INCIDENCE AND CLINICAL PRACTICE RELATED TO STEROID INDUCED DIABETES MELLITUS IN TIKUR ANBESA SPECIALIZED HOSPITAL INTERNAL MEDICINE CLINICS WHO TOOK STEROID THERAPY

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A RESEARCH PAPER TO BE SUBMITTED TO DEPARTMENT OF INTERNAL MEDICINE , TIKUR ANBESA SPECIALIZED HOSPITAL FOR THE PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE SPECIALITY CERTIFICATE IN INTERNAL MEDICINE

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Declaration

I, Gubay Anteneh, do hereby declare that this research thesis is a result of the works of my own making except where due is made in a review of previous literature in the content and by my knowledge, has never been submitted for any prior academic award or qualification in this Institution.

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Approval of thesis submission

I hereby certify that I have read this thesis prepared under my direction and recommend that it can be accepted as fulfilling the thesis requirement.

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Research summary information

Name of the principal investigator	Dr.Gubay Anteneh Taye
Supervisors:	Dr.Melaku Taye
Full title of the project	Incidence and clinical practice related to steroid induced diabetes mellitus in tikur anbesa specialized hospital internal medicine clinics who took steroid therapy
Study area	Tikur Anbessa Specialized Hospital, Addis Ababa Ethiopia
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Abstract

Background: Even though steroid used to treat different medical conditions, chronic exposure of steroid alters body composition, impacting trunk adipose tissue depots, metabolism, and insulin action, further contributing to hyperglycemia and dyslipidemia.from those effects SIDM among the commonest side effects. The magnitude and treatment is variable from center to center.

Objective: To determine the incidence and clinical practice related to steroid induced diabetes mellitus in Tikur Anbesa specialized hospital who took steroid therapy

Methods: single center retrospective study was conducted January 1-february 28,2025 by using structured questionnaire. All patients on systemic steroid who had follow up at internal medicine clinic included. Data were collected by health professionals . The data were entered into SPSS V 25 for analysis. Descriptive statistics was carried out to explore the socio-demographic characteristics of participants. Chi-sequre test were employed. Variables with p value < 0.05 in the multivariate analysis were considered as independent significant determinant factor for steroid induced diabetes mellitus.

Results:from 111 study parcicipantsthe incidence of steroid induced DM is high in this study which is 13.5% (15) which was strong association with age with age (P<0.001), Comorbidities (P-value <0.001),those patients who took aditonal dexamethasone (P=0.03) but the not associated with sex,starting dose,duration of steroid,indication of steroid and tapering of steroid. Assessments of glycemic status before and after commencent of steroid were done inferequently.

Conclusion and Recommendation:. The incidence of steroid induced DM is high in this study which is 13.5% (15) which was strong association with age with age (P<0.001), Comorbidities (P-value <0.001),those patients who took aditonal dexamethasone (P=0.03) . better to monitor before and after commencement of steroid to all patients

Key Words: steroid, steroid induced DM, Ethiopia

Acronyms and Abbreviations

DM-Diabetes Mellitus

FBS-Fasting Blood Sugar

HgbA1c-Hemoglobin A1c

OGTT-Oral Glucose Tolerance Test

RBS-Random Blood Sugar

SIDM-Steroid Induced Diabetes Mellitus

TASH-Tikur Anbesa Specialized Hospital

WHO – World Health Organization

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1. INTRODUCTION

1.1 BACKGROUND

Depend WHO step survey done 2015 in Ethiopia the prevalence of diabetes mellitus was 3.2% (3.5% males and 3.0% females) and the prevalence of impaired fasting glucose was 9.1%.(1)Chronic exposure of steroid alters body composition, impacting trunk adipose tissue depots, metabolism, and insulin action, further contributing to hyperglycemia and dyslipidemia.(2)

Cortisol is a human glucocorticoid hormone that is essential for survival under periods of stress. (3) Steroids are drugs that have been widely used in a variety of medical conditions for different purposes . Some of the conditions are acute exacerbations of chronic obstructive pulmonary disease (COPD), bronchial asthma , gout, and chemotherapy as well as chronically in sarcoidosis, autoimmune diseases, and inflammatory bowel diseases, as chemotherapy regimen in some of hematologic malignancy.(4, 5)

Despite their used in different medical conditions the use of those drugs predispose some harm ful effects . steroid induced hyperglycemia,osteoporosis,hypertension, obesity, cataract are some of them which are increase the morbidity and mortality of patients . (6) Many of these effects are mediated by direct actions of the glucocorticoid receptor, which binds to specific target genes and controls their transcriptional expression".(9)

1.2 Statement of the problem

The relative risk of any individual developing glucocorticoid-induced hyperglycaemia and diabetes mellitus is difficult to predict owing to the combination of doses, variable glucocorticoid potencies, routes of administration and duration of treatment that are used for different diseases.(9) Despite the wide clinical usage of glucocorticoid therapy and well-documented evidence of glucocorticoid-induced hyperglycaemia and diabetes, these complications still go under-diagnosed and –monitored.(8)

The magnitude of this problem is difficult to estimate in Ethiopia since there is limited data available but according to study done in our country south west ethiopia 11.1% of the study subjects had impaired glucose metabolism.(10) Another study which was conducted in bahir dar in 2023 the prevalence of hyperglycemia was 20.39% those who took intermittently took

predisolone. (11)Despite being common, glucocorticoid-induced diabetes remains a neglected clinical issue and action is needed to generate more evidence to improve clinical guidance.(12)

Once they develop SIDM associated increase morbidity and mortality can even present with acute complications like and chronic complications of DM as diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS). It also affectes the outcome of the patient with increasing the infection risk and prolonged hospitalization (7). Long term treatment of steroid with co-existence of inflammatory disease and hyperglycemia increase the long term exacerbation chronic complications including cardiovascular risk(13) .

1.3 Significance of the study

The purpose of this study was to describe the prevalence of steroid induced DM who received systemic steroid therapy and follow up TASH internal medicine clinic. It assessed factors associated with steroid induced DM and clinical practice related to DM.Even though the prevalence is high globally and also systemic steroid prescription high no study so far in my knowledge in our setup which asses DM related to steroid. The result of the study will serve as a baseline data that could be used in increasing level of detection and clinical practice related to steroid induced DM .

2 LITERATURE REVIEW

2.1Magnitude of steroid induced dm

Chronic exposure alters body composition, impacting trunk adipose tissue depots, metabolism, and insulin action, further contributing to hyperglycemia and dyslipidemia.(2) Moreover, in many studies only fasting glycemia is considered and this can lead to underestimate the real dimension of the disease (7)

Based prospective study done in 2019 at Medical University of Warsaw patients diagnosed with connective tissue disease treated with systemic steroid screen with OGTT results, their found In total, 32% of the study population was diagnosed with new-onset glucose metabolism impairment. (14) Study done Saudi Arabia, The King Abdulaziz Specialist Hospital, Taif City, prevalence of hyperglycemia among the patients who were on steroid therapy was 34.2%. (16)

In our country the data are limited ,according to study done in our country south west ethiopia 11.1% of the study subjects had impaired glucose metabolism.(10). Another study which was conducted in bahirdar in 2023 the prevalence of hyperglycemia was 20.39% those who took intermittently took predisolone. (11)

2.2 clinical practice related to steroid induced DM

Most of glucocorticoid-induced hyperglycaemia and diabetes are underdiagnosed and under-monitored .Even if steroid affects mostly postparandial glycemic level most of the crossectional studies used FBS as screening. A study done in UK on adults prescribed systemic steroids for 3 months observations found 1/3 of patients received glucose monitoring prior start of steroid and 60% patients took for over a year some glucose monitoring after exposure of steroid.(17)

2.3 factors related to steroid induced DM

The risk of diabetes associated with glucocorticoid was 1.36 ([95% CI 1.10–1.69], P 0.005), and the PAR was 2.0% on study done in Lodon UK and in another study the risk was double

2.31(18, 19). In one Meta-analysis data which was done in 2014 found out that from all treated with glucocorticoids 32.3% were develop hyperglycemia and 18.6% develop steroid induced diabetes mellitus(20). There are person specific and steroid related risks to develop steroid induced diabetes mellitus . old age,family history of DM,obesity are personal risk factors and steroid related factors include are steroid potency,duration and dosage (21).

Most literature show Supraphysiological doses greater than 5 mg of prednisolone are related to increase side effects glucocorticoid. There individuals who develop side effects in lower dose. Longer duration exposure of steroid has greater risk of developing steroid induced DM with estimated risk 22% in 6 months and 4.3% in 5 years(22) . Once they develop SIDM associated increase morbidity and mortality can even present with acute complications like and chronic complications of DM as diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS). It also affectes the outcome of the patient with increasing the infection risk and prolonged hospitalization (7). Long term treatment of steroid with co-existence of inflammatory disease and hyperglycemia increase the long term exacerbation chronic complications including cardiovascular risk(13) .

But in study done in our country age and sex of patients, waist circumference, family history of DM, Dose and duration of steroids has no significant association with hyperglycemia (10).

3. STUDY OBJECTIVES

3.1 General objectives

To determine the incidence and clinical practice related to steroid induced diabetes mellitus in Tikur Anbesa specialized hospital who took steroid therapy

3.2 Specific Objectives

- To determine the incidence of steroid induced DM who took steroid therapy in Tikur Anbessa Specialized Hospital in Addis Ababa, Ethiopia.
- To assess the clinical practice regarding of steroid induced DM who took steroid therapy in Tikur Anbessa Specialized Hospital in Addis Ababa, Ethiopia.
- To identify predictors of incidence of steroid induced DM who took steroid therapy in Tikur Anbessa Specialized Hospital in Addis Ababa, Ethiopia.

4. Materials and Methods

4.1 Study area

This study was conducted in out patient clinic of internal medicine Tikur Anbesa specialized hospital which is one of the largest hospitals in Addis Ababa, the capital city of Ethiopia. The hospital serves as a training center for undergraduate and postgraduate programs. It is the largest referral center in the country which gives both inpatient and outpatient and 24 hour emergency

service. In internal medicine in patient service has nearly 100 beds at ward and 12 beds for critical care. In internal medicine there are also 9 subspecialty out patient clinics.

4.2 Study period

The study was conducted over a two month period from January to February 2025

4.3 Study Design

A single hospital -based retrospective cohort study design with a quantitative method

4.4 Source Population

All patients who had follow up at internal medicine clinics and who was on systemic steroid therapy in study period

4.5 Study population

All patients who had follow up at internal medicine clinics and was on systemic steroid therapy in study period, who fulfill the inclusion criteria.

4.5.1 Inclusion and Exclusion criteria

I. Inclusion criteria

All patients who had follow up at internal medicine clinic and who was on systemic steroids

II. Exclusion criteria

-Patients who were diagnosed with DM prior to start steroid

-patients who took steroid for unknown duration prior came to this hospital

- Patients who took systemic steroid intermittently

-patients who had no at least one visit after steroid started

4.6 Sampling

4.6.1 Sample Size determination

All patients who took systemic steroid who fulfill the inclusion criteria during the study period was included in the study.

Taking a study done in Southwest Ethiopia, Jima with report of DM percentage was 11.1% as a ; with a confidence interval of 95% (Z=1.96) and margin of error (d) of 5%, the calculated sample size using single population proportion formula

$$n = \frac{z^2\ p(1-P),}{d^2} = \frac{(1.96)^2\ (0.111)\ (0.889)}{(0.05)^2} = 151$$

The estimated number of patients who took systemic steroid at TASH internal medicine clinic was taken as 410 after the revision of the health management information system (HMIS) registry.

Since the source population is less than 10,000, applying a formula for finite population correction is used and the final sample size nf is

$$nf = \frac{n}{\{1+(n\backslash N)\}} = \mathbf{111}$$ where N=410 n=151

4.6.2 Sampling technique

A convenience, non-probability sampling technique will be used with inclusion of study units that happen to be available at the time of data collection. All patient who received systemic steroid who fulfill the inclusion criteria will be included in the study until the sample size is achieved.

4.7 Data Collection tools

Data will be collected using pretested structured questionnaire. The questionnaire will used to collect important information on demographic, clinical and laboratory characteristics of patients.

4.8 Study Procedures

Data collection was done by using a structured questionnaire. It was adopted from different studies and will be structured accordingly in a logical manner into socio demographic, clinical characteristics and steroid induced DM,the indication for steroid therapy, type of steroid and duration was reviewed from the I care of each participants. Data was collected by 2 interns and General practitioner. The main investigator was supervise data collection and check completeness on a daily basis.

4.9. Data quality control assurance

Pretesting was done before the actual data collection procedure. The pre-test results was not included in the study. The data collectors was trained on the structured questionnaire until they became well conversant with the instrument. Supervision of the data collectors was made by the investigator to check on the completeness and accuracy of the completed data recording forms during data collection and at the end of each day. After data collection, each questionnaire was be checked for completeness based on the code given during data collection.

4.10 Data Management and Analysis

Data was entered in to SPSS version 21 statistical package. Coding of individual questionnaires was checked before data entry in to the software. Further, data cleaning was performed to check for outliers, missed values and any inconsistencies before the data was analyzed using the software. The prevalence of corticosteroid-induced hyperglycemia and DM among the study

population was calculated. Subgroup analyses was conducted to explore factors associated with steroid induced hyperglycemia and DM like age, gender, type of steroid, and duration of therapy. To determine which factors were associated with steroid induced DM, chi-sequre test ,survival analysis and cox regression was employed. Variables associated with steroid induced DM
P-values less than 0.05 was considered to be statistically significant.

4.11Variables

4.11.1 Dependent Variable

Steroid induced diabetes mellitus

4.11.2 Independent Variable

Age

Sex

Base line screening for dm and follow up

Base line HgbA1C

Steroid indication

Type of steroid

Dose of steroid

Total duration of steroid used

Duration of steroid till minimum dose

Other drugs used

4.12Operational definitions

Impaired fasting glucose-FBS between 100-125 mg/dl

Impaired glucose tolerance-RBS between 140-199 mg/dl

Steroid induced IGM-FBS≥100 mg/dl or RB≥because of steroid therapy in otherwise normal individuals. Hyperglycemia-an excess of glucose in the bloodstream, often associated with diabetes mellitus (FBS≥126 mg/dl or RBS≥200 mg/dl).

4.13. Ethical considerations

- The confidentiality of client-related data was maintained by avoiding potential identifiers and this study was conducted in consideration of the Helsinki Declaration. No need of consent because secondary data.

4.14 Dissemination of findings

The results of the research was presented to Tikur Anbesa hospital department of internal medicine. The findings will be published in a relevant scientific journal so that they can be of use for other academic researchers and clinical practitioners. They will also be presented on different conferences and professional society meetings.

5. Result

5.1 Socio- demographic characteristics of the patients

About 111 patients majority of them females and in age range of 31-60 years old 81.1% and 64.9% respectively. From them only 5 which is 4.5% is only determined the base line glycemic status. Common Comorbidities associated with patients were hypertension and dyslipidemia 21.6% and 6.3% respectively. The most common indication for steroid were rheumatoid arthritis followed by SLE and glomerulonephritis which acounts 31.1%,22.5%,18.9% (Table: 1)

Table 1: Socio-demographic characteristics of the patients in TASH,Addis Ababa, January 1-February 28, 2025

Variable	Category	Frequency	Percent
Age	15-30years	27	24.3%

	31-60 years	72	64.9%
	>60 years	12	10.8%
Sex	Male	21	18.9%
	Female	90	81.1%
Base line glycemic status determined	Yes	5	4.5%
	No	106	95.5%
Comorbidities	Hyperstension	24	21.6%
	Dyslipidemia	7	6.3%
	Cardiac disease	2	1.8%
	CKD	1	0.9%
	Obesity	1	0.9%
	Pulmonary disease	4	3.6%
Indication for steroid	Rheumatoid arthritis	35	31.5%
	SLE	25	22.5%
	Glomerulonephritis	21	18.9%
	Interstitial lung disease	18	16.2%
	Inflammatory bowel disease	6	5.4%
	Dermatomyositis	2	1.8%

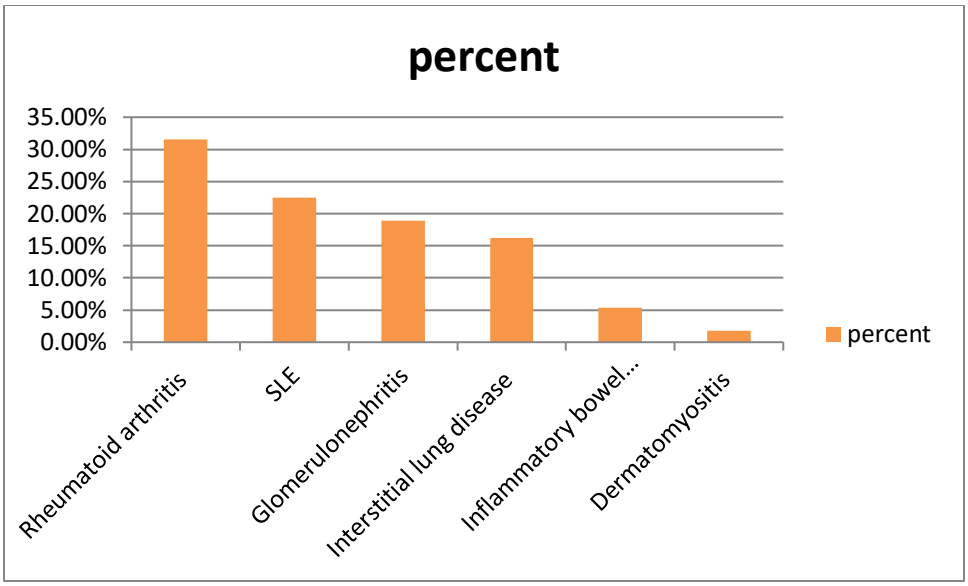

Fig 1:indication of steroid who took systemic steroid TASH ,Adis Abeba

5.2 steroid related characteristics of the patients in TASH,Addis Ababa, January 1-February 30, 2025

All patients included in study most of them received predisolone. All steroids were started with super physiologic dose with the highest predisolone 80 mg po daily and minimum was predisolone 5 mg po daily. About 43.2% of them started with predisolone dose of 5-20 mg po daily. 68.5% of patients who were received steroid took for duration of more than 12 months and from all patients 34.2% of took predisolone dose > 5 mg po daily for only <3 months. On the last visit 82.8% of patients took predisolone dose of 5m and below 5 mg po daily. In addition to steroid 37.8% took methotraxate, 28.8% took MMF,20.72% azathioprine, 9% atorvastatine and 2.7% tacrolimus. From all patients only 3 (2.7%) were determined their glycemic status first visit after started steroid.(Table 2)

Table 2: steroid related characteristics of the patients in TASH,Addis Ababa, January 1-February 28, 2025

Variable	Category	Frequency	Percent
Type of steroid	Predisolone	111	100%

	Methyl predisolone	16	14.6%
	Dexamethasone	4	12.6%
Starting dose of predisolone	5-20mg	48	43.2%
	20-40mg	27	24.3%
	40-80 mg	36	32.4%
Steroid taper	Yes	103	92.8%
	No	8	7.2%
Duration predisolone with dose of >5 mg	<3 months	38	34.2%
	3-6 months	18	16.2%
	6-12 months	17	15.3%
	>12 months	13	11.7%
	Started at 5 mg	7	6.3%
	Not reach to 5mg	18	16.2%
Total duration of predisolone	<3 months	7	6.2%
	3-6 months	5	4.5%
	6-12 months	23	20.7%
	>12 months	76	68.5%
Glycemic status determined in the first visit of steroid	Yes	3	2.7%
	No	108	97.3%
Current predisolone dose	2.5 mg	20	18%

	5mg	72	64.8%
	10 mg	15	13.5%
	15-60 mg	4	3.6%
Other drugs	Methotraxate	42	37.8%
	Azathiprine	23	20.72%
	MMF	32	28.82%
	Tacrolimus	3	2.7%
	Atorvastatine	10	9%
	hydrochlorothiazide	9	8.1%
	Others	24	21.62%

5.3 Glycemic status related characteristics of the patients

From all included in the study who are on systemic steroid 15(13.5%) develop diabetes mellitus and 17.11% (19) has prediabetes others were normal glycemic level ,from patients who develop DM 33.3% diagnosed by FBS, 54.05% diagnosed by HgbA1c and the rest were by both HgbA1c and FBS.the predisolone dose at the time of diagnosis of DM were 5mg p for 33.33% (23),6-10 mg for 20%(23), 10-20 mg 13.33%(23) and >20 mg for 33.33%(23). Regarding management after diagnosis of DM for 53.3%(23) of them steroid tapered,73.33%(11) individuals antiiabetic medication intiated with NPH for 45.55% (23) and metformine 55.54% (23),all of them on life style medication. By this intervention 60% of them had glycemic control and 40% uncontrolled.

Table 3: Glycemic status related characteristics of the patients in TASH,Addis Ababa, January 1-February 28, 2025

Variable	Category	Frequency	Percent
Glycemic status follow up period	Diagnosed to have DM	15	13.5%
	Prediabetes	19	17.11%
	Normal glycemic status	63	56.77%
	Unknown glycemic status	14	12.61%

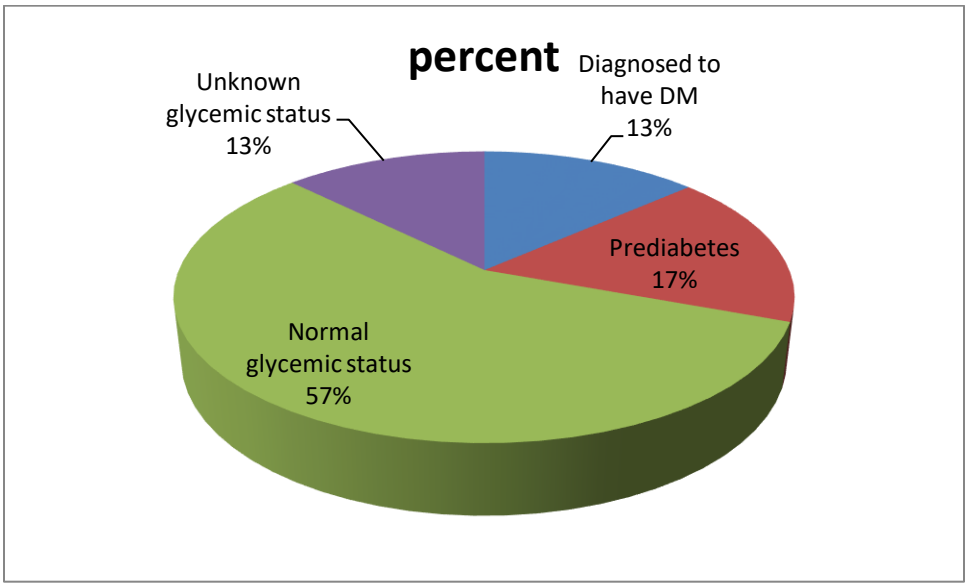

Fig 2: percentage of overall glycemic status who took systemic steroid at TASH,Adis Abeba

Table 4: Clinical characteristics of patients who develop diabetes mellitus in TASH,Addis Ababa, January 1-February 28, 2025

Variable	Category	Frequency	Percent
Diagnosis made by	FBS	5	33.33%
	HgbA1c	6	54.05%
	RBS		
	Both FBS and HgbA1c	4	26.67%
Dose steroid at the time of diagnosis	5 mg	5	33.33%
	6-10 mg	3	20%
	10-20mg	2	13.33%
	>20mg	5	33.33%
Duration of steroid till develop DM	<3 months	7	46.66%
	3-6 months	1	6.66%
	6-12 months	2	13.33%
	>12 months	5	33.33%
Intervention after they develop DM	Steroid tapered	8	53.33%
	Life style modification	15	100%
	Antdiabetic medication started	11	73.33%
Type of antidiabetic	NPH	5	45.45%

medication	Metformine	6	54.54%
	Both metformine and NPH		
Current glycemic status of patients who develop DM	Controlled	9	60%
	Uncontrolled	6	40%

The study undertook cross tabulation and chi-square test to assess the significance of variable association with SIDM. Age,sex, comorbidities,indication for steroid,total duration of steroid and duration of steroid till reach the minimum dose,starting dose of steroid were analyzed. The SIDM has associated with age (P<0.001), Comorbidities (P-value <0.001),those patients who took aditonal dexamethasone (P=0.03) but the not associated with sex,starting dose,duration of steroid and tapering of steroid (Table 5).

Table 5: Cross tabulation, chi-square test of risk factors associated steroid induced DM in TASH,Addis Ababa, January 1-February 28, 2025

Variable		On steroid		P value
		Yes Dm (f(%))	NO dm (f(%))	
Sex	Female	14(15.6%)	76(84.4%)	0.193
	male	1(4.8%)	20(95.2%)	
Age	15-30years	1(3.7%)	26(96.3%)	<0.001
	31-60 years	12(16.7%)	60(83.3%)	

	>60 years	2 (16.7%)	10 (83.3%)	
Comorbidities	Yes	10(32.3%)	21(67.7%)	<0.001
	No	5 (6.3%)	75 (93.7%)	
Indication for steroid	Rheumatoid arthritis	9(25.7%)	26(74.3%)	0.326
	SLE	2(8%)	23(92%)	
	Interstitial lung disease	1(5.6%)	17(94.4%)	
	Inflammatory bowel disease	0	6(100%)	
	Glomerulonephritis	2(9.5%)	19 (90.5%)	
	Dermatomyositis	0	2(100%)	
Type of steroid	Predisolone	100%	100%	
	Methyl predisolone	2 (33.33%)	4(66.66%)	0.34
	Dexamethasone	2 (50%)	2(50%)	0.03
Steroid taper	Yes	14(13.6%)	89(86.4%)	0.931
	No	1(12.5%)	7(87.5%)	
Starting dose of predisolone	5-20mg	9(18.8%)	39 (81.2%)	0.84
	20-40mg	3(11.1%)	24(88.9 %)	
	40-80 mg	3 (8.3%)	33 (91.7%)	
Duration predisolone with dose of >5 mg	<3 months	5(13.2%)	33(86.8 %)	0.172
	3-6 months	5(27.8%)	13(72.2 %)	
	6-12 months	2(11.8%)	15 (88.2%)	

	>12 months	1(7.7%)	12 (92.3%)	
	Started at 5 mg	2(28.6%)	5(71.4%)	
	Not reach to 5mg	0	18(100%)	

- Time to follow up
- Total: months of follow up mean= 25.88, SD=21.44 months minimum 0.5 month and maximum 78
- Time to DM developed Mean=14.96 months, SD=19.56 months minimum 0.5 months and maximum 58 months

No develop DM, Mean month of follow up= 27.58 months, SD=21.3 months minimum 5 months and maximum 78 months

Table 6:time to follow up who took steroid at TASH,Adis Abeba

Cohort person-time	Failures	Incidence rate per 1000 person month of observation	[95% Conf. Interval]per 1000 person month of observation
(0.5 - 3month)	7	22.4	(10.7,46.9)
(3 - 6 month)	1	3.3	(0.5,23.7)
(6 - 12 month)	2	3.8	(1,15.1)
> 12 months	5	2.9	(1.2,7.0)
total	15	5.3	(3.2,8.7)

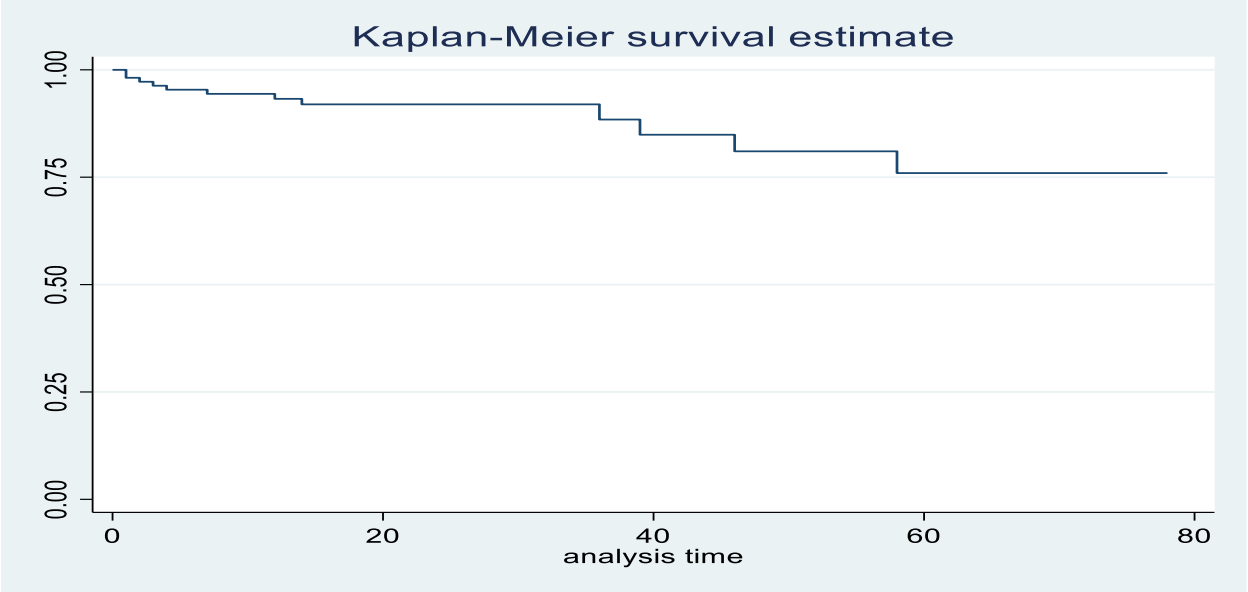

Fig 3 kaplan meier survival estimate of developed steroid induced diabetes mellitus at TASH,Adis Abeba

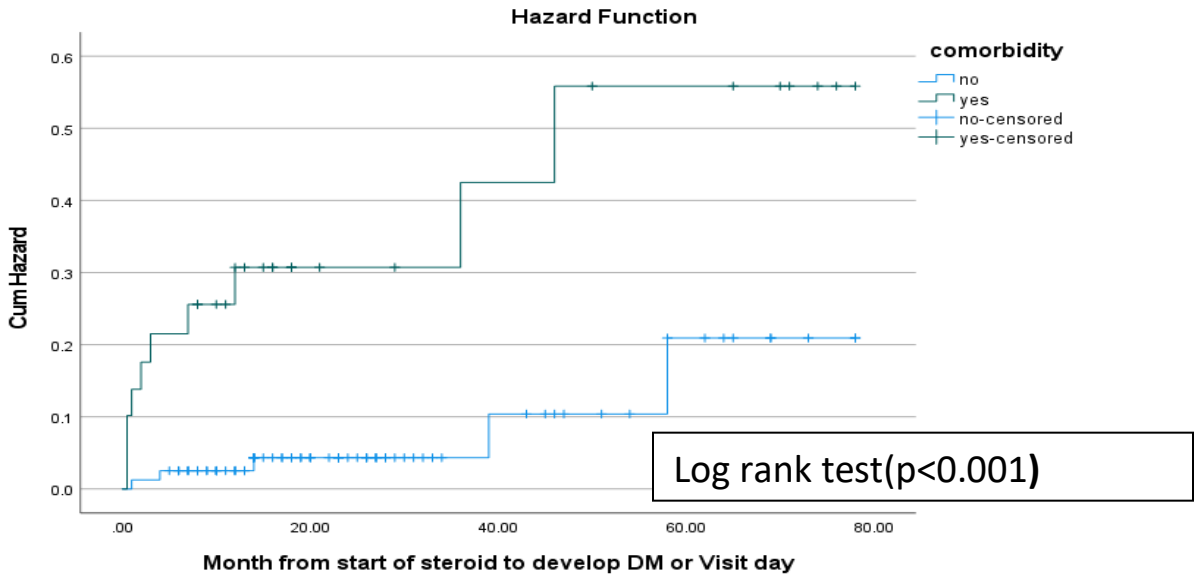

Fig 4:kaplan meier curve time to develop SIDM had comorbidties who took steroid at TASH,Adis Abeba

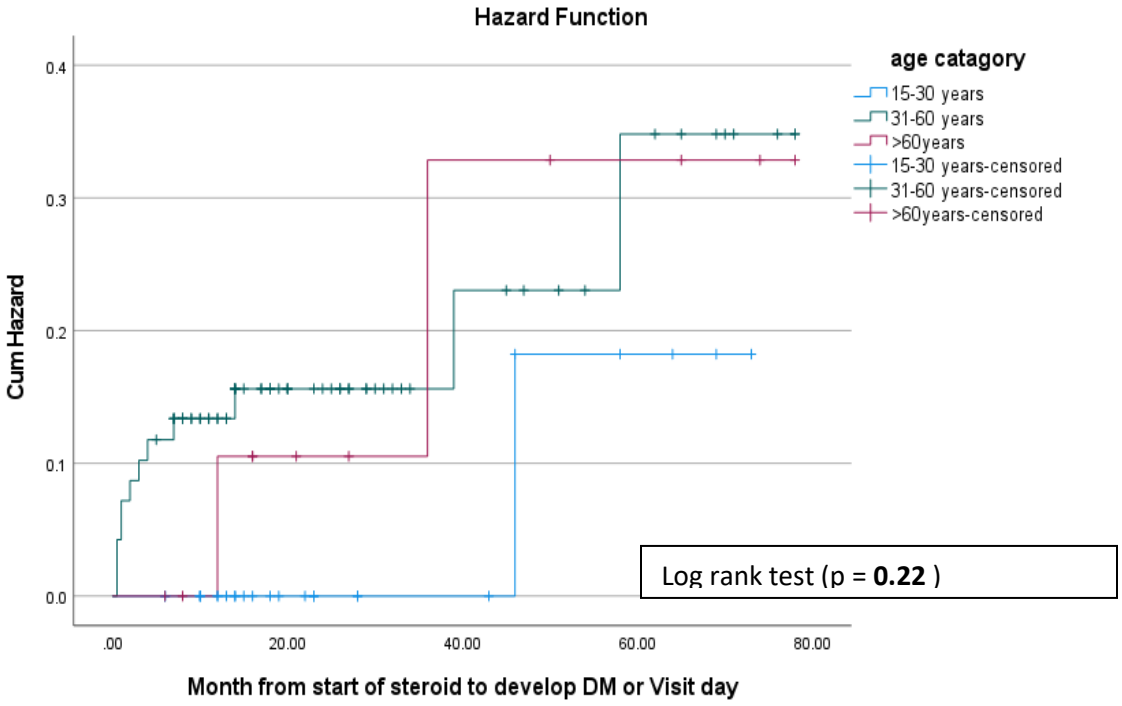

Fig 5:kaplan meier curve time to develop SIDM of in age category who took steroid at TASH,Adis Abeba

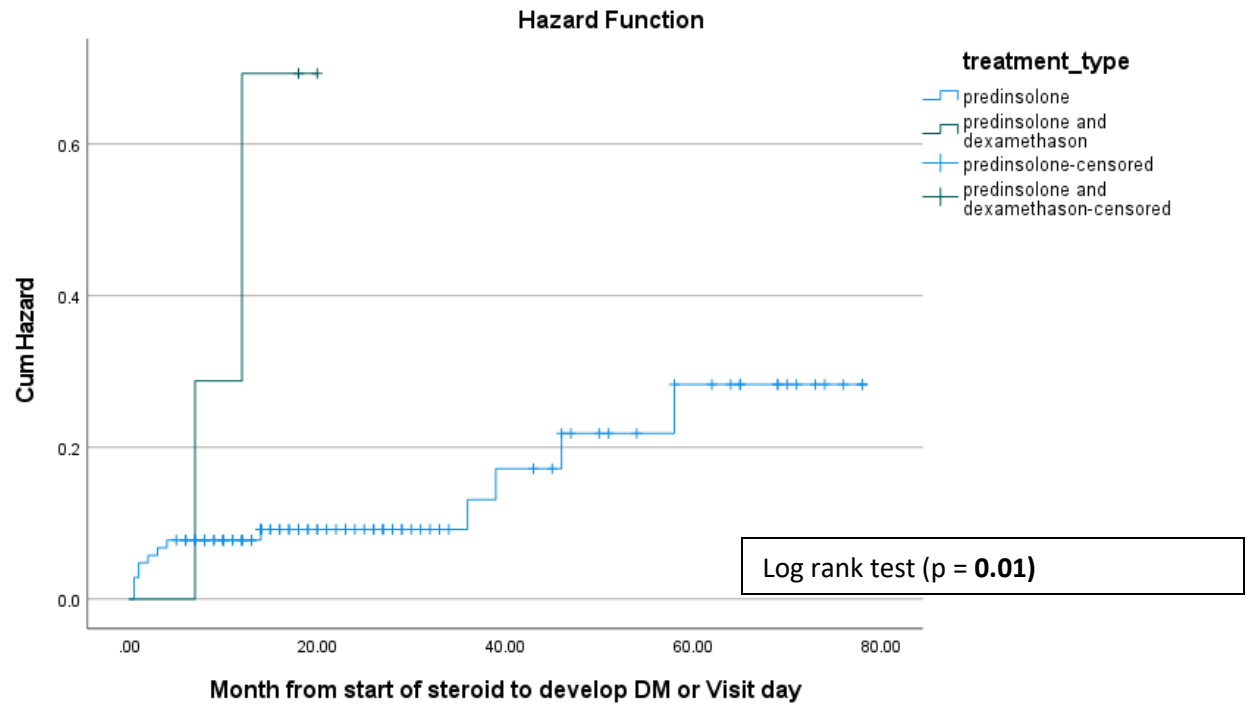

Fig 5:kaplan meier curve time to develop SIDM of in who took adtional dexamethasone at TASH,Adis Abeba

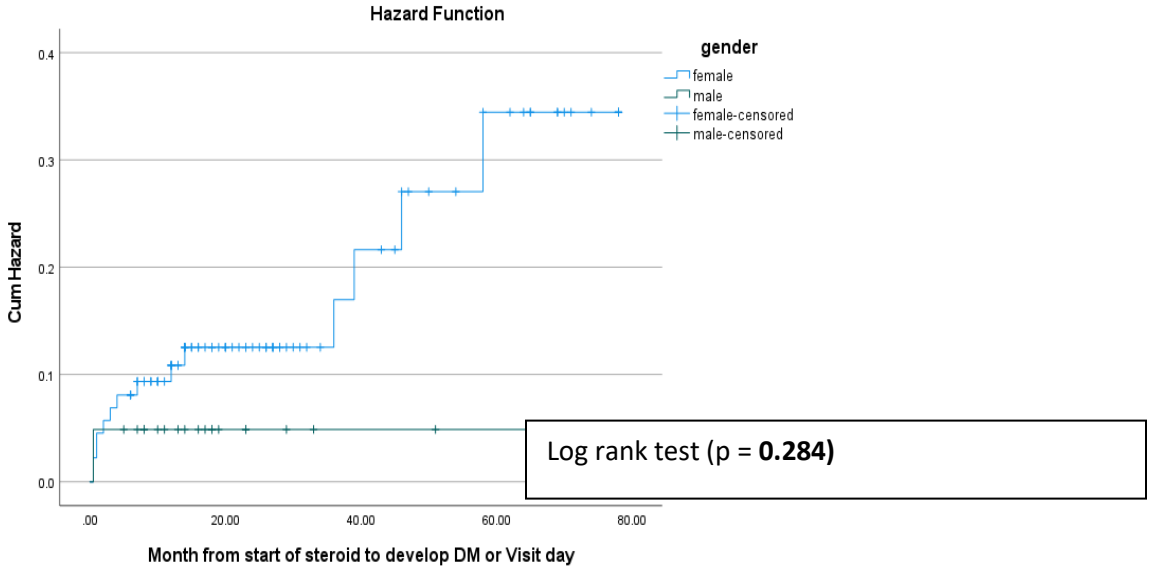

Fig 6:kaplan meier curve time to develop SIDM of male and female who took steroid at TASH,Adis Abeba

Table 7: Cox-regression factor associated develop DM TASH january1,-february 28/2025

Variable		Crude HR(95%CI)
Sex	Female	1
	male	0.39(0.046,2.7)
Age	15-30years	1
	31-60 years	5.5(0.7,38.9)
	>60 years	3.9(0.4,43.2)
Comorbidities	Yes	5.2(1.8,15.2)
	No	1
Indication for steroid	Rheumatoid arthritis	1
	SLE	1.9(0.3,13.8)
	Interstitial lung disease	0.8(0.1,9.0)
	Inflammatory bowel disease	1.3(0.1,14.8)
	Glomerulonephritis	3.4(0.7,15.5)
	Dermatomyositis	1.9(0.3,13.8)
Prednisolone dose	5-20 mg	1
	21-40mg	0.6(0.2,2.3)

	41-80mg	0.6(0.2,2.4)
Reach to minimum dose	Start at minimum dose	1
	No reached to mimum	0.0(0.0,0.0)
	Less than 3 month	0.5(0.1,2.4)
	3-6 month	1.2(0.2,6.1)
	6-12 month	0.4(0.1,2.9)
	Greater than 12 month	0.2(0.0,1.9)

6. Discussion

In this study who are on systemic steroid 15(13.5%) develop diabetes mellitus and 17.11% (19) has prediabetes others were normal glycemic level:this is consistence with the result of study done at south west ethiopia which is 11% of them develop impair blood glucose.(10) majority of participants were females.But result less than the prevalence in the following two studies : Retrospective review done in hospitalized patient who took systemic steroid at least one episodes of hyperglycemia reported in 56%. Those studies are done patients who took systemic steroid as inpatient who may have other factors that increase blood glucose level .

All patients on systemic steroid the follow up of glycemic status was done by FBS and HgbA1c. the diagnosis also made depend on those results which may under estimate the incidence of SIDM because the effect of steroid mostly on postprandial glycemic level.Based prospective study done in 2019 at Medical University of Warsaw patients diagnosed with connective tissue disease treated with systemic steroid screen with OGTT results, their found In total, 32% of the study population was diagnosed with new-onset glucose metabolism impairment which were higher than our result. (14)

About 33.33% (23) f them develop SIDM while on predisolone dose at the time diagnosis this indicates the side effects of steroid not mainly depend on high dose. In our study 13.67 %

patients had any type of glucose monitoring prior or after the commencement of steroid. This result goes with study done in UK on adults prescribed systemic steroids for 3 months observations found 1/3 of patients received glucose monitoring prior start of steroid and 60% patients took for over a year some glucose monitoring after exposure of steroid.(17)

The study undertook cross tabulation and chi-square test to assess the significance of variable association with SIDM. Age,sex, comorbidities,indication for steroid,total duration of steroid and duration of steroid till reach the minimum dose,starting dose of steroid were analyzed. The SIDM has associated with age (P<0.001), Comorbidities (P-value <0.001),those patients who took aditonal dexamethasone (P=0.03) but the not associated with sex,starting dose,duration of steroid and tapering of steroid. Which is consistence with In one Meta-analysis data which was done in 2014 found out that from all treated with glucocorticoids 32.3% were develop hyperglycemia and 18.6% develop steroid induced diabetes mellitus(20). There are person specific and steroid related risks to develop steroid induced diabetes mellitus . old age,family history of DM,obesity are personal risk factors and steroid related factors include are steroid potency,duration and dosage (21).

Regarding management after diagnosis of DM for 53.3%(23) of them steroid tapered,73.33%(11) individuals antiiabetic medication intiated with NPH for 45.55% (23) and metformine 55.54% (23),all of them on life style medication. By this intervention 60% of them had glycemic control and 40% uncontrolled. Generally this study we found that side effects of steroid rarely assessed .

7. Conclusion

The incidence of steroid induced DM is high in this study which is 13.5% (15) which was strong association with age with age (P<0.001), Comorbidities (P-value <0.001),those patients who took aditonal dexamethasone (P=0.03) but the not associated with sex,starting dose,duration of steroid,indication of steroid and tapering of steroid. Assessment of glycemic status before and after commencent of steroid were done inferequently.

8. Recommendation

All patients plan to start steroid therapy better to be identify whether high risk or low risk to develop steroid induced dm and those who has high risk should screened prior to start steroid. By considering the effect of steroid on blood glucose level after started treatment with steroid better to have follow up determination of postprandial blood glucose level. To improve those practice better to develop guide line for TASH community. Further large scale multicenter prospective research is needed to get the overall prevalence and clinical practice of steroid induced DM.

9. Limitations of the study

Data collection mainly depend on the documented data on the electronic card that may miss some laboratory data that done outside the hospital and not documented . All patients not screened at the start of steroid for DM. For diagnosis of steroid induced DM used only FBS and HgbA1C which underestimate the indcidence of SIDM.

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Annex 1 : Data collection tools

Structured questionnaires prepared to collect socio demographic characteristics ,clinical factors and personal factors of patient to assess prevalence and associated steroid induced DM

Part 1 : Information on socio demographic characteristics of patient			
S.No	Question	Response	Skip
101	Card no	……	
102	Age	……yr	
103	Sex	1.Male 2.female	
104	BMI	----------	
105	Base line glycemic status if it was done prior to start steroid	1. HgbA1c 2. FBS 3. RBS	
106	Comorbiditis	1. Hypertension 2. Obesity 3. Dyslipedemia 4. Cardiac disease 5. CKD 6. Liver disease 7. Anemia 8. COPD and bronchial Asthma	
107	Indication for steroid	1. Rheumatoid arthritis 2. SLE 3. Interstitial lung disease	

		4. Inflammatory bowel disease 5. Glomerulonephritis 6. Dermatomyositis 7. Hematologic conditions 8. Others	

Part 2 : steroid related characteristics			
201	Type of steroid used	1. Predisolone 1.1 dose … 1.2 date, date of tapering, tapered dose ,current steroid dose 2. Dexamethasone 1.1 dose… 1.2 duration 3. Hydrocortisone 1.1 dose… 1.2 duration 4. Methyl predisolone 1.1 dose… 1.2 duration 5. More than 1 stroid use 1.1 dose… 1.2 duration	
202	Other diabetogenic drugs used	----------	
203	Glycemic status determined after started steroid	1.Yes 2.No	

204	Diagnosed to have DM	1.Date of diagnosis 2. duration of steroid till diagnosis DM 3.dose of steroid at time of diagnosis 4. diagnosed by 1.FBS –level of FBS 2.RBS -LEVEL 3.HGbA1c- level	
205		1. Normal (<140mg/dl) 2. Prediabetic (140-199mg/dl) 3. Diabetic (>200mg/dl)	
206	If Q No 203 is no What is the current glycemic status	FBS---------- HgbA1c----- RBS----------	

Part 3 : Information on clinical characteristics patient after diagnosed steroid induced DM Only for those to Q No 205 answer is –YES			
Sr.No	Question	Response	Skip
301	What measure took	1. Life style modification 2. Steroid tapered 3. Antidiabetic medication atarted	
302	If the answer is 3 to Q No 301 which type of	1.insulin dose	

	antidiabetic drug started	2. oral hypoglycemic agent dose Specify the drug ……. 3.both insulin and oral hypoglycemic agent dose	
303	What is the current glycemic status of the patient	1.Controlled 2.uncontrolled	

INCIDENCE AND CLINICAL PRACTICE RELATED TO STEROID INDUCED DIABETES MELLITUS IN TIKUR ANBESA SPECIALIZED HOSPITAL INTERNAL MEDICINE CLINICS WHO TOOK STEROID THERAPY by GUBAY ANTENEH

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