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Prevalence of Type 2 Diabetes Mellitus in Adult Population of Durg District of Chhattisgarh, India: A Hospital based Study

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Abstract

India is one of the epicenters of the global diabetes mellitus epidemic and has the second highest number of people with the disease in the world. The ongoing ICMR-India Diabetes (ICMR-INDIAB) study aims to address this knowledge gap by estimating the prevalence of Diabetes mellitus in India, using uniform sampling techniques and diagnostic criteria in a representative sample of individuals from rural and urban areas of all 29 states of India. The present study was carried out to find the prevalence of Type 2 Diabetes Mellitus in adult population of Durg District of Chhattisgarh. For this, blood samples of 299 subjects, after screening were collected.

Fasting glucose level and HbA1c in plasma was measured by using glucose oxidase-peroxidase (GOD-POD) and nephelometric method respectively. Prevalence of Type 2 diabetes was found almost equal among male and female adult population, which may be due to lack of knowledge, lack of physical work or life style pattern. The data generated from this study will be helpful in determining the affected sex ration in a population and the actual cause of prevalence of this disease. Further, the responsible authorities can design some models for mass awakening and implement possible measures for control of the same.

Keywords: Diabetes, Type 2, Plasma Glucose, Public health, Prevalence

1. INTRODUCTION

India is one of the epicenters of the global diabetes mellitus epidemic and has the second highest number of people with the disease in the world (International Diabetes Federation 2015). Diabetes mellitus is a metabolic condition of great impact in universe. Epidemiological data showed that in 2010 there were 285 million people affected with the disease in the world, and it is estimated that in the year of 2030 we will have about 440 million diabetics. (Shaw *et al*., 2010) The Type 2 diabetes affects about 7% of the population (Pereira *et al*., 2014). Diabetes mellitus, commonly specified to as diabetes, is a group of biochemical disease in which there are elevated blood sugar levels over an extended period (WHO 2014). Symptoms of high blood sugar contain frequent urination, increased thirst and increased hunger. If left non-treated, diabetes can cause much complication (WHO 2013).

The first formal studies to evaluate the prevalence of diabetes mellitus in India did not occur until the middle of the twentieth century. By the end of the 1960s, seven studies had been published detailing the prevalence of the disease (Patel *et al*., 1963; Berry *et al*., 1966; Viswanathan *et al*., 1966). Subsequently, numerous single-centre and multicentre studies on the epidemiology of the diabetes mellitus in various parts of the country have been published. Notwithstanding the caveat that these studies have used varying methodologies, sampling techniques and diagnostic criteria, their results suggest a clear increasing trend in the prevalence of diabetes mellitus. For example, this trend has been most markedly visible in the southern Indian city of Chennai, where the results of a series of studies conducted from 1989 to 2004 showed a 72% increase in the prevalence of the diabetes (Mohan *et al*., 2006).

The ongoing ICMR-India Diabetes (ICMR-INDIAB) study aims to address this knowledge gap by estimating the prevalence of Diabetes mellitus in India, using uniform sampling techniques and diagnostic criteria in a representative sample of individuals from rural and urban areas of all 29 states of India (Anjana *et al*., 2011).

Many studies had been conducted to estimate the prevalence of diabetes in different parts of India. The aim of this study is to report the prevalence Type 2 Diabetes Mellitus among adult population of Durg District of Chhattisgarh, India.

2. MATERIALS AND METHODS

Participants were recruited from Maitri College of Dentistry and Research Centre Anjora, Durg Chhattisgarh. College and Research centre heads were consulted to ensure maximum participation, after written or verbal, informed consent was obtained, informants were given a unique study identification number to de-identify the informants at the point of blood collection by expert technicians. Duration of 1st April 2017 to 14th October 2019 a total of 1500 participants were 299 screened for presence of Type 2 diabetics subjects were enrolled. Test Performed in Departmental laboratory, School of Sciences MATS University, Raipur, Chhattisgarh, India.

INCLUSION CRITERIA-

- Age above 18years.
- Fasting for 10 hours.
- Willing to give informed consent.

EXCLUSION CRITERIA-

- Known cases of Type 1 diabetes.
- Secondary causes of hyperglycemia such as pregnancy, corticosteroid therapy and other pharmacotherapy leading to hyperglycemia.
- Patients living in rural areas.

Institutional Ethical Committee approved the present case control study. Informed written consents were obtained from all participants. Demographic records of age, sex, personal habits about smoking, and alcoholism were obtained by administering questionnaire. History of duration of

diabetes, medication, complications, associated comorbidities, past and family medical history were obtained in detail.

All subjects were invited to give blood samples after 12 hours fast and were asked to abstain from smoking, alcohol consumption for 24 hours before investigations.

Blood samples (5mL) were collected in EDTA vial. Serum was separated by centrifugation at 3000rpm for 10 min. Fasting glucose, insulin level and other biochemical parameters were measured in plasma.

Diabetes was defined on fulfillment of criteria laid down by WHO consultation group report and international diabetes federation IDF, i.e. plasma fasting blood glucose ≥126mg/dl or 2 hour plasma post glucose value ≥200mg/dl or HbA1c >6.5% and known cases of Type 2 diabetes mellitus (International Diabetes Federation 2015) .

Plasma glucose was measured by glucose oxidase-peroxidase (GOD-POD) method. For HbA1c determination, Nephelometry method was employed. To assure the accurate reflection of glycemic control, we also reviewed the patients HbA1c records. HbA1c level below 7 was considered a good glycemic control, and HbA1c ≥7 was considered a poor glycemic control.

3. STATISTICAL ANALYSIS

Statistical analysis of data was performed using Statistical Package for Social Sciences (SPSS) version 19.0 (IBM, Chicago, IL, USA). Categorical variables were expressed as absolute number and percentage and continuous variables were expressed as mean and standard deviation

4. RESULTS

Table 1: Age wise distribution of diabetic population

Sex	Age Group (Yrs) (G1) (G2) (G3)						Total	
	18-27		28-37		38-47			
	No. of Patients	(%)	No. of Patients	(%)	No. of Patients	(%)	No. of Patients	(%)
Male	8	0.53	41	2.73	103	6.86	152	10.13
Female	7	0.47	39	2.60	101	6.73	147	9.80
Total	15	1.00	80	5.66	204	13.6	299	19.93

Table 1 reveals that out of all the screened subjects total 19.93% had Type 2 diabetes. Out of which 10.13% were male and 9.8% were female. This indicates that Type 2 diabetes prevalence was almost equal among male and female individuals. Age wise classification revealed that in the age groups viz. 18-27, 28-37 and 38-47 the prevalence of Type 2 diabetes was 1%, 5.66% and 13.6 % respectively (**Figure 1**).

Figure 1: Age wise distribution of diabetic population

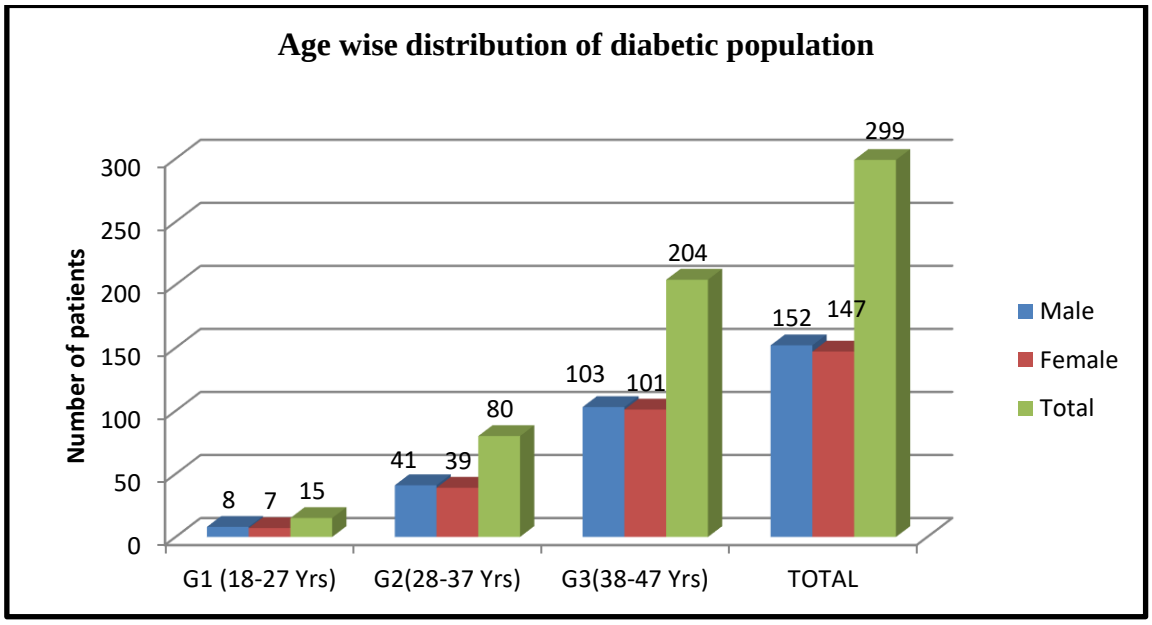
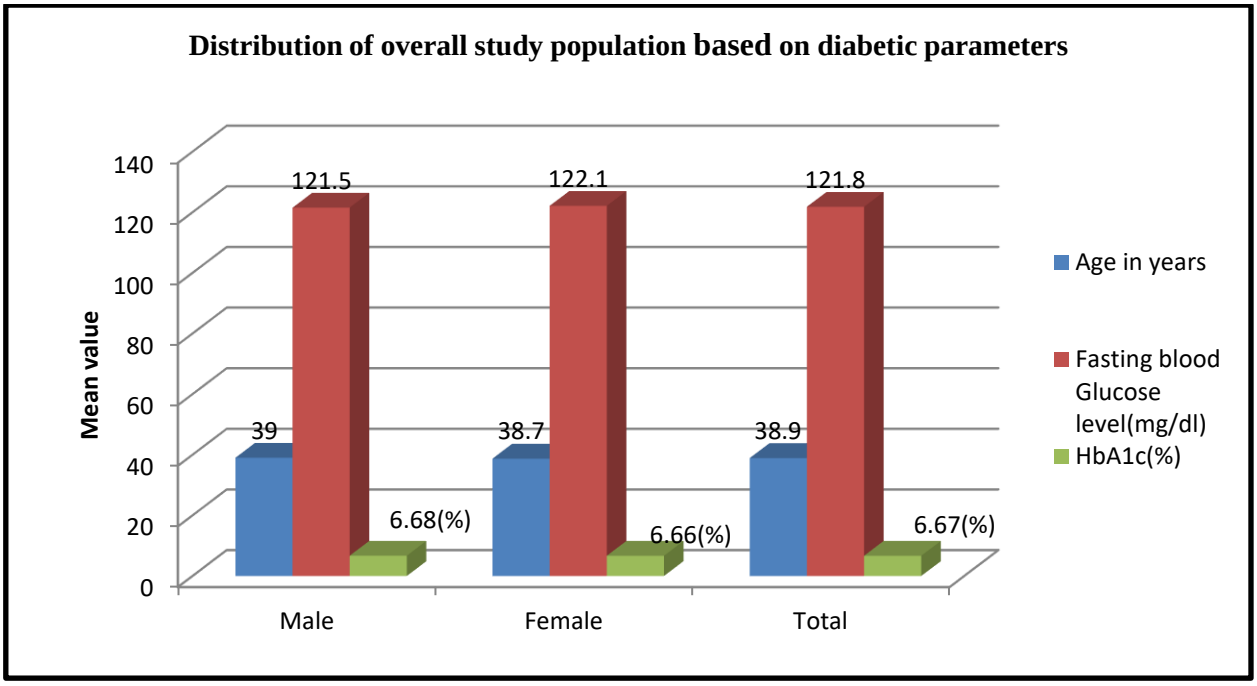


Table 2: Distribution of overall study population based on diabetic parameters

Parameter	Male	Female	Total (Overall)
	(Mean ±SD)	(Mean ±SD)	(Mean ±SD)
Age in Years	39.0± 7.17	38.7±6.33	38.9 ± 6.76
Fasting Blood Glucose (mg/dl)	121.5± 7.17	122.1±5.55	121.8± 5.72
HbA1c (%)	6.68±0.20	6.66±0.19	6.68± 0.19

Table 2 reveals that distribution of overall study population based on diabetic parameters, male has mean of fasting blood glucose 121.5± 7.17 mg/dl & female has mean of 122.1±5.55 mg/dl and second parameter male has mean of HbA1c 6.68±0.20 % & female has mean of 6.66±0.19 %, overall fasting blood glucose has mean 121.8± 5.72 mg/dl & overall HbA1c has mean 6.68± 0.19% (**Figure 2**).

Figure 2: Distribution of overall study population based on diabetic parameters



5. DISCUSSION

The first multicentre study on diabetes mellitus in India was initiated by the Indian Council of Medical Research (ICMR) in 1971. This study estimated the prevalence of diabetes mellitus in six cities and surrounding village in India (Ahmedabad, Kolkata, Cuttack, Delhi, Pune and Trivendrum). The prevalence of the disease was found to be 2.1% in the urban areas and 1.5% in the rural areas (Ahuja *et al*., 1979). More than two decades later, the National Urban Diabetes study sampled individuals from six major metropolitan cities of India and reported prevalence ranging from 9.3% in Mumbai to 16.6% in Hyderabad (Ramachandran *at al*., 2001). At around the same time, the Prevalence of Diabetes in India study evaluated the prevalence of diabetes mellitus in small towns and villages of India, which was found to be 5.9% and 2.7%respectively (Sadikot *et al*., 2004).

Diabetes Mellitus has become a Major health problem in India. The Indian Council of medical research India Diabetes study (ICMR-INDIAB study) showed that india had 62.4 million people with diabetes in 2011. These numbers are projected to increase to 101.2 million by 2030 (Anjana RM *et al*., 2011).

The ongoing ICMR-India Diabetes (ICMR-INDIAB) study aims to address this knowledge gap by estimating the prevalence of Diabetes mellitus in India, using uniform sampling techniques and diagnostic criteria in a representative sample of individuals from rural and urban areas of all 29 states

of India (Anjana *et al*., 2011). From the results of phase 1 of the study (covering four regions of the country like Tamilnadu, Maharashtra, Jharkhand and Chandigarh), it was estimated that 62 million individuals had diabetes mellitus and 77 millions had prediabetes (that is, impaired glucose tolerance and impaired fasting glucose according to the WHO criteria)in India in 2011 (Anjana *et al*., 2011). These results led the IDF to revise their estimates of the number of people with the disease in India from 50million (in the 2009 edition of the IDF Atlas) to 61.9 million (in the 2011 edition) (International Diabetes Federation 2011).

According to Global report by WHO 2014 it was estimated that 422 million adults were living with diabetes in 2014, compaired to 108 million in 1980. These numbers are of course, not static; and the 2015 update of the atlas estimates that 69.2 million people in India will have diabetes mellitus (International Diabetes Federation 2015). Outlines some of the single – centre studies on the prevalence of diabetes mellitus in India. The multicentre studies in which a define increase in prevalence of diabetes mellitus was observed over time. The studied showed that in different age group Type 2 diabetes increased in different age group 18-24years has 1.4 % prevalence, 25-44years has 4.7%, 45-69 years has 18.0% (Tripathy *et al*., 2017), similarly 30-39years has 8.0% prevalence and 40-49 years has 20.5% prevalence (Singh *et al*., 2016).

The Studied had in Chhattisgarh, occurrence of Type 2 diabetes 14.2% was observed in urban population 2011 by (Anjana *et al* 2011) and our study has reveals that total 19.93% of patients had Type 2 diabetes. Among Type 2 diabetic subjects10.13% were male and 9.8%were females. Type 2 diabetes was occurrences almost equal among male and female patients. Age wise classification showed that 13.6 % Type 2 diabetes had in the 38-47 age groups, 5.66 % Type diabetes had in the 28-37 age group and 1% Type 2 Diabetes had in the 18-27 age group.

6. CONCLUSION

In the above study it was found that the prevalence of Type 2 diabetes was almost equal among male and female adult population, which may be due to lack of knowledge, lack of physical work or life style pattern. The data generated from this study will be helpful in determining the affected sex ration in a population and the actual cause of prevalence of this disease. Further, the responsible authorities can design some models for mass awakening and implement possible measures for control of the same.

LIMITATIONS OF THE STUDY

Main limitation of the present study is the small sample size.

FINANCIAL ASSISTANCE: Nil

ETHICAL APPROVAL: The study was approved by the institutional Ethics Committee

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