

ORIGINAL ARTICLE

**SURVEY OF DIABETIC PATIENTS IN RELATION TO BLOOD GROUP PREVALENCE,
CUDDALORE TALUK, TAMIL NADU**

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ABSTRACT

Diabetes mellitus is a multi-factorial trait. The etiology of diabetes mellitus is complex and appears to involve inter-actions of genetic, immunological and environmental factors. The rationale behind this study was that there might be an association between the ABO blood group and diabetes mellitus. The membrane of human red blood cell (RBC) contains a variety of blood group antigens. The most important and best known of these are A and B antigens, which are actually complex oligosachride that differ in their terminal sugar on RBCs, they are mostly glycosphingolipids. There is an influence of the diabetes syndrome on the impact of blood group antigen. The present study was focused on the diabetic patients in relation to blood group prevalence, Cuddalore Taluk, Tamil Nadu

Keywords: Diabetes mellitus, Blood groups, Prevalence, Cuddalore District

1. INTRODUCTION

Diabetes mellitus is a multi-factorial trait. The etiology of diabetes mellitus is complex and appears to involve inter-actions of genetic, immunological and environmental factors. It is reported that the ABO blood group distribution varies in different geographical and ethnic groups, and socio-economic groups (Beardmore and Karimi- Booshehri, 1983). In India, the ABO blood group frequency is variable, the frequency for B ranges from 6% in negritos of Andamans to 48% in Birijas of Bihar while group A is 20-30% in Western and Eastern Himalayas (Barona, 2002). The blood group frequency in North India is B >O>A>AB (Bhasin *et al.*, 1992). The distribution of the ABO blood group in peptic ulcer and gastric cancer patients was studied by Aird *et al.* (1954), Clarke *et al.* (1955), Buckwalter *et al.* (1956), Brown *et al.* (1956), Doll *et al.* (1960), Beasley (1960), and Sharara *et al.* (2006). However Rahman (1976) studied on 2312 confirmed cases of diabetes mellitus for the frequency of the ABO blood groups along with 8936 controls. The number of people with diabetes mellitus (DM) is rapidly increasing because of population ageing, urbanization and lifestyle changes (Ekoe *et al.*, 2001).

Diabetes mellitus is a common disease in Western Europe and in most developed countries of the world. In Greece national figures concerning the prevalence of diabetes

mellitus are lacking, primarily because of difficulties with the flow of information from primary health care services, to central agencies (Li *et al* 2002, Sidhu *et al.*, 1988). Since the discovery of an association between stomach cancer and blood type A by Arid *et al.* (1953). There have been several studies on possible relationship of blood types to certain diseases. Enough has been presented in support and denial of the hypothesis that certain chronic diseases are associated preferentially with selected ABO and other blood groups. ABO blood groups are a stable feature of a population and they differ among various socioeconomic, geographical and ethnic groups. In Europe highest frequency is of allele A, increasing to allele B from West to East (Bhasin *et al.*, 1992). The membrane of human red blood cell (RBC) contains a variety of blood group antigens. The most important and best known of these are A and B antigens, which are actually complex oligosachride that differ in their terminal sugar on RBCs, they are mostly glycosphingolipids (Gomez, 2008). The rationale behind this study was that there might be an association between the ABO blood group and diabetes mellitus. Information on gender, age, smoking status, ABO blood type, diabetes, a family history of diabetes and their location was recorded from medical charts. The ABO blood type was assessed serologically, and the information of Diabetes Mellitus was primarily based on self-report. The present study have been focused on the Diabetic patients in relation to blood group prevalence, Cuddalore Taluk, Tamil Nadu

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DIABETES CHARACTERISTICS

The classic symptoms of diabetes are polyuria (frequent urination), polydipsia (increased thirst), polyphagia (increased hunger), and weight loss. Other symptoms that are commonly present at diagnosis include a history of blurred vision, itchiness, peripheral neuropathy, recurrent vaginal infections, and fatigue. Many people, however, have no symptoms during the first few years and are diagnosed on routine testing. People with type 2 diabetes mellitus may rarely present with hyperosmolar hyperglycemic state (a condition of very high blood sugar associated with a decreased level of consciousness and low blood pressure).

Type 2 diabetes is typically a chronic disease associated with a ten-year-shorter life expectancy. This is partly due to a number of complications with which it is associated, including: two to four times the risk of cardiovascular disease, including ischemic heart disease and stroke; a 20-fold increase in lower limb amputations, and increased rates of hospitalizations. In the developed world, and increasingly elsewhere, type 2 diabetes is the largest cause of nontraumatic blindness and kidney failure. It has also been associated with an increased risk of cognitive dysfunction and dementia through disease processes such as Alzheimer's disease and vascular dementia. Other complications include acanthosis nigricans, sexual dysfunction, and frequent infections.

The development of type 2 diabetes is caused by a combination of lifestyle and genetic factors. While some of these factors are under personal control, such as diet and obesity, other factors are not, such as increasing age, female gender, and genetics. A lack of sleep has been linked to type 2 diabetes. This is believed to act through its effect on metabolism. The nutritional status of a mother during fetal development may also play a role, with one proposed mechanism being that of altered DNA methylation.

2.MATERIALS AND METHODS

Study Design and Setting

A total of 524 blood samples from patients with diabetes mellitus (Type 2) were collected from the District Head quarters Government General Hospital, Cuddalore. The samples represented adequately with different communities and food habits. For comparisons, 320 unrelated normal healthy individuals were sampled randomly from the same area matching age, sex, socio-economic status etc. except the disease condition. Since sex differentiations are known not to exist in the ABO blood type system, the samples collected from both males and females were separately and pooled for the various analyses. For the ABO blood types, standard serological procedures were followed using the anti-A, anti-B and anti-D antisera.

Most of the data were obtained prospectively from currently hospitalized and out patients. The usual clinical criteria, blood glucose, fractional urine, glucose tolerance tests and the historical and physical findings, were used in establishing the diagnosis of diabetes mellitus. Only those

patients who had convincing diagnoses were included in the study. No other factors were used to select patients for inclusion or exclusion in the study. A substantial number of the patients were operated upon for complications of diabetes mellitus. The Blood typing was done according to the slide and tube methods described by the maker of the high titer standardized commercial antisera used in this work. The blood group and secretor frequencies of the patients were compared with those of the controls. The differences between the blood group frequencies of the patients and controls were examined for significance; digital computers and suitable programs were employed in the analysis of the data.

Healthy Controls

A total number of 200 control subjects were also investigated for the distribution of the ABO blood group and the Rhesus antigen. The control group included healthy persons and the staff who were working in the General hospital, who had no individual or family history of diabetes mellitus. An informed consent was obtained from all the patients as well as the control subjects. The study was approved by the Institutional Ethical Committee, District Head quarters Government General Hospital, Cuddalore.

ABO Blood Grouping and Rh Typing

The ABO blood grouping and the Rhesus typing were performed in the Clinical laboratory, District Head quarters Government General Hospital, by the standard slide agglutination reaction by using a commercial kit of Antiserums A, B, O [SPAN Diagnostics Ltd, India] for all the study subjects as well as the control individuals.

The statistical significance was calculated by using *the SPSS software package*. The search strategy for this paper included searching PubMed, Medline, and EMBASE databases for known risk factors. All raw data were assembled and analyzed. The prevalence of blood group frequencies with diabetes mellitus were compared using a chi-squared test for 2-by-2 contingency tables in Excel and **SPSS** software ($P < 0.05$ considered statistically significant). Data were analyzed by 1-way ANOVA to test reliability and significance.

3.RESULTS

Diabetes mellitus in the collected samples

Prevalence of blood group related to Diabetes Mellitus shows that a significant effect in various profiles of the present study. Prevalence of blood group with total collected population shows that 'O' groups is more prevalent and recorded 196 cases out of 524 cases. Other groups 'A' blood group 144 cases and 'B' blood group 164 cases out of 524. Least prevalence also noted that the 'AB' blood group 20 cases out of 524 cases were shown in Fig.1.

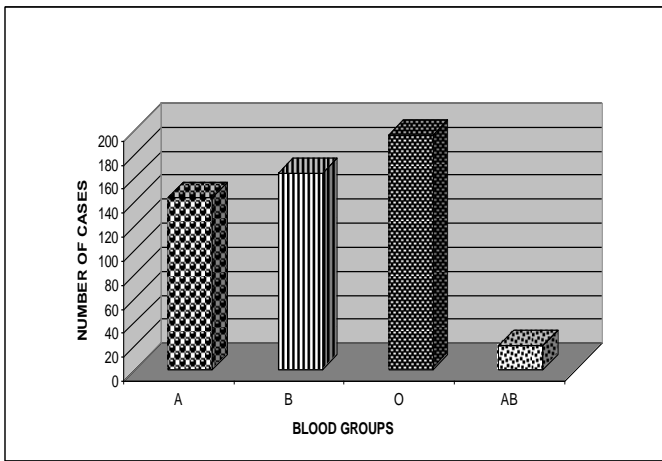


Fig.1 The prevalence of blood groups related to diabetes mellitus in the population

Diabetes Mellitus in male population

Prevalence of blood groups related to Diabetes Mellitus in male population shows that a significant effect in various profiles of the present study. Prevalence of blood group with male population shows that ‘O’ group is more prevalent and recorded 72 out of 208 cases. Other groups are ‘A’ group 44 cases, ‘B’ group 88 cases, and ‘AB’ group 4 cases out of 208. Least prevalence is also noted that the ‘AB’ group 4 cases out of 208 cases (Fig. 2).

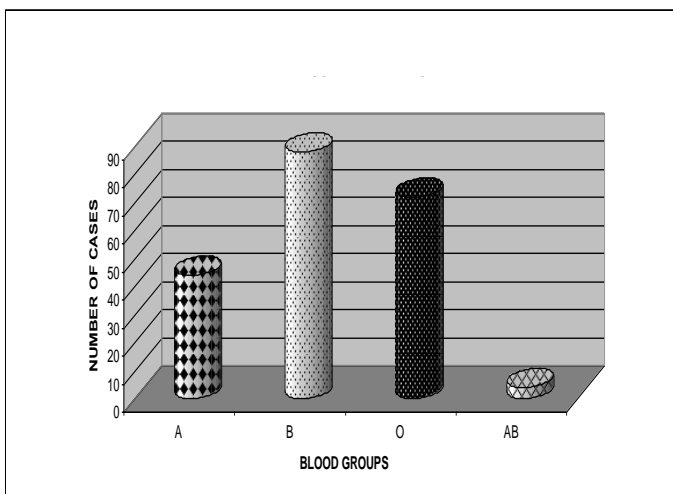


Fig.2 The prevalence of blood groups related to Diabetes Mellitus in the male population

Diabetes Mellitus in the female population

Prevalence of blood group related to Diabetes Mellitus in the female population shows that a significant effect in various profiles of the present study. Prevalence of blood group with female population shows that ‘O’ group is more prevalent and recorded 124 out of 316 cases. Other groups ‘A’ group 100 cases, B’ group 76 cases and ‘AB’ group 16 cases out of 316 cases. ‘Least prevalence is also noted that the ‘AB’ group 16 cases out of 316 cases as shown in Fig. 3.

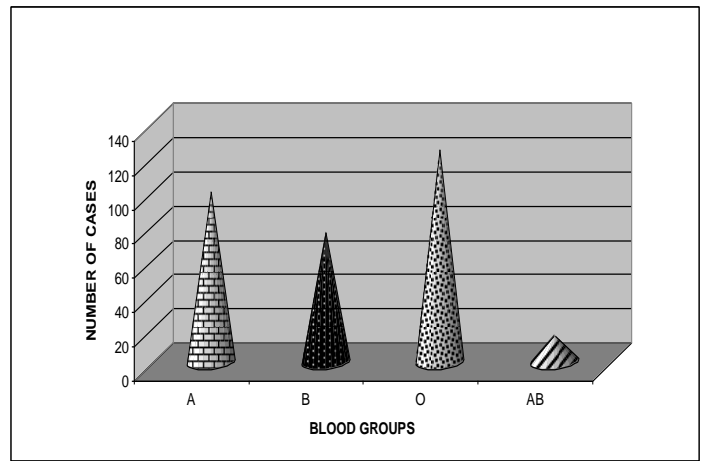


Fig.3 The prevalence of blood groups related to diabetes mellitus in the female population

The prevalence of A blood group with age related to Diabetes mellitus

The prevalence of A blood group with age related to diabetes mellitus shows that a significant effect in various profiles of the present study. Prevalence of ‘A’ blood group with age population shows that 50-60 age more prevalent and recorded 32 out of 144 cases. Other age groups are 20-30 age 4 cases; 30-40 age 16 cases, 40-50 age 32 cases and 60-70 age 16 cases. Least prevalence is also noted that the nil population in the 70-80 age out of 60 cases as shown in Fig 4.

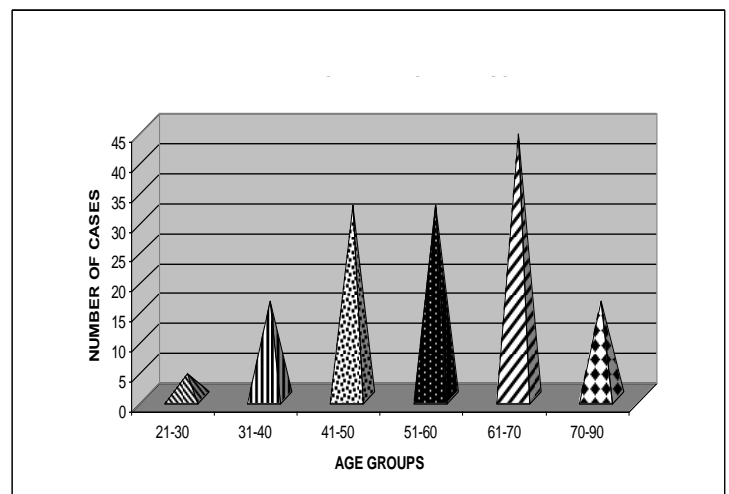


Fig. 4 The prevalence of a blood group with age related to diabetes mellitus

The prevalence of B blood group with age related to Diabetes mellitus

The prevalence of B blood group with age related to diabetes mellitus shows that a significant effect in various profiles of the present study. Prevalence of blood group with age population shows that other age groups are 20-30 age 6 cases, 40-50 age 48 cases, 50-60 age 40 cases 60-70 age 22 cases and 70-80 age 18 case out of 160 cases. Least prevalence is also noted that the 20-30 age group 6 cases out of 160 cases as shown in Fig. 5.

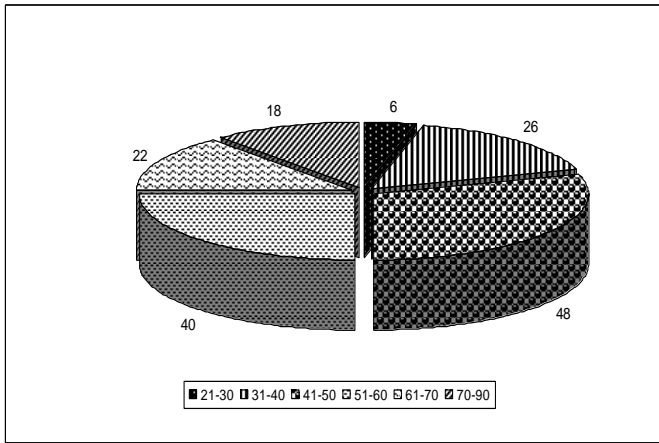


Fig. 5 The prevalence of b blood group with age related to diabetes mellitus

The prevalence of O blood group with age related to Diabetes mellitus

The prevalence of O blood group with age related to Diabetes mellitus shows that a significant effect in various profiles of the present study. Prevalence of O blood group with age population shows that 50-60 age more prevalent and recorded 78 out of 196 cases. Other age groups are 20-30 age 6 cases, 30-40 age 16 cases, 40-50 age 48 cases 60-70 age 38 cases, and 70-80 age 10 cases out of 196 cases. Least prevalence is also noted that the 20-30 group was 6 cases out of 196 cases as shown in Fig 6.

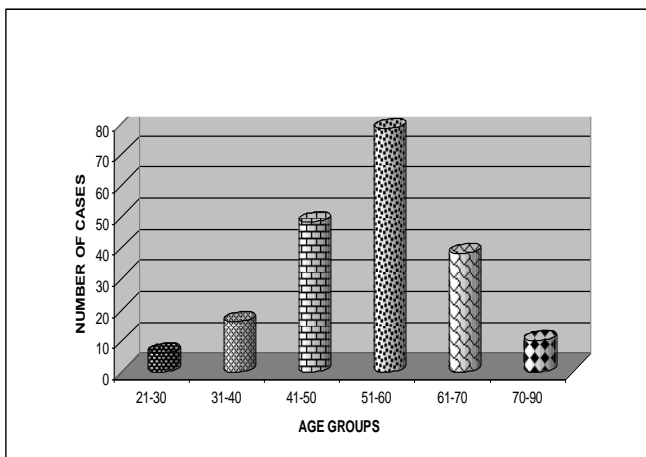


Fig.6 The prevalence of O blood group with age related to Diabetes mellitus

The prevalence of AB blood group with age related to Diabetes mellitus

The prevalence of AB blood group with age related to Diabetes mellitus shows that a significant effect in various profiles of the present study. Prevalence of AB blood group with age population shows that 40-50 age is more prevalent and recorded 6 out of 24 cases. Other age groups are 20-30 age 1 case, 30-40 age 2 cases, 50-60 age 5 cases, 60-70 age 6 cases and 70-80 age 4 cases out of 40 cases. Least prevalence is also noted that 1 case in the 20-30 age out of 24 cases as shown in Fig. 7.

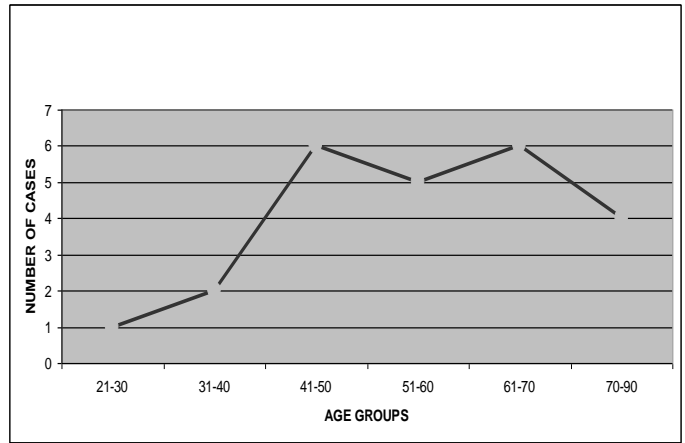


Fig.7 The prevalence of AB blood group with age related to diabetes mellitus

The prevalence of blood groups with age related to Diabetes mellitus

The prevalence of blood groups with age related to Diabetes mellitus shows that a significant effect in various profiles of the present study. Prevalence of blood group with age population shows that 50-60 age is more prevalent and recorded 155 out of 524 cases. Other groups are 20-30 age 17 cases, 30-40 age 60 cases, 40-50 age 134 cases, 60-70 age 110 cases and 70-80 age 48 cases out of 524 cases. Least prevalence is also noted that the 20-30 age 17 cases out of 524 cases as shown in Fig. 8.

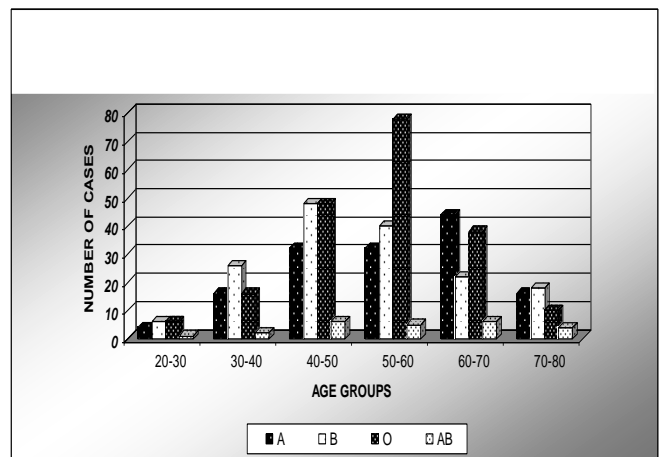


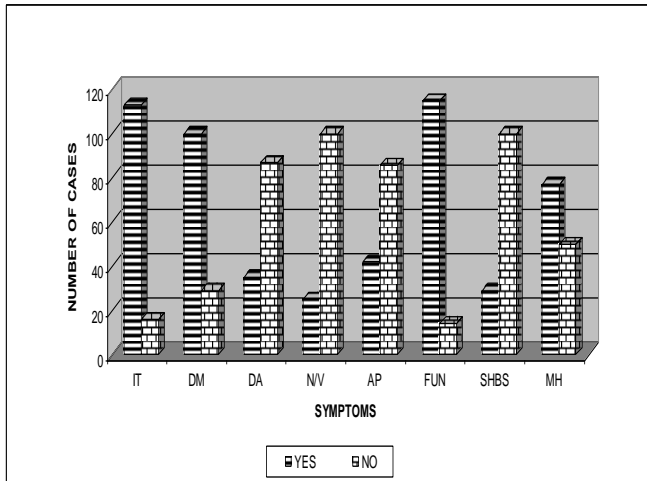
Fig.8 The prevalence of blood groups with age related to Diabetes mellitus

Symptoms analysis of Diabetes mellitus persons

Symptoms analysis of *Diabetes mellitus* persons were done from the Patients based on a questionnaire. The reports were statistically analysed. The reports of the response were not common in all cases. Particularly a common symptoms were notice that increased thirst and frequent urination at the night are causative symptom of *Diabetes mellitus*.

Whereas dry mouth, decreased appetite and nosia and vomiting are consider to be the symptoms of *Diabetes mellitus*. (significant level at .05%) (Fig.9). Morning head and severely higher blood sugar have been the unique

features of *Diabetes mellitus*.. Family pedigree analysis inquires reveals that the disease *Diabetes mellitus* is some way or other connected to the hereditary aspects but it is acquired due to dietic imbalance and also anti drug effect on insulin secretions from the beta cells of islets of langherhans.



4.DISCUSSION

Diabetes mellitus (DM) is a syndrome characterized by hyperglycemia resulting from defects of insulin secretion and/or increased cellular resistance to insulin. DM is generally divided as insulin-dependent diabetes mellitus (IDDM or type I), characterized by an absolute deficiency of circulating insulin and non-insulin-dependent diabetes mellitus (NIDDM or type 2), characterized by elevated insulin levels that are ineffective in normalizing blood sugar levels or by impaired insulin secretion. It was reported that DM type 2 is the most common type, accounting for 90–95% of all diabetic cases

Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both.1-4 Insulin deficiency in turn leads to chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism. As the disease progresses tissue or vascular damage ensues leading to severe diabetic complications such as retinopathy, neuropathy, nephropathy, cardiovascular complications and ulceration. Thus, diabetes covers a wide range of heterogeneous diseases. Diabetes is the most common endocrine disorder and by the year 2010, it is estimated that more than 200 million people worldwide will have DM and 300 million will subsequently have the disease by 2025. The diagnostic criteria and the classification of diabetes was first put forward by the World Health Organization (WHO) in 1965 then by the National Diabetes Data Group (NDDG) in 1979 and this was followed by simplified recommendations by the WHO in 1980. These WHO recommendations were modified slightly in 1985. The latest recommendations have been published by the American Diabetes Association (ADA) in 1997 and by the WHO in 1999. Both groups agree on the recommendations and criteria.2 According to the ADA commendation changes in 1997, the fasting glucose concentration should be used in routine screening for diabetes as well as epidemiological studies. The threshold for fasting glucose was changed from 7.8 mmol/L (140 mg/dl) to 7.0 mmol/L (126 mg/dl);

however the 2-h glucose criterion remains as = 11.1 mmol/L (200 mg/dL). For the diagnosis of diabetes, at least one criteria must apply: Symptoms of diabetes (polyurea, polydipsia, unexplained weight loss, etc) as well as casual plasma glucose concentration = 11.1 mmol/L (200mg/dL). Fasting plasma glucose = 7.0 mmol/L (126 mg/dL), with no caloric intake for at least 8 h.2-h plasma glucose = 11.1 mmol/L (200 mg/dL) during an oral glucose tolerance test (OGTT), with the glucose load containing 75 g anhydrous glucose n water.

The purpose of this study was to find out the association between different ABO blood groups and Diabetes mellitus. Results of this study shows significant association between Blood Groups and Diabetes mellitus. These findings are consistent with the findings of several investigators. (Sidhu *et al.*, 1988) I and Mahler and Adler (1999) showed no significant difference between controls and patients with diabetes mellitus. 190 patients with diabetes mellitus were tested for several genetic erythrocyte and serum protein markers, and compared with healthy controls and did not find an association between diabetes mellitus and the ABO system, as reported in earlier literature (Bjork *et al.* 2003).

Raheja *et al.*(2001) found significant preponderance of group O among diabetic patient. Again Qureshia and Bhatti (2003) found significantly higher occurrence of blood group O than other groups in male and female patients. Different clinical studies have shown that individuals of the O phenotype blood group are more susceptible to Diabetes mellitus diseases. The present results have been confirmed from these findings, in the present study Blood group O is more prevalent and the AB blood group least Prevalent to Diabetes mellitus.

Rahman (1976) have been tested 3212 diabetics for ABO blood groups and compared their frequency with normal (8936) subjects. The data were analysed statistically to detect any possibility of an association between ABO blood groups and diabetes mellitus. No such association was apparent in the subjects studied. Kapur (2001) showed no statistically significant correlation in distribution of blood groups (ABO) and secretor status among diabetics as compared to controls (24). Sidhu *et al* (1988) have been studied 55 patients with type I diabetics and 50 with type II diabetes & found no significant difference in distribution of ABO blood groups between those with type I and these with type II disease. The association between ABO blood groups and DM is still unclear despite many studies referring to this topic. A burning question still remains - do the ABO antigens have any association with diabetes mellitus? No study has convincingly explained the mechanisms by which either A or B antigens could modify the risk of diabetes mellitus. In the present study the blood groups and A and B have been moderately and equally prevalent to diabetes mellitus. It may be due to the co-dominant genotypic nature since the blood group character is multiple gene characteristics. More research is needed to resolve this problem.

Patients with type II diabetes mellitus at the time of initial diagnosis must undergo a dilated fundus examination to rule out evidence of diabetic retinopathy. The results of this

study suggested that only half of the screened population were aware of the disease, diabetes mellitus, and just 37% had knowledge about its eye complication, More individuals in the older age group (40-49 years) (Bai *et al.*, 2009). In the present study reveals that the age group 50-60 have been higher prevalent age to rather than other. It may be due to the unawareness of the people about the risk factors of diabetes mellitus. It is also suggested that the awareness and careful in monitoring the blood sugar are the essential factors to reduce the effect of diabetes mellitus. In particular interest to our findings are those reported by Bibawi and Khatwais who found the frequency of blood groups A and AB increased in 951 diabetes mellitus patients. The results of the family studies in the present investigation provide little evidence of the ABO blood group association to diabetes mellitus. When the findings are examined by age and sex of the patients and the severity of the diabetes, no evidence of an ABO blood group association related to these factors emerge. Likewise the findings do not suggest an association between the A and AB subgroups, MN and Rhesus blood groups or the secretion of ABO (H) blood group substances in saliva, to diabetes mellitus. Our findings in view of those reported by other investigators can be best explained on the basis of the random distribution of the ABO blood groups in diabetes mellitus.

Symptoms analysis of Diabetes mellitus persons were done from the Patients based on a questionnaire. The reports were statistically analysed. The reports of the response were not common in all cases. In the present investigation, a common symptoms were notice that increased thirst and frequent urination at the night are causative symptom of Diabetes mellitus. It is confirmed from the earlier studies (Rahman, 1976, Kapur, 2001, Sidhu et al 1988)

Whereas dry mouth, decreased appetite and nosia and vomiting are consider to be the symptoms of Diabetes mellitus. (significant level at .05%). Morning head and severely higher blood sugar have been the unique features of Diabetes mellitus.. Family pedigree analysis inquires reveals that the disease Diabetes mellitus is some way or other connected to the hereditary aspects but it is acquired due to dietic imbalance and also anti drug effect on insulin secretions from the beta cells of islets of langherhans. These observations in the present study also have coherence with the findings of Mohan *et al.* 2003.

5.CONCLUSION

Diabetes mellitus (DM) is a syndrome characterized by hyperglycemia resulting from defects of insulin secretion and/or increased cellular resistance to insulin . Diabetes mellitus is also a multi-factorial trait. The etiology of diabetes mellitus is complex and appears to involve interactions of genetic, immunological and environmental factors.

A total of 524 blood samples from patients with diabetes mellitus (Type 2) were collected from the District Head quarters Government General Hospital, Cuddalore. Since sex differentiations are known not to exist in the ABO blood type system, the samples collected from both males and

females were separately and pooled for the various analyses. For the ABO blood types, standard serological procedures were followed using the anti-A, anti-B and anti-D antisera.

The purpose of this study was to find out the association between different ABO blood groups and diabetes mellitus Results of this study showed no significant association between Blood Groups and Diabetes mellitus..

Blood group O is more prevalent and the AB blood group least Prevalent to Diabetes mellitus. The blood groups A and B have been moderately and equally prevalent to Diabetes mellitus. It may be due to the co-dominant genotypic nature since the blood group character is multiple gene characteristics. The results of the family studies in the present investigation provide little evidence of the ABO blood group association to diabetes mellitus. Whereas dry mouth, decreased appetite and nosia and vomiting are consider to be the symptoms of Diabetes mellitus. (significant level at .05%). Morning head and severely higher blood sugar have been the unique features of Diabetes mellitus. Family pedigree analysis inquires reveals that the disease Diabetes mellitus is some way or other connected to the hereditary aspects but it is acquired due to dietic imbalance and also anti drug effect on insulin secretions from the beta cells of islets of langherhans.

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