

Study on Salicylates and Antihypertensive Drugs Induced Hypoglycemia in a Tertiary Care Hospital

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Abstract

Hypoglycemia is termed as unusual low blood glucose levels. It is most common in people who have DM. This study aimed to estimate the hypoglycemic activity of salicylate and anti-hypertensive drugs. The study was performed in In-patient and outpatient departments at Gandhi hospital. It is a prospective observational study with Sample size 80 to 100 in a duration of six months. Both in IP patients and OP patients there is significant change in glucose levels. When they are taken in combinations like hypoglycemic agents, anti-hypertensive and aspirin. In the present study out of 64 subjects, the greater number of cases found in age group 50-59 years (28.1%). According to statistical data the age groups between 50-59 years are at more risk followed by 60-69 years. When compared with op patients, there is much more decrease in blood glucose levels by taking combination of aspirin, OHA, HTN drugs in ip patients.

Keywords: Aspirin • Blood glucose levels • Diabetes mellitus • Hypertension • Oral hypoglycemic agents

Introduction

Diabetes mellitus is a foremost enduring disease in all over the world. In the elderly population, 1 in 4 adults of age 65 years have been diagnosed with T2DM and another 50% have prediabetes, who are at higher risk of developing diabetes in the future [1]. Hypoglycemia is a predominantly concerned problem in geriatric patients who are having diabetes mellitus because of diminished counter regulatory hormone response to hypoglycemia. It is a common acceptance that beta-blockers should be avoided in diabetic patients because they may prolong hypoglycemia and mask the hypoglycemic symptoms [2]. In healthy individuals a complicated glucoregulatory system acts rapidly to counter hypoglycemia by reducing insulin production which is important in mechanism that removes glucose from the bloodstream and activating energy assets from the fat and liver. When this glucoregulatory system does not function, there will be excessive large amounts of insulin in the blood. Which results in sudden radical drop in circulating glucose [3]. In, most of the cases hypoglycemia occurs in diabetic patients who are enduring therapeutic intervention with meglitinides, sulfonylureas or insulin [4]. Many theories about the mechanisms of antihypertensive induced glycaemic effects have been hypothesized. Few of these theories have been deep-rooted and some are contradictory. In general, postulated mechanisms can be classified into Effects on peripheral blood flow, insulin receptors, liver and Insulin release [5]. Aspirin is the trade name for acetylsalicylic acid. It is used to treat pain, swelling and fever etc. Aspirin is a prototype of non-steroidal anti-inflammatory drugs. The effect of diabetes on enhancing platelets adhesion (expression of p-selectin), activation (activates protein kinase C) and aggregation. Furthermore, diabetics have less platelet lifespan, causing increased bone marrow platelet production. Finally, platelets upregulate both glycoproteins IIb, IIIa and P2Y12 signaling. Which ultimately increase platelet aggregation and adhesion. This makes aspirin therapy of potential value in these patients to diminish platelet activation and aggregation. Anti-hypertensive drugs are used to treat a patient who are having high blood pressure and also to prevent the complications. Such as myocardial infarction, stroke and other cardiovascular disease. ACE inhibitors remain as a safe

choice of drug for treating patients with diabetes mellitus. Beta Blockers inhibits glycogenolysis; diminishes signs and symptoms [6].

The chemical structure of Salicylic acid is shown in (Figure 1).

Materials and Methods

Study design: A prospective observational study.

Sample size: 80 to 100.

Study duration: 6 months.

Study period: September 2019 to February 2020.

Study approval: Institutional ethical committee approval was obtained before commencing study and Study protocol was submitted to Institutional Ethical Committee (IEC), CMR College of Pharmacy, and Hyderabad for approval.

A prospective observational study will be conducted and includes the following:

Participating in the ward rounds.

Identification of cases according to inclusive criteria and document in data documentation form.

To note down the blood glucose level values.

Preparation of final report and submission.

Publication of work.

The Inclusion criteria of the study are selection of diabetic patients treating with oral hypoglycemic agents, salicylates and anti-hypertensive drugs. Patients with age group of 25-80 years of both the gender were included as in higher (>80) and lower (<25) age group the blood glucose levels may not be accurate. The Exclusion criteria of the study are patients who are absconded and patients who are non-diabetics.

Results and Discussion

According to inclusion criteria, the total 64 diabetic and hypertension patients were scrutinized. In the present study out of 64 subjects, 46 (69.6%) were females and 20(30.3%) were males. Among gender wise distribution collected data females are more than males as shown in (Figure 2). The greater number of cases were found in age group 50-59 years (28.1%) in which males were 11 and females were 7 as shown in (Table 1). According to statistical data the age

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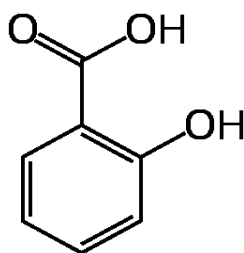


Figure 1. Structure of salicylic acid.

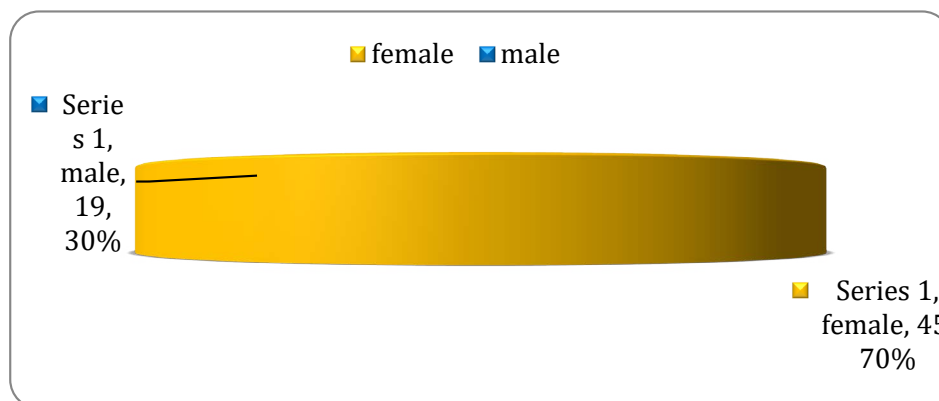


Figure 2. Gender wise distribution.

Table 1: Distribution of cases according to age.

S. no	Age	Gender		No. of cases		Percentage	
		Female	Male	Female	Male	Female	Male
1	30-39	5	0	5	0	7.80%	0%
2	40-49	9	4	13	4	20.30%	6.25%
3	50-59	11	7	18	7	28.10%	10.94%
4	60-69	12	3	15	3	23.40%	4.69%
5	70-79	6	5	11	5	17.20%	7.81%
6	80-89	2	0	2	0	3.20%	0%
Total		45	19	64	19	100%	29.69%

More number of cases collected among age group 60-69 i.e., 15 cases in which 12 were female and 3 were male and percentage was 28.1%.

groups between 50-59 years are at more risk followed by 60-69 years (Table 2). Out of 64 subjects, 19 patients who are treated with anti-diabetics and aspirin, 18 patients treated with anti-diabetics and hypertensive (Table 3), 27 patients were treated with combination (Aspirin+Hypertensive drugs+Diabetic drugs (Table 4) as shown in (Figure 3). In our study, six patients were prescribed with beta blockers and oral hypoglycemic agents in which 2 patients were showed decreased glucose levels. Among 6 patients one was treated with carvedilol and five were treated with atenolol. The patient treated with carvedilol showed no decrease in glucose levels. This result is contradicted to the study by [7] that specified that hypoglycemia was higher for carvedilol. In our study, five patients were treated with calcium channel blocker (amlodipine, cilnidipine) in which one patient administered amlodipine showed decreased glucose levels. Which results, decrease in glucose levels not only in non-diabetic patients but also in diabetic patient. The glucose levels were decreased in the age group 50-59 with drug combinations of anti-hypertensive drugs, aspirin and oral hypoglycemic agents (Table 5). The result supports the study by [8,9] conducted on calcium channel blockers use in association with lower fasting serum glucose among adults in type 2 diabetes and concludes that Calcium channel blockers use was associated with lower fasting blood glucose levels among diabetes. Out of 45 patients who were treated with aspirin and oral hypoglycemic agents. 43 patients revealed decreased glucose levels. This result supports the study which is accomplished by [10-14] determined that salicylates have been reported to lower blood glucose concentrations. And this result is also supported by they concluded that salicylates appear to be the promising treatment

option for prevention or treatment of diabetes mellitus by lowering the glucose levels.

The results according to our study are as follows:

The patients from OP department who are prescribed with oral hypoglycemic and aspirin were observed for 8 months and there is a considerable decrease in blood glucose levels as shown in (Figure 4).

The patients from OP department who are prescribed with oral hypoglycemic and anti-hypertensive drugs were observed for 8 months and there was a slight decrease in blood glucose levels as shown in (Figure 5).

The patients from OP department who are prescribed with oral hypoglycemic drugs, aspirin and anti-hypertensive drugs were observed for 8 months and there was a considerable decrease in blood glucose levels as shown in (Figure 6).

The patients from IP department who are prescribed with hypoglycemic agents along with aspirin were observed for 10 days and there was a slight decrease in blood glucose levels as shown in (Figure 7).

The patients of IP department who are prescribed with hypoglycemic agents along with anti-hypertensive drugs were observed for 10 days and there was a slight decrease in blood glucose levels as shown in (Figure 8).

The patients from IP department, who are prescribed with hypoglycemic agents along with anti-hypertensive and aspirin. Were observed for 10 days and there is a considerable decrease in blood glucose levels as shown in (Figure 9).

Table 2: Statistical arrangement of collected cases.

S.no	Age	Frequency	Excepted value	o- E	(O-E)2	(O-E)2
						E
1	30- 39	5	10.6	-5.6	31.36	2.9
2	40- 49	13	10.6	2.4	5.76	0.5
3	50-59	18	10.6	7.4	54.76	5.1
4	60-69	15	10.6	4.4	19.36	1.8
5	70-79	11	10.6	0.4	0.16	0.01
6	80-89	2	10.6	-8.6	73.96	6.9

*Degree of freedom = 5

P value at 0.05 is 11.07

Calculated value is more than the table value, so there is more risk at age group 50-59 followed by 60-69 age group.

More number of cases was collected from general medicine department.

Table 3: Statistical arrangement of gender wise distribution according to drugs.

S.no	E	O-E	(O-E)	(O-E)2
				E
1	10.2	-0.2	0.04	0.0039
2	4.7	0.3	0.09	0.0191
3	12.2	3.8	14.4	1.1803
4	5.7	-3.7	13.6	2.3859
5	20.4	-3.4	11.5	0.5637
6	9.5	3.5	12.2	1.2842

=5.4371

Degree of freedom = (R-1) (C-1) = (2-1) (3-1) = 2

Z² value i.e. (2) is less than the table value at certain level of significance, the fit is considered to be good one.

Table 4: Drugs given in combination.

Drugs	No.of patients	No. of patients with decreased glucose levels
CCB		
Amlodipine +OH*	3	1
Cilnidipine+OH*	2	0
ARB		
Telmisartan +OH*	2	0
ACE		
Enalapril+ OH*	2	0
Beta blockers		
Atenolol+ OH*	5	2
Carvedilol+OH*	1	0
salicylates		
Aspirin + OH*	45	43

*OH – Oral Hypoglycemics

The highest number of patients with decreased glucose levels is present in combination of oral hypoglycemia and aspirin that is out of 45 patients, 43 patients had showed decreased levels of glucose levels.

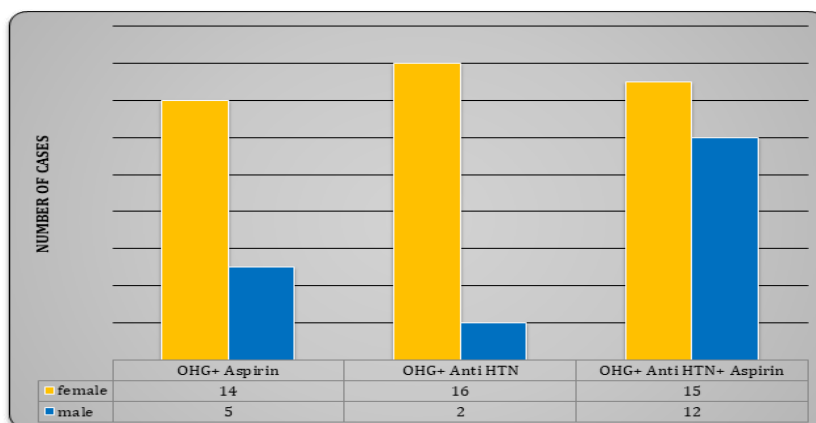


Figure 3. Distribution of cases according to drugs.

Table 5: Age wise decrease in glucose levels.

S no	Age group	Hypoglycemic drugs+ anti HTN drugs			Hypoglycemic+ anti HTN drugs+ aspirin		Hypoglycemic+ aspirin		
1	30-39	0	2	2	0	0	0	2	2
2	40-49	1	3	4	1	2	1	2	3
3	50-59	1	2	3	6	6	1	1	2
4	60-69	0	2	2	1	4	0	2	2
5	70-79	0	3	3	1	2	2	1	3
6	80-89	0	0	0	0	0	0	2	2
7				14					14

*The glucose levels were decreased in the age group of 50-59 with anti-hypertensive drugs, aspirin and hypoglycemic agent combination.

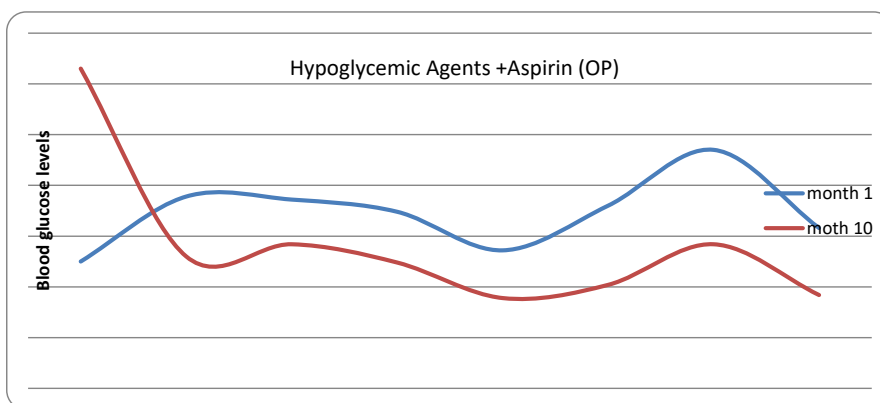


Figure 4. Graphical representation of decreased blood glucose levels (oral hypoglycemic+ Aspirin).

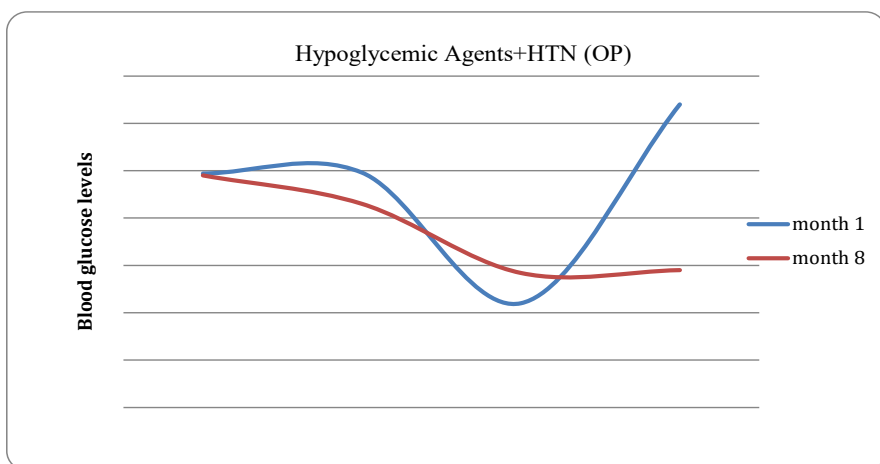


Figure 5. Graphical representation of decreased blood glucose level (hypoglycemic agents+ Anti-Hypertensive drugs).

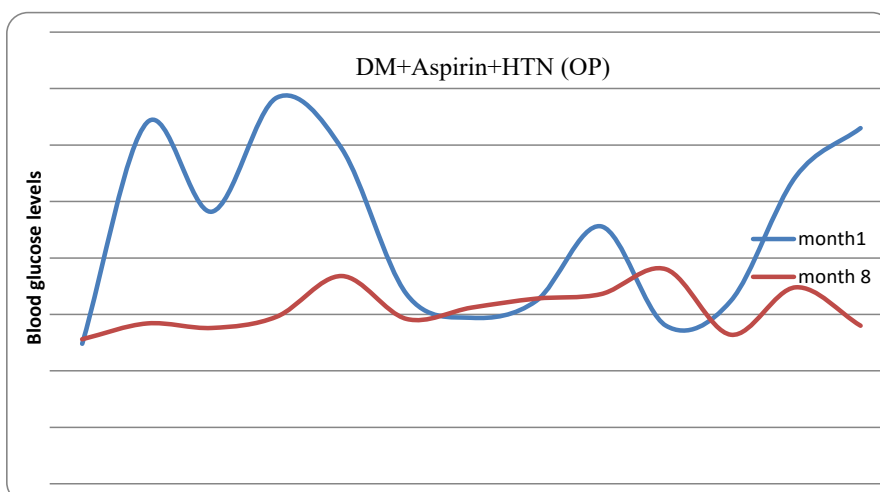


Figure 6. Graphical representation of decreased blood glucose levels (oral Hypoglycemics+Aspirin+ Anti-HTN).

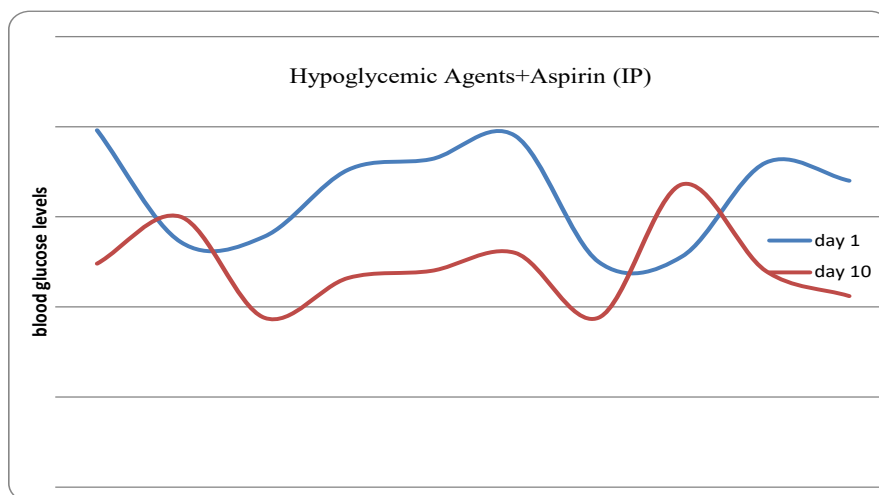


Figure 7. Graphical representation of blood glucose levels (oral hypoglycemics+aspirin).

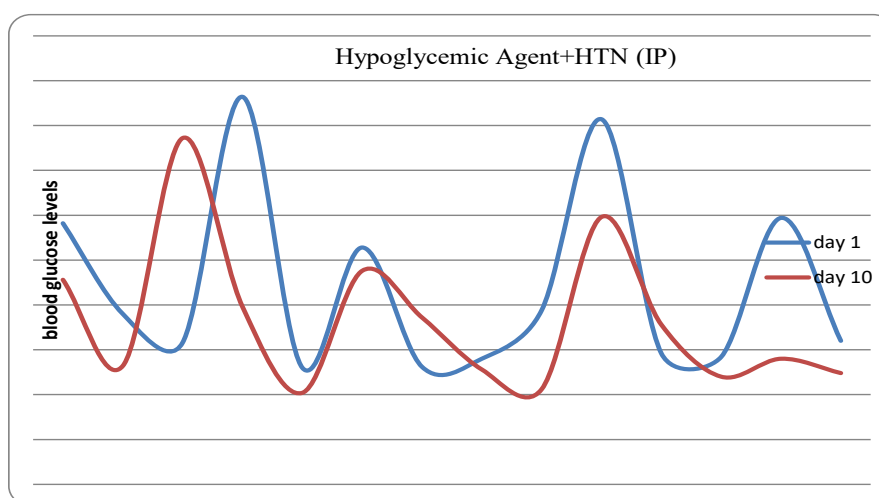


Figure 8. Graphical representation of decreased blood glucose levels (hypoglycemic agents+ anti-HTN).

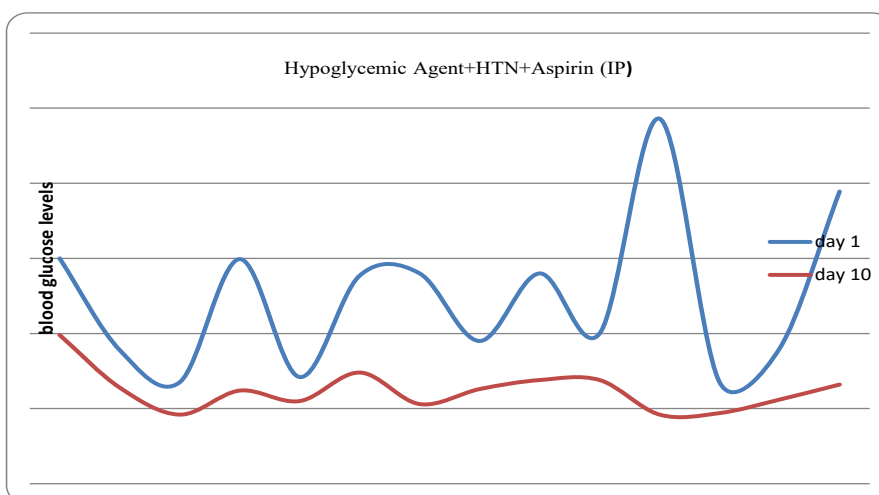


Figure 9. Graphical representation of decreased blood glucose levels (oral Hypoglycemic+ Anti-HTN+aspirin).

Conclusion

In Outpatient Department and in Inpatients, there is abundant decrease in blood glucose levels by taking combination of drugs like aspirin, oral hypoglycemic agents and anti-hypertensive drugs and in patients taking oral hypoglycemic agents along with aspirin also showed decreased blood glucose levels but when compared with these two combination Aspirin +OHA+HTN group has shown much decrease in glucose levels. In Inpatient Department, there is

much more decrease in blood glucose levels in patients taking combination of aspirin, oral hypoglycemic agents, anti-hypertensive.

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also discussed various points related to the case whenever asked to them. Without their support this work would not have been successfully completed smoothly. (Figure 3) The greater number of patients are taking combination of anti-hypertensive, anti-diabetics and aspirin that is 27 patients.

Abbreviations

HTN- Hypertension

OHG- Oral Hypoglycemics

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