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Assessment Of Balance In Diabetic Men, A Cross- Sectional Study From Hail City Saudi Arabia.

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ABSTRACT

Diabetes mellitus (DM) is metabolic disorder in which the patient has high blood glucose there are three types of DM which are type1, type2 and Gestational diabetes. The common type of diabetes is type 2DM, its common complication is peripheral neuropathy which affect a large population. The present study was carried to assess the effects of Type 2 DM on balance in hail city. This study was carried out in the outpatient clinics of the King Khaled Hospital. 50 mal patients included in our study. A Biodex Balance System (BBS) was used to measure the balance ability in different situations. Statistical analysis of the limits of stability test and the fall risk test revealed a significant difference in the studied group. The current study concluded that Individuals with long-standing type 2 DM with Peripheral neuropathy result in – balance and mobility impairments.

Keywords: Diabetes, Balance, falling postural instability.

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INTRODUCTION

Diabetes is a metabolic disease that leads to carbohydrates, fats, and proteins metabolism impairment, the most common complication of Diabetes is diabetic neuropathy [1]

Diabetes mellitus (DM) are a group of disorders characterized by elevation of blood sugar. When a patient has diabetes, the body either does not produce enough insulin or is unable to use its own insulin effectively. Glucose builds up in the blood and causes a condition that, if not controlled, can lead to serious health complications and even death. The risk of death for a person with diabetes is twice the risk of a person of similar age who does not have diabetes. [2]

Type 1 DM is an autoimmune condition. It is caused by the body attacking its own pancreas with antibodies. In people with type 1 diabetes, the damaged pancreas does not make insulin. With Type 2 DM, the pancreas usually produces some insulin. But either the amount produced is not enough for the body's needs, or the body's cells are resistant to it. Insulin resistance, or lack of sensitivity to insulin, happens primarily in fat, liver, and muscle cells. Gestational diabetes resembles type 2 DM in several respects, involving a relatively inadequate insulin production. [3]

Type 1 DM due to the body's failure to secrete insulin. This form was previously referred to as "insulin-dependent diabetes mellitus" (IDDM) or "juvenile diabetes. In Type 2 DM, This form was previously referred to as non insulin-dependent diabetes mellitus (NIDDM) or "adult-onset diabetes. [4]

The classic initial presentation of type 1 diabetes is increased thirst, increased urination, weight loss, hunger due to starvation of cells, and fatigue. , The symptoms of type 2 DM are similar to type 1, but generally occur later in life and have a more gradual onset which include increased thirst and urination, diabetic ketoacidosis, or a condition called hyperosmolar hyperglycemic state.[5]

The major complications of diabetes, including coronary artery disease, cardiovascular disease, peripheral vascular disease, and cerebrovascular disease which are caused by damage to large vessels in the body. [6]

High blood glucose levels may also damage the smallest vessels in the body, leading to multiple long-term microvascular complications. Poorly controlled diabetes can cause retinopathy (damage to the retina in the eyes, leading to blindness), nephropathy (damage to the kidneys resulting in kidney failure), neuropathy (damage to nerves, which can cause numbness or tingling) neuropathy contributes to the risk of diabetes-related foot problems (such as diabetic foot ulcers), and gastroparesis (dysfunction of your digestive system causing chronic vomiting and abdominal pain). All of these symptoms are caused by glucose-induced damage to blood vessels. [7][8]

Diabetes mellitus diagnosed by any one of the following as described by Saydah et al., 2001) [9]:

- Fasting plasma glucose level \geq (126 mg/dl)
- Plasma glucose \geq 200 mg/dL two hours after meal .
- Symptoms of hyperglycemia and casual plasma glucose \geq 200 mg/dl
- Glycated hemoglobin (Hb A1C) \geq 6.5%.

Prevention of diabetes mellitus involve a healthy diet, exercises, stop tobacco, and decrease body weight. Control blood pressure and foot care are also important. Type 1 diabetes must be treated with insulin injections Type 2 diabetes treated with medications with or without insulin. Pancreas transplantation have been tried in type 1 diabetes with limited success. Gastric bypass surgery has been successful in many obesity patients with type 2 DM. [10],[11]

Management of diabetes mellitus depend on controlling blood glucose levels as much as we can closed to normal ("euglycemia"), without causing hypoglycemia. This can usually be done with diet control, regular exercises, and medications). [12]

Management of diabetes mellitus also depend on Patient education, social support, and exercise, with the goal of keeping blood glucose levels within normal. [13]

Type1 diabetes is treated with a combinations of insulin, When insulin is used in type 2 diabetes, a long-acting is usually added initially, while continuing oral medications. [14]

Definition Balance is the person ability to maintain the line of gravity of his body within the base of support with little postural sway. [15]

Maintaining balance needs coordination of input from different sensory systems: vestibular, somato sensory, visual systems.[16]

Posture is how you hold your body. [17]

To improve Posture, a single exercise done properly is best. To focus on exercises that strengthen your abdominal and low back muscles that connect to your spine and pelvis. Some of these muscles move your torso by flexing, extending, or rotating your spine. Others stabilize your pelvis and spine in a natural, neutral position. [18]

Peripheral neuropathy leads to reduced ankle strength and mobility, which they considered to be the primary factors contributing to gait alterations. Additionally, individuals with peripheral neuropathy show postural instability with a larger centre of pressure displacement, higher sway area and greater instability when standing still with eyes closed. Postural instability was further found to be significantly associated with sensory neuropathy. [19]

Diabetic persons are known to complain from increased risk of falls and fall related injuries which are often assumed to influence on the physical activity levels of these patients. Public Health guidelines for diabetes management recommend that patients perform at least 30 min of physical activity a day six times a week, requiring adequate gait security and balance. [20]

Exercise therapy; including Aerobic Exercise, balance Exercise and Group exercise therapy have been used to activate the sensory afferent system to improve balance in these patients also effective in reducing the risk of falling. [21]

MATERIAL AND METHODS

SUBJECTS:

This study was carried out in the outpatient clinics of the King Khaled Hospital. The target population of this study includes 50 diabetictype2 subjects with following criteria:

1. Age between 45 and 55 years
2. The mean duration of illness of the patients in the diabetic group between 10 and20 years
3. **The criteria for exclusion** in the study were , that the patients had disruption of balance while walking or sitting due to problems in vision or hearing, feeling dizzy after mild activity.

MATERIAL:

Balance tests were recorded with the Biodex Balance System (BBS) (model 302–945; Shirley, New York)

PROCEDURES: All the patient were concluded in the following tests:

1. The limit of stability test:
2. Fall risk test:

STATICAL ANALYSIS:

SPSS, V 16 was used for statistical analysis. The descriptive data of the patients and the healthy subject were represented in the form of mean and standard deviations.

RESULTS

The results of the overall direction with the limits of stability test were lower in the diabetic group compared with the normal. Mean was (2.67), P value(0.004)

Table 1: overall stability in type 2 diabetic patient

	Mean	Std deviations.	P
overall direction	2.67	1.6	0.004

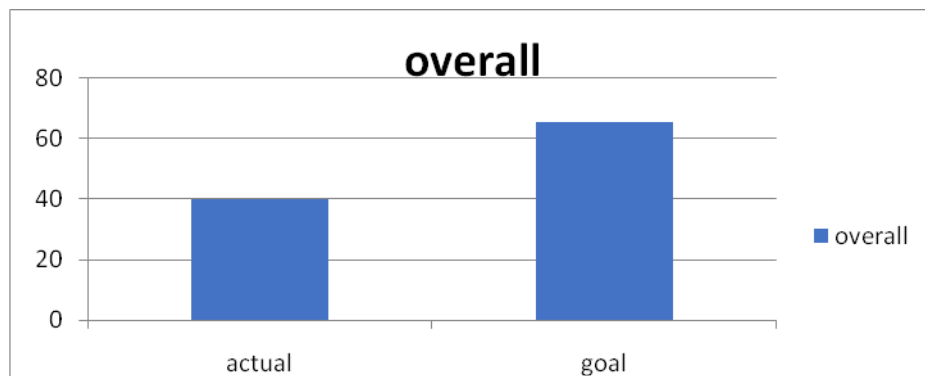


Figure 1: overall stability in type 2 diabetic patient

In Right direction was lower in diabetic patients than value of normal. But there was no statistically significant difference. Mean was (3.07), P value was (0.001)

Table 2: Right stability in type2 diabetic patient

	Mean	Std deviations.	P
Right direction	3.07	0.87	0.001

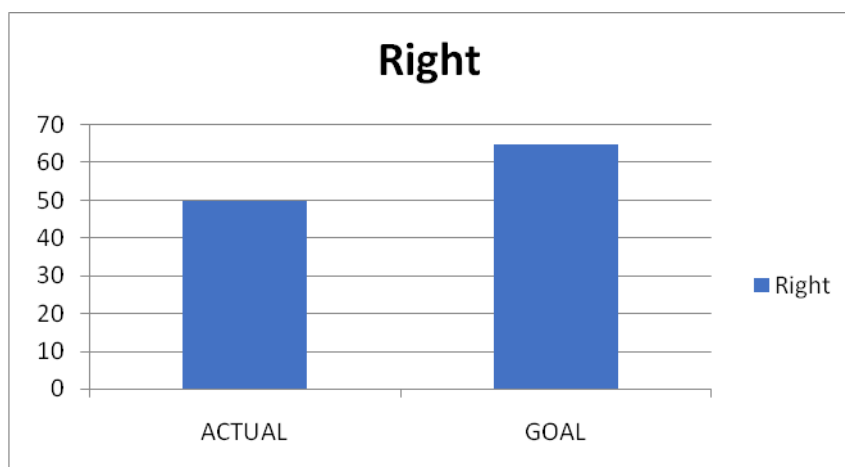


Figure 2: Right stability in type2 diabetic patient

In Left direction and also was lower in diabetic patients than value of normal. But there was no statistically significant difference. Mean was (3.27),P value(0.001)

Table 3: Left stability in type 2 diabetic patient.

	Mean	Std deviations	P
Left direction	3.27	0.87	0.001

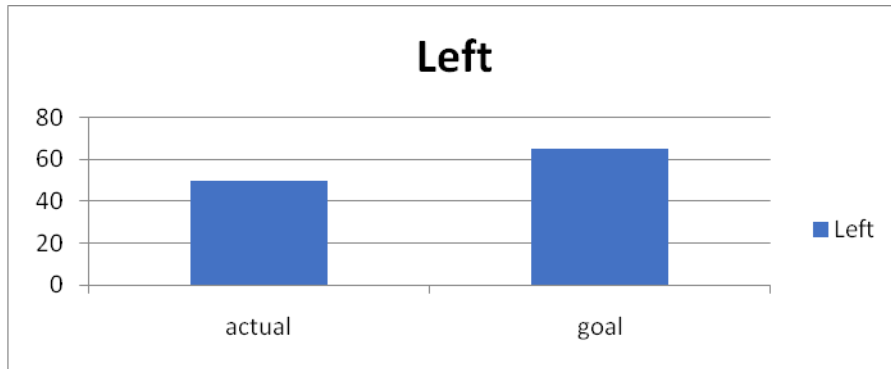


Figure 3: Left stability in type 2 diabetic patient

Forward direction: Results was significantly lower in the diabetic group than of normal. Mean was (3.30), P value was(0.002)

Table 4: Forward stability in type 2 diabetic patient

	Mean	Std deviations	P
forward direction	3.30	1.09	0.002

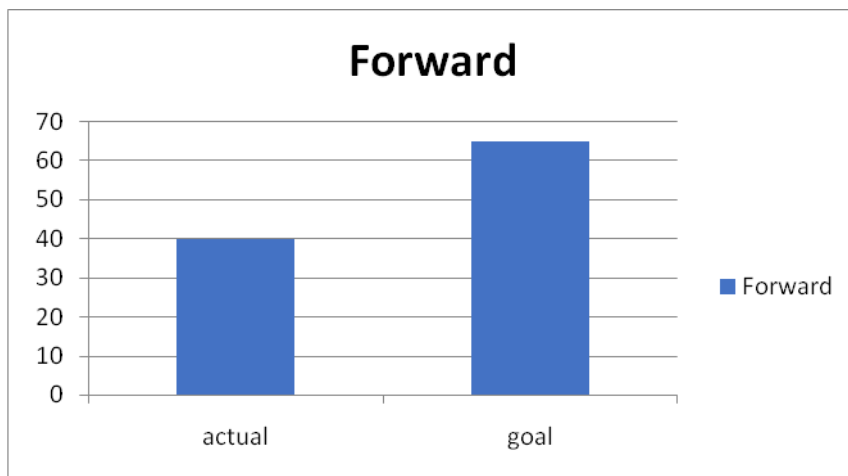


Figure 4: Forward stability in type 2 diabetic patient

Backward direction: and also results were more significantly lower in the diabetic group than of normal. Because it is difficult direction for patient Mean was(2.43),p value(0.003)

Table 5: Backward stability in type 2 diabetic patient

	Mean	Std deviations	P
Backward direction	2.43	1.01	0.003

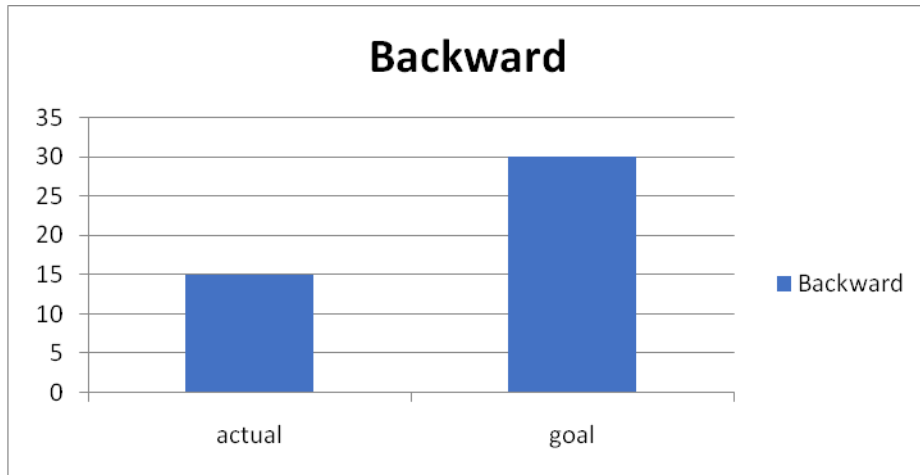


Figure 5: Backward stability in type 2 diabetic patient

The overall stability index with The Fall risk test were significant difference lower in the diabetic group than of normal. Mean was (1.88),P value (0.004)

Table 6: Overall stability index in type 2 diabetic patient.

	Mean	Std deviations	P
Overall stability index	1.88	0.67	0.004

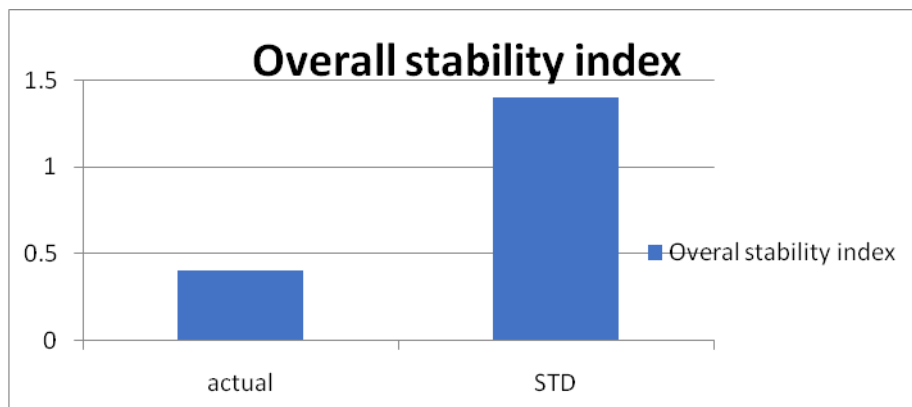


Figure 6: Overall stability index in type 2 diabetic patient

DISCUSSION

DM is a metabolic condition characterized by persistent hyperglycemia, with resultant morbidity and mortality.

In DM patient with Peripheral neuropathy it is well known that mild distal muscle weakness can accompany predominant distal symmetrical sensory neuropathy. [22]

Polyneuropathy is a common problem diabetes patients, which leading to a major problems like pain and sensation impairment in lower limbs, which in turn can lead to Diabetic neuropathy which plays a great role in risk of falling among these patients and balance disorder.[23]

There are many studies on diabetic sensory neuropathy, also there is little studies about motor dysfunction in diabetic patients, our present study is the first one to report the influence of diabetes on balance for Saudi men who are living in Hail city.

The aim of this study was to detect the effect of diabetes mellitus on balance of diabetic patients with neuropathy and compare them with the control group.

The results of our study revealed that there is a significant decrease of the limits of stability test with the Biodex Balance System in the diabetic group compared with the normal. And the fall risk test value for overall stability index was lower in the DM group.

Diabetic patients with peripheral neuropathy have gait disorders like decreased cadence, shorter stride length, increased stance time and higher step-to-step variability compared with healthy men, these gait alterations increase on irregular surfaces, and this is the same in findings to our study.[24]

In addition, Allet L et al ,. 2008, concluded that Diabetic patients with neuropathy show postural instability, higher sway area and greater instability when standing. Postural instability was found to be significantly associated with sensory neuropathy. [19]

Kim BJ et al., 2006 informed that the most common causes of injury or death in People with diabetic neuropathy with balance disorders even with open eyes, making them vulnerable to falls are micro traumas, wounds and slips or falls.[25]

David M. Nathan, et, al 2009 does not agree with us, he said that diabetes does not affect the balance and no effect on them if they are committed to diet and Sports [26]

CONCLUSION

According to the present study, we can conclude that in DM patients who experience peripheral neuropathy is associated with balance impairment and increase in the risk of falls.

LIMITATIONS:

- 1- The shortness of time.
- 2- Also, because of cultural reasons, we were not able to study the same variables on female subjects.
- 3-An important limitation of this study is the small sample size.

RECOMMENDATIONS:

Therefore, further detailed studies are needed to explain the relationship between neuropathy and balance. Awareness of Patient on the impact of this disease on their balance and give them the necessary advice

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