SPECIAL EFFECTS OF INSULIN REGIMEN (DISSIMILAR PROCEDURES) ON HOSPITALIZED PATIENTS OF TYPE 2 DIABETES MELLITUS (T2DM)

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Abstract:
Objective: To evaluate hospitalized type 2 diabetes mellitus (T2DM) patients with dissimilar insulin procedure.
Methods: Our research analyzed the medical history of the T2DM non-severe cases above 18 years of age at Services Hospital, Lahore (Medical Department) from March 2016 to April 2017. Participants were given bio-data forms and after the fulfilment of inclusion principles, we divide the participants into three groups with respect to insulin treatment which they were provided.
Results: Total number of participating patients was 417 which contained 220 males. We divided the Participants into three groups with respect to the insulin treatment they had obtained. Maximum was dependent upon descending measures of insulin, indicating 45%, while 33% and 22% participants got pre-mixed and basal-bolus treatment. The treatment of Participants treated with basal-bolus had better development in glycemic control, within the small period of hospitalized duration in comparison with the other two groups. Average hyperglycemic proceedings were found high in sliding scale group and average hypoglycemic proceedings were found high in the group of basal-bolus.
Conclusion: Non-severe participants having diabetes type 2, treatment of basal-bolus is higher than the treatment of sliding and pre-mixed insulin. There is a need to discourage the sliding scale in non-severe diabetic patients of T2DM.
Keywords: *T2DM Non-critical Patients, Basal-Bolus, Pre-Mixed, Sliding-Scale and Insulin regimen.*

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INTRODUCTION:

In hospitalized diabetic patients, high blood sugar levels are having a greater risk of complications. Hospital complications can be prevented and clinical outcome can be improved with the better glucose control with insulin. In hospitalized patients, uncontrolled blood sugar levels are linked with greater illness, mortality, and longer duration of hospitalization, while best glycemic control results better [1, 3]. In hyperglycemic patients, blood glucose level should be properly controlled. However, it is still under discussion that which insulin treatment is better for non-serious diabetics of type 2. It is commonly seen in Pakistan that doctors prefer a sliding scale of fixed insulin in non-severe sick patients. It is seen since 1934 that the sliding scales of insulin in regular (SSI) is being utilized in the administration of diabetic patients [4]. SSI has a significant role in healthcare institutions [1, 5]. because it is relaxed and convenient, but having a drawback of non-providing insulin in a physiological manner, thus bringing a difference in the rate of glycemic values [2, 3, 6]. In spite of these disadvantages, SSI is in use since the previous 79 years. Many prospective research studies have found that SSI is not to be supported due to its less operational resources of attaining optimal glycemic control [1, 5 – 7]. Basal insulin should be provided to non-severe diabetic hospitalized patients and they should also be provided with arranged pre-prandial dosages of fast action insulin and supplemental fast-acting insulin [8]. In many teaching Pakistani hospitals, still, insulin sliding scale is being utilized for its suitability. There is a need for interventional and educational programs for the improvement of hospitalized and outpatient diabetes care. To define the current condition of the glucose management in T2DM non-severe patients, health records were reviewed to evaluate hyperglycemia inpatient management related to T2DM non-severe cases. The data were also compared with, insulin's impact on glycemic control and its dissimilar treatments.

METHODS:

Our research analyzed the medical history of the T2DM non-severe cases above 18 years of age at Services Hospital, Lahore (Medical Department) from March 2016 to April 2017. All biodata was gained through case records. Participants in this research study were: hospitalized Males and females older than 18 years, possessing a history of diabetes mellitus type 2, above six months, alone on controlling diet or receiving any oral anti-diabetic elements: sulfonylureas, thiazolidinedione, metformin and DPP-4 inhibitors.

There should not be laboratory confirmation of Ketoacidosis related to diabetes (serum bicarbonate less than 18 mEq L) or urinary ketones and admission blood glucose level should be above 141 mg and under 400 mg/dl. Participants were excluded for the following reasons, Type 1 diabetes, hyperglycemia deprived of the history of diabetes, diabetic ketoacidosis history and state of ketonuria or hyperosmolar hyperglycemia, and known HIV cases. American Association of Critical Care has defined severe medical or surgical illness as those patients at higher risk of actual dangerous health issues which require severe and attentive nursing care. It involves the patient in the intensive care unit. Hepatic disease relevant to the clinic disease of kidney, as indicated by creatinine beyond serum 2.6mg/dL. As CKD recently classified based on "eGFR" which contains a very rough link with creatinine serum limits. Creatinine value > 2.4 mg shows third stage or an extra developed (CKD eGFR 34.5 ml/L). Cushing syndrome, pre-chaunism Lip dystrophic states, Werner syndrome of Werner and Rabson-Mendenhall, which are considered Diagnosed or suspected endocrine diseases as they are linked with the resistance of insulin. All pregnant and breastfeeding cases were also excluded.

The bio-data sheet contained sexual category, age, BMI, weight, RBS, HbA1c, the frequency of hypoglycemic and hyperglycemic events and periods of duration of hospital days and type of treatment of insulin being used. Participants were categorized into three groups with respect to the kind of insulin treatment they obtained. These treatments included basal-bolus, sliding scale and prior mixed treatments of insulin. Through sliding-scale, conditioned regular insulin dosage was used according to the pre-prandial blood glucose levels outcomes, while before each meal, in basal-bolus numerous short-acting insulins as the bolus and at bedtime intermediate insulin as basal was utilized. In the pre-mixed (70/30) grouping of systematic and intermediary acting insulin was used two times in a day. The software SPSS was used for Statistical data [15]. The Continuous variable as weight, age, FBS, RBS, BMI, the occurrence of 'hypo and hyperglycemic actions moreover, a period of hospital days was conveyed as mean ±SD. Distinct variables as a sexual category were indicated as fraction and quantity. One-way ANOVA was used and comparison was made among the consequences of three insulin treatment (P-value under 0.05).

RESULTS:

For the duration of two years, 417 patients of diabetes were selected while 63 were omitted as they did not fulfil the participation principles. A total

number of four hundred and seventeen participants were finally assessed, out of the 220 (52%) were male. In accordance with the treatment of insulin, participants were categorized into various three groups which include pre-mixed, basal-bolus 70/30 and sliding-scale groups.

Table – I: Baseline clinical characteristics (416)

| Variable	Sliding scale		Basal Bolus		Pre-mixed 70/30	
	Number / Mean	Percentage / ±SD	Number / Mean	Percentage / ±SD	Number / Mean	Percentage / ±SD
No. of Patients (%)	186	44.7	138	33.2	92	22.1
Age ± SD (Years)	52.3	7.1	49.8	9	52.7	11.2
Male	87	20.9	95	22.8	38	9.1
Female	99	23.8	43	10.3	54	12.9
Weight ± SD (Kg)	63.3	6.2	64.14	7	63.93	6.9
BMI ± SD (Kg/m^2)	32	6	31	5	32	2
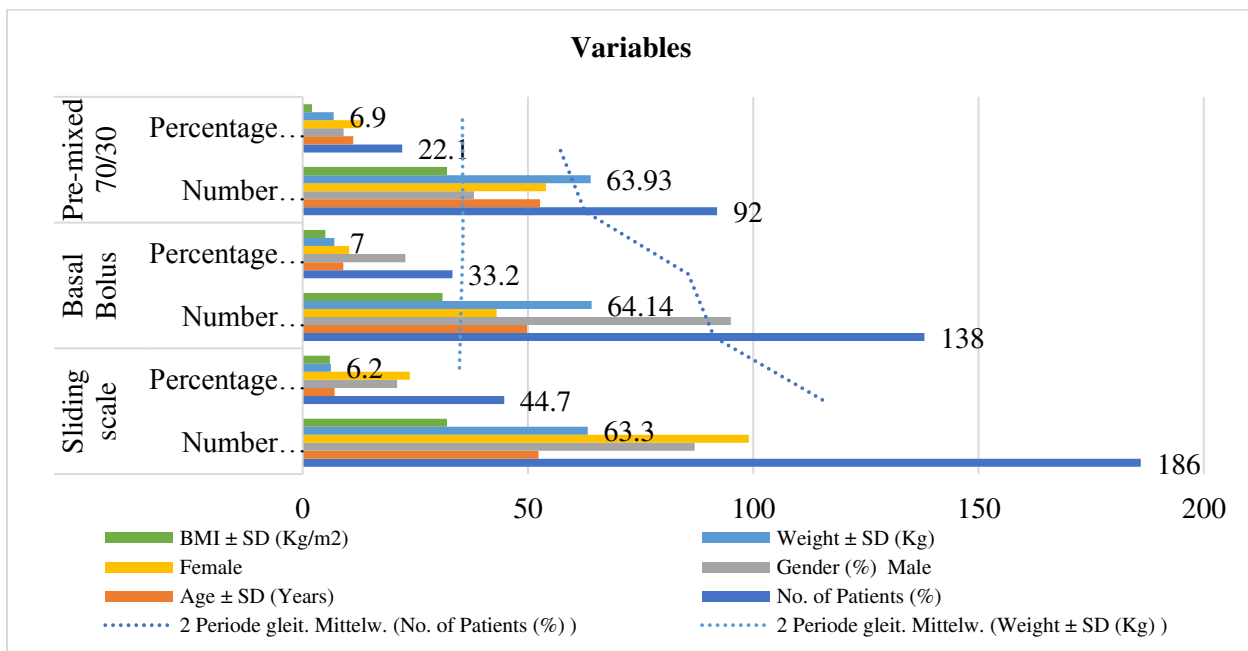
In the sliding-scale group, the number of participants was 185 (44.6%), the group of basal-bolus contained 139 (33.2%) participants whereas the number of participants in the group of pre-mixed was 93 (22.2%). There was no apparent change in the average figure of blood glucose, age, and BMI among treatment groups. Average hospital duration was (15.6 ± 3.6) days in participants which were managed with sliding-scale and duration of (7.9 ± 1.9) days in the participants treated with the basal-bolus group and in the pre-mixed group (8.7 ± 1.4) through (p under 0.001). In the Participants managed with basal-bolus, insulin had a larger development in controlling glycemic as compared to those which were cured through pre-mixed 70/30 and as that of group of sliding scale, but average hypoglycemic proceedings were somewhat larger in the group of basal-bolus (3.9 ± 1) as compared to other two treatment groups, in the group of sliding-scale and pre-mixed in turn, showing (2.9 ± 0.8) and (3.1 ± 0.8). The average hyperglycemic proceedings were larger through the group of sliding scale (9.4 ± 7) as compared to the other groups as shown in Table – II.

Table – II: Glycemic control and hospitalization duration with various insulin regimen

Variables	Insulin Regimen	Number	Mean	± SD	Upper	Lower	P-Value
FBS	Sliding scale	186	154	24	150.69	157.77	<0.001
	Basal bolus	138	122	9	120.81	124.15	
	Pre-mixed 70/30	92	133	9	131.29	135.25	
RBS	Sliding scale	186	273	40	267.28	279.03	<0.001
	Basal bolus	138	165	26	160.88	169.69	
	Pre-mixed 70/30	92	190	21	185.9	194.62	
Duration of hospitalization	Sliding scale	186	15.5	3.6	14.99	16.03	<0.001
	Basal bolus	138	7.8	1.9	7.5	8.17	
	Pre-mixed 70/30	92	8.7	1.4	8.44	9.04	
Hypoglycemic events	Sliding scale	186	2.9	0.8	2.75	2.99	<0.001
	Basal bolus	138	3.9	1	3.71	4.06	
	Pre-mixed 70/30	92	3.1	0.8	2.85	3.19	
Hyperglycemic events	Sliding scale	186	9.4	6.9	8.36	10.36	<0.001
	Basal bolus	138	1.2	0.7	1.08	1.31	
	Pre-mixed 70/30	92	1.7	0.8	1.51	1.88	

Mean ± SD (X - Y Scatter Chart)

Upper and Lower Limit Graph
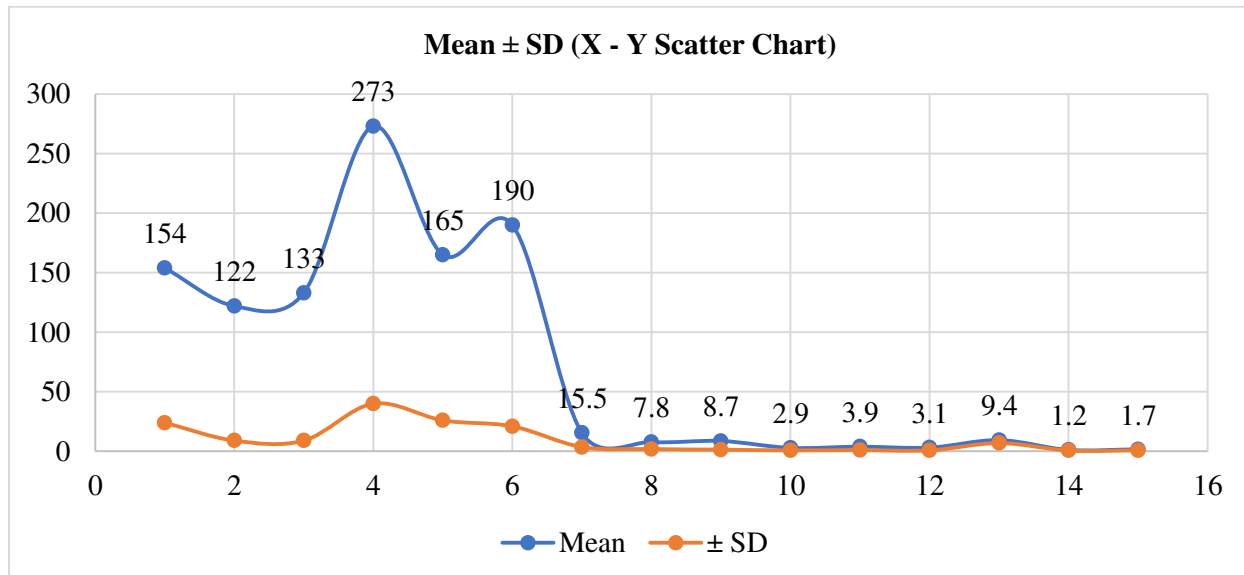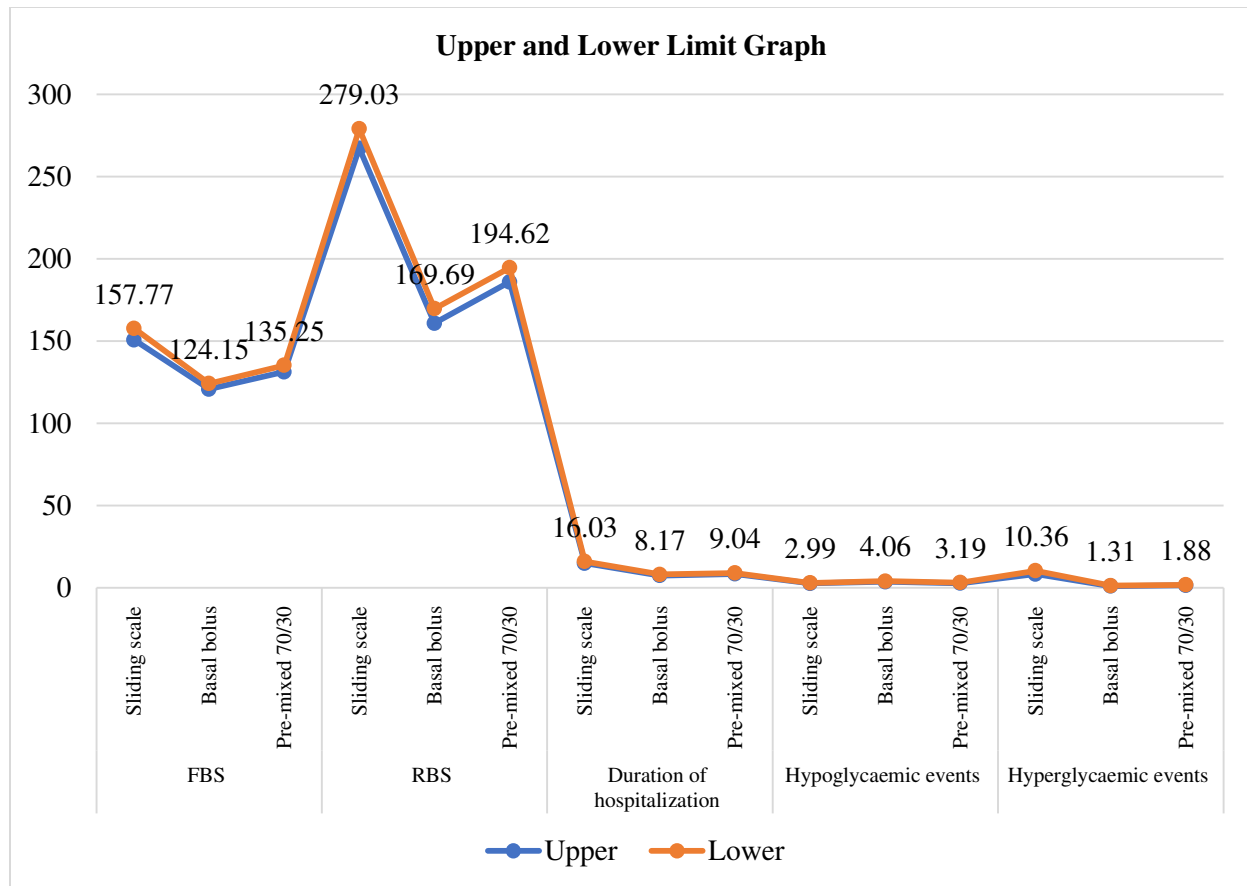
DISCUSSION:

T2DM non-severe patients, despite the use of insulin, glycemic control remains disappointing in the hospitalized patients. It was observed that insulin sliding scale is at priority in usage by doctors as 44.8% participants in the research study were getting through this treatment, similar other academic organizations [10]. We also analyzed the situation of non-severe hospitalized patients having unstable sugar level in blood. The 'Sliding-scale insulin' (SSI), is in over usage because of convenience and it does not need a physician regarding the essential insulin dose [11]. A factor behind the usage of SSI instead of insulin in basal-bolus is fear of hypoglycemia [12]. The participants had more hyperglycemic events on SSI treatment and longer duration of hospitalized stay in comparison with the basal-bolus treatment, which can be compared to research studies displaying the usage of SSI as the only cure for hospitalized patients. It is unsuccessful moreover, linked with many problems including hyperglycemic proceedings [5, 13, 14]. It was noticed in our research that glycemic control was expressively improved as compared to the treatment with basal-bolus then SSI. The Participants obtained NPH insulin in place of long-acting glargine in basal-

bolus treatment. Controlling the level of random and fasting average value of glucose in blood was larger to basal-bolus treatment as in comparison with pre-mixed and SSI treatment (Table – II).

Our observations can be compared with other research studies [15 – 17]. A study had stated the consequences of a prospective, random test in which treatment with basal-bolus insulin was compared with SSI and stated that insulin with basal-bolus utilization made large advancements in blood glucose mechanism as compared to alone SSI. It was observed in a study report if the number of severe hypoglycemic events is not increased, basal-bolus treatment is linked with improved control of glycemic (67% vs 37%) and lesser occurrence related to hospital problems as compared to SSI.

A most advanced method to diabetes care is basal-bolus insulin and it suggests a traditional insulin distribution [18,19]. Glucose is dealt with the basal insulin and process of synthetization is carried out by the liver. Post-meal glucose is controlled by the bolus insulin. This treatment is suitable and fulfils the physical needs of each individual due to different needs related to basal-bolus insulin in various people. A study stated that treatment with basal-bolus, using

glulisine /glargine fallouts in an apparent premix therapy versus larger glycemic control in people with long-lasting treated with insulin T2DM. This research also displayed, no change in the rates of hypoglycemia. Both basal and nutritional components must be obtained through Insulin therapy for achieving blood glucose objectives. Patients in the hospital often are in need for high insulin dosages to obtain targeted glucose levels because of enhanced insulin resistance; therefore, patients often are in need for supplemental insulin for the cure with basal and nutritional insulin requirements. There is a need to spread awareness among patients and physicians to achieve target blood glucose for the purpose of reducing the illness and death linked with 'T2DM [21].

CONCLUSION:
The treatment with basal-bolus is greater than sliding and pre-mixed insulin treatment, in patients of diabetes which are not severely ill. A sliding scale must not be encouraged in non-severely ill diabetic patients of T2DM.

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