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Prevalence of gestational diabetes in the northern states of India: a questionnaire based study

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ABSTRACT
Gestational diabetes is an abnormal milieu of pregnancy in which pregnant women suffer with a condition of hyperglycemia. Persistent hyperglycemia during pregnancy can lead to several anomalies in growth and development of foetus. It has been seen that the incidences of gestational diabetes are increasing day-by-day. According to World Health Organization, there is a huge increase in the cases of diabetes mellitus and related morbidities. Pregnant women are also being affected severely with this vicious malady. Numerous instances of gestational diabetes have been observed in territory hospitals of northern India. Gestational diabetes has become a very perturbing disease for pregnant women. In this study, a questionnaire based survey has been conducted to estimate the prevalence of gestational diabetes among the female diabetics of northern states of India. With the help of pharmacists, practitioners and supporting staffs of hospitals, total 1098 appropriately filled questionnaires were received and categorized for the anatomization. It has been observed that the incidences of gestational diabetes are higher in urban area (48.87%) as compared to rural (19.61%) and sub-urban areas (31.51%). Among the all female diabetics, the cases of gestational diabetes are 28.32%, which is a sizable concern. The cases of gestational diabetes were rather high in aged women above age 30. Life-style and age of the pregnant women were observed as influential factors in the prevalence and proliferation of this illness.
Keywords: *Gestational diabetes, Hyperglycemia, Shoulder dystocia.*

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INTRODUCTION

Human body is incredible creation of nature. There is a colossal coordination among their organs and systems through their unique physiological responses. Today we have enhanced understanding of what constitutes virtuous health. Human health depends on various exogenous and endogenous factors. Environmental toxicants and sedentary lifestyle are the autocratic detrimental factors which are affecting physical and physiological configurations of human beings. They are the carrier of many metabolic disorders. Diabetes mellitus is one of the most common metabolic disorders affecting human life in many ways[1]. It is characterized by hyperglycemia. Chronic hyperglycemia is a common cause of organ dysfunction, damage and failure. According to World Health Organization (WHO), more than 400 million people live with diabetes and about 1.6 million deaths are directly related to diabetes[2]. It has become a leading cause of morbidity and mortality worldwide.

The term diabetes was derived from a Greek word meaning siphon – to pass through and mellitus a Latin word meaning sweet[3]. This sweet taste had been observed in urine by ancient Greeks, Indians, Egyptians, Chinese and Persians as evident from their literatures[4]. According to ancient Greek literatures, this disease was known with the description of 'a melting of the flesh and limbs into urine'[5]. Diabetes mellitus is a clinical syndrome characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, impaired glucose tolerance and impaired fasting glycaemia[6]. Patient with hyperglycemia will experience a group of symptoms like polyuria, polydipsia and polyphagia. It is also considered as metabolic disorder since the features like glycosuria, hyperlipaemia, negative nitrogen balance and ketonaemia can be seen in a hyperglycemic person[7]. In year 2016, it was estimated that over 74 million individuals throughout the India had diabetes[8].

The etiology of diabetes is multifactorial which includes obesity, environmental factor, drugs, alcohol, genetic factor and life style also. Sedentary life style is one of the major factors of diabetes worldwide. The

prevalence of diabetes mellitus in urban area is higher than rural area in India[9]. It has become a fast growing potential epidemic worldwide. Diabetes mellitus is broadly classified into three types - Insulin dependent diabetes mellitus (type-I), Non insulin dependent diabetes mellitus (type-II) and Gestational diabetes mellitus. However, the metabolic maladies, such as impaired glucose tolerance (IGT) and impaired fasting glycaemia (IFG) have also been included in these types[10]. Insulin dependent diabetes mellitus is a result of insulin insufficiency, where as non-insulin dependent diabetes mellitus diabetes mellitus is a heterogeneous disorder characterized by various degree of insulin resistance, impaired insulin secretion and increased glucose production.

Glucose intolerance may also develop during pregnancy which is known as gestational diabetes mellitus. The worldwide prevalence of gestational diabetes has increased dramatically over the past two decades. Gestational diabetes is a condition in which women diagnosed diabetes without any past history and exhibit high blood glucose level during pregnancy (especially during their third trimester). In case of pregnancy the placenta of pregnant mother releases many hormones which provoke a rise in blood sugar to a level that can affect the growth and development of fetus. There are many hormonal changes occur which are sudden and unique in the life of women.

The placenta acts as a temporary endocrine unit during pregnancy. It produces many hormones, such as human chorionic gonadotropin, progesterone, estrogen, human placental lactogen (hPL), and placental corticotrophin releasing hormone (placental CRH) while progesterone and estrogen are also secreted by ovary[11]. Human lactogen is also known as human chorionic somatomammotropin. This hormone is primarily produced by syncytiotrophoblast during pregnancy. The excessive level of hPL is known for its anti-insulin properties[12]. It decreases maternal insulin sensitivity as well as maternal glucose utilization.

GESTATIONAL DIABETES

Gestational diabetes can occur in any pregnant women, but few women, such as obese and less active women are at higher risk. It has been seen that age and family history are also the influential factor that serves as prominent risk for gestational diabetes (Figure 1). The state of hyperglycemia that develops during pregnancy is usually disappears after parturition. The condition of gestational diabetes occurs when pancreas is not producing enough amount of insulin to meet the extra need during pregnancy[13],[14],[15]. This metabolic muddle can cause problems for mother as well as for baby during and after birth, but the chance of these risks can be reduced if it is detected and managed well after its onset during pregnancy.

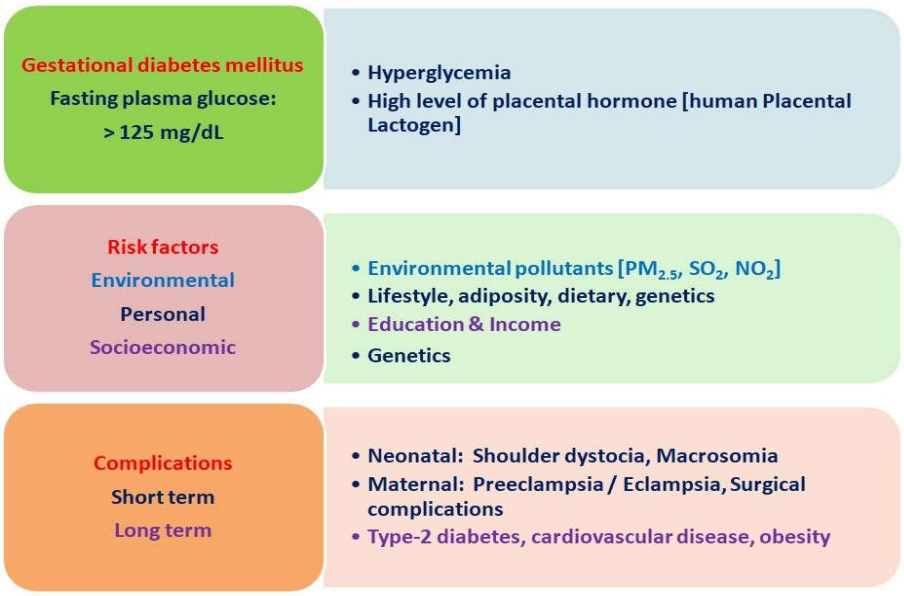

Figure 1: Gestational diabetes – Risk factors and Complications

The unfortunate state of gestational diabetes can be diagnosed by measuring fasting plasma glucose level in the later phase of pregnancy. If the fasting plasma glucose level of a pregnant woman is found to be greater than 125mg/dL, it can be considered under the state of gestational diabetes. The increased level of plasma glucose can also be re-confirmed by manifesting other tests, such as glycosylated haemoglobin (HbA1c) and oral glucose tolerance test (OGTT)[16]. Recent researches express many risk factors which are responsible for its speedy flow. The environmental risk factors, such as air pollutants [$PM_{2.5}$, SO_2 &

NO_2] play a crucial role in its extensive occurrence[17],[18]. Sedentary life style, adiposity and socioeconomic status of the pregnant women have also an influential role in onset of this illness[19],[20]. In case of poor management of gestational diabetes, the patient is inclined to have obstacles like shoulder dystocia, macrosomia and surgical complications[21]. The prevalence of gestational diabetes has been appallingly quantified in the northern Indian territories. Hence, this study was designed and carried out. The aim of this study was to survey and predict the occurrence of gestational diabetes with respect to other types of diabetes in order to recognize the severity of these illnesses.

MATERIAL AND METHODS

In November 2018, the questionnaire was designed and distributed with the help of pharmacists, practitioners and supporting staffs to the various hospitals of northern territories of India. The questionnaires were preferably distributed to the female patients of diabetes in order to get some useful information related to the occurrence of the disease. The questionnaire was divided into two parts consisting total 11 questions that incorporate the information about their age, pregnancy, onset of disease, management and complications. First part of the questionnaire i.e. Section A was composed of demographic details of the patient, such as age, gender, body-weight and state of life-style; while Section B was framed by details about the patient disease type, family history, patient's history, medications and proclaimed complications. Most of the queries were in the form of written responses, verbal responses were not considered unless it was put in black and white. This study was conducted between November 2018 and January 2019. The study population consisted of female diabetic patients of all age groups. The complexion of survey and its objectives were delineate to the patients. The obtained data were tabulated and analyzed by χ^2 – test and represented in the form of pie-chart and bar-graph.

RESULT

Out of 3000 questionnaires distributed in the various hospitals of northern territories, 1172 filled questionnaires were received. Out of these, 74 questionnaires were discarded because of their unreadable writing and their incomplete details.

Table 1: Survey summary of diabetes mellitus in the women of northern territories

Types of Areas	Total number of diabetic patients (surveyed) = 1098			
	Gestational diabetes	Type-2 diabetes	Type-1 diabetes	Other diabetes
Urban	152	253	54	17
Semi-urban	98	187	98	2
Rural	61	121	55	0

Overall, 1098 questionnaires were considered for analysis. The data were categorically recorded in a tabular form (Table-1) and analyzed in order to observe the prevalence of gestational diabetes of various areas with the help of χ^2 – test. The observations revealed that prevalence of gestational diabetes was high in urban regions (48.87%) as compared to rural (19.61%) and sub-urban regions (31.51%) of northern states of India (Figure-2).

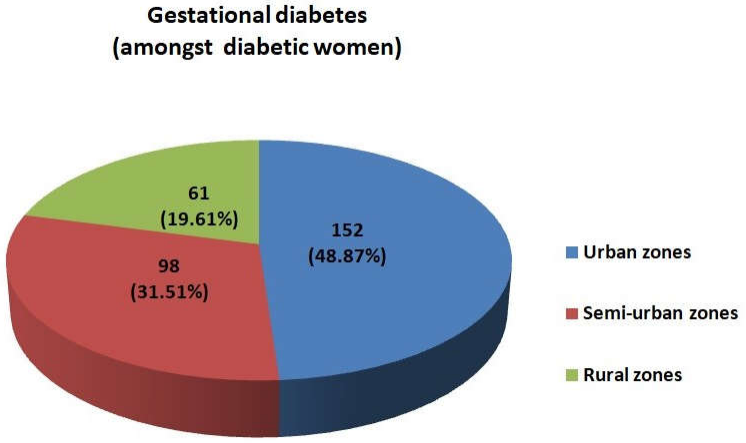

Figure 2: Prevalence of gestational diabetes in northern states of India

Among the diabetic women of all age groups, the percentage prevalence of diabetes type-2 was quite high (51.09%) (Figure-3). Cases of gestational diabetes were more frequent in women older than age 30. Most

cases of gestational diabetes required caesarean section during delivery of neonate. However, neonates born to mother with inadequately controlled gestational diabetes were too large. It was observed that diabetic diet, exercise and insulin injection were the favoured treatments of gestational diabetes. Many pregnant women were able to control their blood sugar with low sugar diet and increased physical activities.

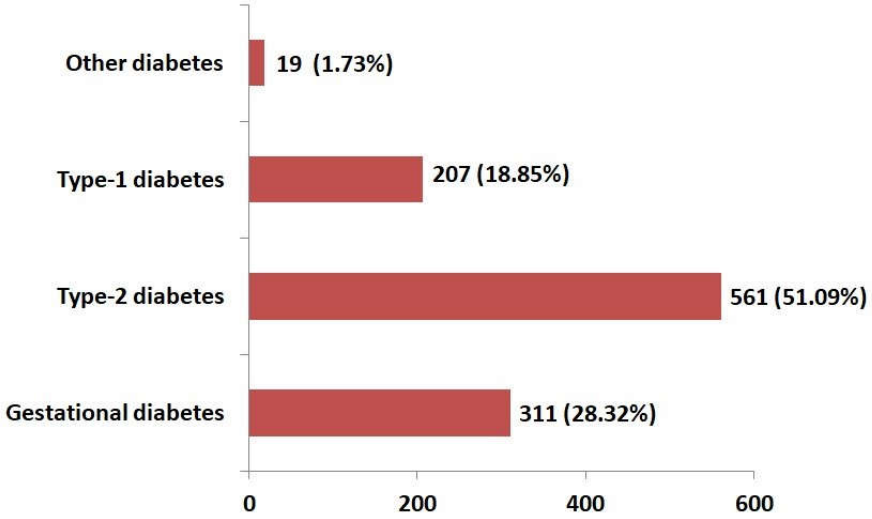

Figure 3: Total number of diabetic females (surveyed) = 1098

CONCLUSION

Gestational diabetes has been a subject of thoroughgoing investigations in recent years due to its increasing incidences throughout the world. During pregnancy, the mother requires high level of glucose for growth and development of fetus; hence the placenta produces more and more insulin-counteracting hormones. In case of their excessiveness, gestational diabetes develops especially during the later-half of pregnancy. It is a very consequential disease of gestation that can lead to many queasy effects on mother as well as foetus. In order to estimate its noxious consequences and upshots, this study was carried out. A well designed questionnaire was used as instrument for the collection of data. The data were collected from territory hospitals, clinics as well as from direct contact with the patients through pharmacy stores. Questionnaires were given to the female diabetic patients in order to assess the types of diabetes and preferred medications.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

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