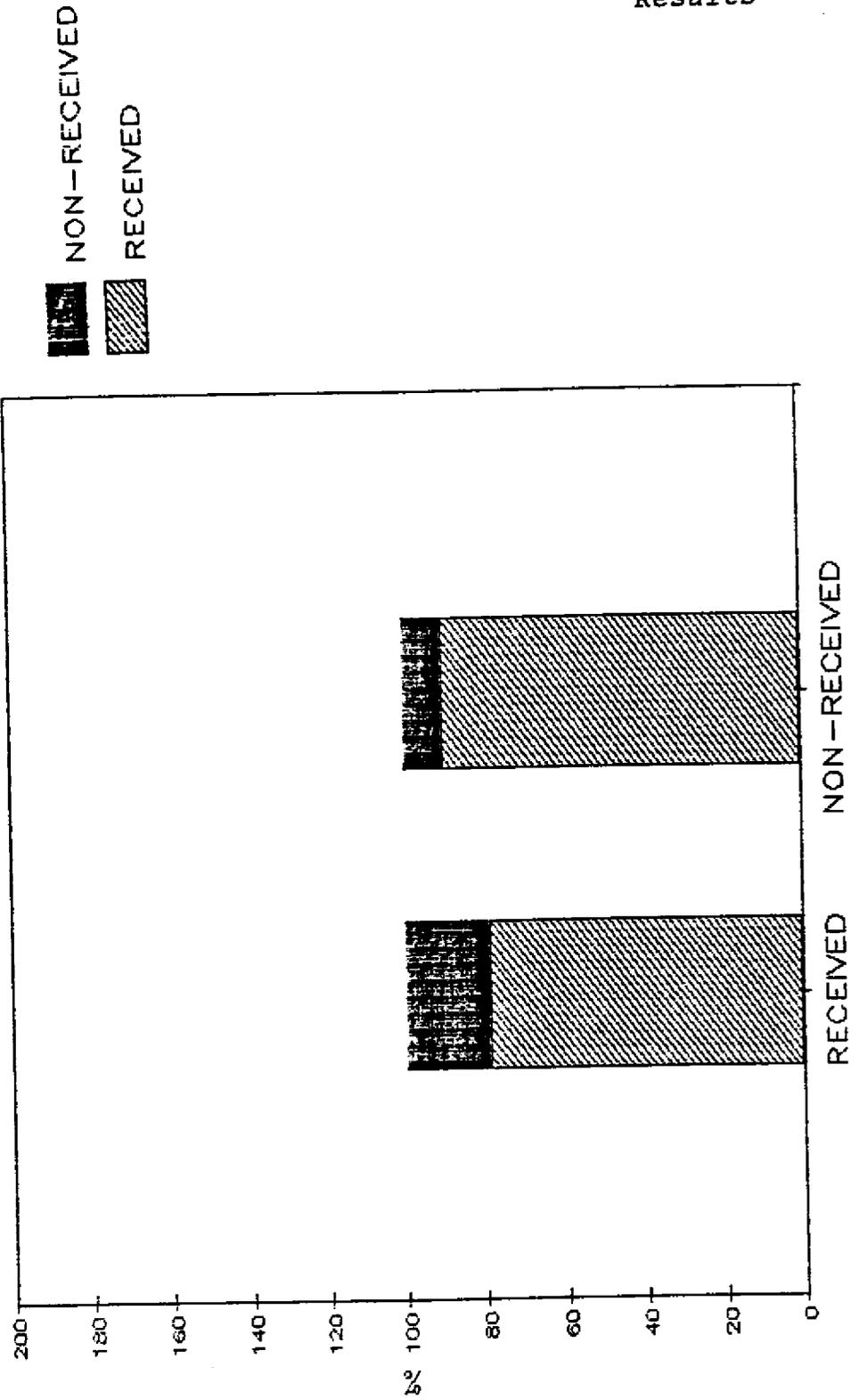
They show the relation between line of long-term prophylaxis and recurrence rate. None of the drug regimens proved to be statistically significantly superior in preventing recurrence ( $P > 0.05$ ).

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**Table (11):** Recurrence of SVT in cases received and those non received long-term prophylaxis.

	Cases received long term prophylaxis		Cases non received long-term prophylaxis	
	No.	%	No.	%
Single recurrence:				
Recurred	23	79	9	90
Non recurred	6	21	1	10
Total	29	100	10	100

CHART (6) RECURRENCE OF SVT IN CASES  
RECEIVED AND THOSE NON-RECEIVED  
LONG TERM PROPHYLAXIS



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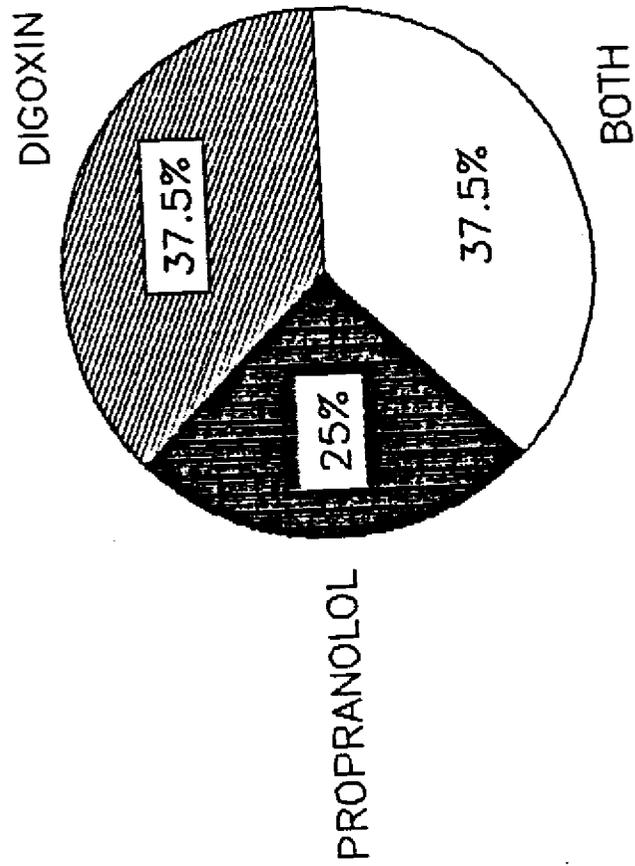
**Table (12):** Relation between line of therapy for long-term prophylaxis and recurrence rate:

Line of therapy	Recurred cases		Non recurred cases	
	No.	%	No.	%
Digoxin	9	37.5	-	0
Propranolol	6	25.0	3	60
Digoxin and propranolol	9	37.5	2	40
Total	24	100.0	5	100

Chi-square = 1.42

P > 0.05

CHART (7) DISTRIBUTION OF RECURRENT  
CASES ACCORDING TO LINE OF LONG TERM  
PROPHYLAXIS



**Table (13):**

It shows classification of recurrent cases according to duration before recurrence. Twenty-three cases (72% of recurrent cases) showed recurrence within 3 months from the first attack. In 9 cases (28%), more than 3 months elapsed before the second episode of SVT. Therefore, in only 7/39 cases (18%) did SVT not recur. Four cases could not be followed.

**Table (14):**

It illustrates data of the 3 neonatal cases. The first case was male, 3 days old, one of twin of diabetic preeclamptic mother, presented with respiratory distress, pneumonia, congestive heart failure, and cyanosis. The heart rate was 250 bpm, P wave was visible with an axis 270-360. QRS was normal in duration and configuration. No pre-excitation was found on ECG during sinus rhythm. Echo cardiographic finding was the presence of tricuspid regurgitation. Adenosine was given and terminated the attack. Digoxin was given as a long-term prophylactic therapy. No recurrence occurred during a follow up period of 6 months.

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Table (13): Classification of recurrent cases according to duration before recurrence.

Duration before recurrence	No. of cases	%
< 3 mo.	23	72
> 3 mo.	9	28
Total	32	100

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**Table (14):** Illustrated data of neonatal cases.

No.	Age	Sex	Predisposing factors	Presenting symptoms and signs	ECG during SVT			Therapy	Response	Long term prophylaxis	Recurrence
					H.R.	P wave	QRS				
1	3 days	Male	- Tricuspid regurg.  - Preeclamptic mother  - Pneumonia	- Respiratory distress type II  - CHF  - Cyanosis	250/min	N.	N.	Adenosine	Success	Digoxin	Not recurred
2	4 days	Female	- Tricuspid regurg.  - Diabetic mother	- Respiratory distress type II  - CHF  - No cyanosis	300/min	N.	N.	Adenosine	Success	-	Died as a result of septicemia
3	12 days	Female	No predisposing factors	- Cyanosis  - No CHF	235/min	270-360 P wave axis	N.	DC	Success	Digoxin	Recurred after 2 months

H.R. = Heart rate.  
N = Normal.

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The second case was female, 4 days old, infant of diabetic mother, presented with respiratory distress, CHF with no cyanosis. The heart rate was 300 bpm. P wave was normal in duration and axis. QRS duration and configuration were normal. No pre-excitation on sinus rhythm. Echo cardiographic finding was the presence of tricuspid regurgitation. Adenosine was successful in terminating the attack, but the patient died of septicemia.

The third case was female, 12 days old, with normal heart, presented with cyanosis but no CHF. The heart rate was 235 bpm. P wave was visible with a P wave axis 270-360. QRS was normal in duration and configuration. Electrical cardioversion terminated the attack and digoxin was given as a long term prophylaxis. The SVT recurred after 2 months.

### **Atrial fibrillation:**

This study included eleven patients presented with atrial fibrillation. They included six males and five females with age group ranging from 5 to 18 years. The results are illustrated in Table (15).

Among the eleven cases, six patients (54%) had rheumatic heart disease with severe mitral regurgitation,

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**Table (15):** Illustrated data of cases with atrial fibrillation

No.	Age	Sex	Predisposing factors	CHF	Treatment	Response	Long-term treatment
1	17.0 years	Female	Rheumatic heart MVD, P++	Present	Full digital. + Quinidine	Reduced vent. response	Digoxin, Quinidine
2	16.0 years	Female	Rheumatic heart MVD, TR, P++	-	Full digital. + Quinidine	Improved after surgical correction	-
3	15.5 years	Male	MVP, MR	-	Cardioversion	Reversion to sinus rhythm	Digoxin
4	14.8 years	Female	Rheumatic heart severe MR	Present	Full digital. + Quinidine	Reduced vent. response	Digoxin, Quinidine
5	16.0 years	Male	Rheumatic heart MVD	-	Full digital. + Quinidine	Improved after surgical correction	-
6	14.0 years	Female	Rheumatic heart MR	Present	Full digital. + Quinidine	Reduced vent. response	Digoxin, Quinidine
7	12.0 years	Male	C. Cardiomyopathy, MR	Present	Full digital. + Quinidine	Reduced vent. response	Digoxin, Quinidine
8	11.0 years	Female	Rheumatic heart MVD, AR, P++	-	Full digital. + Quinidine	Reduced vent. response	Digoxin, Quinidine
9	5.0 years	Male	Post operative (ASD)	-	Cardioversion	Reversion to sinus rhythm	Digoxin
10	18.0 years	Female	Cardiomyopathy, MVP	Present	Full digital. + Quinidine	Reduced vent. response	Digoxin, Quinidine
11	6.0 years	Male	Cardiomyopathy, MR	-	Full digital. + Quinidine	Reduced vent. response	Digoxin, Quinidine

AR = Aortic regurgitation.

C. Cardiomyopathy = congestive cardiomyopathy.

Full digital. = Full digitalization.

MR = Mitral regurgitation. MVD = Mitral valve disease.

MVP = Mitral valve prolapse. P++ = Pulmonary hypertension.

TR = Tricuspid regurgitation.

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three patients (27%) had cardiomyopathy with mitral regurgitation, one patient had MVP with mitral regurgitation, and one patient had the onset of AF post-operatively after repair of ASD.

Five patients (45%) presented with congestive heart failure.

ECG findings showed the characteristic irregular and chaotic atrial deflections distorting the baseline with varying AV conduction.

Digoxin was given to 9 patients combined with Quinidine. The response achieved was slowing of ventricular response but no reversion to sinus rhythm.

DC cardioversion was used in two cases with successful termination of atrial fibrillation. One case was mitral valve prolapse with mitral regurgitation and the other case was postoperative atrial fibrillation after repair of ASD.

In two cases, AF disappeared after mitral valve replacement for rheumatic mitral valve lesion.

Long term therapy of digoxin was given in two cases after reversion to sinus rhythm by cardioversion. Digoxin combined with quinidine was given in seven patients. The aim

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of long term therapy was to prevent recurrence in those patients with reversed sinus rhythm and to lessen ventricular response in those with persistent atrial fibrillation.

### Atrial flutter:

Ten patients were diagnosed as atrial flutter in the study. They included six males and four females with age group ranging from 11 months to 13 years.

Table (16) illustrates the results of the study on cases with atrial flutter.

Four cases (40%) had a normal heart and 6 cases (60%) had congenital heart defects (preoperated in 5 and post-operated in one). Congenital heart defects were ASD (3 cases = 30%), TGA (2 cases = 20%), and congestive cardiomyopathy (one case = 10%).

Presenting symptoms of the cases were palpitations (7 cases = 70%), dyspnea and other symptoms of congestive heart failure (2 cases = 20%).

ECG was diagnostic for atrial flutter by characteristic sawtooth appearance which is prominent in leads II, III, AVF, V<sub>1</sub>.

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Table (16): Illustrated data of cases with atrial Flutter:

No.	Age	Sex	Predisposing factors	CHF	Treatment	Response	Long-term Prophylaxis
1	8.0 years	Male	ASD	-	DC	Reversion to sinus rhythm	Digoxin, Quinidine
2	1.0 years	Male	TGA	Present	DC	Reversion to sinus rhythm	Digoxin, Quinidine
3	11.0 years	Female	Normal heart	-	Digoxin, Quinidine	Reversion to sinus rhythm	Digoxin, Quinidine
4	7.5 years	Male	Normal heart	-	DC	Not	Digoxin, Quinidine
5	7.0 years	Female	ASD	-	DC	Reversion to sinus rhythm	Digoxin, Quinidine
6	3.5 years	Male	Congestive cardiomyopathy	Present	Digoxin, Quinidine	Not	Digoxin, Quinidine
7	11.0 month	Female	TGA	Present	Digoxin, Quinidine	Not	Digoxin, Quinidine
8	10.0 years	Female	Post operative (ASD)	-	DC	Reversion to sinus rhythm	Digoxin, Quinidine
9	13.0 years	Male	Normal heart	-	DC	Reversion to sinus rhythm	Digoxin, Quinidine
10	9.0 years	Male	Normal heart	-	Digoxin, Quinidine	Reversion to sinus rhythm	Digoxin, Quinidine