A STUDY ON DIABETIC INDUCED COMPLICATIONS AND THEIRPRONE TOWARDS SURGERY

Comment [b1]: It is better to mention the methodology

Abstract:

Back ground: The Diabetes mellitus describes a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate,fat and protein metabolism resulting from defects in insulin secretion,insulin action, or both.The effects of diabetes mellitus include long-term damage,dysfunction and failure of various organs.

Comment [b2]: Please give a good reason to study.

Materials and methods: A prospective observational study was conducted in the Santhiram college& general hospital, to assess the macro vascular and micro vascular complications of diabetes mellitus and who prone to surgery of diabetes mellitus complications by using case sheets, prescriptions in tertiary care teaching hospital.

Comment [b3]: Mention the year of study.

Results: A total of 150 patients are included in this study.In that diabetic ulcer with cellulitis in 19, gangrene in 19, peripheral vascular disease in 6, gangrene with cellulitis in 11,Non healing diabetes foot ulcer in 35, CAD , NSTEMI in 24, diabetic retinopathy 25, MI in 11 patients, it was observed that the outcome of the surgery conducted patients were given their satisfaction as Excellent by 75,Very Good by 35, Good by 24, Average by 20 and zero for the poor respectively.

Comment [b4]: The result does not match the title. If you intend to consent to surgery, please do not modify the title

Conclusion: In our study we conclude that out of 150 cases Male patients are more prone to diabetic complications than females.The patient counseling should involve to minimize the incidence and prevalence of diabetes by conducting the continuing health education and other health programms.

Keywords: Diabetic mellitus,Micro and macro vascular complications, Lab parameters of fasting blood sugar(FBS),Random blood sugar(RBS),Post prandial blood sugar(PPBS), Hemoglobin A1c(HbA1c) and Patient counseling.

Comment [b5]: Please write keywords based on MESH.

INTRODUCTION: Diabetes is a chronic disease with a group of metabolic disorders characterized by high sugar levels in blood (hyperglycemia). It is caused due to deficiency of

Comment [b6]: Introduction needs major reform.

insulin or resistance to insulin or both. Insulin is secreted by pancreatic β-cells to regulate blood sugar levels.[1] (Dattatreya adapa et.al., **Epidemiology**: According to recent diabetes atlas, the global prevalence of diabetes is estimated at 415 million (8.8%), which is predicted to rise to 642 million in next 25 years. In India, there are about 69.2 million people with diabetes and are expected to cross 123.5 million by 2040. Moreover, worldwide approximately 193 million diabetics remain undiagnosed predisposing them to the development of several long-term complications of untreated chronic hyperglycemia[3](Abdulfatai at.al.,).etiology of type2DM is constitutional insulin resistance with relative insulin deficiency. The main factors that contribute to the development of insulin resistance (T2DM) include Age, Obesity , Physical inactivity, Smoking and alcohol, dyslipidemia, hypertension, and cardiovascular disease, Mutations in the insulin gene and Insulin receptors. **Symptoms of diabetics**: Excessive thirst,frequently urination,extreme hunger,weight loss,fatigue,polyuria, Dry mouth and skin.[4] (Manish Kumar Maurya et.al.,)

Risk factors of T2DM are Adiposity(Weight, Height, Body mass index (BMI), Waist circumference, Hip circumference) Biomarkers (↑ ALT,↑ ΄YGT,↑uric acid,↑CRP↓ adiponectin,↓ vitamin D).Dietary factors(↑ Sugar sweetened beverages,↓ whole grains,↓ Coffee,↓ Healthy deitarypattern,↓ Heme iron,↑ Processed meat),Psychosocial factors (↓educational status, ↓conscientiousness) ,Lifestyle factors (↓physical activity,↑sedentary time,↑television watching, ↑NO_2,↓alcohol,↑PM_{10},↑smoking), Medical history(↑age at menarche, ↑SBP, Gestational diabetes Metabolic syndrome, Preterm birth).

The diagnosis of patients with diabetes or pre diabetes some test are needed to performed ,like oral glucose tolerance testing , HbA1c testing etc. The 1997 American diabetes association (ADA) was recommendation for diagnosis of DM factor. Focus on fasting plasma glucose (FPG). While WHO is focus on the OGTT. Diabetes mellitus is diagnosed by any following type of test 1-Fasting plasma glucose level: It should be 8 hour fasting before taking this test. Condition of DM More than 126mg/dl. 2-plasma glucose: More than or equal to 200mg/dl two hours after a 75 gram oral glucose load as in a OGTT. 3-Symptoms of high blood sugar and casual plasma glucose: It is greater than or equal to 200 mg/dl. 4-Glycated hemoglobin (HbA1c): It is greater than or equal to 48mmol/mol Note: According to current definition of DM, two fasting glucose measurement above 126 is considered diagnostic for DM. The WHO people with fasting glucose levels from 110 to 125mg/dl are considered to have impaired fasting glucose. HbA1c test is much better than the FGP test for determination risk of cardiovascular disease and death from any cause[4] (Manish Kumar Maurya et al.,).

Comment [b7]: Please correct the sentences according to the principles of scientific essay writing.

When compared to people without diabetes, diabetics have a 30-fold higher risk of lower-extremity amputation owing to infection. Diabetic foot infections that aren't treated well or aren't treated at all result in lower-extremity amputation in about 10% of patients.[4]

Diabetic neuropathy, nephropathy, and retinopathy are all examples of microvascular problems. Macrovascular Blood vessels and neurons are damaged as a result of chronic problems. Damage to blood arteries can lead to strokes, heart attacks, kidney failure, blindness, slow skin break healing (with the increased risk of infection), and even amputations due to poor circulation (decreased blood flow, mainly to the extremities).[3]

Comment [b8]: The purpose of the study should be stated.

RESEARCH QUESTION

Is patient satisfied with outcome of the surgery?

Comment [b9]: Your other question is what are the complications of the disease?

HYPOTHESIS

Null hypothesis: Their is no satisfaction with outcome after surgery.

Alternative hypothesis: their is satisfaction with outcome after surgery.

METHODOLOGY:

Study design: It is a prospective observational study which includes patients with , cellulites, gangrene,non healing diabetic foot ulcers,myocardial infraction,coronary artery disease with angiagram procedure from general medicine department of Santhiram medical college and general hospital investigational study on diabetic induced complications and it's prone towards surgery.

Comment [b10]: This is transferred to the participants section.

Study period: 6 months (December 2020 – May 2021)

Study site: Santhiram Medical College and General Hospital, Nandyal, which is 1000 bedded Tertiary care teaching Hospital with multi specialisations.

Study Target population:

All patients from Inpatient and Outpatient units of General medicine, surgery Departments of SRMC&GH

Sample size: 150

Ethical considerations: Ethical approval obtained from Santhiram Medical College and General Hospital, Nandyal.

Comment [b11]: Please complete the ethical considerations.

Study materials/Source of data:

- Case sheets
- Discharge medication charts

STUDY CRITERIA:

Inclusion criteria:

- Patients with informed consent form
- Patients with age group >20years.
- Patient with DM
- Patients with complaint of lack of wound healing, infections
- Patient with diabetic complication
- **Exclusion criteria:**
- Participants unwilling to join the study
- Women with pregnancy
- **METHOD OF DATA COLLECTION:**

This prospective observational study was carried out after obtaining the permission of institutional ethical committee, Santhiram medical college and general hospital, Nandyala A.P, India, with proposal number .... All patients according to the study criteria, admitted in the Cardiology, General surgery, ophthalmology, between December to May were included in the study.

A specially designed proforma was used for collecting data which includes patient demographics, past medical history, family and surgical history, co-morbidities, diagnosis

Comment [b12]: How did you make sure the forms were valid?

and present medications prescribed for each patient. The data was obtained by direct patient interview and from patient case profiles. Total 150 cases were collected from wards, according to study criteria. All the prescriptions which contain different laboratory values concerning blood sugar and drugs were collected during the study period to analyze the information. And the satisfaction of the patient after surgery was measured by 5-point likert scale which contains excellent, very good, good, average and poor.

STATISTICAL ANALYSIS:

The data was subjected to descriptive and inference statistics using Graphpad Prism 5. Data subjected to mean, standard deviation, standard error and percentages. According to the ordinal data kruskal wallis test was used to obtain p-value and also Dunn's multiple comparison test was performed between groups. P-value < 0.05 considered as statistically significant.

RESULTS& DISCUSSION:

1)Socio-demographic details		No. of patients
Gender N (%)	Males	84(56%)
	Females	66(44%)
2)Area wise population of cases	Urban	35(23%)
	Rural	115(77%)
3)Department wise distribution	General surgery	90
	Cardiology	35
	Opthamalogy	25

4)Social history of patient	Alcoholic	36
	Smoker	48
	Both	20
5) Based Family history	Diabetic	87(58%)
	Hypertension	42(28%)
	Diabetic and Hypertension	21(14%)
6)Medication history	H.Actropid	35(23%)
	Glycomet- gp1	32(21%)
	Metformin	37(25%)
	Metformin and H.Actropid	46(25%)

1) Gender distribution: The total sample for the study was 150 subjects. In this sample males were 84 subjects and Females were 66 subjects. The percentage includes 56 and 44 respectively.

Comment [b13]: Please delete from the text if there is a finding in the tables.

2) The Table describes that Rural Population(77%) were more effected with diabetic complication when compared to urban Population(23%).
3) Department wise:Among the 150 patients of our study the general surgery department patients are 90 members cardiology department 35 members and opthamalogy departments 25 members.
   NOTE : Due to unproper cleaning and the hygienic conditins of the lower limbs and foot the most of the people facing lower limbs extremity problems and the irregular mentainence of the diet and the medications the more number of patients are admitting in the general surgery ward.
4) The Table describes that among the 150 patients of our study the alcoholics were 36 members, smokers were 48 members, and both (alcoholic and smokers) were 20 members and the females were excluded.
5) The Table describes that Among the 150 patients of our study the family history of diabetic was high compare to the hypertension and comorbid condition that was hypertension & diabetic
6) The Table describes that among the 150 patients of our study the widely used medications were metformin and H.Actropid of 25%.

Table-1: AGE WISE GENDER DISTRIBUTION

Age	Female	%	Male	%	Total %
31-40	2	3	0	0	1.33
41-50	13	20	13	15	17.33

51-60	26	39	35	43	40.6
61-70	17	26	21	25	25.33
71-80	8	12	13	15	14
81-90	0	0	2	2	1.33
Total	**66**	**100**	**84**	**100**	**100%**

The Table describes that among the 150 patients of our study patients suffering from diabetic complication were observed more in the age group of 51-60 years (females- 39% and males - 43%) and less observed at age group of 31-40 years (females 3% and males-0) and 81-90 years (females-0% and males-2%). Males were more effected compare to females.

Note: As no people diagnised with the diabetic prone to surgery below 30 years

Table.2: Self maintenance

Indication	Diet Maintenance	Physical Activity
Yes	36	30
No	114	120
Total	**150**	**150**

The Table describes that among the 150 patients of our study the diet maintenance was followed only by 36 members and not followed by 114 members, and the physical activity was followed only by 30 members and not followed by 120 members.

Note: Due to the lack of self maintainence like diabetic diet and physical activity the more popupation facing a diabetic complications.

Table.3: Laboratory parameters

Range	RBS			FBSM			PPBS		
	M	**F**	**%**	**M**	**F**	**%**	**M**	**F**	**%**
100-140	2	2	3	25	16	27	20	10	20
141-180	26	22	32	30	25	37	27	25	34.66
181-230	30	24	36	20	14	23	22	10	21.33
231-270	2	2	3	4	7	7	11	10	14
271-310	6	6	8	3	2	3	2	6	5.33
311-350	8	3	8	2	2	3	2	5	4.66
350	10	7	10	0	0	0	0	0	0

- Above									
Total	**84**	**66**	**100**	**84**	**66**	**100**	**84**	**66**	**100**

RBS = Random blood sugar, FBS = fasting blood sugar measurement, PPBS = Post prandial blood sugar

The Table describes that among the 150 patients of our study the highest RBS value ranges from 181-230 (36%) and the lowest RBS value ranges from 100-140 (2.66%). Among the 150 patients of our study the highest FBS value ranges from 141-180 (36.66%) and the lowest FBS value ranges from 311-350 (2.66%). And among the 150 patients of our study the highest PPBS value ranges from 141-180 (34.66%) and the lowest PPBS value ranges from 311-350 (4.66%).

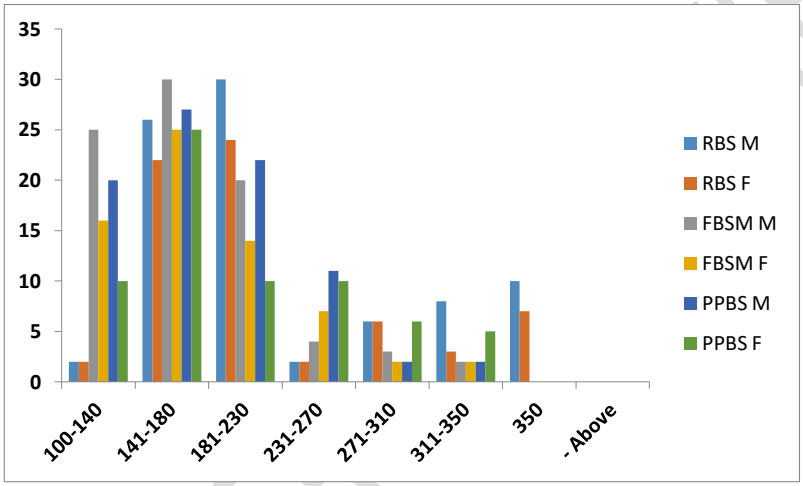

Fig. 1. Blood glucose level

Table.4: HbA1c laboratory parameter

Lab Parameter of HbA1c	No.of Patients
lesser than 6.5	18
greater than 6.5	72
Total	**90**

HbA1c = Hemoglobin A1c

The Table describes that among the 150 patients of our study the highest HBA1c value greater than 6.5 were 72 patients and less than 6.5 were 18 patients found.

TABLE:5-DIAGNOSIS OF THE PATIENTS

Diagnosis	Female	Male	Total	Percentage%
Diabetic ulcer with cellulitis	9	10	19	12.6
Peripheral vascular disease	4	2	6	4
Gangrene	6	13	19	12.6
Gangrene with cellulitis	7	4	11	7.33
Non healing diabetic foot ulcer	15	20	35	23.3
CAD, NSTEMI	10	14	24	16
Diabetic retinopathy	10	15	25	16.6
Myocardial infraction	5	6	11	7.33
Total	**66**	**84**	**150**	**100%**

The Table describes that among the 150 patients of our study based on diagnosis non healing diabetic foot ulcer of male and female(23.3%) was found to high. peripheral vascular disease female and male(4%) was found as low.

Figure.2: Diagnosis of the patients

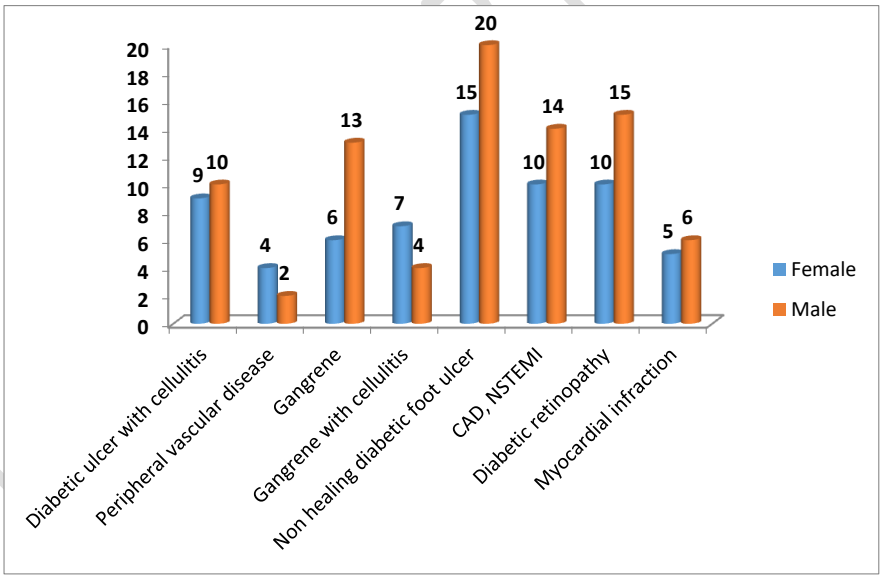

Table.6: SURGICAL PROCEDURE PERFORMED TO THE PATIENT DUE TO COMPLICATION

Surgical Procedure	No. of Patients	Percentage%
Debridement	45	30

Amputation	20	13
Skin grafting	25	17
Angioplasty	35	23
Lasix surgery	25	17
Total	**150**	**100**

The Table describes that mong the 150 patients of our study based on surgical procedure debridement was performed in 30% patients, Amputation were performed in 13%, skin grating was performed in 13% patients, Angioplasty were performed in 23% patients and lasix surgery performed in 13% patients.

Debridment > Angioplasty > Skin grafting = Lasix surgery > Amputation.

Table.7: SURGICAL DATA

Prone to Surgery	Prone to Re -Surgery	First Aid For Post Surgery
130	40	20

The Table discribes that among the 150 members of our study all 150 members have undergone surgery. Among them 130 members have undergone single surgery, 40 members under gone resurgery and the remaing 20 members under gone to first aid after post surgery.

Note: Due to lack of caring the wound, irregular followups and medications the 40% patients are undergoing re-surgerical producer.

Table.8: Distribution of patients based on antibiotics prescribing

Drugs	No.of Patients	%
Ceftriaxone(monocef)	33	22
Cefoperazone+Salbactum(zostum)	48	32
Ofloxacin+Ornidazole (oflox-OZ)	27	18
Pipercillin+Tazobactum(piptaz)	22	15
Amikacin	8	5
Linizolid	12	8

Total	**150**	**100%**

The Table discribes that among the 150 patients of our study Zostum (cefoperazone + salbactum) was the most common prescribed antibiotic in diabetic patients.

Note: The antibiotics are prescribed based on culture sensitivity test.

Table.9: Outcome of the patient after surgery

Outcome	General surgery	Cardiology	Ophthalmology	No.of Patients	%
Excellent	23	32	20	75	50
Very good	25	3	3	31	20.6
Good	23	0	1	24	16
Average	19	0	1	20	13.3
Poor	0	0	0	0	0
Total	**90**	**35**	**25**	**150**	**100**

The Table discribes that among the 150 patients of our study the 50% population outcome was excellent, 31% population outcome was very good, 24% population outcome was good and the remaing 20%population outcome was average.

Note: Due to the irregular followups and medication the 20% population were at average outcome.

Figure.3: Outcome of the patient after surgery

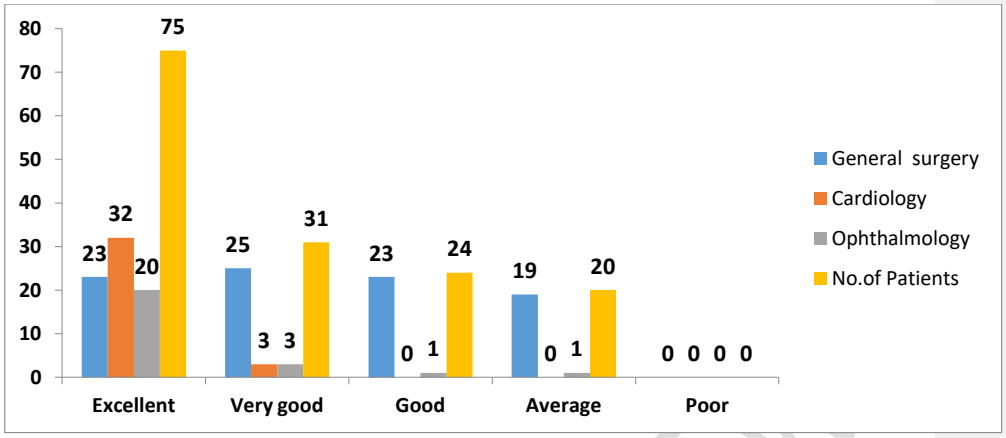

Table.10: Descriptive statistics

Comment [b14]: Raw data is presented in all parts of the findings.

Order	Excellent	Very Good	Good	Average	Poor
Number of values	3	3	3	3	3
Minimum	20.0000	3.00000	0.0	0.0	0.0
25% Percentile	20.0000	3.00000	0.0	0.0	0.0
Median	23.0000	3.00000	1.00000	1.00000	0.0
75% Percentile	32.0000	25.0000	23.0000	19.0000	0.0
Maximum	32.0000	25.0000	23.0000	19.0000	0.0
Mean	25.0000	10.3333	8.00000	6.66667	0.0
Std. Deviation	6.24500	12.7017	13.0000	10.6927	0.0
Std. Error	3.60555	7.33333	7.50555	6.17342	0.0
Lower 95% CI	9.48663	-21.2193	-24.2937	-19.8953	0.0

Upper 95% CI	40.5134	41.8860	40.2937	33.2286	0.0

Std. = Standard

CI = Confidence Interval

Figure.4: Outcome of the patient after surgery mean with SEM

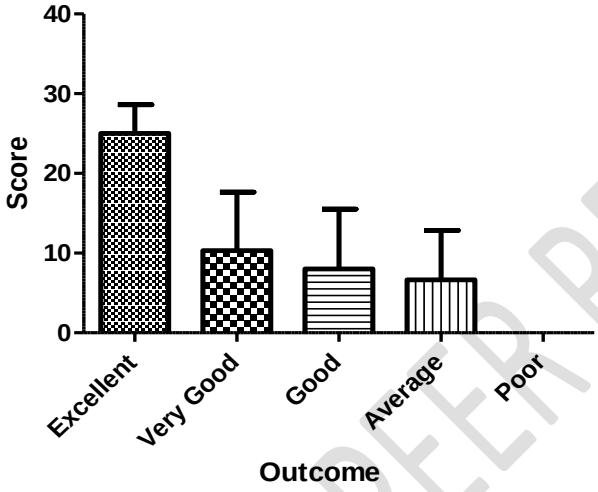

Table.11: Inference statistics

Kruskal-Wallis test		
P value	**0.0653**	
Exact or approximate P value?	Gaussian Approximation	
Do the medians vary signif. (P < 0.05)	No	

Number of groups	5	
Kruskal-Wallis statistic	8.83799	
Dunn's Multiple Comparison Test	Difference in rank sum	Significant? P < 0.05?
Excellent vs Very Good	2.50000	No
Excellent vs Good	5.50000	No
Excellent vs Average	6.33333	No
Excellent vs Poor	9.83333	No
Very Good vs Good	3.00000	No
Very Good vs Average	3.83333	No
Very Good vs Poor	7.33333	No
Good vs Average	0.833333	No
Good vs Poor	4.33333	No
Average vs Poor	3.50000	No

P-Value: < 0.05 = Considered as Significant

After performing non-parametric Kruskal wallis test for ordinal data the obtained p- value was 0.0653. That means it was not statistically significant. Why because the value > 0.05 slightly. Eventhough it was not statistically significant, but it was significant clinically. The values were explain the data was clinically significant.

SUMMARY AND CONCLUSION:

Comment [b15]: Study is not a part of the discussion. Be sure to add.

The diabetic patients need to care themselves otherwise leads to diabetic complications. In severe conditions physician could suggest for surgery. The patients outcome in this study after surgery was expressed highly as excellent, very good, good minorly on average. The values obtained clinical significant, but statistically not significant.

The Laboratory values of RBS, FBSM, PPBS were monitered and with this observed thing was that 25% patients are not taken care about their health condition. The highest number of patients was existed in the range of 141- 180 and 181 – 230. However the value above 200 also have chance to get complications if the blood sugar persisted for long time. In the same why the other laboratory parameter for knowing blood sugar status was HbA1c. In this laboratory value approximately half of the patients that was 72 patients have HbA1c value greater than 6.5, this indicates chances for getting more complications in the patients; further may leads to surgery as well according the condition of the patient.

From the study observed disease conditions of the patient were diabetic ulcers, peripheral vascular disease, gangrene, gangrene with cullitis, non healing diabetic foot ulcers and diabetic retinopathy. All this disease conditions were develop because of the uncontrolled blood sugar levels and improper self maintenane.

The surgical data also explains the need of controlling of blood sugar levels. All the patients in our study undergone for different surgical procedures. Those were debriment, amputation, skin grafting, angioplasty and lasix surgery. These data also suggests to patients to control blood sugar levels.

Outcome satisfaction of the patient were also estimated bt using 5 – point likert scale. All the patients who were undergone to various surgical procedures expressed their satisfaction. In total of 150 patients 75 patients were expressed their outcomme as excellent,

31 as very good, 24 as good, 20 as average and zero for the poor respectively. These indicates the data was clinically significant.

All the health care professionals in this regard conducted councilling and explained about the diabetes disease, controlling of the blood sugar levels and its importance. Diabetes is a world wide health care problem, in view of this concern all the health care professionals like physicians, pharmacists and nurses should involved to minimize the incidence and prevalence of diabetes by conducting the continuing health education and other health programms. Ultimately this may help in minizing the number of cases in across the world.

Comment [b16]: As a conclusion, it is very long.

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Comment [b17]: All references should be reviewed and corrected.

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Comment [b18]: References need major correction.

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