RESULTS

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PART (1) Effect Of Chlorpromazine , Propranolol & Metoprolol singly and in combination On Amphetamine-Induced Schizophrenic model (Group 1) .

Amphetamine in a single s.c. dose 5 mg/kg b.wt. induced a characteristic abnormal behaviour in the tested mice ,started at 10 min.as sniffing (Group 3) , licking and biting the cage wire , also mice showed fighting behaviour (Group 4,5,6) , all criteria for schizophrenic behaviour model were present prominantly & constantly at 30 min. and reached their peak at 60 min. ,then fading of fighting behaviour occured and the sniffing reappear again at 120 min.,three to five hours after amphetamine injection the sniffing was gradually replaced by more normal activities such as eating and drinking ,then the mice finally falling asleep (Table 1) .

During the tested time ,mice showed some movement as walking forward & backward ,pressed their backs or their sides against a cage , sense of fearing , total absence of locomotion and remained for a certain period on the spot , usually the cage corner .

Tab. (1) *Effect Of Amphetamine 5 mg/kg s.c. (Group 1) on Schizophrenic behaviour Of Mice And Their Average Scale Grade (A.S.G.) Within 180 min.*

Drugs s.c.	Grade	% Distribution of mice at time of recording after drug injection .										Statist ic
		10	20	30	40	50	60	90	120	150	180	
Saline	2	100	100	100	100	100	100	100	100	100	100	
Amphet amine 5 mg/kg	2	90	70	0	0	0	0	0	0	0	0	Chi sq. 1207.4
	3	10	20	10	5	5	0	0	40	60	50	D.F. 36
	4	0	10	20	10	10	0	0	0	10	20	P<0.001
	5	0	0	30	25	25	50	50	20	10	10	
	6	0	0	50	60	50	50	50	40	20	20	Mean±SE
Average Scale Grade (A.S.G.)		2.1	2.4	5.1	5.4	5.0	5.5	5.5	4.6	3.9	4.0	4.15 ± 0.4

Effect Of Prophylactic Administration Of Different Doses Of Chlorpromazine .

Chlorpromazine administered with amphetamine in doses of 0.75 , 1.5 , 3 , 6 & 12 mg/kg b.wt. s.c. suppressed significantly ($P < 0.001$) the schizophrenic behaviour with all tested doses and change the behaviour scale grade toward the normal grade **(Grade 2)** then the mice showed marked sedation and showed no movement and become asleep **(Grade 1, 0)** with higher doses (6, 12 mg/kg) at the end of experiment time **Tab. (2) , Fig. (3) .**

Tab. (2) *Effect Of Prophylactic Injection Of Different Doses Of Chlorpromazine On The Schizophrenic Behaviour Of Mice And Their Average Scale Grade (A.S.G.) Within 180 min.*

Drugs s.c.	Grade	% Distribution of mice at time of recording after drug injection.										Statistic
		10	20	30	40	50	60	90	120	150	180	
Chlorp. 0.75 mg/kg	0	0	0	0	0	0	10	10	5	5	0	Chi Sq 277.27
	1	5	10	25	50	50	60	60	60	55	50	D.F. 27
	2	85	85	70	50	50	30	30	35	40	50	P<0.001
	3	10	5	5	0	0	0	0	0	0	0	
Average Scale Grade (A.S.G.)		2.05	1.95	1.8	1.5	1.5	1.2	1.2	1.3	1.35	1.5	Mean±SE 1.535±0.09 *
Chlorp. 1.5 mg/kg	0	0	0	0	20	30	35	25	15	10	0	Chi Sq. 438.34
	1	0	30	60	60	60	60	70	60	60	60	D.F. 18
	2	100	70	40	20	10	5	5	25	30	40	P<0.001
Average Scale Grade (A.S.G.)		2.0	1.7	1.4	1.0	0.8	0.7	0.8	1.1	1.2	1.4	Mean±SE 1.21±0.13 *
Chlorp. 3 mg/kg	0	0	0	20	30	40	50	50	40	30	0	Chi Sq. 589.10
	1	10	40	60	60	55	50	50	60	60	35	D.F. 18
	2	90	60	20	10	5	0	0	0	10	15	P<0.001
Average Scale Grade (A.S.G.)		1.9	1.6	1.0	0.9	0.65	0.5	0.5	0.6	0.8	1.15	Mean±SE 0.955±0.15 *
Chlorp. 6 mg/kg	0	10	20	50	50	70	30	80	75	75	65	Chi Sq. 403.19
	1	40	60	40	50	30	20	20	25	25	35	D.F. 18
	2	50	20	10	0	0	0	0	0	0	0	P<0.001
Average Scale Grade (A.S.G.)		1.4	1.0	0.6	0.5	0.3	0.2	0.2	0.25	0.25	0.35	Mean±SE 0.5350±0.13 *
Chlorp. 12 mg/kg	0	40	60	90	90	100	100	100	100	100	100	Chi Sq. 402.76
	1	40	35	20	10	0	0	0	0	0	0	D.F. 18
	2	20	5	0	0	0	0	0	0	0	0	P<0.001
Average Scale Grade (A.S.G.)		0.8	0.45	0.2	0.1	0	0	0	0	0	0	Mean±SE 0.155±0.055 *

* $P < 0.001$

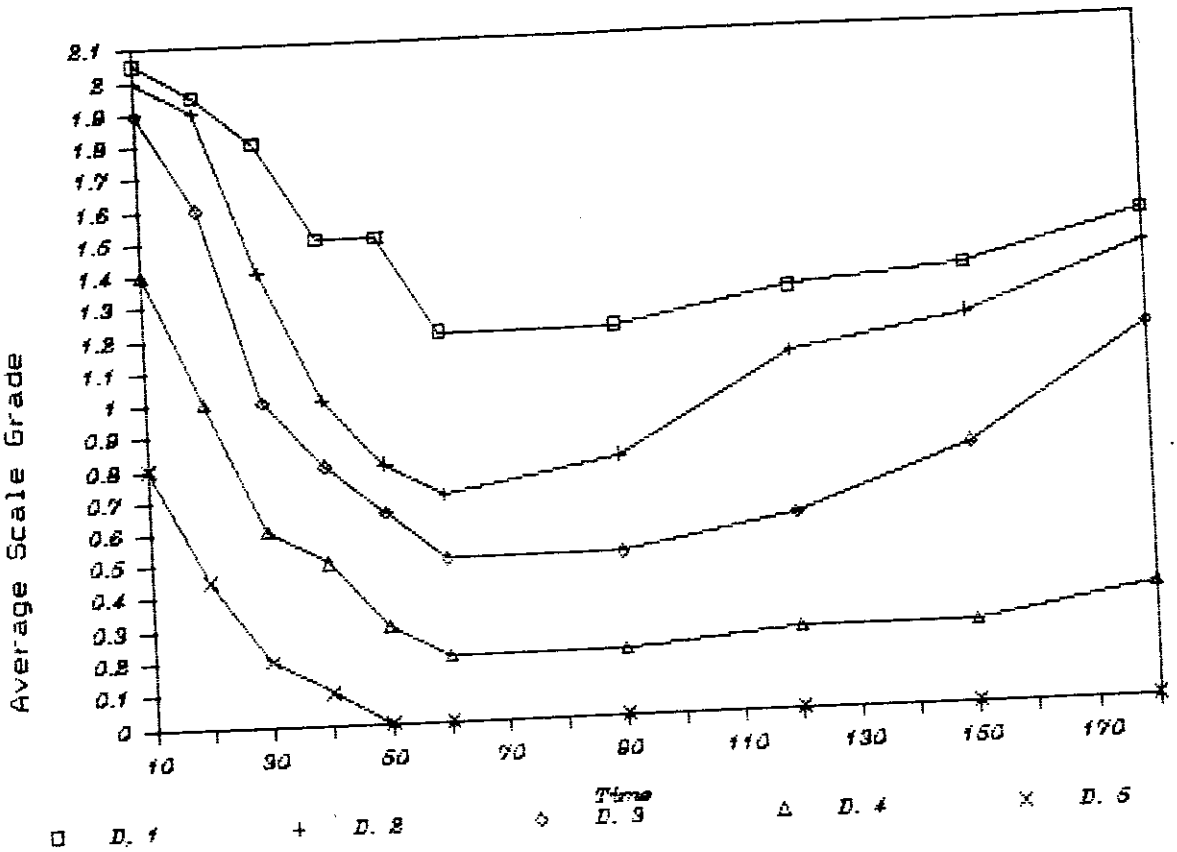

Fig. (3) Prophylactic effect of different doses of chlorpromazine (d_1=0.75 , d_2=1.5 , d_3=3 , d_4=6 , d_5=12 mg/kg) on the observed average scale grade of schizophrenic mice behaviour at different times .

Tab. (3) *Effect Of Curative Administration Of Different Doses Of Chlorpromazine On Schizophrenic Behaviour Of Mice And Their Average Scale Grade (A.S.G.) Within 180*

Drugs s.c.	Grade	% Distribution of mice at time of recording after drug injection.										Statistic	
		10	20	30	40	50	60	90	120	150	180		
Chlorp. 0.75 mg/kg	0	0	0	0	0	0	5	5	5	0	0	Chi Sq. 919.51	
	1	0	0	0	5	20	15	55	45	50	40		
	2	10	30	40	75	75	75	40	50	50	60	D.F. 45	
	3	40	40	50	20	5	5	0	0	0	0		
	4	30	30	10	0	0	0	0	0	0	0	P<0.001	
	5	20	0	0	0	0	0	0	0	0	0		
Average Scale Grade (A.S.G.)		3.6	3.0	2.7	2.15	1.85	1.8	1.35	1.45	1.5	1.6	Mean±SE 2.1±0.2	*
Chlorp. 1.5 mg/kg	0	0	0	0	0	5	20	20	5	0	0	Chi Sq. 677.16	
	1	0	0	10	25	30	50	50	65	60	50		
	2	50	65	75	75	65	30	30	30	40	50	D.F. 36	
	3	30	30	15	0	0	0	0	0	0	0	P<0.001	
	4	20	5	0	0	0	0	0	0	0	0		
Average Scale Grade (A.S.G.)		2.7	2.4	2.05	1.75	1.6	1.1	1.1	1.25	1.4	1.5	Mean±SE 1.685±0.2	*
Chlorp. 3 mg/kg	0	0	0	0	10	20	40	50	50	30	0	Chi Sq. 574.29	
	1	0	10	30	40	50	40	40	40	40	60	D.F. 27	
	2	30	60	70	50	30	20	10	10	30	40	P<0.001	
	3	20	10	0	0	0	0	0	0	0	0		
Average Scale Grade (A.S.G.)		2.2	2.0	1.7	1.4	1.1	0.8	0.6	0.6	1.0	1.4	Mean±SE 1.28±.2	*
Chlorp. 6 mg/kg	0	0	0	20	40	60	80	90	80	80	80	Chi Sq. 743.71	
	1	10	30	50	50	30	20	10	20	20	20	D.F. 18	
	2	90	70	30	10	10	0	0	0	0	0	P<0.001	
Average Scale Grade (A.S.G.)		1.9	1.7	1.1	0.7	0.5	0.2	0.1	0.2	0.2	0.2	Mean±SE 0.68±0.2	*
Chlorp. 12 mg/kg	0	0	40	60	80	100	100	100	100	90	90	Chi Sq. 560.37	
	1	100	60	40	20	0	0	0	0	10	10	D.F. 9	
												P<0.001	
Average Scale Grade (A.S.G.)		1.0	0.6	0.4	0.2	0	0	0	0	0.1	0.1	Mean±SE 0.24±.1	*

* $P < 0.001$

(n = 8-10)

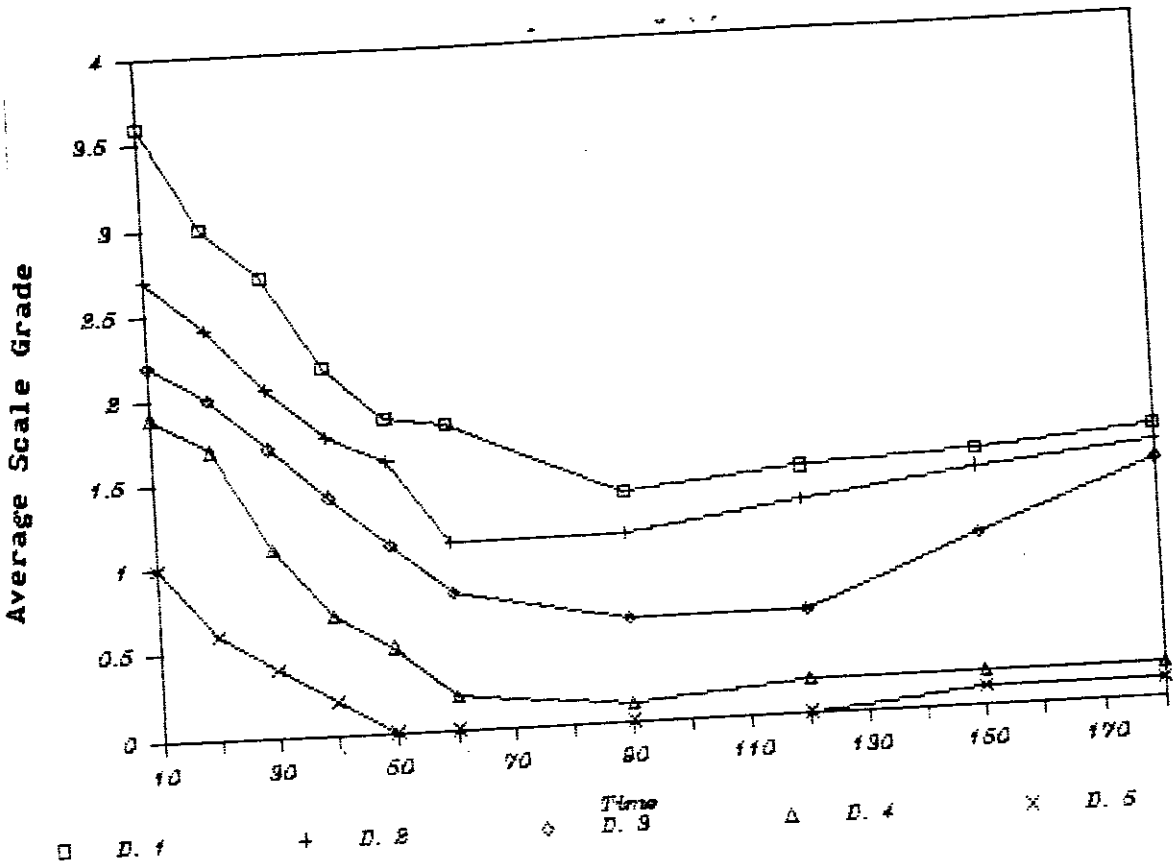

Fig. (4) Curative effect of different doses of chlorpromazine (d_1=0.75 , d_2=1.5 , d_3=3 , d_4=6 , d_5=12 mg/kg) on the observed average scale grade of schizophrenic mice behaviour at different times . (n = 8-10)

Effect Of Prophylactic Injection Of Different Doses Of Propranolol

Propranolol a non -selective beta -adrenoceptor blocker administered 30 min. before amphetamine injetion in doses of 10., 20 ,40 mg/kg b. wt. to be served as a prophylactic treatment suppressed significantly ($P< 0.001$) the schizophrenic behaviour and changed the behaviour scale grade toward the normal grade (Grade 2) and the activities less than normal (Grade 1) **Tab. (4) & Fig. (5)**

Tab. (4) *Effect Of Prophylactic Injection Of different Doses Of Propranolol On Schizophrenic Behaviour Of Mice And Their Average Scale Grade (A.S.G.) Within 180 min.*

Drugs s.c.	Grade	% Distribution of mice at time of recording after drug injection.										Statistic	
		10	20	30	40	50	60	90	120	150	180		
Prop. 10 mg/kg	1	20	0	0	0	0	0	0	0	0	0	Chi sq. 278.203	
	2	80	70	60	60	75	30	75	70	70	70	D.F.27	
	3	0	20	00	30	20	20	25	30	30	30		
	4	0	10	10	10	5	0	0	0	0	0	P<0.001	
Average Scale Grade (A.S.G.)		1.8	2.4	2.5	2.5	2.3	2.2	2.25	2.3	2.3	2.3	Mean±SE $2.29^{\pm 0.06}$	*
Prop. 20 mg/kg	1	40	10	0	0	0	0	0	0	0	0	Chi sq. 531.553	
	2	60	60	60	60	80	90	90	90	90	90	D.F.27	
	3	0	25	00	40	20	10	10	10	10	10		
	4	0	5	10	0	0	0	0	0	0	0	P<0.001	
Average Scale Grade (A.S.G.)		1.6	2.25	2.5	2.4	2.2	2.1	2.1	2.1	2.1	2.1	Mean±SE 2.145±0.08	*
Prop. 40 mg/kg	1	80	80	60	50	40	40	30	30	30	30	Chi sq. 144.902	
	2	20	20	40	50	60	60	70	70	70	70	D.F.9	
												P<0.001	
Average Scale Grade (A.S.G.)		1.2	1.2	1.4	1.5	1.6	1.6	1.7	1.7	1.7	1.7	Mean±SE 1.43±0.11	*

* *P < 0.001 (A dose of drug in related to schizophrenic control group)*

(n = 8-10)

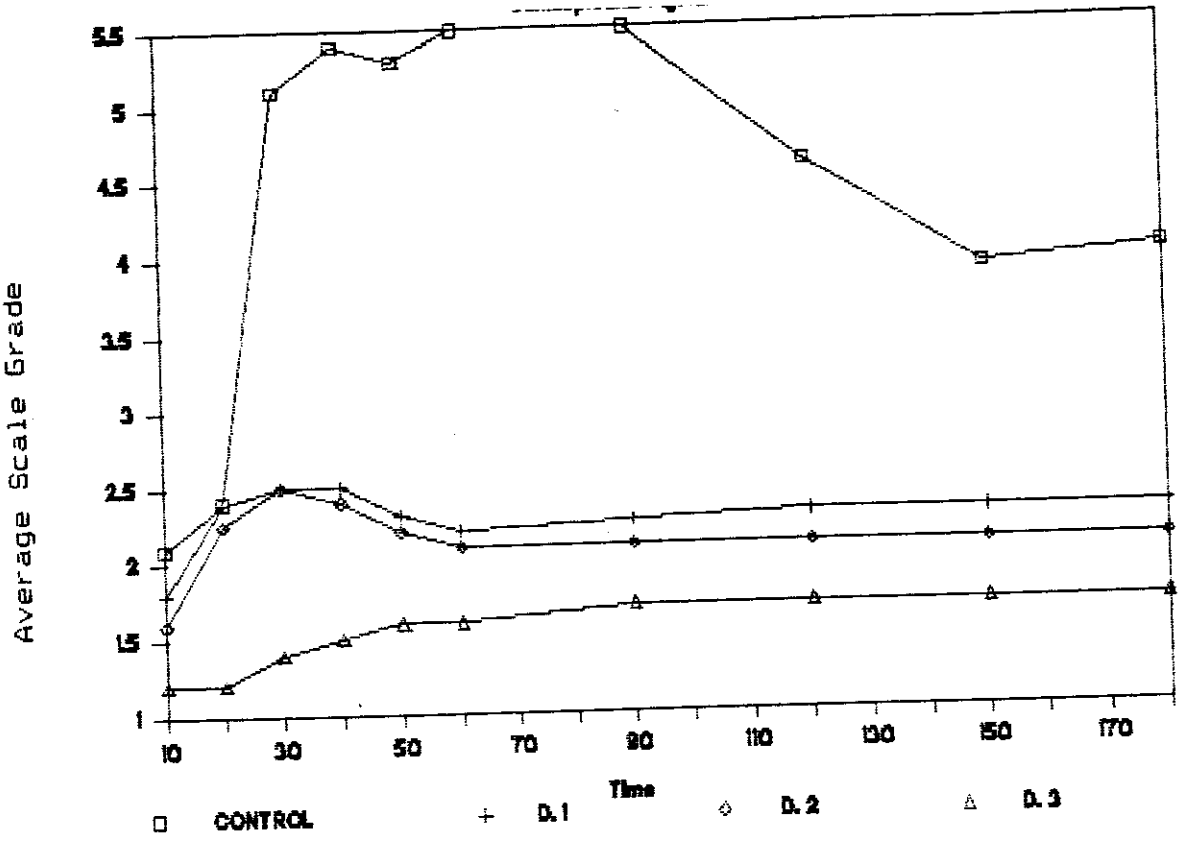

Fig. (5) Prophylactic effect of differnt doses of propranolol (d_1= 10 , d_2=20 , d_3=40 mg/kg) on the observed average scale grade of schizophrenic mice behaviour at different times . (n = 8-10)

Effect Of Curative Injection Of Different Doses Of Propranolol

Propranolol injected 30 min. after amphetamine administration in doses of 10 ,20 ,40 mg/kg b.wt. for resembling a curative treatment suppressed significantly ($P < 0.05$, $P < 0.001$) the schizophrenic behaviour toward the normal grade (Grade.2)and less than normal (Grade 1) **Tab.(5) & Fig.(6).**

The suppresion of mice schizophrenic behaviour by prophylactic treatment was more prominant than that of curative treament

Tab. (5) *Effect Of Curative Injection Of Different Doses Of Propranolol On Schizophrenic Behaviour Of Mice And Their Average Scale Grade (A.S.G.) Within 180 min.*

Drugs s.c.	Grade	% Distibution of mice at time of recording after drug injection.										Statistic	
		10	20	30	40	50	60	90	120	150	180		
Prop. 10 mg/kg	2	0	10	30	30	40	40	50	50	50	60	Chi sq. 381.097	
	3	30	30	30	30	30	40	40	40	50	40		
	4	30	30	30	30	30	20	10	10	0	0	D.F. 27	
	5	40	30	10	10	0	0	0	0	0	0	P<0.001	
Average Scale Grade (A.S.G.)		4.1	3.8	3.2	3.2	2.9	2.8	2.3	2.6	2.5	2.4	Mean±SE 3.01± 0.18	‡
Prop. 20 mg/kg	1	0	0	0	10	20	10	10	0	0	0	Chi sq. 650.449	
	2	10	30	50	60	60	80	90	100	100	100		
	3	50	40	40	30	20	10	0	0	0	0	D.F. 27	
	4	40	30	10	0	0	0	0	0	0	0	P<0.001	
Average Scale Grade (A.S.G.)		3.3	3.0	2.6	2.2	2.0	2.0	1.9	2.0	2.0	2.0	Mean±SE 2.3±0.2	*
Prop. 40 mg/kg	1	0	10	20	40	50	50	50	50	50	50	Chi sq. 554.992	
	2	30	70	70	60	50	50	50	50	50	50	D.F. 18	
	3	70	20	10	0	0	0	0	0	0	0	P<0.001	
Average Scale Grade (A.S.G.)		2.7	2.1	1.9	1.6	1.5	1.5	1.5	1.5	1.5	1.5	Mean±SE 1.73± 0.13	*

‡ *P < 0.05*

* *P < 0.001 (A dose of drug in related to schizophrenic control group)*

(n = 8-10)

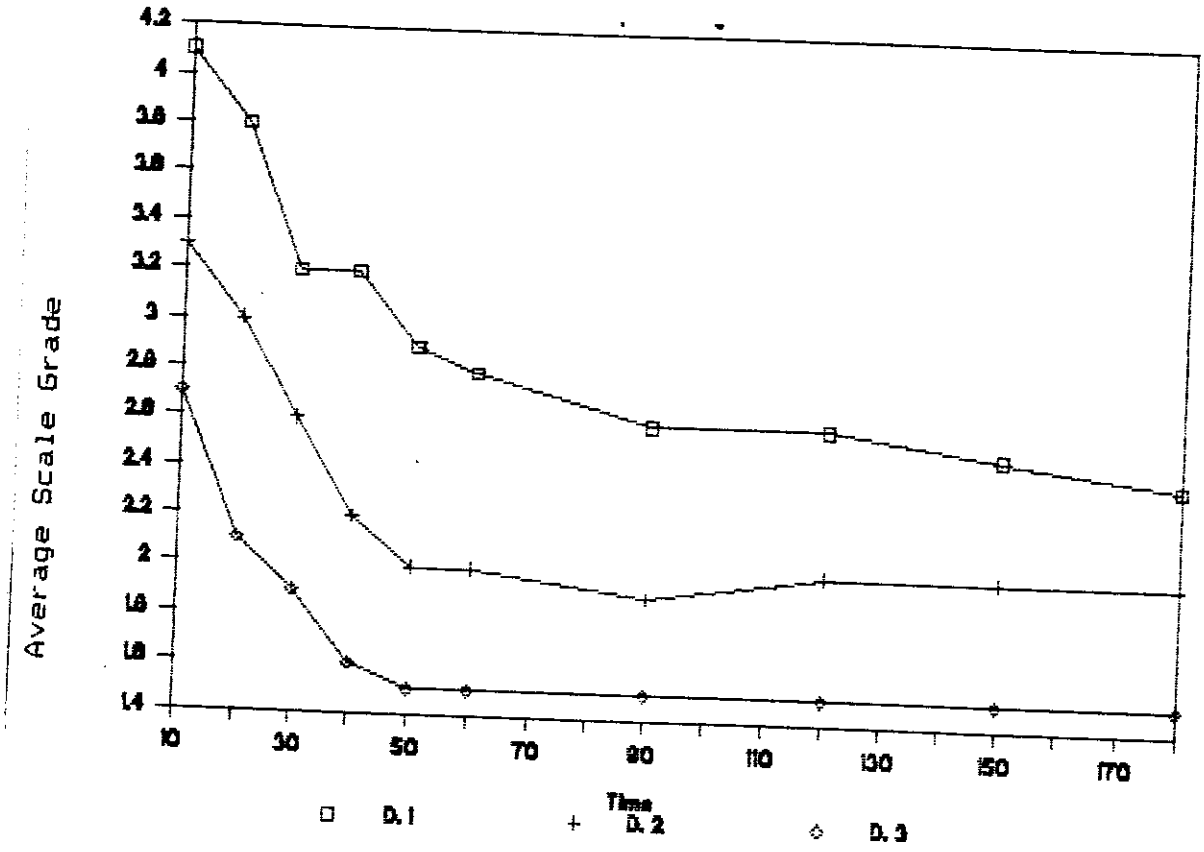

Fig. (6) Curative effect of different doses of propranolol (d_1=10 , d_2=20 , d_3=40 mg/kg) on the observed average sacle grade of schizophrenic mice behaviour at different times . (n = 8-10)

Effect Of Prophylactic Injection Of Two Doses Of Metoprolol .

Metoprolol a selective beta-adrenoceptor blocker administered 30 min. before amphetamine injection in equipotent doses to propranolol of 15 & 30 mg/kg b.wt. s.c. to be served as a prophylactic treatment suppressed significantly ($P < 0.001$) the schizophrenic behaviour and changed the behaviour scale grade toward the normal grade (Grade 2) **Tab. (6) & Fig. (7) .**

Tab. (6) *Effect Of Prophylactic Administration Of The Two Doses Of Metoprolol On Schizophrenic Behaviour Of And Their Average Scale Grade (A.S.G.) Within 180 min. .*

Drugs s.c.	Grade	% Distribution of mice at time of recording after drug injection .										Statistic
		10	20	30	40	50	60	90	120	150	180	
Metop. 15 mg/kg	2	100	80	20	0	0	0	0	10	20	40	Chi sq. 770.323 D.F.27 P<0.001
	3	0	20	30	30	20	20	40	50	50	50	
	4	0	0	40	40	40	40	40	30	30	10	
	5	0	0	10	30	40	40	20	10	0	0	
Average Scale Grade (A.S.G.)		2.0	2.2	3.4	4.0	4.2	4.2	3.8	3.4	3.1	2.7	Mean±SE 3.3± 0.25 *
Metop. 30 mg/kg	2	100	90	50	50	50	60	70	80	80	80	Chi sq. 148.541 D.F.18 P<0.001
	3	0	10	30	25	25	20	20	10	10	10	
	4	0	0	20	25	25	20	10	10	10	10	
Average Scale Grade (A.S.G.)		2.0	2.1	2.7	2.75	2.75	2.6	2.4	2.3	2.3	2.3	Mean±SE 2.52± 0.13 *

* $P < 0.001$ (between a dose of drug in related to schizophrenic control group)

(n = 8-10)

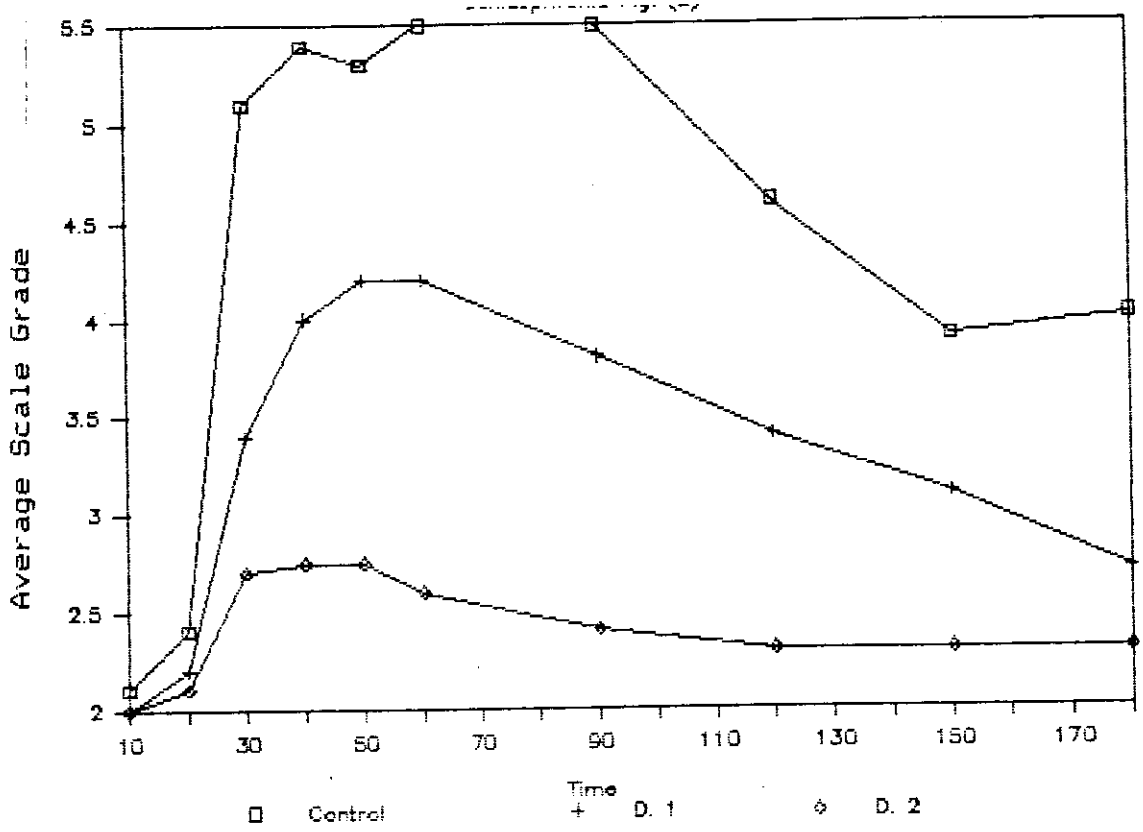

Fig. (7) Prophylactic effect of different doses of metoprolol (d_1=15 , d_2= 30 mg/kg) on the observed average scale grade of schizophrenic mice behaviour at different times .(n = 8-10)

Effect Of Curative Injection Of Two Doses Of Metoprolol .

Metoprolol a cardio-selective beta-adrenoceptor blocker administered 30 min. after amphetamine injection in propranolol equipotent doses of 15 & 30 mg/kg b.wt. s.c. to be served as a curative treatment produced insignificant suppression with the first dose , then suppressed significanty ($P< 0.05$) the schizophrenic behaviour and changed the behaviour scale grade toward the normal grade (Grade 2) **Tab. (7) & Fig. (8) .**

The suppression of mice schizophrenic behaviour shown by prophylactic treatment was more prominant than that of curative treatment .

Tab. (7) *Effect Of Curative Administration Of The two Doses Of Metoprolol On Schizophrenic Behaviour Of Mice And Their Average Scale Grade (A.S.G.) Within 180 min. .*

Drugs s.c.	Grade	% Distribution of mice at time of recording after drug injection .										Statistic
		10	20	30	40	50	60	90	120	150	180	
Metop. 15 mg/kg	2	0	0	0	0	0	0	10	20	30	40	chi sq. 597.849
	3	10	20	20	30	30	30	50	50	50	50	
	4	20	20	40	40	50	50	30	30	20	10	D.F. 36
	5	30	30	20	20	20	20	10	0	0	0	P<0.001
	6	40	30	20	10	0	0	0	0	0	0	
Average Scale Grade (A.S.G.)		5.0	4.7	4.4	4.1	3.9	3.9	3.4	3.1	2.9	2.7	Mean±SE 3.81±0.24 (*)
Metop. 30 mg/kg	2	0	0	0	0	10	20	30	40	50	70	Chi sq. 884.156
	3	10	20	30	40	40	40	40	50	50	30	
	4	20	40	40	50	50	40	30	10	0	0	D.F. 36
	5	30	30	30	10	0	0	0	0	0	0	P<0.001
	6	40	10	0	0	0	0	0	0	0	0	
Average Scale Grade (A.S.G.)		5.0	4.3	4.0	3.7	3.4	3.2	3.0	2.7	2.5	2.3	Mean±SE 3.41±0.17 (**)

(n = 8-10)

(*) *Insignificant*

(**) *F (of (between a dose of drug in related to schizophrenic control group)*

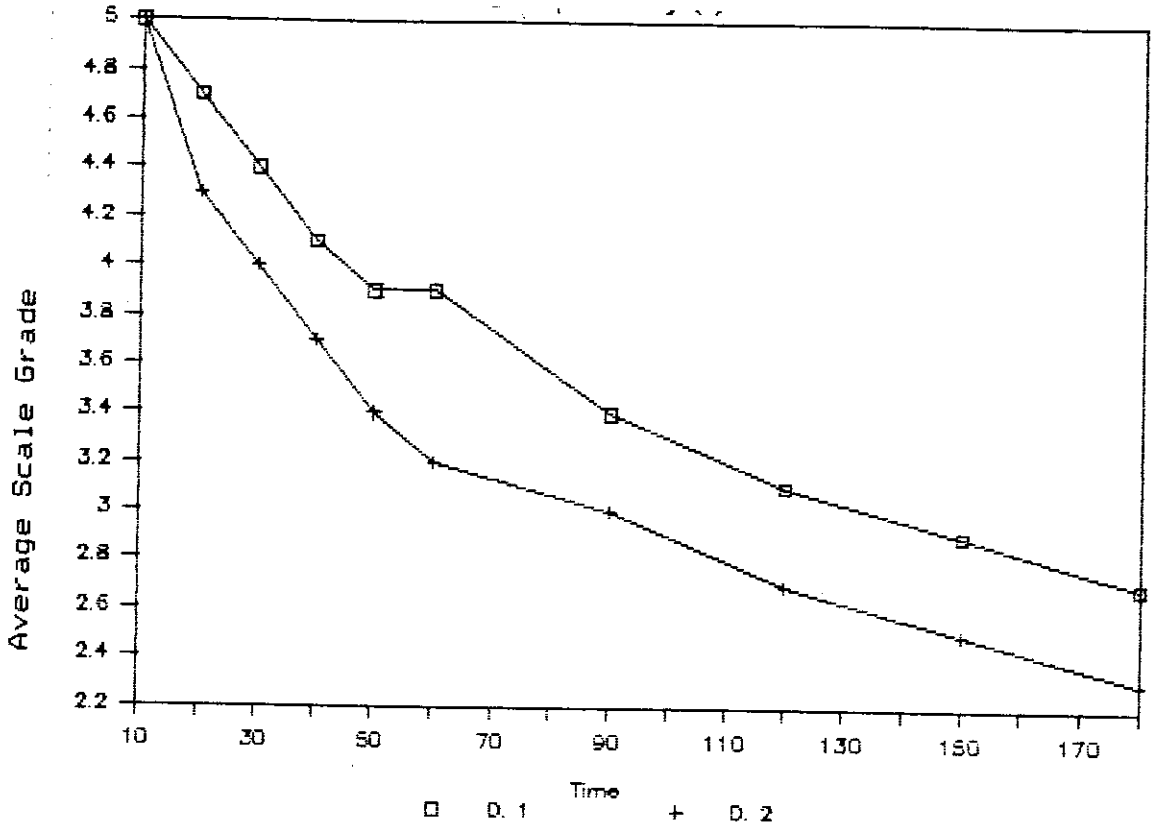

Fig. (8) Curative effect of different doses of metoprolol (d_1=15 , d_2=30 mg/kg) on the observed average sacle grade of schizophrenic mice behaviour at different times .(n = 8-10)

Effect Of Prophylactic Administration Of Combined Chlorpromazine And Propranolol .

Chlorpromazine in doses 0.75 & 1.5 mg/kg b.wt. injected with amphetamine and combined with propranolol in a dose of 10 mg/kg b.wt. 30 min. before amphetamine administration suppressed signififcantly the schizophrenic behaviour (P< 0.001) more than that the dose of chlorpromazine alone and changed the behaviour scale grade toward the normal grade **(Grade2)** then showed marked sedation **(Grade 1,0)** and the mice become asleep **Tab. (8 , 13) Fig. (9) .**

Tab. (8) *Effect Of Prophylactic Administration Of Combined Chloropromazine & Propranolol On Schizophrenic Behaviour Of Mice And Their Average Scale Grade (A.S.G.) Within 180 min.*

Drugs s.c.	Grade	% Distribution of mice at time of recording after drug injection .										Statistic	
		10	20	30	40	50	60	90	120	150	180		
Chlorp. 0.75 mg/kg & Prop. 10 mg/kg	0	0	0	10	10	45	45	50	30	20	10	Chi sq. 387.59	
	1	20	40	60	80	50	50	40	50	50	50	D.F.18	
	2	80	60	30	10	5	5	10	20	30	40	P<0.001	
Average Scale Grade (A.S.G.)		1.8	1.6	1.2	1.0	0.6	0.6	0.6	0.9	1.1	1.3	Mean±SE 1.07 ± 0.153	*
Chlorp. 1.5 mg/kg & Prop. 10 mg/kg	0	10	10	30	60	80	80	90	100	100	100	Chi sq. 608.644	
	1	40	70	60	30	15	15	10	0	0	0	D.F.18	
	2	50	20	10	10	5	5	0	0	0	0	P<0.001	
Average Scale Grade (A.S.G.)		1.4	1.1	0.8	0.5	0.25	0.25	0.1	0	0	0	Mean±SE 0.44 ± 0.158	*

* $P < 0.001$ (combination in relation to control schizophrenic group)

(n = 8-10)

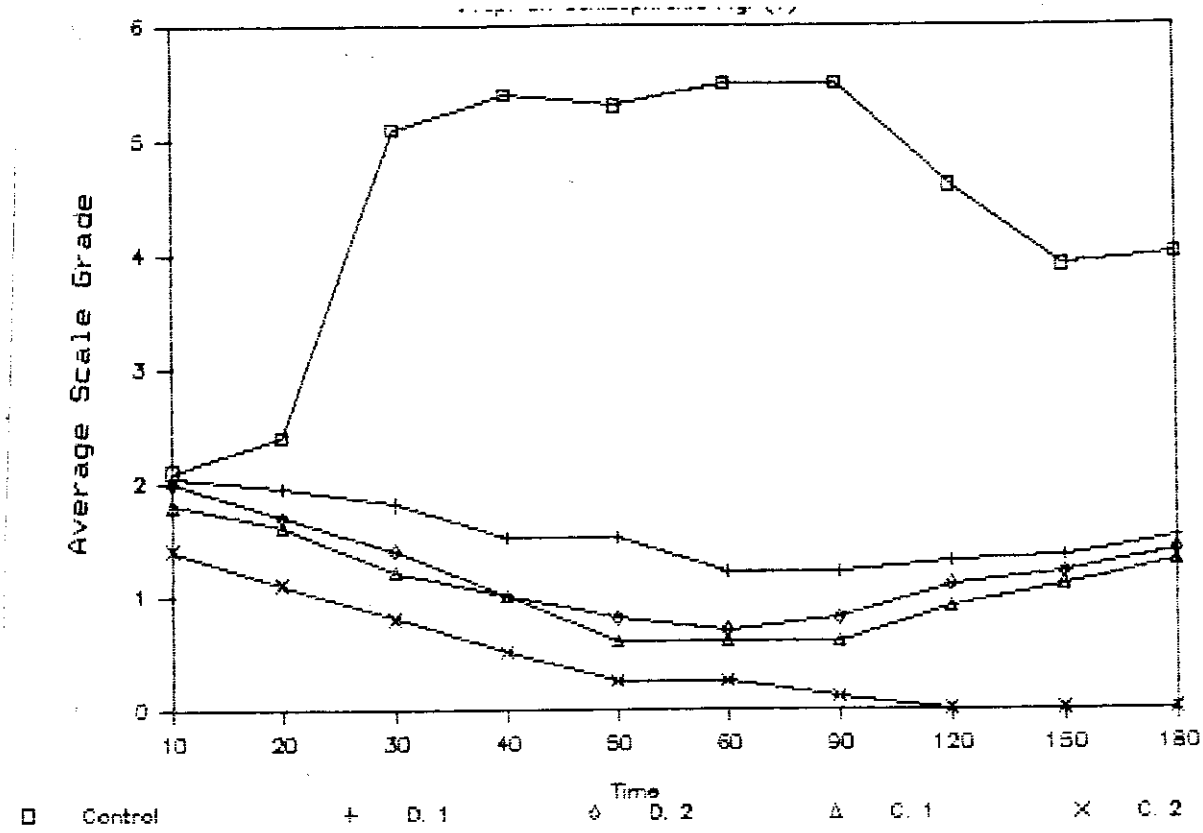

Fig. (9)Prophylactic effect of combined chlorpromazine and propranolol (chlorp.d_1=0.75 , d_2=1.5 , comb.c_1=0.75+10 c_2=1.5+10 mg/kg) on the observed average scale grade of schizophrenic mice behaviour at different times .(n=8-10)

Effect Of Curative Administration Of Combined Chlorpromazine And Propranolol .

Chlorpromazine in doses of 0.75 ,1.5 mg/kg b.wt.injected in a combination of propranolol in a dose of 10 mg/kg b.wt. 30 min. after amphetamine administration suppressed significantly (P< 0.001) the schizophrenic behaviour more than that of the tested doses of chlorpromazine alone and changed the behaviour scale grade toward the normal grade **(Grade2)** then showed marked sedation **(Grade1,0)** as seen by the larger doses (6,12mg/kg) of chlorpromazine alone **Tab. (9 , 13) Fig. (10) .**

Tab. (9) *Effect Of Curative Administration Of Combined Chlorpromazine & Propranolol On Schizophrenic BehaviourOf Mice And Their Average Scale Grade (A.S.G.) Within 180 min. .*

Drugs s.c.	Grade	% Distibution of mice at time of recording after drug injection .										Statistic
		10	20	30	40	50	60	90	120	150	180	
Chlorp. 0.75mg/kg % Prop. 10 mg/kg	0	0	0	0	5	10	20	30	30	20	10	
	1	10	10	10	20	40	60	60	60	70	70	Chi sq.
	2	20	30	40	50	40	20	10	10	10	20	312.712
	3	30	40	40	20	10	0	0	0	0	0	D.F. 45
	4	20	20	10	5	0	0	0	0	0	0	P<0.001
	5	20	0	0	0	0	0	0	0	0	0	
Average Scale Grade (A.S.G.)		3.2	2.7	2.5	2.0	1.5	1.0	0.8	0.8	0.9	1.1	Mean±SE 1.65 ± 0.28 *
Chlorp. 1.5 mg/kg % Prop. 10 mg/kg	0	0	0	10	30	40	60	80	90	100	100	
	1	10	20	40	40	40	30	15	10	0	0	Chi sq. 1143.39
	2	20	20	50	30	20	10	5	0	0	0	
	3	40	50	0	0	0	0	0	0	0	0	D.F. 45
	4	20	10	0	0	0	0	0	0	0	0	
	5	10	0	0	0	0	0	0	0	0	0	P<0.001
Average Scale Grade (A.S.G.)		0.0	2.5	1.4	1.0	0.8	0.5	0.25	0.1	0	0	Mean±SE 0.955± 0.33 *

* *P < 0.001 (comination in relation to control schizophrenic group)*

(n = 8-10)

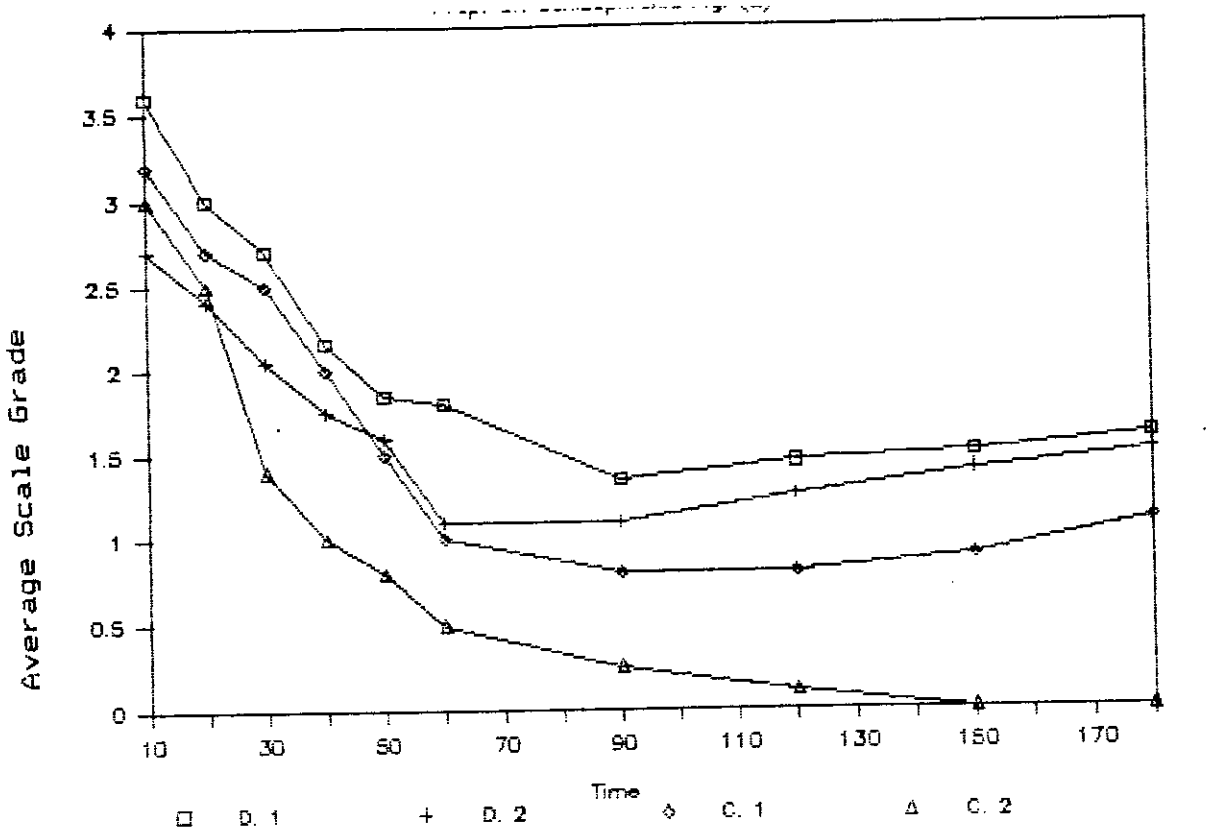

Fig. (10) Curative effect of combined chlorpromazine and propranolol (chlorp. d_1=0.75 , d_2=1.5 , comb. c_1=0.75+10 c_2=1.5+10 mg/kg) on the observed average scale grade of schizophrenic mice behaviour at different times .(n=8-10)

Effect Of Prophylactic Administration Of Combined Chlorpromazine And Metoprolol .

Chlorpromazine injected with amphetamine in doses 0.75 , 1.5 mg/kg b. wt. and combined with metoprolol in a dose of 15 mg/kg b. wt. injected 30 min. before amphetamine administration suppressed significantly (P< 0.001) the schizophrenic behaviour more than that of the chlorpromazine alone and changed the behaviour scale grade toward the normal grade **(Grade2)** then showed marked sedation **(Grade 1,0)** that seen with higher doses of chlorpromazine alone (6,12mg/kg) **Tab. (10 , 13) Fig. (11) .**

Tab. (10) *Effect Of Prophylactic Administration Of Combined Chlorpromazine & Metoprolol On Schizophrenic Behaviour Of Mice And Their Average Scale Grade (A.S.G.) Within 180 min. .*

drugs s.c.	Grade	% Distribution of mice at time of recording after drug injection .										Statistic
		10	20	30	40	50	60	90	120	150	180	
Chlorp. 0.75 mg/kg & Metop. 15 mg/kg	0	0	10	20	40	50	80	90	100	100	100	Chi sq. 678.282
	1	40	40	50	50	40	10	10	0	0	0	D.F.18
	2	60	50	30	10	10	10	0	0	0	0	P<0.001
Average Scale Grade (A.S.G.)		1.6	1.4	1.1	0.7	0.6	0.3	0.1	0	0	0	Mean±SE 0.58 ± 0.19 *
Chlorp. 1.5 mg/kg & Metop. 15 mg/kg	0	0	10	30	45	60	90	100	100	100	100	Chi sq. 720.891
	1	50	50	60	50	35	10	0	0	0	0	D.F.18
	2	50	40	10	5	5	0	0	0	0	0	P<0.001
Average Scale Grade (A.S.G.)		1.5	1.3	0.8	0.6	0.45	0.1	0	0	0	0	Mean±SE 0.475± 0.18 *

* *P < 0.001 (combination in relation to control schizophrenic group)*

(n = 8-10)

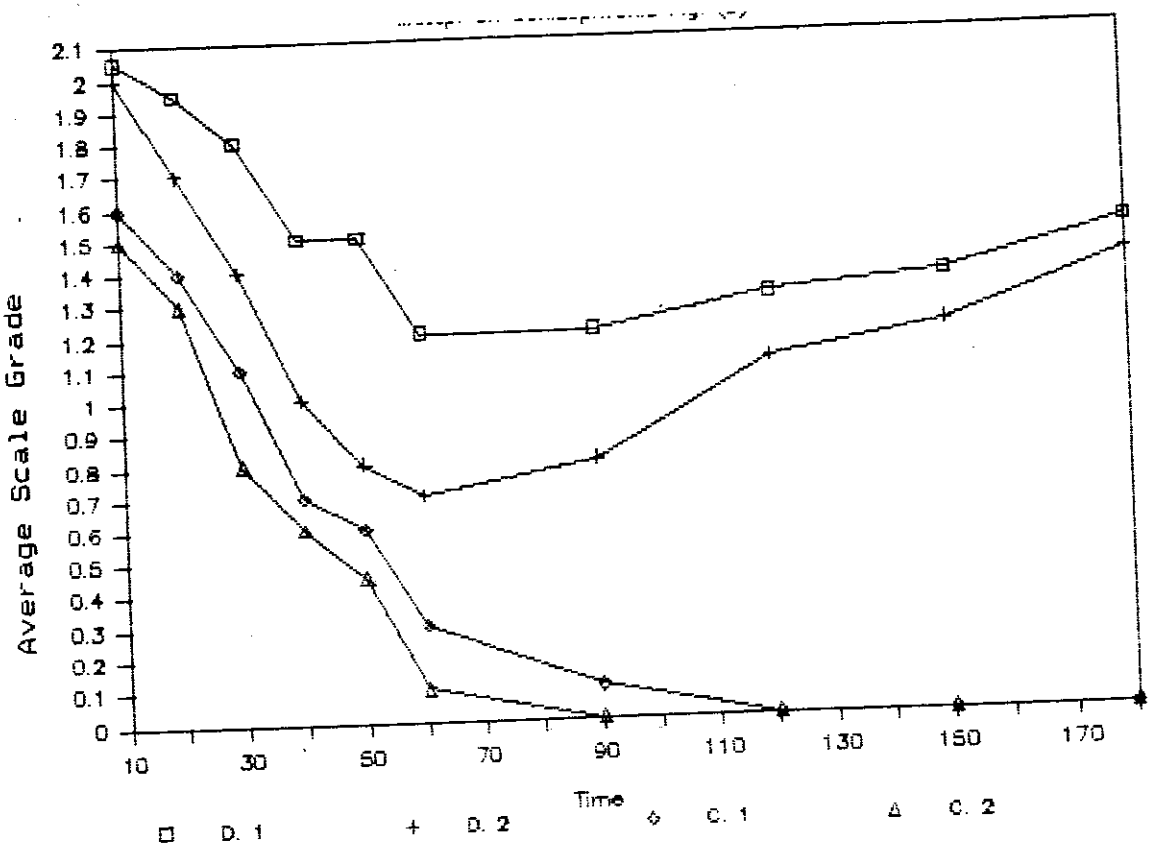

Fig. (11) Prophylactic effect of combined chlorpromazine and metoprolol (chlorp. d_1=0.75 , d_2=1.5 , comb. c_1=0.75+15 c_2=1.5+15 mg/kg) on the observed average scale grade of schizophrenic mice behaviour at different times .(n=8-10)

Effect Of Curative Administration Of Combined Chlorpromazine And Metopeolol .

Chlorpromazine in doses of 0.75 , 1.5 mg/kg b.wt. injected in a combination with metoprolol in a dose of 15 mg/kg b.wt. 30 min. after amphetamine administration suppressed significantly (P< 0.001) the schizophrenic behaviour more thanthat of the chlorpromazine alone and changed the behaviour scale grade toward the normal grade (**Grade 2**) then showed marked sedation as seen with higher doses of chlorpromazine alone (6,12 mg/kg) (**Grade1,0**) **Tab. (11 , 13) Fig. (12) .**

Tab. (11) *Effect Of Curative Administration Of Combined Chlorpromazine & Metoprolol On Schizophrenic Bhaviour Of Mice Between Behaviour Scale And Their Average Scale Grade (A.S.G.) Within 180 min.*

Drugs s.c.	grade	% Distribution of mice at time of recording after drug injection .										Statistic
		10	20	30	40	50	60	90	120	150	180	
Chlorp. 0.75mg/kg	0	0	0	0	10	20	40	70	90	100	100	Chi sq. 1241.91
%	1	0	10	20	40	60	50	20	10	0	0	
Metop. 15mg/kg	2	30	50	60	50	20	10	10	0	0	0	D.F.36
	3	40	30	20	0	0	0	0	0	0	0	
	4	30	10	0	0	0	0	0	0	0	0	P<0.001
Average Scale Grade (A.S.G.)		3.0	2.4	2.0	1.4	1.0	0.7	0.4	0.1	0	0	Mean±SE 1.1 ± * 0.34
Chlorp. 1.5 mg/kg	0	0	0	10	20	40	70	90	100	100	100	Chi sq. 1421.13
%	1	10	10	40	60	55	30	10	0	0	0	
Metop. 15 mg/kg	2	20	70	50	20	5	0	0	0	0	0	D.F.36
	3	40	20	0	0	0	0	0	0	0	0	
	4	30	0	0	0	0	0	0	0	0	0	P<0.001
Average Scale Grade (A.S.G.)		2.9	2.1	1.4	1.0	0.650.1		0.1	0	0	0	Mean±SE 0.845± * 0.31

* *P < 0.001 (combination in relation to control schizophrenic group)*

(n = 8-10)

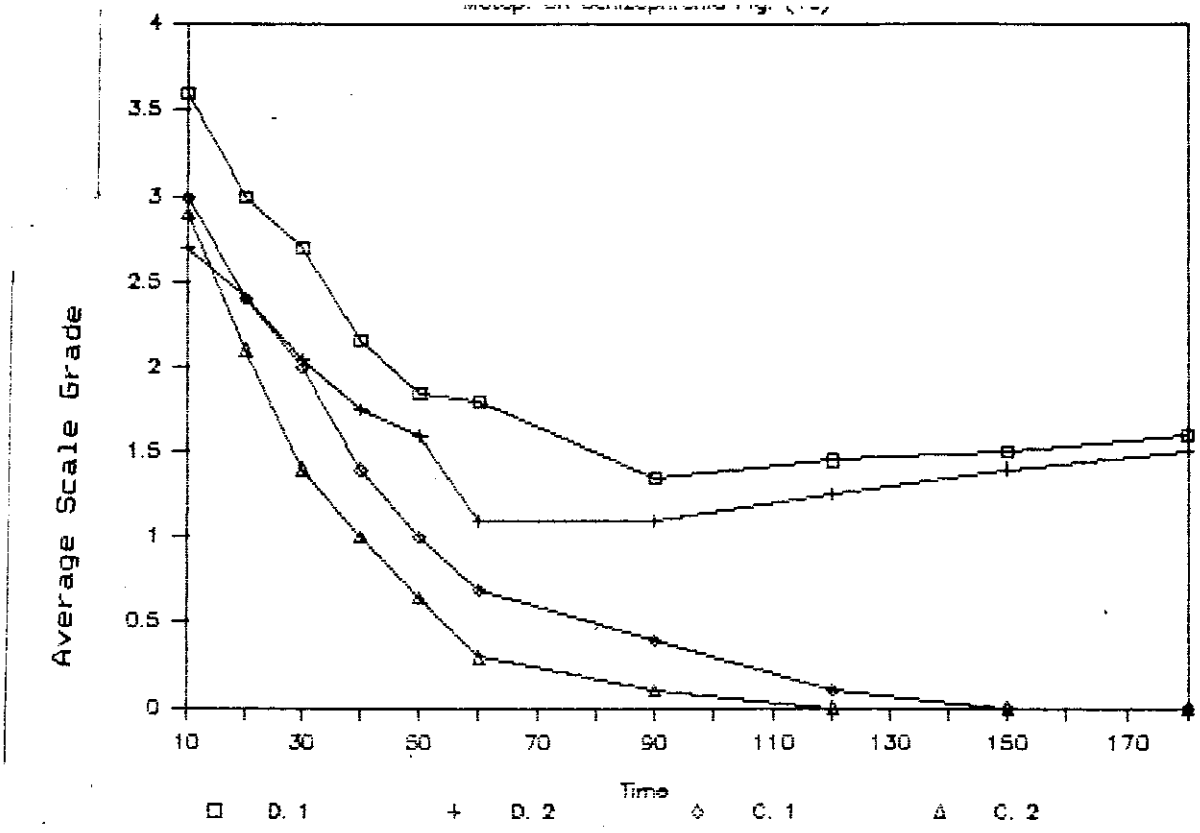

Fig. (12) Curative effect of combined chlorpromazine and metoprolol (chlorp. d_1=0.75 , d_2=1.5 , comb. c_1=0.75+15 c_2=1.5+15 mg/kg) on the observed average scale grade of schizophrenic mice behaviour at different times .(n=8-10)

Comparizon of the prophylactic effects of chlorpromazine (0.75 , 1.5 mg/kg b.wt.) , propranolol (10 mg/kg b.wt.) , metoprolol (15 mg/kg b.wt) and combination of the two doses of chlorpromazine with either of beta blockers on the average scale grade of schizophrenic behaviour at :

30 min. (Start of schizophrenic behaviour in mice)

90 min. (Maximum of schizophrenic behaviour in mice)

180 min. (End of experiment) .

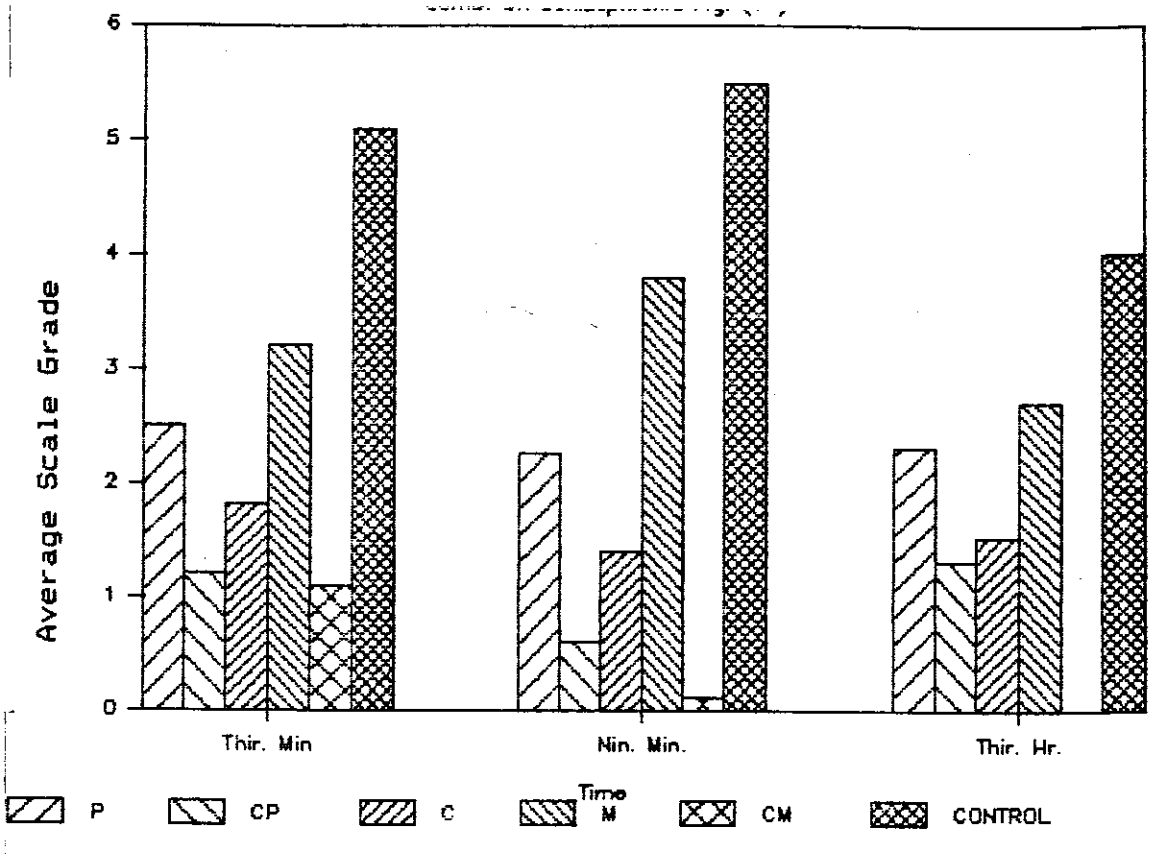

Fig. (13) Bar-chart of prophylactic effect of chlorpromazine (0.75) propranolol (10) , metoprolol (15) and combination of chlorpromazine with each of B-blocker at 30 , 90 & 180 min. on the observed average scale grade of schizophrenic mice behaviour .. P = propranolol , CP = chlorpromazine + propranolol , C = chlorpromazine , M = metoprolol , CM = chlorpromazine + metoprolol **(n = 8-10)**

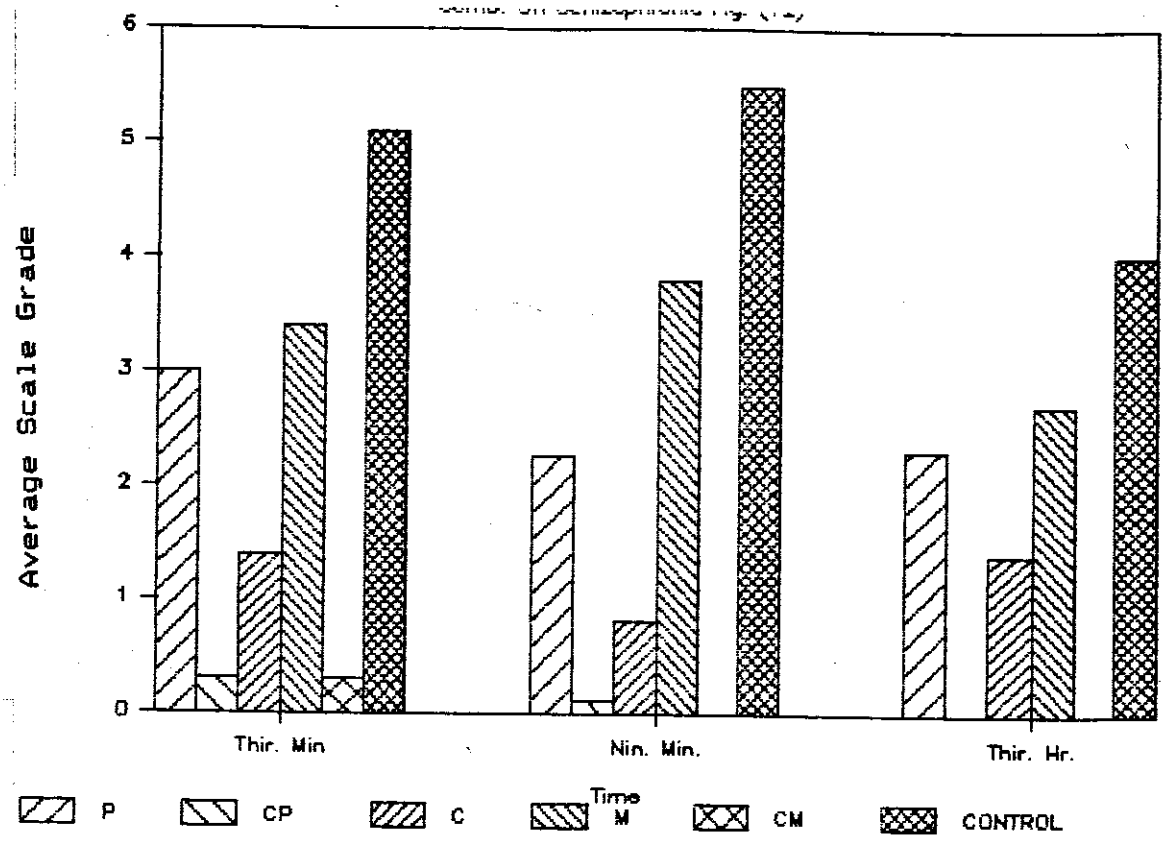

Fig.(14) Bar-chart of prophylactic effect of chlorpromazine (1.5) propranolol (10) , metoprolol (15) and combination of chlorpromazine with each of B-blocker at 30 , 90 & 180 min. on the observed average scale grade of schizophrenic mice behaviour ..

P = propranolol , CP = chlorpromazine + propranolol ,

M = metoprolol , MP = chlorpromazine + metoprolol ,

C = chlorpromazine (n = 8-10) .

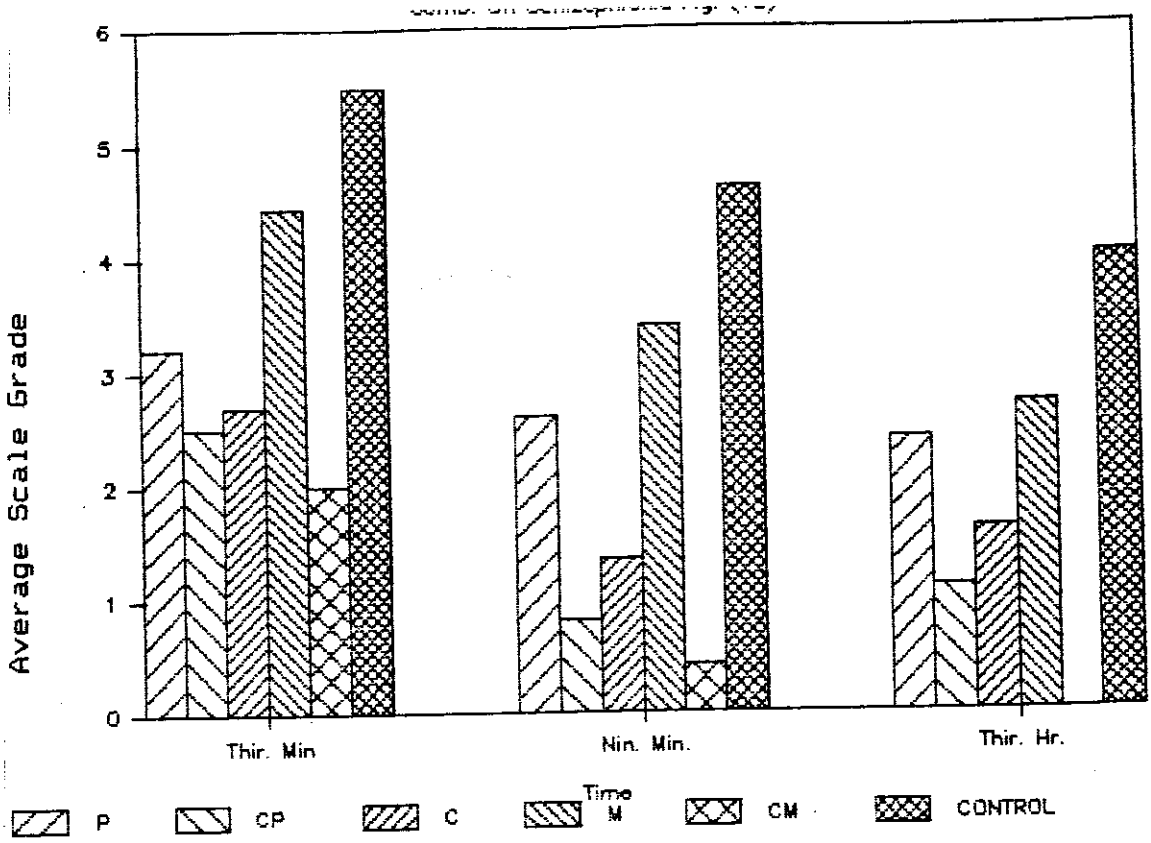

Fig. (15) Bar-chart of curative effect of chlorpromazine (0.75) , propranolol (10) , metoprolol (15) and combination of chlorpromazine with each of B-blocker at 30 , 90 & 180 min. on the observed average scale grade of schizophrenic mice behaviour ..

P = propranolol , CP = chlorpromazine + propranolol

M = metoprolol , CM = chlorpromazine + metoprolol

C = chlorpromazine (n = 8-10)

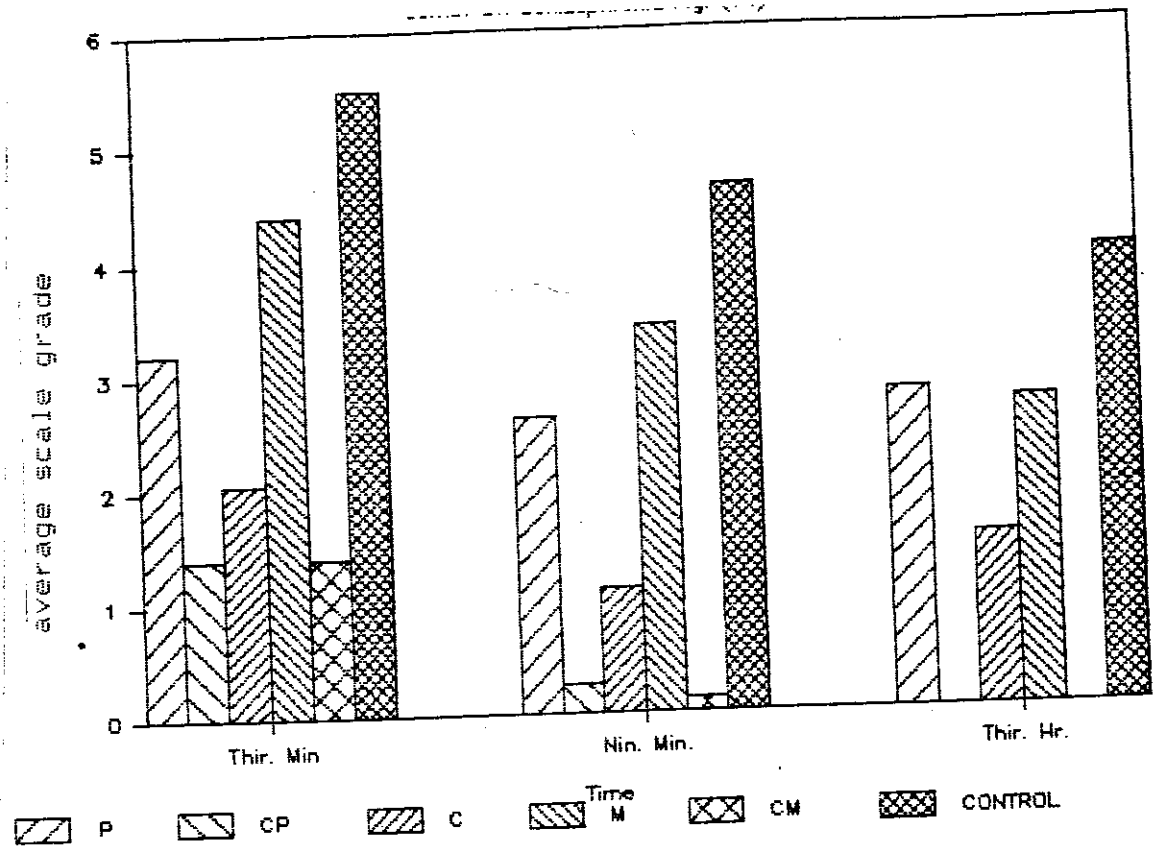

Fig. (16) Bar-chart of curative effect of chlorpromazine (1.5) , propranolol (10) , metoprolol (15) and combination of chlorpromazine with each of B-blocker at 30 , 90 & 180 min. on the observed average scale grade of schizophrenic mice behaviour ..

P = propranolol , CP = chlorpromazine + propranolol

M = metoprolol , CM = chlorpromazine + metoprolol

C = chlorpromazine (n = 8-10)

Tab. (12) *Collective Data Of Average Scale Grade (A.S.G.) Of Schizophrenic Behaviour In Response To All Tested Drugs.*

Type of treatment	Average Scale Grade (A.S.G.) at different time .										Mean ± SE	
	10	20	30	40	50	60	90	120	150	180		
Saline	2	2	2	2	2	2	2	2	2	2	2	
Schizophrenic 5mg/kg amph.	2.1	2.4	5.1	5.4	5.3	5.5	5.5	4.6	3.9	4.0	4.15 ± 0.38	
Chlorpromazine proph.												
0.75mg/kg	2.05	1.95	1.8	1.5	1.5	1.2	1.2	1.3	1.35	1.5	1.535 ± 0.096	*
1.5mg/kg	2.0	1.7	1.4	1.0	0.8	0.7	0.8	1.1	1.2	1.4	1.21 ± 0.13	*
3mg/kg	1.9	1.6	1.0	0.8	0.65	0.5	0.5	0.6	0.8	1.15	0.95 ± 0.15	*
6mg/kg	1.4	1.0	0.6	0.5	0.3	0.2	0.2	0.25	0.25	0.35	0.505 ± 0.10	*
12mg/kg	0.8	0.45	0.2	0.1	0	0	0	0	0	0	0.155 ± 0.09	*
curative												
0.75mg/kg	3.6	3.0	2.7	2.15	1.85	1.8	1.35	1.45	1.5	1.6	2.1 ± 0.24	*
1.5mg/kg	2.7	2.4	2.05	1.75	1.6	1.1	1.1	1.25	1.4	1.5	1.685 ± 0.17	*
3mg/kg	2.2	2.0	1.7	1.4	1.1	0.8	0.6	0.6	1.0	1.4	1.28 ± 0.18	*
6mg/kg	1.9	1.7	1.1	0.7	0.5	0.2	0.1	0.2	0.2	0.2	0.68 ± 0.21	*
12mg/kg	1.0	0.6	0.4	0.2	0	0	0	0	0	0	0.24 ± 0.11	*
Propranolol proph.												
10mg/kg	1.8	2.4	2.5	2.5	2.3	2.2	2.25	2.3	2.3	2.3	2.29 ± 0.06	*
20mg/kg	1.6	2.25	2.5	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.145 ± 0.08	*
40mg/kg	1.2	1.2	1.4	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.43 ± 0.11	*
curative												
10mg/kg	4.1	3.8	3.2	3.2	2.9	2.8	2.6	2.6	2.5	2.4	3.01 ± 0.18	#
20mg/kg	3.3	3.0	2.6	2.2	2.0	2.0	1.9	2.0	2.0	2.0	2.3 ± 0.16	*
40mg/kg	2.7	2.1	1.9	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.73 ± 0.13	*
Metoprolol proph.												
15mg/kg	2.0	2.2	3.4	4.0	4.2	4.2	3.8	3.4	3.1	2.7	3.3 ± 0.25	*
30mg/kg	2.0	2.1	2.7	2.75	2.75	2.6	2.4	2.3	2.3	2.3	2.25 ± 0.10	*
curative												
15mg/kg	5.0	4.7	4.4	4.1	3.9	3.9	3.4	3.1	2.9	2.7	3.81 ± 0.25	#
30mg/kg	5.0	4.3	4.0	3.7	3.4	3.2	3.0	2.7	2.5	2.3	3.41 ± 0.27	**
Combined chlorp. & prop proph.												
0.75mg + 10mg	1.8	1.6	1.2	1.0	0.6	0.6	0.6	0.9	1.1	1.3	1.07 ± 0.13	*
1.5mg + 10mg	1.4	1.1	0.8	0.5	0.25	0.25	0.1	0	0	0	0.44 ± 0.15	*
curative												
0.75mg + 10mg	3.2	2.7	2.5	2.0	1.5	1.0	0.8	0.8	0.8	1.1	1.55 ± 0.28	*
1.5mg + 10mg	3.0	2.5	1.4	1.0	0.8	0.5	0.25	0.1	0	0	0.955 ± 0.03	*
Combined chlorp. & metop proph.												
0.75mg + 15mg	1.6	1.4	1.1	0.7	0.6	0.3	0.1	0	0	0	0.58 ± 0.13	*
1.5mg + 15mg	1.5	1.3	0.8	0.6	0.45	0.1	0	0	0	0	0.475 ± 0.13	*
curative												
0.74mg + 15mg	3.0	2.4	2.0	1.4	1.0	0.7	0.4	0.1	0	0	1.1 ± 0.34	*
1.5mg + 15mg	2.9	2.1	1.4	1.0	0.65	0.3	0.1	0	0	0	0.845 ± 0.37	*

\# *Insignificant* ** *P < 0.05* * *P < 0.001*

PART (2) Effect Of Chlorpromazine ,Propranolol And Metoprolol On Aggressive Behaviour Of Mice Induced By Foot Shock Electric Stimulation

When two mice were placed under an inverted 2 litres beaker and above a parallel brass rods floor then electrically foot-shocked , the response to the shock initially appeared as attempting to climb up the sides of beaker , when this attempt failed ,they circuled around the wall of the beaker crossing over or under one another or attempted to ride on top of the other mouse in order to escape the shock . Generally this pricipitated the first "fighting episode" which consisted of the mice converging abruptly and standing on their hind legs with face to face position then biting each other , the demarcation of one fighting episodes from the next was a return of mice to the quadripedal posture and remained a part for 5 or more seconds ,the number of fighting episodes were counted during 3 min.interval .

Effect Of Different Doses Of Chlorpromazine On The Foot Shock Induced Aggressive Behaviour .

Chlorpromazine in doses of 1.5 ,3 .6 mg/kg b. wt. suppressed significantly (P< 0.001) the mean number of fighting episodes during the foot shock electric stimulation after 30 ,60 ,90 min.of drug administration in relation to 0 time (before drug administration) which served as a control , the mean fighting episodes showed marked reduction to 0 at all times with higher doses (3 , 6 mg/kg b.wt.) **Tab . (14) Fig . (17) .**

Tab. (14) *Effect Of different Doses of Chlorpromazine on The Foot-Shock Aggressive Behaviour (number of fighting episodes during 3 min.).*

Drugs sc.	Number of fighting episodes during 3 min interval			
	control 0 time	after 30 min	after 60 min	after 90 min
Chlorp. 1.5 mg/kg	16	10	6	4
	36	29	13	10
	30	21	15	11
	20	15	11	9
	27	20	14	14
Mean ±SE "t"	25.8 ±3.6	19 ±3.2 10.3 *	11.3±1.6 5.6 *	9.6±1.6 5.7 *
Chlorp. 3 mg/kg	27	1	0	0
	22	0	0	0
	33	3	0	0
	29	2	0	0
	15	0	0	0
Mean ±SE "t"	25.2 ±3.1 3.1	1.2 ±0.6 9.3 *	0 ±0 8.1 *	0 ±0 8.1 *
Chlorp. 6 mg/kg	21	0	0	0
	32	0	0	0
	37	0	0	0
	22	0	0	0
	14	0	0	0
Mean ±SE "t"	25.2 ±4.1	0 ±0 6.1 *	0 ±0 6.1 *	0 ±0 6.1 *

* $P < 0.001$

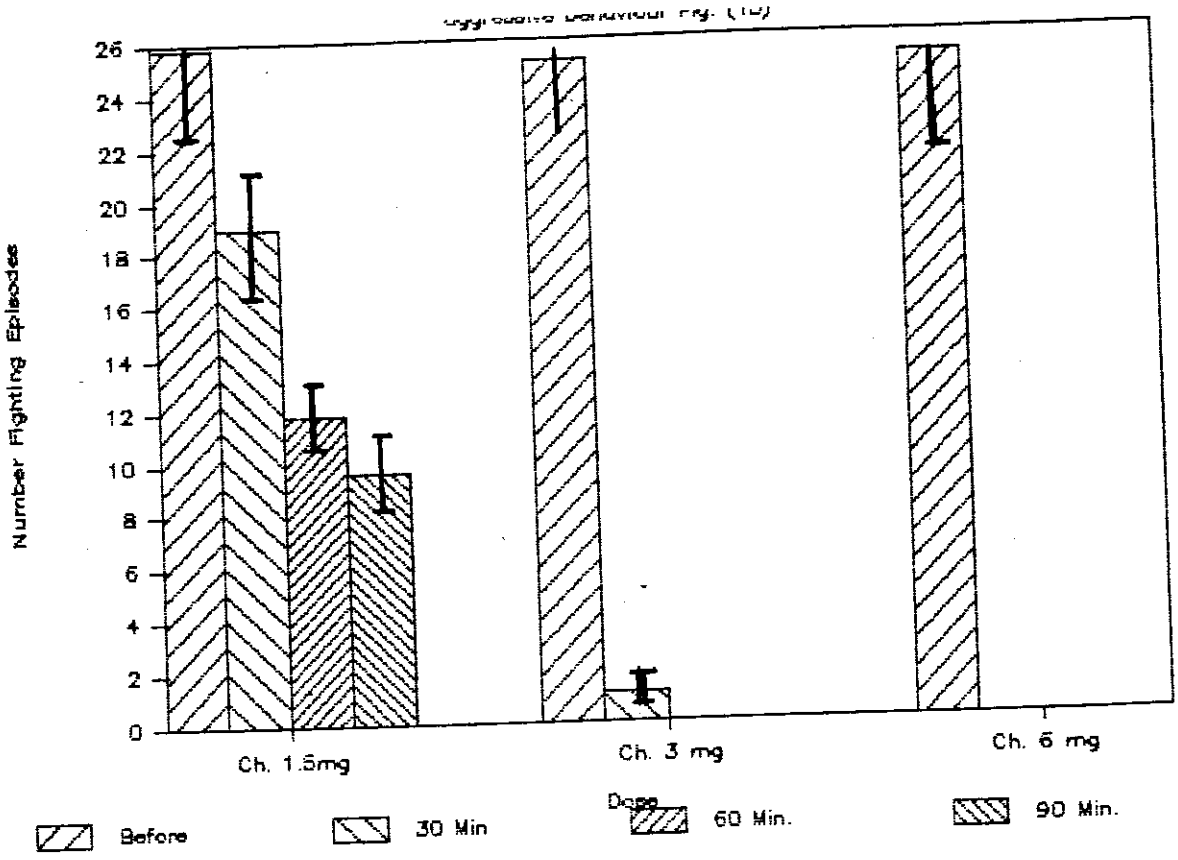

Fig. (17) Effect of different doses of chlorpromazine on the foot-shock aggressive behaviour at 30 , 60 & 90 min. after the drug injection .(**n = 30**)

Effect Of different Doses Of Propranolol On The Foot Shock Induced Aggressive Behaviour .

The mean number of fighting episodes during foot shock electric stimulation was suppressed significantly (P< 0.001) after propranolol administration in a dose of 10 mg/kg b. wt. after 30 , 60 , 90 min. in relation to control , with increasing propranolol doses , the mean number of fighting episodes showed more reduction (P< 0.001) particularly with 40 mg/kg b.wt. **Tab . (15) Fig . (18) .**

The effect of propranolol at all times on the mean number of fighting episodes is less than that of chlorpromazine effects .

Tab. (15) *Effect Of Different Doses Of Propranolol On The Foot Shock Aggressive Behaviour .*

Drugs s.c.	Number of fighting episodes during 3 min interval			
	control o time	after 30 min	after 60 min	after 90 min
Prop. 10 mg/kg	33	16	25	25
	19	8	10	11
	13	7	8	9
	35	15	19	21
	15	7	9	9
Mean ±SE "t"	23 ±4.6	10.6±2.0 4.7 *	14.2 4.6 *	15 ±3.3 4.8 *
Prop. 20 mg/kg	29	15	11	9
	24	17	13	14
	20	6	10	6
	12	5	4	6
	26	11	10	10
Mean ±SE "t"	22.2 ±2.9	10.8±2.4 6.3 *	9.6±1.5 6.7 *	9 ±1.5 5.5 *
Prop. 40 mg/kg	25	10	9	4
	17	8	5	3
	20	10	7	3
	27	11	8	4
	30	13	10	7
Mean ±SE "t"	23.8±1.4	10.4±0.8 8.2 *	7.8±0.9 10.1 *	4.2±0.7 11.03 *

* *P < 0.001*

(n = 10)

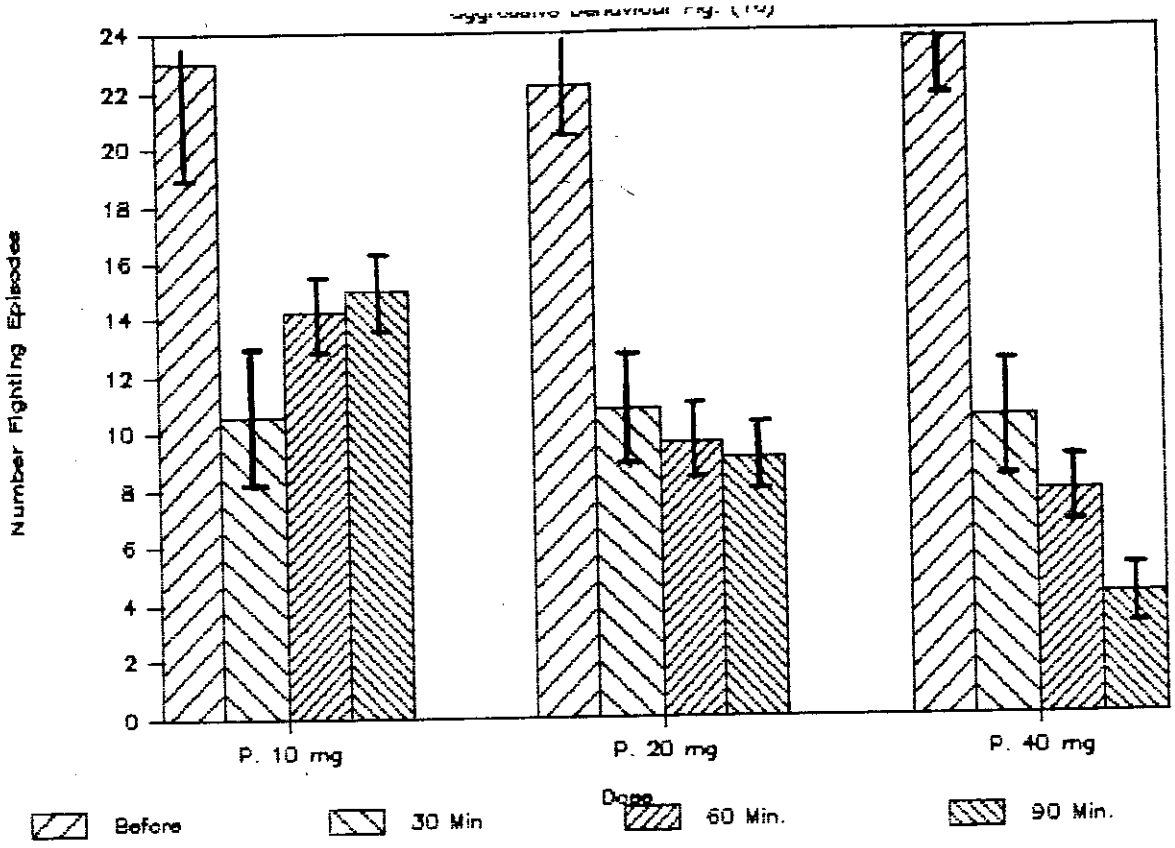

Fig (18) Effect of different doses of propranolol on the foot-shock aggressive behaviour at 30 , 60 & 90 min. after the drug injection .(n = 30)

Effect Of Metoprolol On The foot Shock Induced Aggressive Behaviour .

Metoprolol in doses 15 & 30 mg/kg b. wt. suppressed significantly (P< 0.001) the mean number of fighting episodes during the foot shock electric stimulation after 30 ,60 ,90 min. of metoprolol administration in relation to 0 time (before drug administration) **Tab . (16) Fig . (19) .**

The effect of metoprolol at all times on the mean number of fighting episodes is less than that of chlorpromazine effects .

Tab. (16) *Effect Of the doses of Metoprolol On The Foot Shock Aggressive Behaviour .*

Drugs sc.	Number of fighting episodes during 3 min interval			
	control 0 time	after 30 min	after 60 min	after 90 min
Metop. 15 mg/kg	28	16	14	12
	24	17	7	10
	17	5	3	4
	21	12	9	8
	12	6	4	3
Mean ±SE	22.4 ±3.9	11.2±2.5	7.4±2	7.4±1.7
"t"		6.1 *	4.7 *	6 *
Metop. 30 mg/kg	15	9	9	8
	21	7	8	11
	20	5	4	3
	18	5	5	4
	22	8	7	6
Mean ±SE	19.2±1.2	6.8±0.8	6.6±0.9	6.6±1.4
"t"		7.6 *	7.2 *	6.8 *

* $P < 0.001$

($n = 10$)

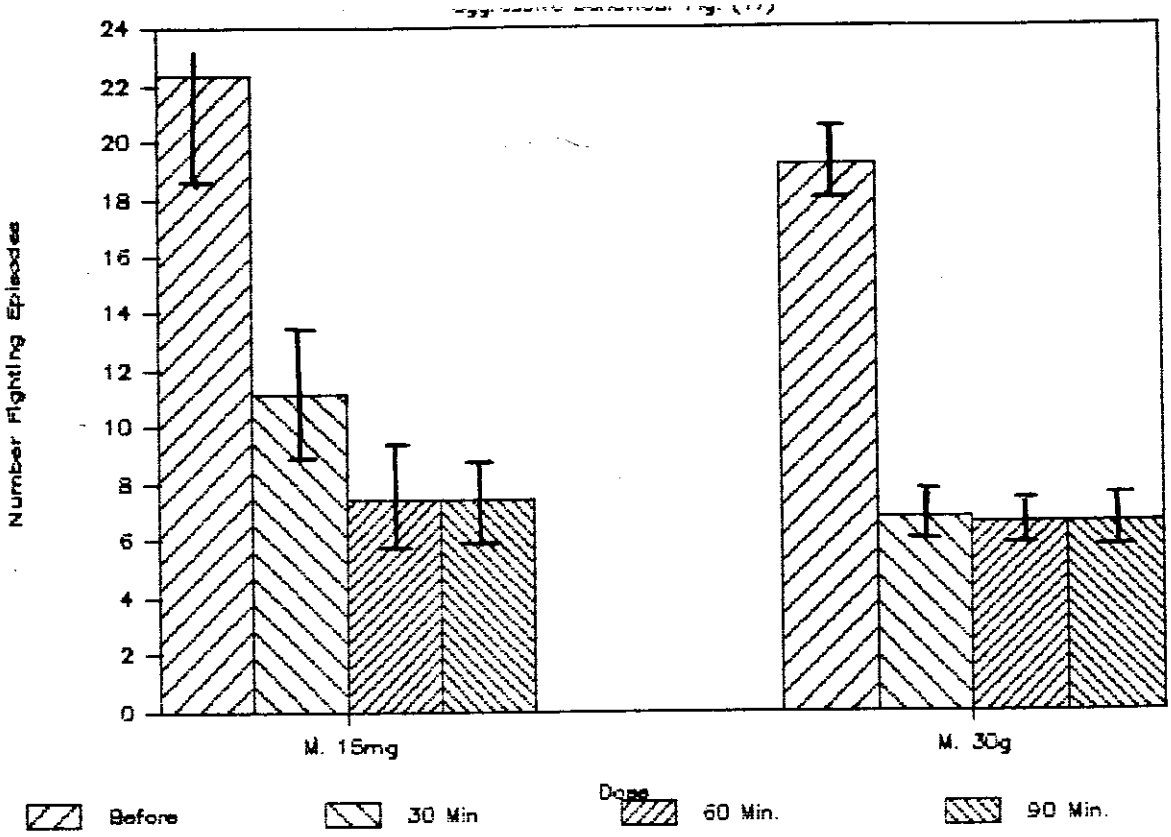

Fig. (19) Effect of different doses of metoprolol on the foot shock aggressive behaviour at 30 , 60 & 90 min. after the drug injection . (n = 30)

Effect Of Combined Chlorpromazine And Propranolol On The Foot Shock Aggressive Behaviour .

Chlorpromazine in a dose 1.5 mg/kg b. wt. combined with propranolol in a dose 10 mg/kg b. wt. were suppressed significantly (P< 0.001) the mean number of fighting episodes during the foot shock electric stimulation in relation to control and significantly (P< 0.001) in relation to that of chlorpromazine alone after 30 ,60 ,90 min. of drugs injection **Tab . (17) Fig . (20) .**

Tab. (17) *Effect Of Comination of Chlorpromazine And Propranolol On Foot Shock Aggressive Behaviour .*

Drugs sc.	Number of fighting episodes during 3 min interval			
	control 0 time	after 30 min	after 60 min	after 90 min
Chlorp. 1.5 mg/kg Prop. * 10 mg/kg	30 24 13 33 25	9 7 5 11 10	0 0 0 0 0	0 0 0 0 0
Mean ±SE "t"	25±3.4	8.4±1 6.6 *	0±0 7.3 *	0±0 7.3 *
"t" & P compared with chlorp. alone		2.8 P<0.05	7.4 P<0.001	5.9 P<0.001

* *P < 0.001*

(n = 10)

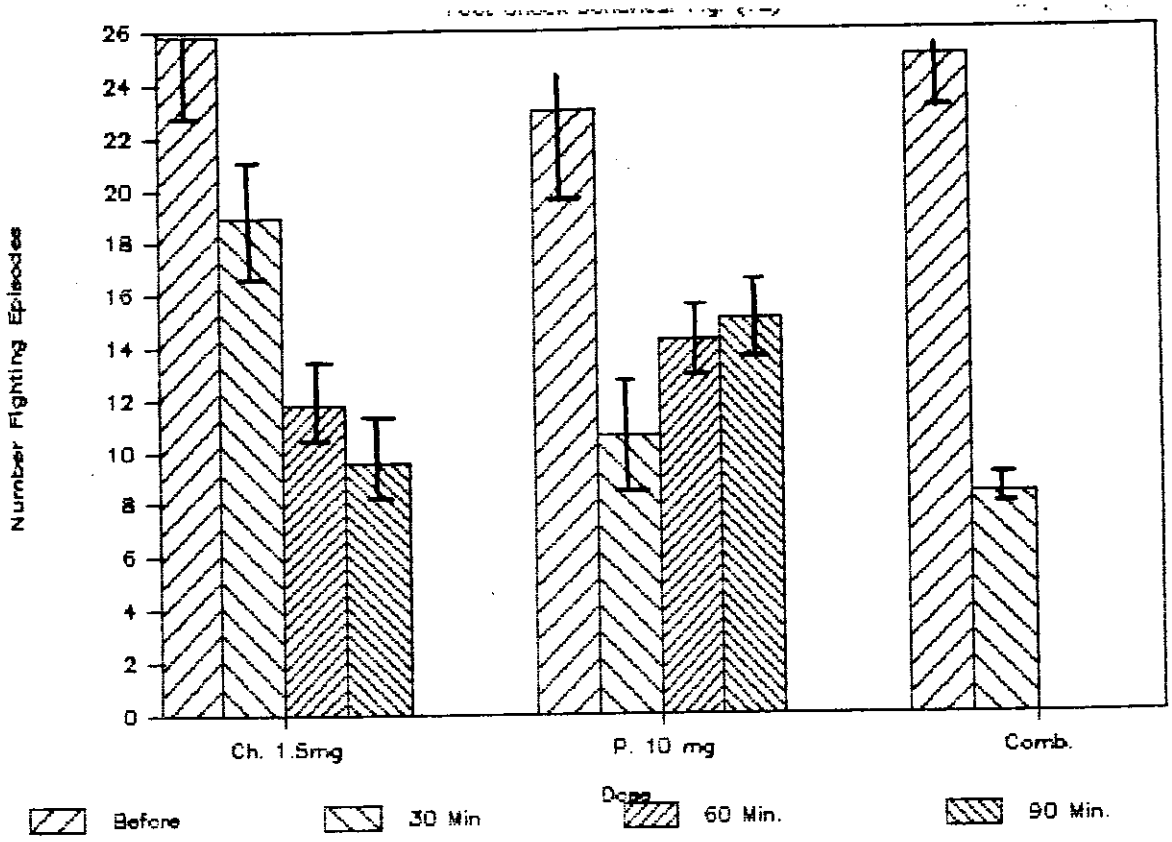

Fig. (20) Effect of combined chlorpromazine (1.5) with propranolol (10) on the foot-shock aggressive behaviour at 30 , 60 & 90 min. after the drug injection .(n = 30)

Effect Of Combined Chlorpromazine And Metoprolol On The Foot Shock Induced Aggressive Behaviour .

The mean number of fighting episodes during the foot shock electric stimulation were suppressed significantly (P< 0.001) after 30 , 60 , 90 min. of combined chlorpromazine (1.5 mg/kg b. wt.) and metoprolol (15 mg/kg b. wt.) in relation to 0 time which served as control and in relation to that of chlorpromazine alone (P< 0.001) **Tab . (18) Fig . (21) .**

Tab. (18) *Effect Of Combination Of Chlorpromazine And Metoprolol On Foot Shock Aggressive Behaviour .*

Drugs sc.	Number of fighting episodes during 3 min interval			
	control 0 time	after 30 min	after 60 min	after 90 min
Chlorp. 1.5 mg/kg	33	9	2	0
	20	8	0	0
Metop.* 15 mg/kg	16	5	1	0
	30	10	1	0
	27	4	1	0
Mean ±SE "t"	25.2±3.1	7.2±1.2 6.8 *	1±0.3 8.2 *	0±0 9 *
"t" & P compared with chlorp. alone		3.1 P<0.05	5.9 P<0.001	5.9 P<0.001

* *P < 0.001*

(n = 10)

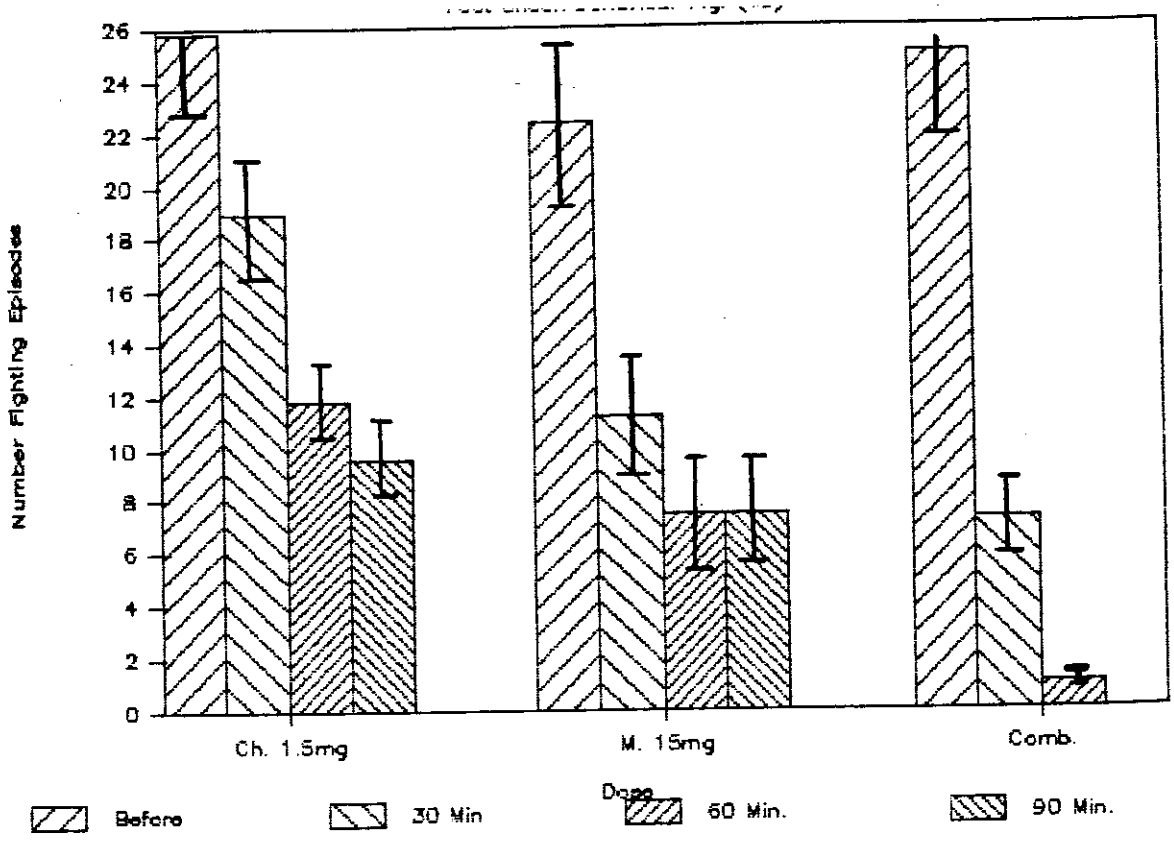

Fig. (21) Effect of combined chlorpromazine (1.5) with metoprolol (15) on the foot-shock aggressive behaviour at 30 , 60 & 90 min. after the drug injection .(n = 10)

PART (3) Effect Of Chlorpromazine , Propranolol And Metoprolol On Aggressive Behaviour Induced By isolation Of Mice .

After isolation of mouse in a separate cage for at least 3 weeks , the isolated mouse invariably displayed great excitability and usually assumed an aggressive posture with a characteristic tail motion and then attacked immediatly the non -isolated mouse , the number of attacks were recorded during 15 min. before administration of any tested drug (0 time which served as control group) and after drugs injection by 30 ,60 ,90 min.

Effect Of Chlorpromazine ,Propranolol ,Combination Of Each On The Mean Number Of Fighting episodes (attacks) .

Chlorpromazine (1.5 mg/kg) decreased significantly (P< 0.001) the mean of fighting episodes at 30 , 60 , 90 min. after its injection . At the same time , propranolol (10 mg/kg) decreased significantly the fighting episodes of mice (P< 0.001)

The number of fighting episodes was suppressed significantly (P< 0.001) after chlorpromazine injection in a dose 1.5 mg/kg b. wt. more than propranolol administration in a dose 10 mg/kg b. wt. at all times , but when combination of each occured , there was marked reduction of fighting episodes to "0" at all times **Tab. (19) Fig. (22) .**

Tab. (19) *Effect Of Chlorpromazine ,Propranolol & Combination Of Each On Mice Aggressive Behaviour Induced by Isolation*

Drugs sc.	Number of fighting episodes during 3 min interval			
	control 0 time	after 30 min	after 60 min	after 90 min
Chlorp. 1.5 mg/kg	25	3	0	0
	40	4	0	0
	33	5	0	0
	29	7	0	0
	17	2	0	0
Mean ±SE	28.8±3.9	4.2±0.9	0±0	0±0
"t"		7	7.5	7.5
Prop. 10 mg/kg	24	10	7	6
	34	13	7	6
	31	17	10	10
	20	9	4	5
	18	7	3	4
Mean ±SE	25.4±3.1	11.2±1.7	6.2±1.2	6.2±1.1
"t"		7.8 *	8.7 *	7.6 *
Chlorp. 1.5 mg/kg Prop.* 10 mg/kg	30	0	0	0
	20	0	0	0
	19	0	0	0
	39	0	0	0
	40	0	0	0
Mean ±	33.8±4.5	0±0	0±0	0±0
"t"		6.6 *	6.6 *	6.6 *
"t" & P compared with chlorp. alone		4.9	9999.9	9999.9
		P<0.001	P<0.001	P<0.001

(n = 10)

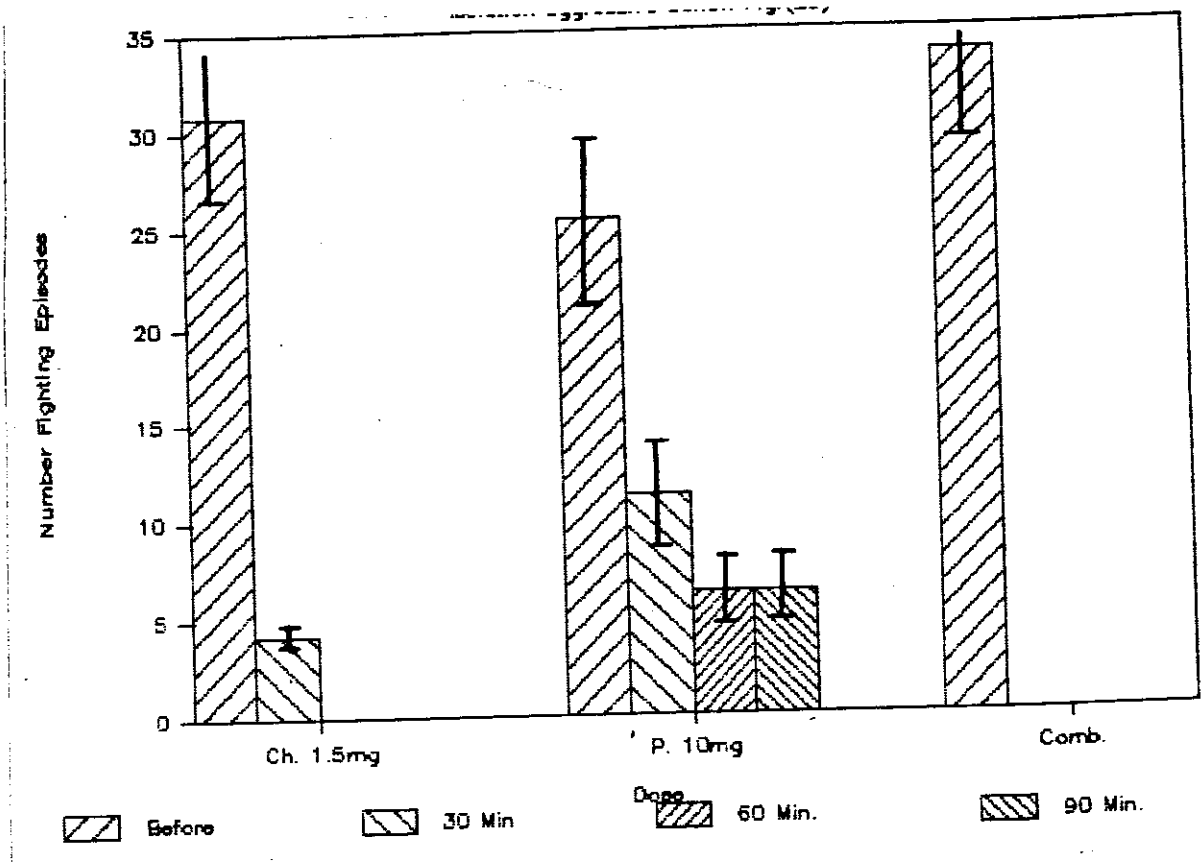

Fig. (22) Effect of chlorpromazine (1.5) , propranolol (10) and combination of each on the isolation induced aggressive behaviour at 30 , 60 & 90 min. after the drug injection

(n = 30)

Effect Of Chlorpromazine ,Metoprolol And Combination Of Each On The Mean Number Of Fighting Episodes .

Chlorpromazine (1.5 mg/kg) decreased significantly (P< 0.001) the mean number of fighting episodes at 30 , 60 , 90 min. after drug injection . At the same time , metoprolol (15 mg/kg) decreased significantly (P< 0.001) the mean number of fighting episodes at 30 ,60 , 90 min. after the drug injection .

Chlorpromazine in a dose 1.5 mg/kg b. wt. suppressed significantly (P< 0.001) the mean number of fighting episodes more than metoprolol injection in a dose 15 mg/kg b. wt. ,but in combination between each drugs , the mean number of fighting episodes was markedly reduced to "0" after all times of drugs injection **Tab. (20) Fig. (23)** .

Tab. (20) *Effect Of Chlorpromazine , Metoprolol & Combination Of Each On Mice Aggressive Behaviour Induced By Isolation*

Drugs sc.	Number of fighting episodes during 3 min interval			
	control 0 time	after 30 min	after 60 min	after 90 min
Chlorp. 1.5 mg/kg	25 40 33 29 17	3 4 5 7 2	0 0 0 0 0	0 0 0 0 0
Mean ±SE "t"	28.8±3.9	4.2±0.9 7 *	0±0 7.5 *	0±0 7.5 *
Metop. 15 mg/kg	42 18 20 33 28	21 0 9 10 9	15 0 8 11 5	13 0 8 11 4
Mean ±SE "t"	28.2±4.4	10.4±3.4 10 *	7.8±2.6 8 *	7.2±2.4 7.3 *
Chlorp. $\frac{1.5}{mg/kg}$ & Metop. $\frac{15}{mg/kg}$	21 30 41 35 19	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Mean ±SE "t"	29.2±4.2	0±0 7 *	0±0 7 *	0±0 7 *
"t" & P compared with chlorp. alone		4.9 P<0.001	9999.9 P<0.001	9999.9 P<0.001

(n = 10)

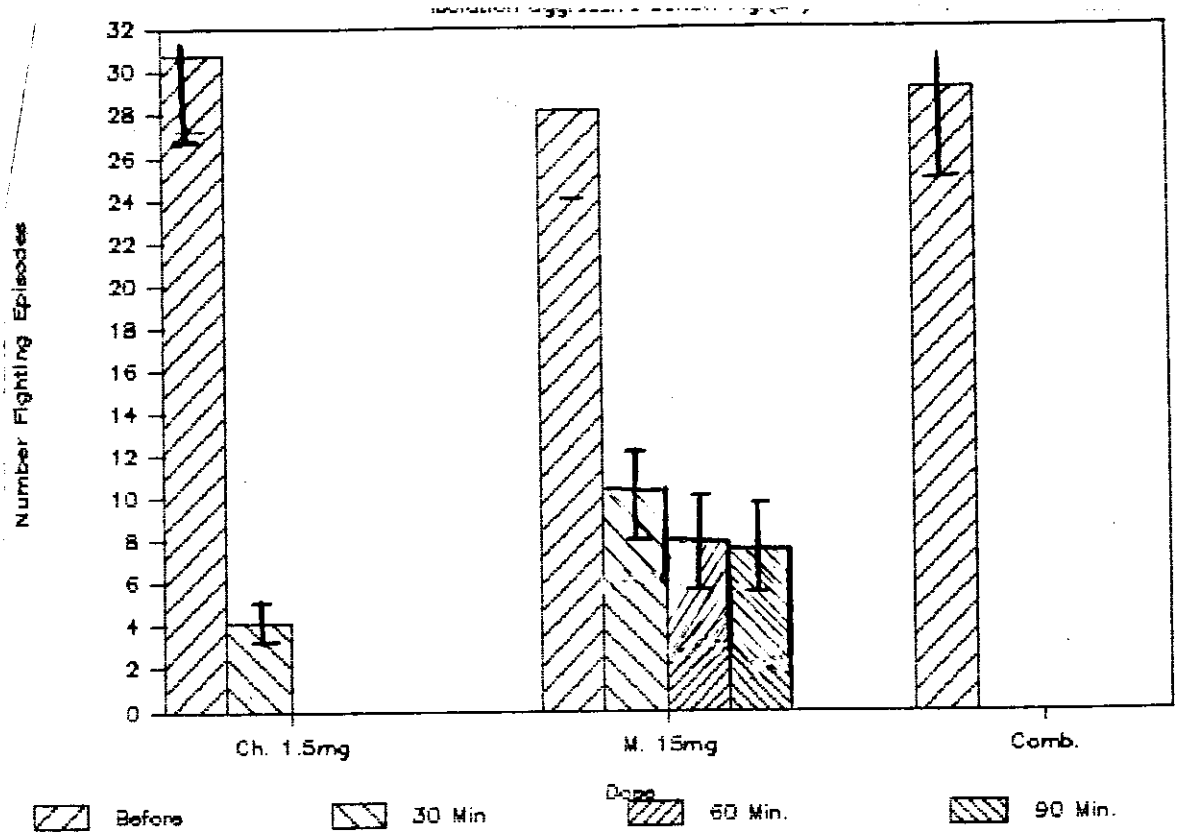

Fig. (23) Effect of chlorpromazine (1.5) , Metoprolol (15) and combination of each on the isolation induced aggressive behaviour at 30 , 60 & 90 min. after the drug injection .

(n = 30)