RESULTS

The study was carried out on 90 diabetic patients. Thses patients were divided into 3 main groups:-

(1) Group I; 30 insulin-dependent diabetic patients (IDDM) with diabetic retinopathy (DR), who were subdivided into other "2" subgroups according to the type of retinopathy: IDDM with background retinopathy (BDR), and IDDM with proliferative retinopathy (PDR).

(2) Group II; 40 non-insulin-dependent diabetic patients (NIDDM) with DR, who were also subdivided into other 3 subgroups: NIDDM with BDR, NIDDM with PDR; and NIDDM with preproliferative retinpathy (PPDR).

Both BDR and PPDR of the NIDDM group were considered in one subgroup as non- proliferative diabetic retinopathy to facilitate comparison with the same subgroup in IDDM patients.

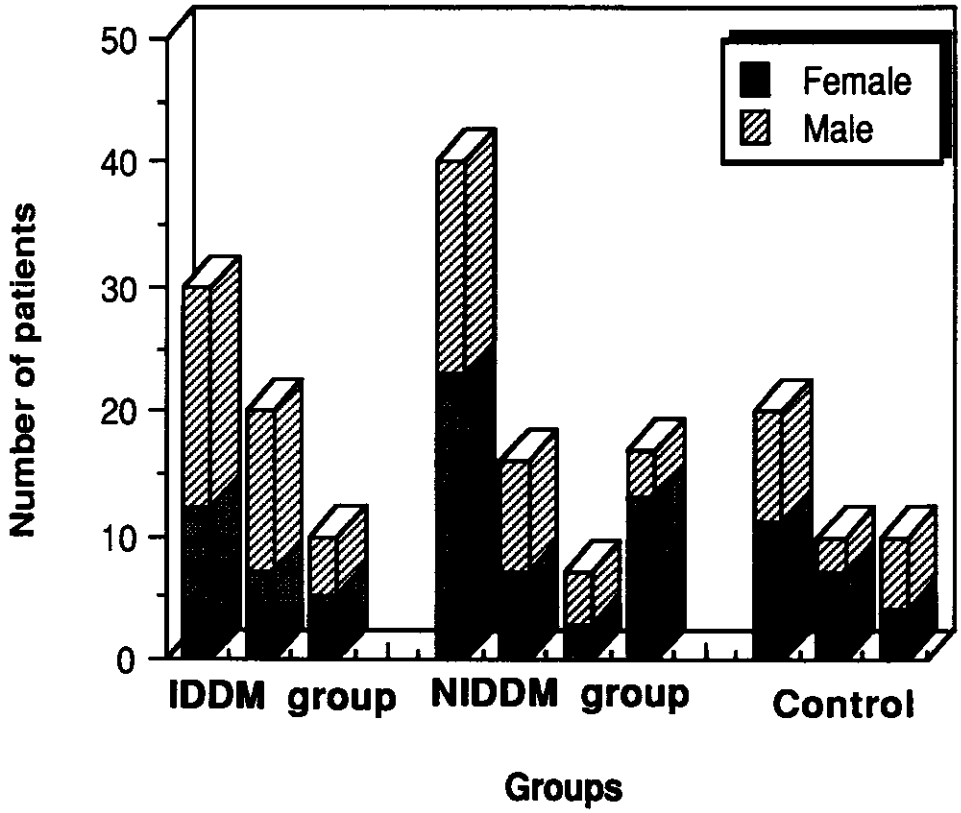
(3) Group III; control group of both IDDM patients (10 patients) and NIDDM patients (10 patients) who have minimal change or no change of DR.

Table (1) & Figure (1) show this division with refernce to male & female distribution among these groups.

Table (1): Number of patients in the main groups and subgroups with reference to female(♀) and male(♂) distribution.

IDDM (30 Patients)				NIDDM (40 patients)						Control (20)			
BDR (20)		PDR (10)		BDR (16)		PPDR (7)		PDR (17)		IDDM (10)		NIDDM (10)	
♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
7	13	5	5	7	9	3	4	13	4	7	3	4	6

Fig. (1) **Female : Male distribution in studied groups**



All these patients were subjected to multiple variable analysis concerning all possible medical factors that could lead to, share in, or help progression of DR. There were 23 variables for that analysis. These varibles include the following:-

(A) Time- related variables, including age of patient at time of examination' age of the patient at onest of diabetes, and duration of diabetes.

(B) Other clinical information, mainly hypertension represented by both systolic and diastolic readings of blood pressure.

(C) Associated nephropathy; represented by creatinin measurement and presence of proteinuria.

(D) Treatment received by the patient, whether insulin or oral hypoglycemics. For comparison between both, ranking system was used.

(E) glycemic control; represented by fasting (FBS) and post prandial glucose measurments (PPBS) and also by glycoselated hemoglobin (HbA1c) measurement.

(F) Blood lipids measurements, including total lipids total cholesterol, triglycerides, HDL- cholesterol, and LDL-cholestrol.

(G) Immunological studies including IgG, IgA, IgM, C3, C4, and cIc measurements.

(H) HLA- typing im different groups.

All variables were expressed finally as means. Collected data were statistically analysed using the "F" test according to wiley, J. (1978). In case where the test revealed significance, LSD (Least significance difference) at 5% level of probability, as well as LSD at 1% level of probability (in case of highly significant difference) were compluted to elucidate the magnitude of results.

The reults show the following

(A) Time related variables

Significance of time related variables in the main groups is shown in table (2); while significance of these variables in different subgroups is shown in table (3). Figures (2) and (3) also illustrate these findings.

Table (2) : Time - related variables and their significance in retinopathy in main groups.

group / Variable	IDDM	NIDDM	Control	F. test	L.S.D. 5%	L.S.D. 1%
Age	36.73	57.32	46.30	* *	3.97	5.27
Duration	16.10	12.78	13.00	* *	1.79	2.38
Age onset	20.63	44.55	33.30	* *	3.50	4.64

Where N.S = Non - significant

* = significant

** = Highly significant

Table (3): Time related variables and their significance in retinopathy in different subgroups.

group / Variable	IDDM		NIDDM		Control	F. test	L.S.D. 5%	L.S.D. 1%
	BDR	PDR	BDR	PDR				
Age	36.30	37.60	57.83	56.30	46.30	* *	5.49	7.29
Duration	15.80	16.70	12.78	12.76	13.00	* *	2.47	3.27
Age onset	20.50	20.90	45.04	43.88	33.30	* *	4.84	6.42

Fig. (2) : Time related variables

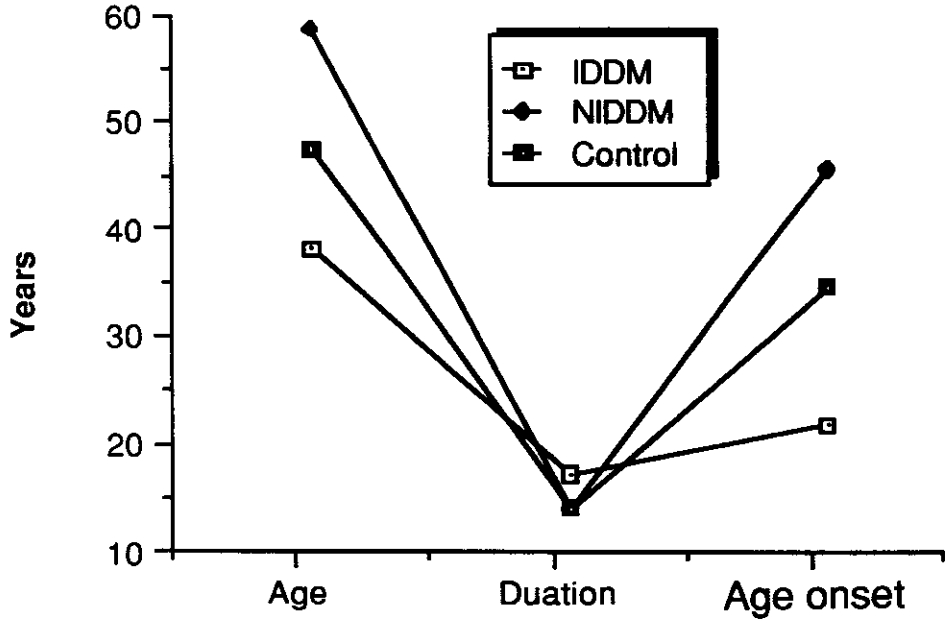
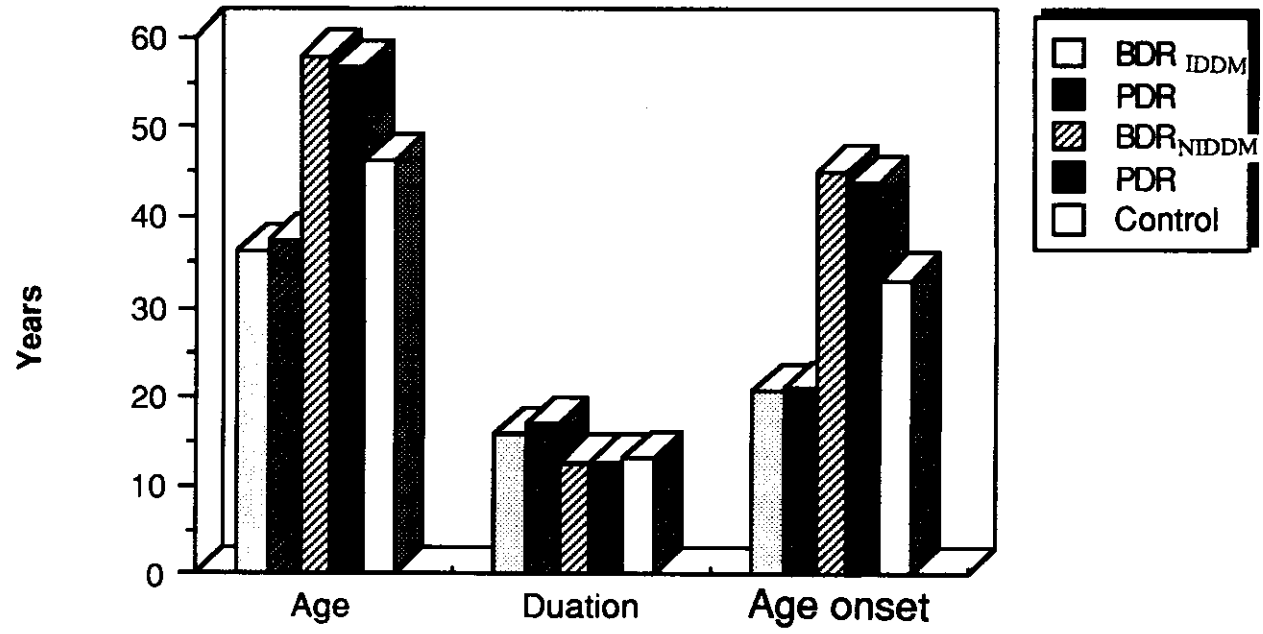


Fig. (3). Time related variables



As shown in both tables; ***age of the patients,*** as shown in the main groups and in the subgroups (whether BDR or PDR of both types) was found to be a major risk facter for developing retinopathy.

Duration of diabetes was found to be highly significant factor in IDDM group (whether inducing BDR or PDR) but not significant in NIDDM group., being more significant in PDR of IDDM then BDR of the same group.

Age at onset of diabest was found to be of highly significance in relation to IDDM and NIDDM groups. Highest significance was in the BDR of IDDM group.

(B) Hypertension

Systolic and diastolic blood pressure and their significance is shown in tables (4) & (5). Figures (4) & (5) also illustrate these findings.

Systolic blood pressure was significant in NIDDM group, being also highl;y significant in each subgroup of NIDDM patients. It was also highly significant in the proliferative group of IDDM patients.

Diastolic blood pressure was non- significant in both IDDM & NIDDM groups. But as a risk factor for PDR of IDDM subgroup, it is considered highly significant factor.

So, hypertension could be considered as a risk facter mainly for PDR of IDDM patients.

Table (4): Relation of hypertension to prevalence of retinopathy in main groups.

group / Variable	IDDM	NIDDM	Control	F. test	L.S.D.	
					5%	1%
Sys. B.P.	144.27	152.02	134.50	*	11.31	--
Dias. B.P.	89.90	90.32	87.50	N.S.	--	--

Table (5): Relation of hypertension to prevalence of retinopathy in different subgrogroups.

group / Variable	IDDM		NIDDM		Control	F. test	L.S.D.	
	BDR	PDR	BDR	PDR			5%	1%
Sys. B.P.	137.00	158.80	152.00	152.06	134.50	* *	9.09	12.07
Dia. B.P.	84.50	100.70	91.09	89.25	87.50	* *	7.68	10.19

Fig. (4). Blood pressure in studied groups

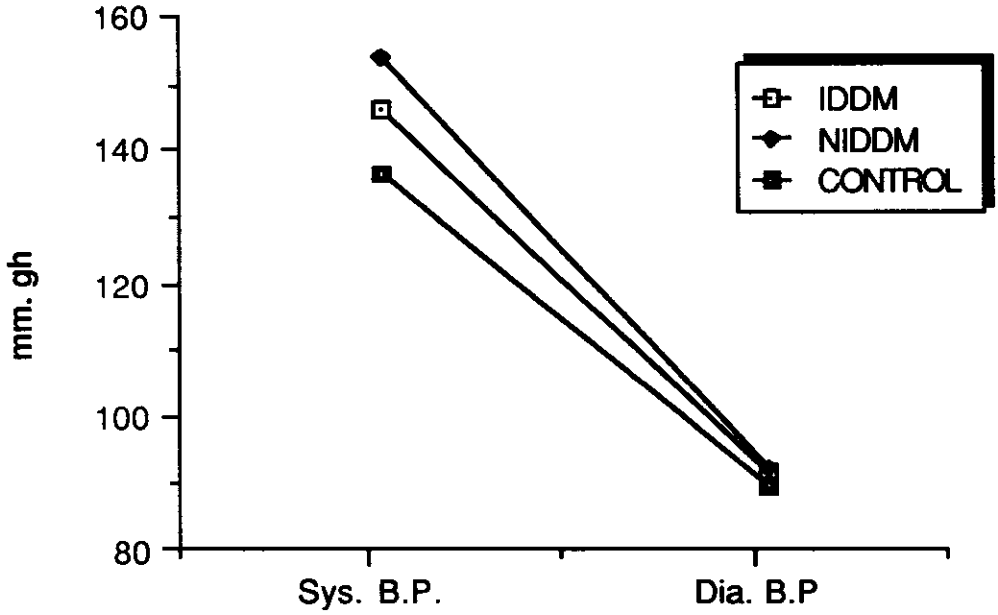
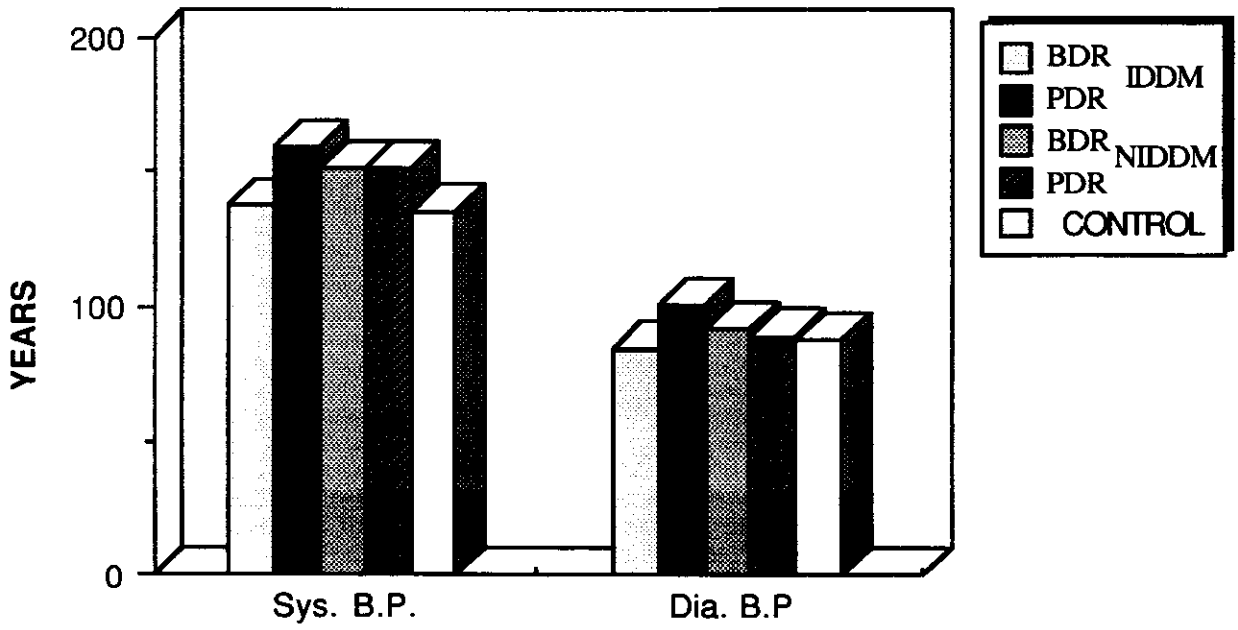


Fig (5). Blood presure in subgroups



(C) Associated Nephropathy

Tables (6) , (7) & (8) show significance of creatinin and presence of proteinuria in association with retinopathy in main groups and subgroups. These relations are also illustrated by figures (6), (7) & (8).

As shown in table (6), creatinin was not found to be of significance as an index of nephropathy, inducing retinopathy. Highest levels, however, was present in the NIDDM group, especially the PDR subgroup.

Concerning ***proteinuria,*** which is also considered as an index of nephropathy; tables (7) & (8) is showing number of patients with proteinuria among main groups & subgroups respectively.

As shown from the tables, about 30% of IDDM patients had positive Albustix proteinuria compared to 37% of the NIDDM group & 15 % of control group.

This figure is completly changing concerning the subgroups. As shown in table (8), about 60 % of IDDM patients with PDR showed proteinuria. Also, same type of NIDDM group is showing high %, 52.9%.

Of importance to mention that also BDR of both groups has a remarkable %, but BDR of NIDDM was found to be higher than that of IDDM, in the contrary to PDR of these groups.

This means that, although creatinin not proved significance as

index of nephropathy, a risk that may lead to retinopathy; proteinuria which is also considered an index of nephrophathy could be of value as a risk for retinopathy.

Tables (6): Relations of creatinin as index of nephropathy to retinopthy.

group / Variable	IDDM		NIDDM		Control	F. test	L.S.D.	
							5%	1%
Creat	1.03		1.23		1.09	N.S.	--	--
	BDR	PDR	BDR	PDR				
Creat	0.98	1.15	1.19	1.29	1.09	N.S.	--	--

fig. (6). Creatinin in studied patients and control

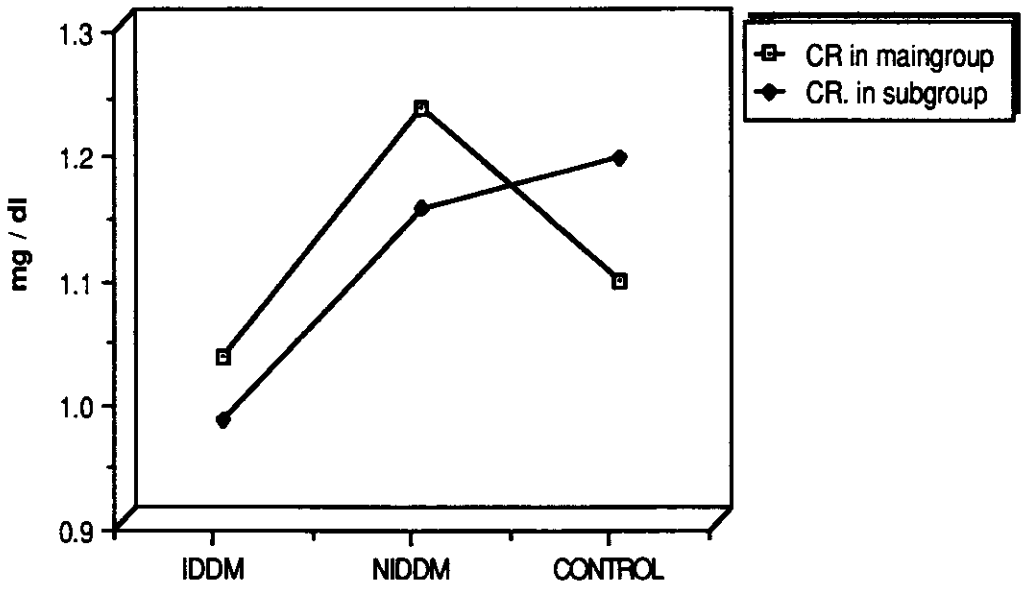


Table (7): Prevalence of proteinuria in diabetics with and without retinopathy

Variable \ group	IDDM	NIDDM	Control
No. of patient	9 / 30	15 / 40	3 / 20
%	30 %	37 %	15 %

Fig. (7). Proteinuria prevalence in main groups

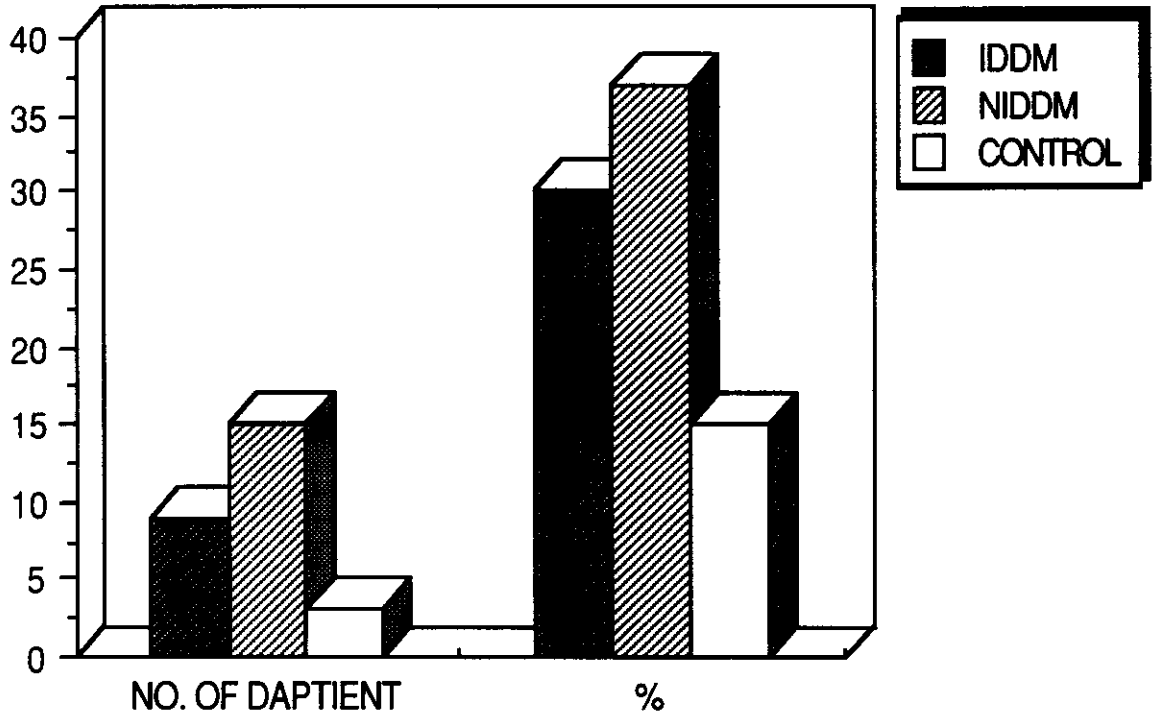
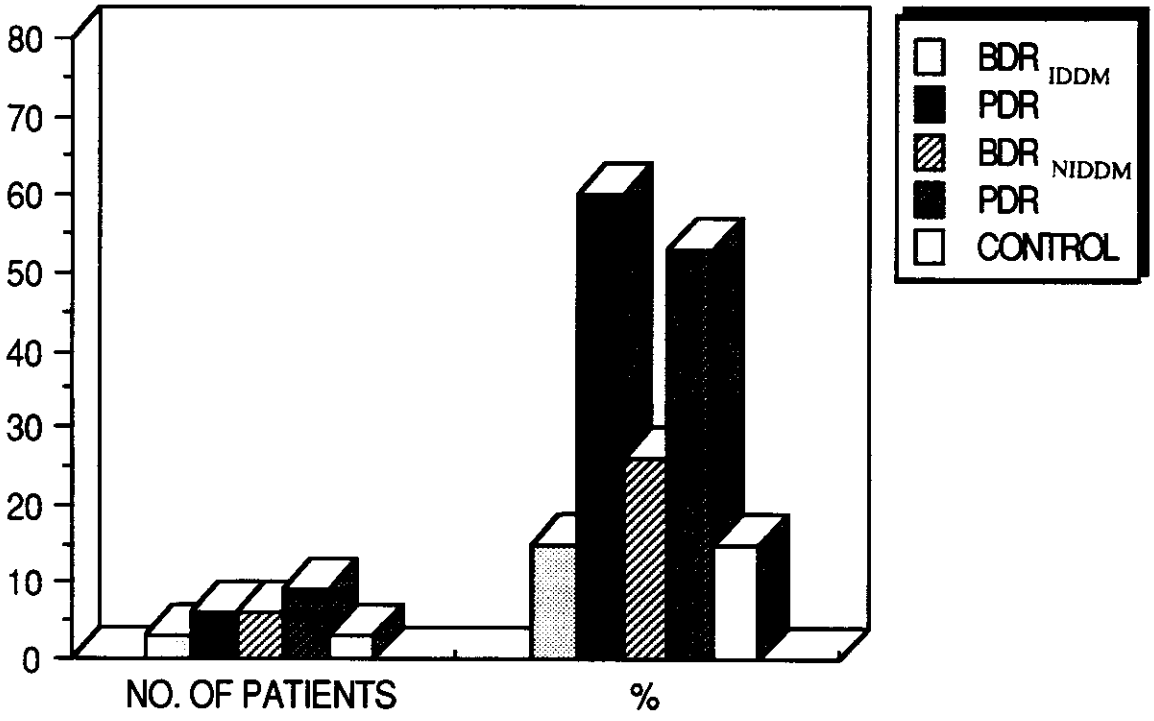


Table (8): Prevalence of proteinuria in different subgroups of retinopathic patients.

group / Variable	IDDM		NIDDM		Control
	BDR	PDR	BDR	PDR	
No. of patient	3 / 20	6 /10	6 / 23	9 / 20	3 / 20
%	15 %	60 %	26.08 %	52.9 %	15 %

Fig. (8). Proteinuria prevalence in subgroups



(D) Treatment

Tables (9) & (10) show difference between main groups & subgroups concerning treatment used for diabetes mellitus. As altready known, treatment of IDDM patients is mainly by insulin (whether short, medium, or long acting)which is calculated as total units/day that could achive glycemic control.

The case is different in NIDDM patients, where either insulin or most probly oral hypoglycemics could be used. so, for comparison with the IDDM group, a ranking system comparing strength of oral durugs related to the number of patients using them, to insulin units, is used.

As shown in table (9), higher units was required for IDDM group to slow down the disease proces, in contrast to NIDDM or control groups.

This means that treatment could be of risk in inducing retinopathy as higher units were required for treating patients with retinopathy in IDDM group compared to control group .

Also, treatment offered to NIDDM group was too low to slow down retinopathy in relation to control group.

This idea is more clarified in the subgroups as shown in table (10) where higher units were needed for PDR of IDDM group; where lower units were given for PDR of NIDDM group. Also whithin the same group, PDR was always found to show higher units more than BDR subgroup.

Table (9): Treatment in diabetic patients complicated with retinopathy and its relation to metabolic control.

group / Variable	IDDM	NIDDM	Control	F. test	L.S.D. 5%	L.S.D. 1%
Treatment ranking	52.00	22.05	41.30	**	9.02	11.97
F.B.S.	197.80	168.62	138.50	**	28.86	31.50
P.P.B.S.	290.43	276.12	197.50	**	39.82	52.83
Hb A1c	9.99	9.66	8.81	**	0.67	0.89

Table (10): Treatment in diabetic patients complicated with retinopathy and its relation to glycemic control in different subgroups.

group / Variable	IDDM		NIDDM		Control	F. test	L.S.D.	
	BDR	PDR	BDR	PDR			5%	1%
Treatment ranking	45.50	65.00	23.65	19.88	41.30	**	5.93	7.87
F.B.S.	198.80	195.80	172.74	163.06	138.50	**	39.90	----
P.P.B.S.	303.35	264.60	278.00	273.5	197.50	**	54.63	72.47
Hb Aic	10.10	9.78	9.30	10.14	8.81	**	0.90	1.20

Fig (9). Glycemic control in relation to treatment

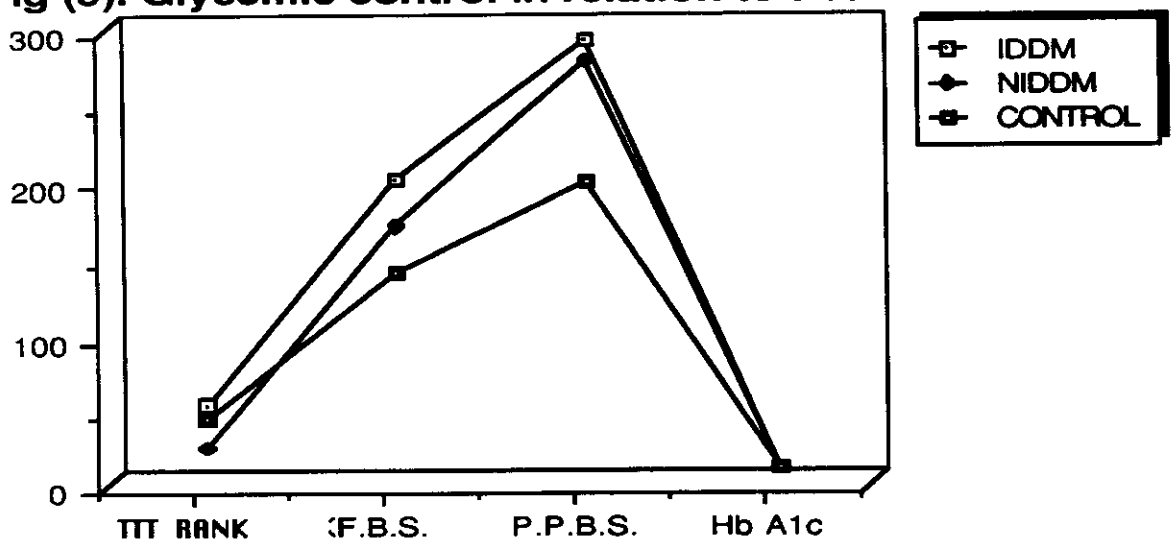
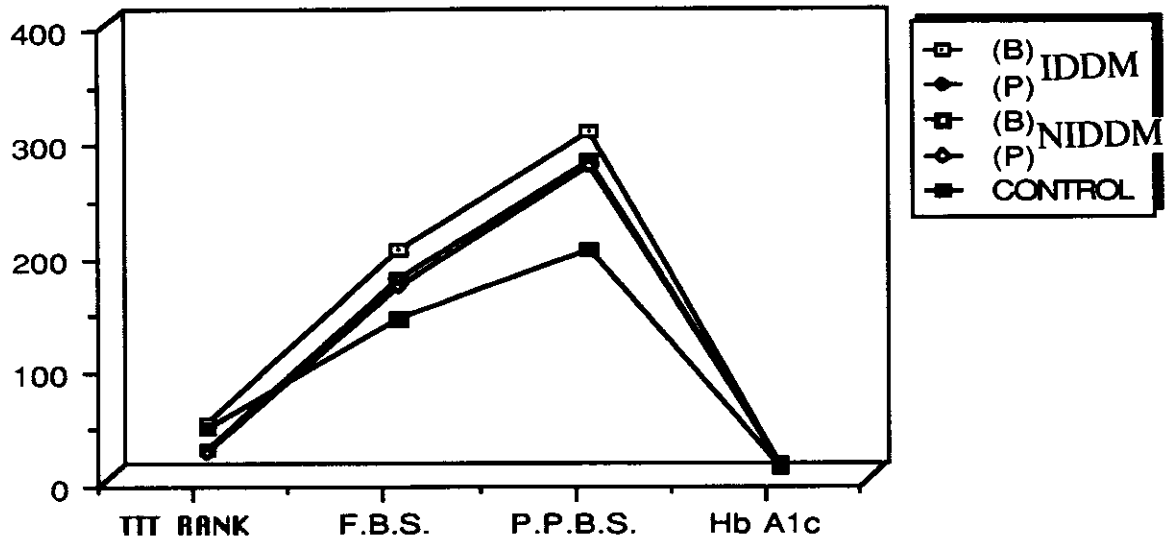


Fig. (10). Glycemic control with treatment in subgroups



(E) Glycemic control

Tables (9) & (10) show the following facts:-

(1) Concerning ***fasting blood sugar*** (F.B.S.), a significance was found concerning IDDM & NIDDM groups, being highly significant for IDDM group. Also, same significance is present in the subgroups, although highest, mean level was for BDR subgroup in IDDM patients.

(2) Concerning ***postprandial blood surgar*** (PPBS), it was found to be highly significant in relation to both IDDM & NIDDM grroups. The same also was found in all subgroups except for PDR of IDDM group which was found to be significant (not highly significant).

(3) As regards ***glycoselated hemoglobin*** (Hb A1c); significance was clearly shown, being highly in IDDM group. The same is applied to subgroups but with non- significance of BDR of NIDDM group. It is of importance to mention that highest level of this test was found in PDR of NIDDM group. Also, it is noticed that value of this is more in BDR of IDDM group them in PDR of the same group.

We could cenclude that hyperglycemia represented by FBS, PPBS, and Hb A1c is considered of risk in retinopathy whatever type of diabets or retinopathy.

(F) Blood lipids

Tables (11) & (12) show the following facts:-

(1) ***Total lipids*** were found to be of significance in IDDM group and of high significance in PDR of IDDM group. The other group NIDDM or subgroups (including BDR of IDDM) show no significance in relation to this test.

(2) ***Total cholesterol*** was found to be of significance as a risk factor for retinopathy. It was found to be highly significant in both the main groups IDDM & NIDDM, BDR and PDR of IDDDM, and significance in BDR and PDR of NIDDM. The highest mean was related to PDR of IDDM group.

(3) ***Triglycerdes*** (Triges), was also found to be of high significance in relation to all groups and sub groups, giving highest means value to PDR such group of IDDM patients.

(4) ***HDL & LDL cholesterol,*** were of no significance as risk factors for retinopathy in spite of increased levels of cholesterol and triglycerdies and also of being not much reduced to an extent lesser then that of the control group. It is of importance to mention that all values of HDL (whether in main groups or subgroups) were found to be at same means, being always less in control than affected diabetics. But in relation to L DL, variations were noticed, being higher in PDR of IDDM group than all other groups. Also all results concerning LDL were higher in affected diabetics than cont

Table (11): Plasma lipids in reinopathic patients from the main groups.

group / Variable	IDDM	NIDDM	Control	F. test	L.S.D. 5%	L.S.D. 1%
Total lipids	871.90	838.22	786.50	*	59.98	----
Cholest.	240.87	234.70	208.00	* *	15.72	20.86
Triges.	142.53	145.68	103.50	* *	16.00	21.22
HDL	44.93	45.22	43.90	N.S.	----	----
LDL	167.43	160.34	143.4	N.S.	----	----

Table (12): Plasma lipids in reinopathic patients in different subgroups.

group / Variable	IDDM		NIDDM		Control	F. test	L.S.D. 5%	L.S.D. 1%
	BDR	PDR	BDR	PDR				
Total lipids	831.60	925.50	844.43	829.8	786.50	* *	79.52	105.49
Cholest.	236.00	250.60	236.17	232.71	208.00	* *	21.57	28.62
Triges.	136.65	172.24	146.00	145.26	103.50	* *	21.89	29.06
HDL	45.35	44.10	45.78	44.47	43.90	N.S.	----	----
LDL	163.32	172.24	161.19	159.18	143.4	N.S.	----	----

Fig (11). Plasma lipids in main groups

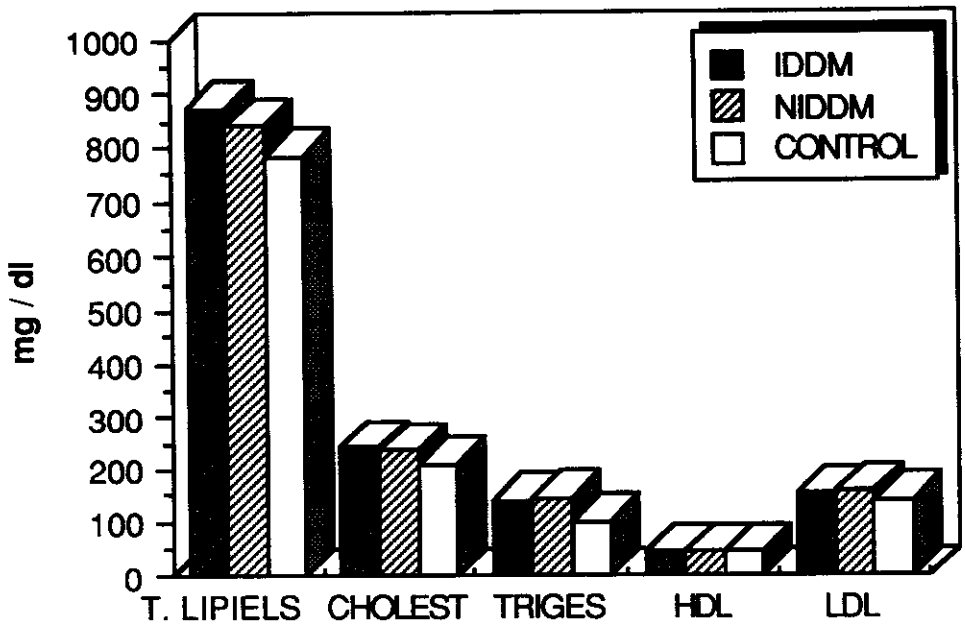
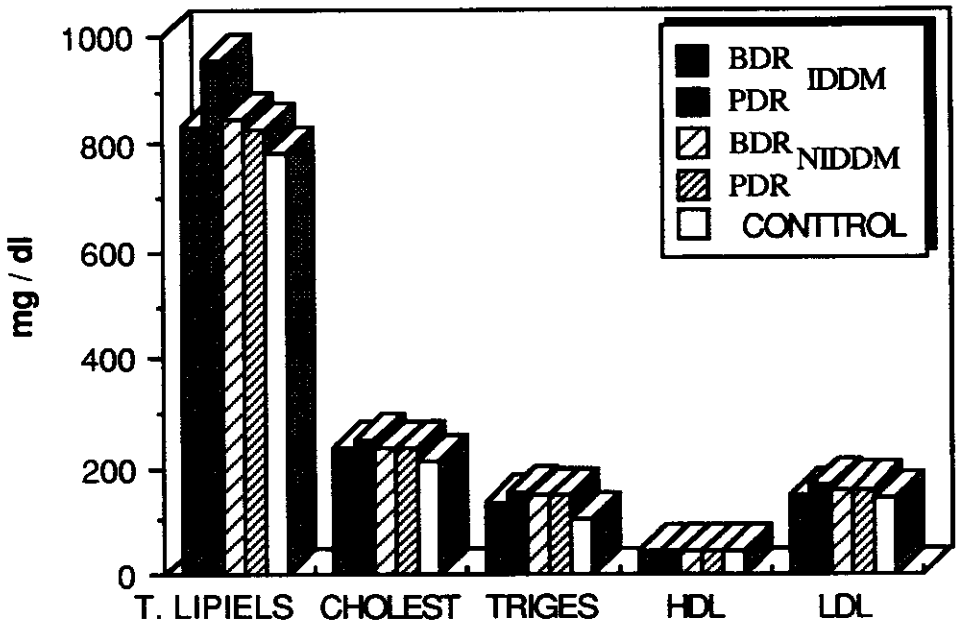


Fig (12). Plasma lipids in subgroups



(G) Immunological Findings:-

Tables (13) & (14) show the following facts:-

(1) *IgG*, was non-significant in relation to groups IDDM &NIDDN. It was highly significant in relation to subgroups; BDR & PDR of IDDM group; and BDR and PDR of NIDDM group.The highest mean value was in BDR variety of IDDM group; while lowest value was that of PDR variety of IDDM group.

(2) *IgA*,, was found to be highly significant in relation to the main groups IDDM and NIDDM. It was also found to be highly significant in relation to all subgroups. The highest value was found in PDR of NIDDM group and lowest value was found in BDR of same group. Both BDR and PDR of IDDM group were found to be almost always similar.

(3) *IgM*, , were found to be of highly significance of all groups and subgroups. Almost always all means were similar, BDR variety of IDDM group being the highest.

(4) *C3*, was non-significant in IDDM and NIDDM groups. On the contrary, it was highly significant in all other subgroups, being higher in BDR of NIDDM and that of IDDM respectively.

(5) *C4*, was highly significant in all groups & subgraups. The highest mean values were that of PDR variety of NIDDM and that of IDDM groups.

(6) *CICs*, were found highly significant in all groups and

subgroups. The highest mean value was of BDR of IDDM group, while the lowest was that of PDR of NIDDM group. It was noted also that values of PDR variety, of IDDM group, was lesser than that of BDR of same group, on the contrary of NIDDM group, in which PDR variety was found to be lesser than that of BDR.

Table (13): Immunogbbulin levels, complement and circulating immune complex in retinopathic patients in main groups.

group / Variable	IDDM	NIDDM	Control	F. test	L.S.D. 5%	L.S.D. 1%
IgG	12.31	11.88	11.43	N.S.	----	----
IgA	2.05	2.03	1.42	* *	0.28	0.37
IgM	2.23	2.12	1.58	* *	0.25	0.33
C3	0.80	0.83	0.80	N.S.	----	----
C4	0.34	0.36	0.26	* *	0.03	0.04
CIC	21.20	20.08	14.30	* *	2.52	3.35

Fig (13). Ig-, C-, CIC levels in main groups

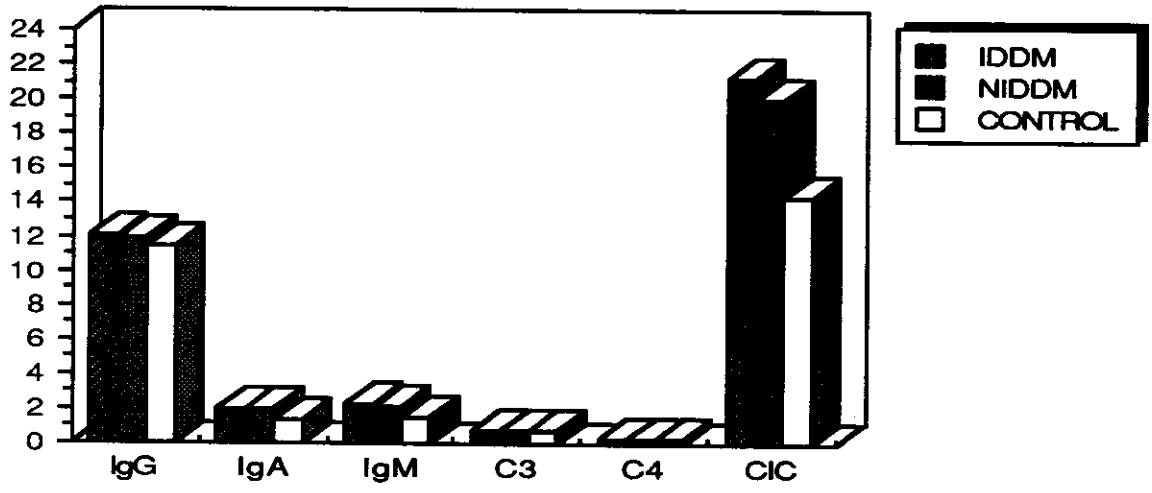
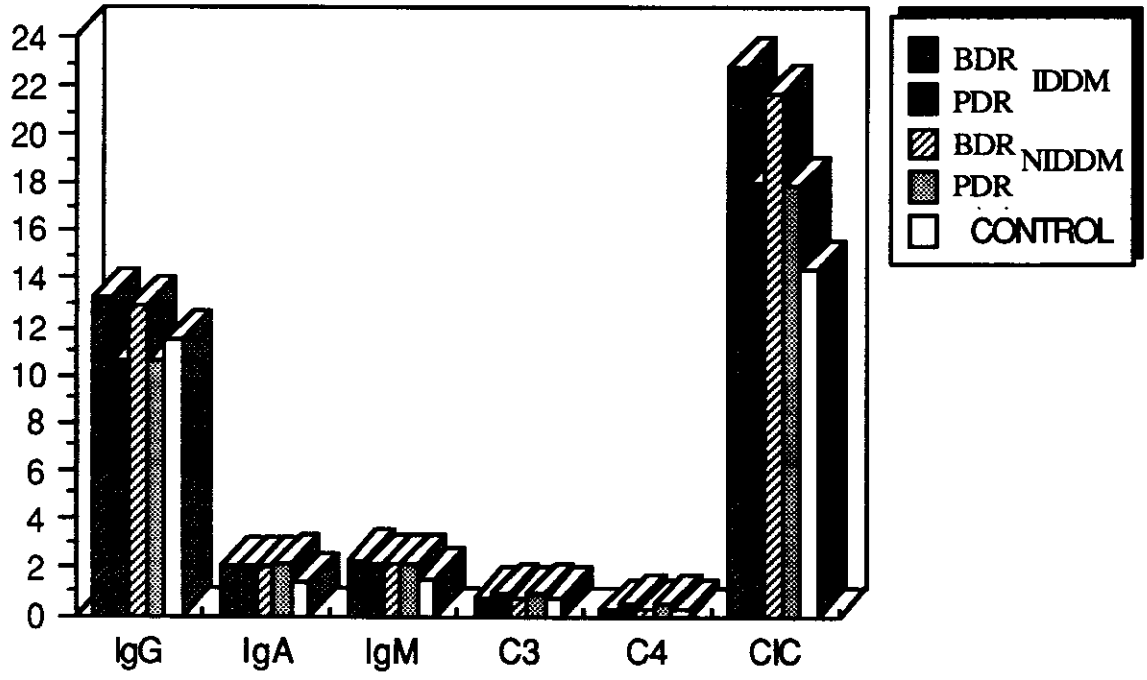


Table (14): Immunoglobulin levels, complement and circulating immune complex in retinopathic patients in different subgroups.

Variable \ group	IDDM		NIDDM		Control	F. test	L.S.D.	
	BDR	PDR	BDR	PDR			5%	1%
IgG	13.12	10.60	12.81	10.61	11.43	**	0.58	0.77
IgA	2.05	2.04	1.95	2.13	1.42	**	0.07	0.09
IgM	2.25	2.20	2.12	2.12	1.58	**	0.06	0.08
C3	0.73	0.94	0.73	0.97	0.80	**	0.05	0.07
C4	0.31	0.42	0.31	0.43	0.26	**	0.03	0.04
CIC	22.75	18.10	21.70	17.88	14.30	**	3.25	4.31

Fig (14). Ig-, C-, CIC in subgroups



(H) HLA-typing

Tables (15) & (16) show the prevalence of HLA-antigens in IDDM and NIDDM patients with retinopathyof either BDR or PDR categories.

Concerning IDDM group ; increased frequencies of DR3, B8, DR1, A28, A2, B5, and CW2 in that order of frequency were noticed. Combinations of B14/B8 and DR3/DR4 were found to exist more than any other combination.

For the BDR of this group (IDDM), increased frequencies of B8, DR3, DR1, A2, B5, and CW2 respectively, were noticed. Lowest frequenc was for BW35. Also, the highest combination was for B14/B8 type.

For the PDR of the same group (IDDM), increased frequencies of DR3, A28, A1, B8, B12, and DR4 were existing in this respect. Decreased frequencies were for A9, DR5, and DR7. Types like A10 and DR2 were showing no existence at all. Also, itws noticed that combination like DR3/DR4 was found to exist in a recognizable percentage among these patients.

Concerning NIDDM group ; frequency of HLA antigens was completely different. Increased frequencies of B12, A1, BW21, DR1, BW6, DR3, A2, DR4, and CW3 respectively, were found to exist. Decreased frequencies of A10, BW4, and A9 were also noticed. Combinations like B12/BW21, A1/A2, and DR3/DR4 respectively were recognized in this group.

For the BDR of that group (NIDDM), increased frequencies of B12, BW6, A1, DR1, A2, CW3, and DR4 were found in this respect. Lowest frequencies were for A9 and BW4. B12/BW21 combination was also existing in high percentage. DR3/DR4 was found in low percentage.

For the PDR of the same group (NIDDM), increased frequencies of DR1, A1, B12, DR3, A2, and BW4 were noticed. Lowest frequencies were for B5, CW4, and DR7. As for combinations, A1/A2, B12/BW21, and DR3/DR4 were found to exist in the same frequency for all of them, but not in a recognizable percentage.

As noticed in the tables, differences of antigens present in IDDM or NIDDM groups were clear. Also, among the subgroups of these patients, differences were recognized.

Table (17) shows the prevalence of HLA-antigens in the control group of diabetics without retinopathy. As shown in this table; increased frequencies of A1, A2, DR1, CW2, DR4 were noticed. DR5 was absent in this control group.

All of these results are illustrated by diagrams as shown in Figures(15), (16), (17) & (18) for IDDM group, and figures (19), (20), (21) & (22) for NIDDM group.

Table (15) : Prevalence of HLA - antigens in retionpathic IDDM group and its subgroups.

HLA	IDDM (30)		BDR (20)		PDR (10)	
Antigens	No.	%	No.	%	No.	%
A1	8	26.6	4	20	4	40
A2	10	33.3	7	35	3	30
A9	5	16.6	4	20	1	10
A10	4	13.3	4	20	0	0
A28	11	36.6	6	30	5	50
B5	10	33.3	7	35	3	30
B8	15	50	11	55	4	40
B12	7	23.3	3	15	4	40
B14	9	30	6	30	3	30
BW4	4	13.3	2	10	2	20
BW6	7	23.3	5	35	2	20
BW35	3	10	1	5	2	20
CW2	10	33.3	7	35	3	30
CW3	5	16.6	3	15	2	20
CW4	6	20	4	20	2	20
DR1	13	43.3	9	45	4	40
DR2	3	10	3	15	0	0
DR3	17	56.6	10	50	7	70
DR4	7	23.3	4	20	3	30
DR5	5	16.6	4	20	1	10
DR7	4	13.3	3	15	1	10

Fig (15). HLA - A prevalance in IDDM group

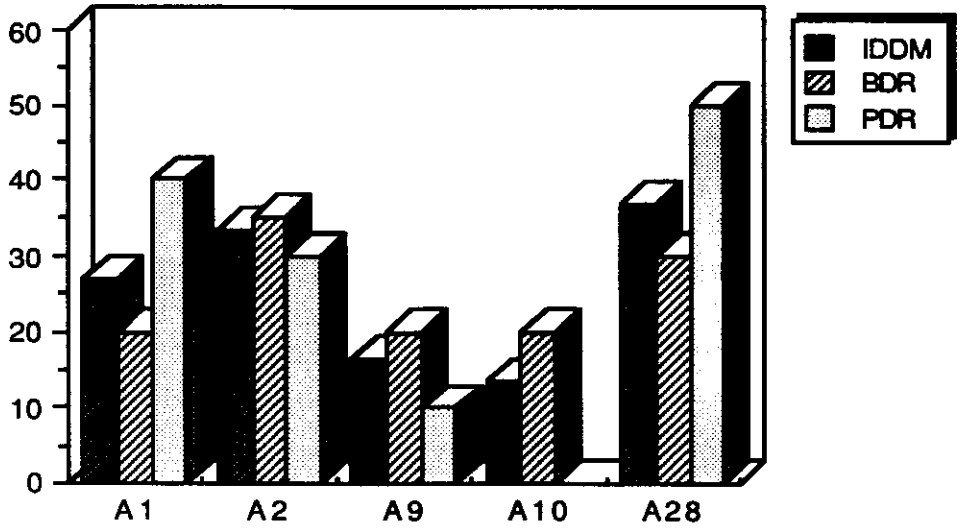


Fig. (16). HLA-B prevalence in IDDM group

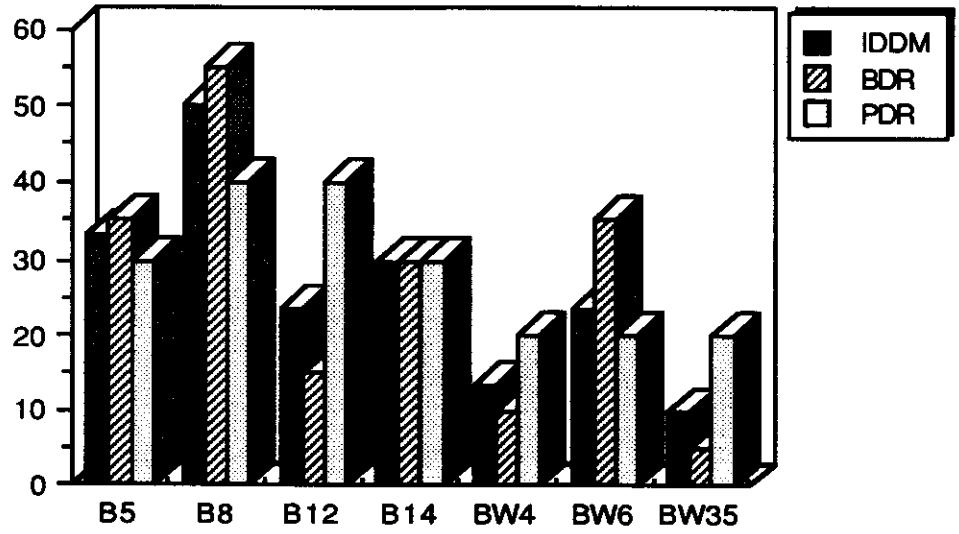


Fig (17). HLA- C prevalance in IDDM group

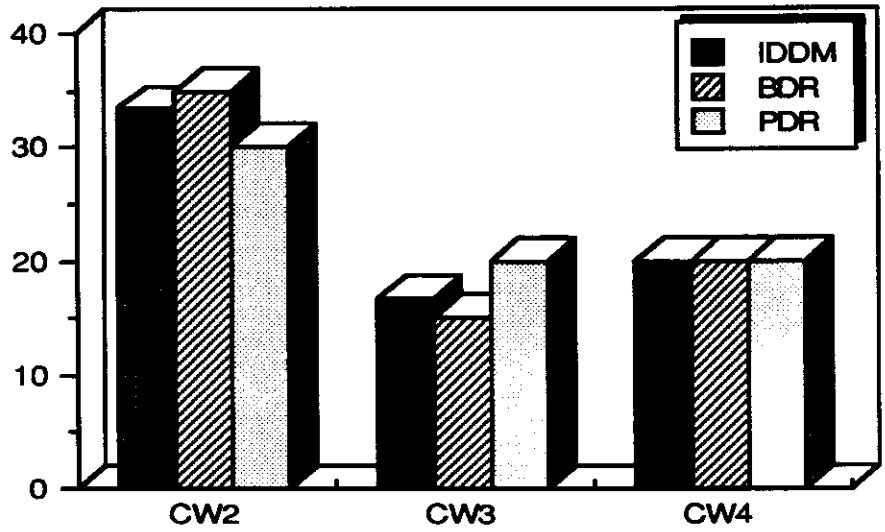


Fig (18). HLA- DR prevalance in IDDM group

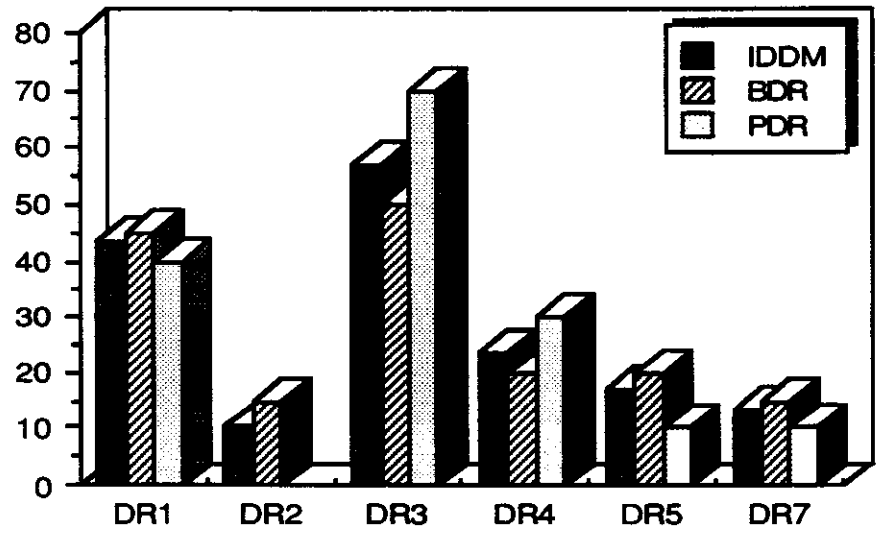


Table (16) : Prevalence of HLA- antigns in retionpathic NIDDM group and its subgroups.

HLA	IDDM (40)		BDR (23)		PDR (17)	
Antigens	No.	%	No.	%	No.	%
A1	24	60	15	65.2	9	52.9
A2	16	40	9	39.1	7	41.1
A9	4	10	1	4.3	3	17.6
A10	5	12.5	2	8.7	3	17.6
B5	5	12.5	4	17.4	1	5.9
B12	27	67.5	18	78.2	9	52.9
B14	10	25	7	30.4	3	17.6
BW4	5	12.5	1	4.3	4	23.5
BW6	18	45	12	52.2	6	35.3
BW21	24	60	7	73.9	7	41.2
BW35	10	25	7	30.4	3	17.6
CW2	7	17.5	3	13.04	4	23.5
CW3	13	32.5	9	39.1	4	23.5
CW4	5	12.5	4	17.4	1	5.9
DR1	24	60	14	60.8	10	58.8
DR2	6	15	4	17.4	2	11.7
DR3	17	42.5	8	34.8	9	52.9
DR4	15	37.5	9	39.1	6	35.3
DR7	9	22.5	8	34.8	1	5.9

Fig (19). HLA- A prevalance in NIDDM group

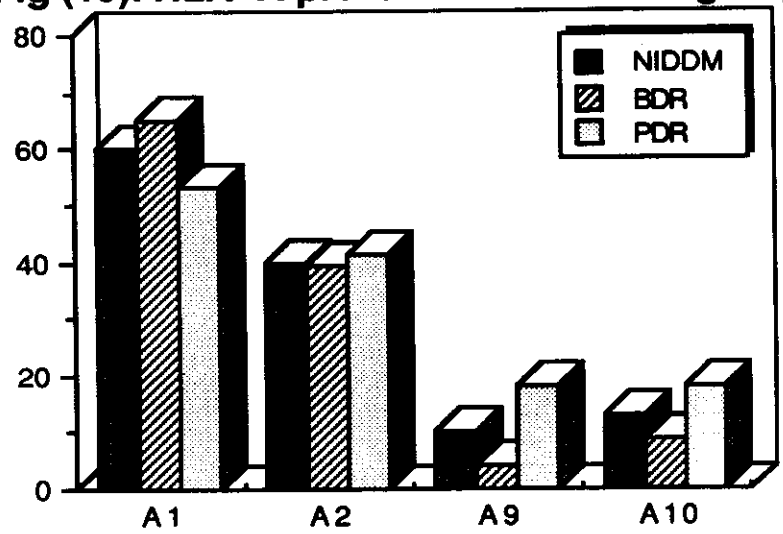


Fig. (20). HLA-B prevalence in NDDM group

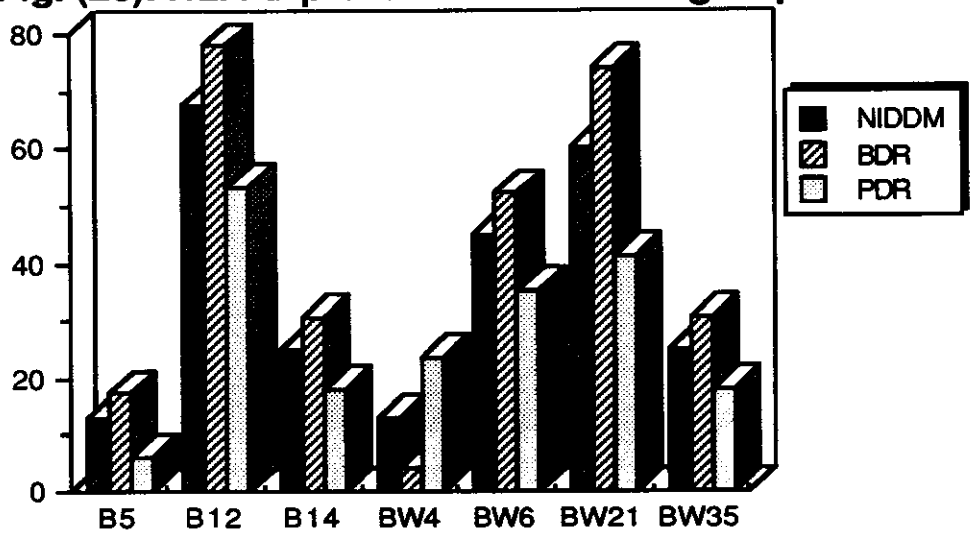


Fig (21). HLA-C prevalance in NIDDM group

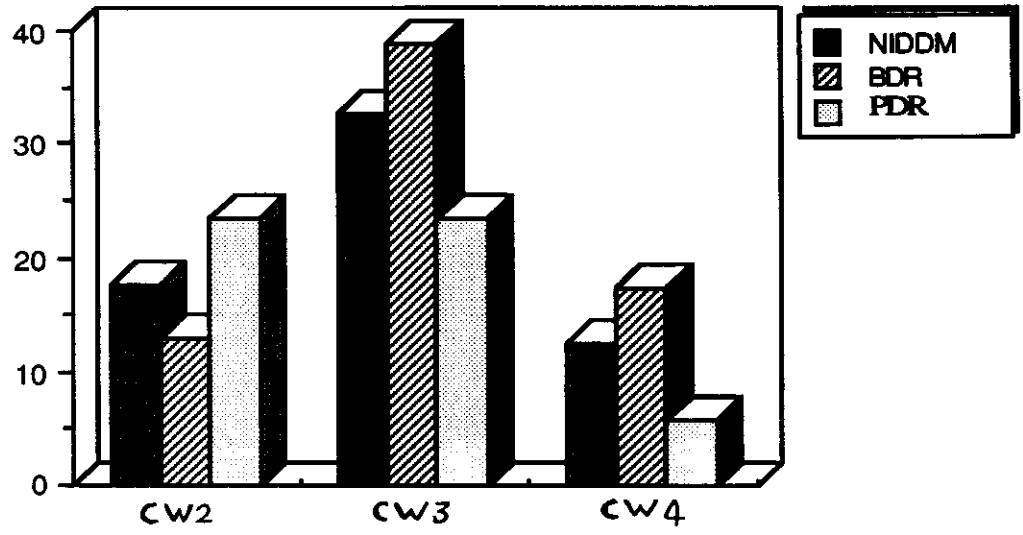


Fig (22). HLA- DR prevalance in NIDDM group

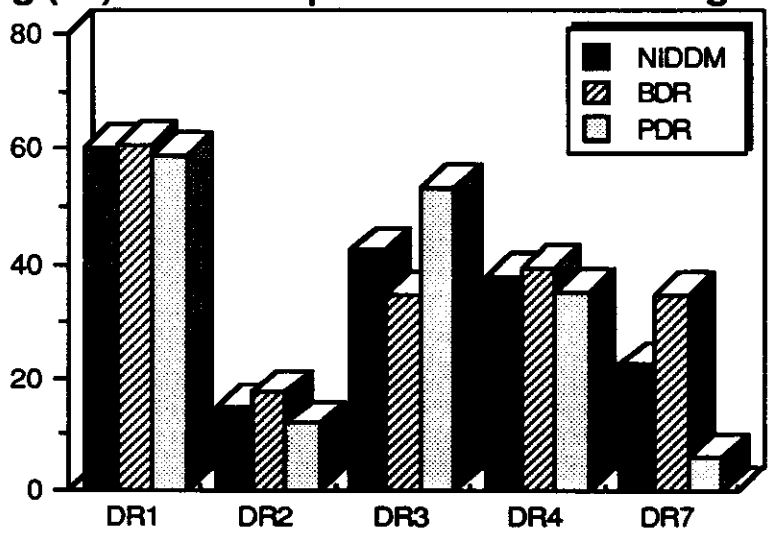


Table (17) **:** Prevalence of HLA - antigens in diabetics without retionpathy.

HLA	IDDM (10)		BDR (10)		PDR (20)	
Antigens	No.	%	No.	%	No.	%
A1	6	60	4	40	10	50
A2	5	50	7	70	12	60
A9	2	20	3	30	5	25
A10	1	10	3	30	4	20
A28	1	10	2	10	3	15
B5	2	20	1	10	3	15
B8	1	10	1	10	2	10
B12	1	10	3	30	4	20
B14	2	20	3	30	5	25
BW4	3	30	2	20	5	25
BW6	4	40	3	30	7	35
BW35	3	30	2	20	5	25
CW2	5	50	4	40	9	45
CW3	2	20	3	30	5	25
CW4	2	20	2	20	4	20
DR1	4	40	6	60	10	50
DR2	3	30	3	30	6	30
DR3	3	30	5	50	8	40
DR4	4	40	5	50	9	45
DR5	0	0	0	0	0	0
DR7	4	40	3	30	7	35