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RESEARCH ARTICLE

GLYCEMIC CONTROL WITH ORAL HYPOGLYCEMIC AND LIFESTYLE MODIFICATIONIN TYPE 2 DIABETES MELLITUS PATIENTS: A DESCRIPTIVE STUDY

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FBS Fasting blood sugar,
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BMI body-mass index,
HBAIc HemoglobinAIc.

ABSTRACT

Nowadays, Diabetes is a chronic metabolic disorder of the endocrine system. Type 2 diabetes is a major non-communicable disease with increasing prevalence at global level and for this it should be properly managed otherwise it can lead to a number of serious health issues including heart disease, stroke, kidney disease and peripheral vasculardiseases.

Aim: The purpose of this study is to compare glycemic control with lifestyle modification, oral hypoglycemic and natural herbs in patients with type 2 diabetes mellitus.

Method: Data from January 2018 to May 2018 Medicare Cardiac & General Hospital,Jinnah Medical college Hospital(Korangi campus) was used for this investigation. Questionnaire method of 102 patients is used to compare glycemic control with lifestyle modification and oral hypoglycemic drugs.

Result: The study done on type 2 diabetes mellitus patients having increased BMI, fasting and Radom blood sugar and HBAIc above 6. Showed that oral hypoglycemic (metformin) and lifestyle modification both improved glycemic control. Although the glycemic control by oral hypoglycemic was more significant.

Conclusion: Lifestyle modification and oral hypoglycemic both are highly beneficial for glycemic control in type 2 diabetes mellitus. Management with OHG along with life style and dietary modifications has greater benefits.

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INTRODUCTION

Type 2 diabetes (non-insulin dependent or adult onset diabetes) is caused by the body`s ineffective use of insulin. It often results from excess body weight and insulin resistance (Tahrani, 2011). Diabetes Mellitus is characterized as chronic hyperglycemia associated with altered carbohydrate, lipid and protein metabolism. The aim is to maintain the HbAIc levels below 7% (Tahrani, 2011 and Pratley, 2007). Diabetes mellitus, is a metabolic disorders in which the blood glucose is higher than normal levels, due to insufficiency of insulin release or improper response of cells to insulin, resulting in high blood pressure.

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The resultant hyperglycemia produces sever complications. Metformin drug has been shown to prevent diabetes in people who are at high risk and decrease most of the diabetic complications (Nyenwe, 2011; Frank, 2001 and Tay, 2015). Recent reports on metformin, not only indicate some implications such as renoprotective properties have been suggested for metformin, but some reports indicate its adverse effects as well that are negligible when compared to its benefits (Nasri, 2014). Metformin reduces serum glucose level by several different mechanisms, it increases the effects of insulin; "insulin sensitizer". Metformin also suppresses the endogenous glucose production by the liver, which is mainly due to a reduction in the rate of gluconeogenesis and a small effect on activates the enzyme adenosine monophosphate kinase (AMPK) resulting in the inhibition of key enzymes involved in gluconeogenesis and glycogen synthesis in the liver while stimulating insulin signaling and glucose transport in muscles. AMPK regulates the cellular and organ metabolism and any

decrease in hepatic energy, leads to the activation of AMPK. The study to an extent has explained the mechanism of metformin action on liver gluconeogenesis (Seo-Mayer, 2011 and Sung, 2012). Overweight or obesity was the single most important predictor of diabetes. Lack of exercise, a poor diet and smoking were all associated with a significantly increased risk of diabetes, even after adjustment for the body-mass index (BMI). As compared with the rest of the cohort, women in the low-risk group. Lifestyle modification is that diet control and daily exercise has shown to benefit in control FBS, RBS in type 2 diabetics with lowering their weight (Stephanie, 2016). Certain natural herbs have shown to be beneficial in lowering glucose levels, include, Cinnamon (Ahmed, 2001 and Altschuler, 2007), Garlic (Paul Crawford, 2009), Curry leaves (Wood, 2006 and Wasnik, 2016), Aloe Vera (Ghorbani, 2014), Fenugreek (Younghaiyudha, 1996).

Rational of the study

To compare the glycemic control in type 2 diabetics with the lifestyle modifications and diet, oral hypoglcemics and herbal treatment. Managing diabetes and to keep a balanced blood glucose level the patient has to undergo either drug therapy Management of diabetes by oral hypoglycemic agents, lifestyle changes or herbal medication.

Drug therapy: Oral hypoglycemic drugs are anti-diabetic drugs. There are 4 classes of oral hypoglycemic drugs-(Tahrani, 2011), Sulfonylureas, Metformin, Thiazolidinediones, Alpha – glycosidase inhibitors.OHDs lower the levels of glucose in the blood which helps people with diabetes to manage their condition however, they have many adverse effects including nausea, skin reactions, abnormal liver function tests, lactic acidosis occurs with metformin, cvs and bonehealth risks (Blevins, 2007). Metformin is primarily used for the treatment of type 2 diabetes mellitus, particularly in obese patients. Metformin has been shown to reduce diabetes mortality and complications by thirty percent compared to insulin, glibenclamide andchlorpropamide. Common side –effects of metformin are Nausea, vomiting, stomach upset, diarrhea, weakness, or a metallic taste in the mouth may occur (Nasri, 2014). Lifestyle changes: Many health care professionals term “diet and exercise” or more appropriately “lifestyle changes”. In other words a person in early stages of type 2 diabetes may be able to control his blood glucose levels by following a carbohydrate and calorie controlled meal plan, losing some weight(if necessary) and fitting regular physical activity into his schedule. At this stage the body is still making enough insulin and healthy eating and activity help the body use its own insulin quite efficiently (Nyenwe, 2011).

Herbs/ Dietry Hypoglycemic Agents: Natural remedies are often used as an alternate treatment of diabetes mellitus type 2. Some commonly used herbal supplements are Momorddicacharantia (karela) (Ahmed, 2001), Cinnamon (Altschuler, 2007; Blevins, 2007; Paul Crawford, 2009 and Wood, 2006), Murrayakoenigii (curry leaves) (Wasnik, 2016), ginger (Daily, 2015), turmeric (Arshad, 2013), Aloe Vera (Ghorbani 2014 and Younghaiyudha, 1996), Fenugreek (Yimam, 2013; Basch, 2003 and Naidu, 2010). Herbal remedies help in reducing hyperglycemia and also lower the levels of LDL, cholesterol and triglycerides although herbal medication has also shown some adverse effects like excessive bleeding during surgery. They also interfere and interact with supplements and prescription medication. Aim of this study is to compare to suggest improvementin fasting, random blood sugar and HBAIc in type 2 diabetic patients.

MATERIALS AND METHODS

Sample size: 102 patients with type II Diabetes Mellitus (will be collected from Medicare cardiac & general hospital - OPD, (Shaheed – E- Millat campus), Jinnah Medical college Hospital (Korangi campus).

Inclusion criteria: 102 patients with diagnosed type II Diabetes Mellitus.

Exclusion criteria: DM patients on insulin therapy.

Study design: Descriptive study. Data collection: Questionnaire.

Sampling Technique: convenience sampling.

Blood samples for FBS (12 hours fasting), RBS and HbAIc will be collected for laboratory records from mentioned centers. Sample will be divided into 3 groups, Group A DM2 lifestyle modifications and diet control (51 patients), Group B DM2 oral hypoglycemics (51 patients).

Statistical analysis

In this study three variables were compared weight reduction, HbAIc, RBS, FBS (i.e. oral hypoglycemic and lifestyle modification) by applying t-test.

RESULTS

The present study focused on the glycemic control among the three groups in Karachi which is an area of changing demographies with a high Diabetes type 2 prevalence. The results were evaluated by analysis as shown in the table 1.Oral hypoglycemic had the best results comparatively with levels of FBS, RBS and HbA1c being more in range followed by Herbal treatment and lifestyle modification.

DISCUSSION

Diabetes mellitus is a group of metabolic disorders in which the blood glucose is higher than normal levels, due to insufficiency of insulin release or improper response of cells to insulin hyperglycemia produces the classical symptoms of polyuria, polydipsia and polyphagia. It may also cause nerve problems, kidney problems, blindness, loss of limbs, and increase in heart attack or stroke (Neha, 2015) Metformin, by controlling blood glucose level decreases these complications. Metformin works by helping to restore the body's response to insulin. It decreases the amount of blood sugar that the liver produces and that the intestines or stomach absorb. A low-calorie almond “appetizer” decreased postprandial hyperglycemia in individuals with prediabetes or isolated 1-hour postprandial hyperglycemia. (Michael, 2016). This study shows that the changes in group on OHA was, HbA1c (5%), FBS (80-100), RBS and weight. In comparison the loss of weight at change in HbA1c, FBS, RBS in type 2 Diabetic patients on life stylemodification. The group on herbal therapy had loss of weight at change in HbA1c, FBS, RBS in type 2 Diabetic patients.

Table 1. General Characteristic of TYPE II Diabetic Patients

General Characteristics	OHA (n=51)	Life style Modification (n=51)
Gender:n(%)		
Male	28(54.9)	25(49.0)
female	23(45.1)	26(51.0)
Age: Years mean (SD)	61.35(11.674)	52.88(11.124)
Body-weight (Kg) mean (SD)	70.15(10.418)	69.03(8.471)
Height (cm) mean (SD)	166.15(8.782)	167.80(8.820)
BMI(kg/m^2) mean (SD)	25.39(3.436)	24.54(2.609)
Duration of Diabetes:Years mean (SD)	9.72(7.02)	3.67(2.063)
FBS: mean (SD)		
Before	179.84(20.703)	155.88(25.583)
After	136.66(21.880)	132.09(23.373)
RBS mean (SD)		
Before	286.00(48.027)	224.90(43.778)
After	228.19(47.826)	197.27(29.118)
HBAIcmean (SD)		
Before	7.89(0.642)	6.88(0.240)
After	7.16(0.529)	6.54(0.286)

OHA: Oral hypoglycemic agents, FBS: Fasting blood sugar, RBS: Random blood sugar, HBA1c: Hemoglobin AIc.

Table 2. Outcome of therapy intype II Diabetic Patients

Variables	OHG n=51 mean(SD)	LIFE STYLE n=51 mean(SD)	Mean difference (95% CI)	t-Statistics	*p-value**
Pre-post treatment FBS (mg/dL)	43.17(18.737)	23.78(11.552)	19.39(13.261, 25.522)	6.291	<0.001
Pre-post treatment RBS (mg/dL)	57.80(39.848)	27.62(23.085)	30.17(17.343, 43.009)	4.680	<0.001
Pre-post treatment HbA1c	0.733(0.330)	0.343(0.153)	0.390(0.288, 0.492)	7.636	<0.001

*p-value were calculated by two tailed t test

Cinnamon lowered HbA1c by 0.83% compared with standard medication alone lowering HbA1C 0.37%. Taking cinnamon could be useful for lowering serum HbA1c in type 2 diabetics with HbA1c>7.0 in addition to usual care (Altschuler, 2007). Another study done with 36 participants with T2D divided into four groups wherein they were given 0, 1, 2 or 3 g of cloves/day for 30 days followed by a 10-day washout period had the following results. Serum glucose decreased from 225 ± 67 to 150 ± 46 mg/dL (Blevins, 2007). In study published in International Journal of Development Research studied in detail the effects curry leaves have on diabetes type 2. According to the research data, curry leaves contain a phytochemical that can help control blood sugar level in patients with Diabetes type 2 by reducing fasting and postprandial blood sugar level (Wood, 2006). Studies conducted on rats show that ginger extract can have a significant anti-hyperglycemic effect (Daily, 2015) Ginger root supplementation significantly lowers blood glucose and HbA1c levels. When combined with dietary and lifestyle interventions it may be an effective intervention for managing Type 2 diabetes mellitus. Although ginger supplementation significantly lowered fasting blood glucose concentrations and HbA1c levels, but did not significantly lower fasting blood insulin (Daily, 2015), Studies conducted on rats prove that curcumin, the active ingredient in turmeric, is effective in reducing plasma glucose level and HbA1C as well as improving the lipid profile (Arshad, 2013), Studies show For diabetes, aloe vera has been shown to significantly reduce blood glucose levels (Ghorbani, 2014). In a study, a combination of ginger extract and a sub-optimal dose of glibenclamide (0.5 mg/kg) was found to exert effects similar to a full therapeutic dose of glibenclamide (1 mg/kg) in the STZ-induced diabetic model, highlighting the possibility of reduced side-effects of antidiabetics (due to the lower dose required) when used in combination with ginger extract. In addition, ginger has been shown to have renal protective effects when used with metformin (Ghorbani, 2014). Multiple studies show that Fenugreek seeds help lower blood sugar by slowing down the process of digestion and absorption of carbohydrates in the small intestine. This action is similar to the prescription drug Acarbose (Younghaiyudha, 1996). Fenugreek is commonly used as a spice in South Asia and is known for its hypoglycaemic and hypocholesterolemic properties (Yimam, 2013). The proximate composition of fenugreek (seeds, husk and cotyledons) contains saponin, protein and polyphenols (Basch, 2003). The combination of fenugreek (150 mg/kg) and metformin (100 mg/kg) produced a significant reduction in plasma glucose level (20.7%) in type 2 diabetes (Naidu, 2010 and Neha, 2015). A low-calorie almond “appetizer” showed decrease in postprandial hyperglycemia in individuals with prediabetes or isolated 1-hour postprandial hyperglycemia (Michael, 2016). Metformin is an insulin-sensitizing andantihyperglycemic agent. Its efficacy in reducing hyperglycemia in type 2 diabetes mellitus is similar to that of sulfonylureas, thiazolidinediones, and insulin (Ramesh, 2017). Metformin-based combination therapy is superior to therapy with a single hypoglycemic agent (Scheen, 2013 and Kirpichnikov, 2002).

Conclusion

Although glycemic control in diabetes mellitus is difficult, in addition to very important role of oral hypoglycemic agents in control of type II diabetes, dietary and herbal therapy has strongly proved as highly beneficial in lowering blood glucose levels along with daily exercise and healthy activities. When

combining the oral hypoglycemic with the herbal or dietary therapy it should be kept in mind the interaction of these agents.

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