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EDITORIAL



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Depression in diabetes: Whom, When, and How to Screen

Maskey Robin¹

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INTRODUCTION

Diabetes have a twofold increased risk of depression compared with the general population both sharing common biological and behavioral mechanisms.¹ The two dominant hypotheses responsible for increased risk of depression in diabetic patients are as follows:

- 1) Due to biochemical changes directly due to the illness or its treatment and
- 2) The psychosocial demands or psychological factors related to the illness or its treatment.

The former hypothesis has also been referred to as a mood disorder due to a medical condition for which specific criteria have been formulated in Diagnostic and Statistical Manual of Mental Disorders. Both hypotheses are not mutually exclusive.²

Depression and diabetes results in poor glycemic control and self-management as well as increased health care costs and mortality.³ So, early recognition and treatment of depression and diabetes are essential for achieving optimal goals in the management of depression and in patients' overall quality of life.

Whom to Screen?

Depression is a condition in which patients meet at least five of the Diagnostic and Statistical Manual of Mental Disorder, Fifth Edition (DSM-5) criterion for major depressive disorder (MDD) nearly every day during the same 2-week period which are as follows:⁴

- 1 Depressed mood most of the day
- 2 Reduced interest or pleasure in all or almost all activities

- 3 Marked weight loss or weight gain
- 4 Sleep disorders
- 5 Psychomotor agitation or retardation
- 6 Fatigue or loss of energy
- 7 Feelings of worthlessness or guilt (excessive or inappropriate)
- 8 Problems concentrating or indecisiveness
- 9 Recurrent thoughts of death, suicidal ideation, or suicide attempt

Screening for Depression and Diabetes Distress

Experts suggest asking patients about alcohol use, since many people who are depressed self-medicate with alcohol, which also can affect glycemic control.

Because these depression scales are symptom-based and do not link symptoms to a cause, experts believe that many people with diabetes who have depressive symptoms actually have emotional distress rather than clinical depression.⁵

Tools for screening and diagnosing depression include the 9-item Patient Health Questionnaire,⁶ Composite International Diagnostic Interview,⁷ Beck Depression Inventory,⁸ and the Center for Epidemiological Studies-Depression Scale.⁹

When to screen?

Patients with diabetes and depressive symptoms have mortality rates nearly twice as high as persons with diabetes and no depression. Depression may be due to biochemical changes of diabetes, like hyperglycemia, inflammation, activation of hypothalamic-pituitary-adrenal axis, or it could be due to the lifestyle factors associated with diabetes.¹⁰

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Also, neurohormonal changes induced by depression, like hypercortisolism, can lead to insulin resistance and diabetes. Behavioral factors associated with depression, including lack of physical activity and poor diet, increase the risk of diabetes. All diabetics should be screened annually for depression. Two simple questions mentioned below help in screening the patients and it is clinically effective.

During the past month, have you often been bothered by feeling down, depressed, or hopeless?

During the past month, have you often been bothered by little interest or pleasure in doing things?

How to screen?

There are various instruments for how to screen depression in diabetes but the two-item case finding instrument proposed by Whooley et al.,¹¹ has sensitivity and specificity of 96% and 57%, respectively, in identifying depression so it is widely used¹² which includes two questions taken from the 27-item Primary Care Evaluation of Mental Disorders Procedure PRIME-MD¹²:

These two questions are:

- During the past month, have you often been bothered by feeling down, depressed, or hopeless?
- During the past month, have you often been bothered by little interest or pleasure in doing things?

An answer of yes to either of these two questions needs a detailed evaluation for depressive disorder. The Whooley questions can be utilized as a simple, time-saving, validated instrument to screen for depression in diabetes care centers.

Another short, easy-to-administer instrument is the five-item World Health Organization Well Being

Index that assesses the psychological well-being, which includes five items that assess positive mood (good spirits, relaxation), vitality (being active and waking up fresh and rested), and general interests (being interested in things).

Each of the five items is rated on a 6-point Likert scale from 0 (=not present) to 5 (constantly present). A raw score less than 13 or an answer of 0 to 1 to any of the five items warrants detailed evaluation for depressive disorder.

That's why diabetes care professionals should incorporate the use of easy case-finding instruments, such as Whooley's questions and the WHO (Five) Well-Being Index in their routine practice.

Professional organizations across the globe should follow the example set by national guidelines in India, Germany, and other countries, which recommend regular assessment of psychological well being which is important part of diabetes care.¹³

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Profile and Outcome of Diabetic Admissions: A Retrospective Study from Eastern Nepal

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Abstract

Introduction: Despite the increasing prevalence of diabetes, lack of awareness about the disease, its consequences and lack of quality care in diabetes lead to delayed presentation to health care giver that might be associated with more number of complication and co-morbid condition of the disease which may adversely affect the outcome of the patient. Therefore we undertook this study to determine the common symptoms that lead to admission of patients suffering from diabetes along with the complications they present and their outcome.

Methods: We analyzed data from the medical records available among admitted patients with diabetes over a period of 6 months.

Results: Among 200 subjects with mean age of 52 years, majority had Type 2 diabetes mellitus, 53% were males and more than half had some other comorbidities. Most of them, 68% had microvascular complications, and 27% of them had some form of macrovascular complications.

Conclusions: Despite of continuous effort from various organizations, micro and macrovascular complications are very high among diabetic patients, so more emphasis has to be given on prevention of these complications at various level of health care delivery system.

Key Words: diabetes, microvascular, Nepal

Introduction

Diabetes mellitus is a group of metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Estimates show a global prevalence of 382 million people with diabetes in 2013, expected to rise to 592 million by 2035¹. Diabetes is estimated to have resulted in 1.5 to 3.7 million deaths per year worldwide². Nepal is also seeing the increasing prevalence of diabetes similar to neighbouring countries in South asia³.

The prevalence of diabetes in Nepal is reported to be 9.5% ⁴ and Nepal Diabetes Association reports that among people aged 20 years and older living in urban areas, 15% are affected by this disease, among people aged 40 years and older in urban areas 19% are affected⁵. Despite the increasing prevalence of diabetes lack of awareness about the disease, its consequences and lack of quality care in diabetes lead to delayed presentation to health care giver that might be associated with more number of complication and co-morbid condition of the disease which may adversely affect the outcome of the patient.

Therefore we undertook this study to determine- 1) common symptoms that lead to admission of patients suffering from diabetes, 2) common

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complications associated with diabetes and 3) outcome of patients.

METHODS

This was a hospital based retrospective study in which the diabetic patients admitted at the Medicine ward of B.P. Koirala Institute of Health Sciences (BKIHS) for a period of 6 months were enrolled. After ethical clearance from the Institutional Ethical Review Board data was obtained from the records register in the Medicine ward which included demographic characteristics, presenting symptoms, co-morbidities, complications, previous treatment, duration of hospital stay and outcome of the patient.

RESULTS

Table 1: Baseline Characteristics of the Patient enrolled in the study (n=200)

Age (Mean in yrs)	52 (22-82)
Sex (Male %)	53%
% of patients > 50 years of age	56%
Type of Diabetes Mellitus (%)	
Type 1	7%
Type 2	93%
Others	0%
Family history of diabetes in at least one parents (%)	9%
Smoker (%)	43%
Alcohol consumer (%)	58%
Co-morbidities	
None	48%
Hypertension	25%
Duration of diabetes in years (%)	
< 10 years	63%
10-20 years	34%
>20 years	3%
Treatment modality (%)	
Dietary and lifestyle modification alone	2%
OHA and dietary modification	25%
Insulin and dietary modification	18%
Insulin, OHA and dietary modification	45%

The mean age group of our study population was 52 years and the gender distribution revealed slight male predominance with 53% patients male. Majority of patients (56%) belonged to age group >50 years and 93% were affected by type2 DM. About 43% of our Patients were smokers, 58% of our patients consumed alcohol and only 9% revealed family history of diabetes in at-least one parent. Hypertension was the most common co-morbidity associated which was seen in 25% of patients.

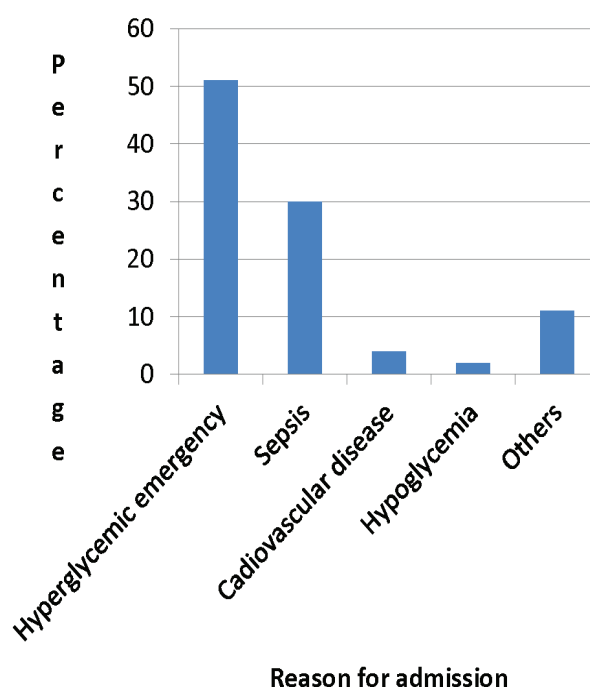


Figure 1: Reason for admission among patients enrolled (n=200)

Hyperglycemic emergency (51%) was the major cause of admission of the patients in our study. It was followed by sepsis (30%), cardiovascular disease (6%), hypoglycemia (2%) and others (11%).

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Table 2: Complications present at the time of admission among patients enrolled in the study (n=200)

Complications	Percentage (n=200)
Micro-vascular complications	68%
Nephropathy	21%
Neuropathy	10%
Retinopathy	8%
Nephropathy and Retinopathy	9%
Nephropathy and Neuropathy	7%
Neuropathy and Retinopathy	3%
All three	10%
Macro-vascular complications	27%
Cardio-vascular disease	20%
Peripheral vascular disease	4%
Both	3%

In our study population, 68% of the patients were affected by micro vascular complications of which nephropathy was the most common (21%) followed by neuropathy (10%) and retinopathy (8%). 10% had all the three micro vascular complications. Similarly, 27% of them were affected by macro vascular complication of (20%) had Cardio-Vascular and 4% had Peripheral Vascular Disease and 3% had both.

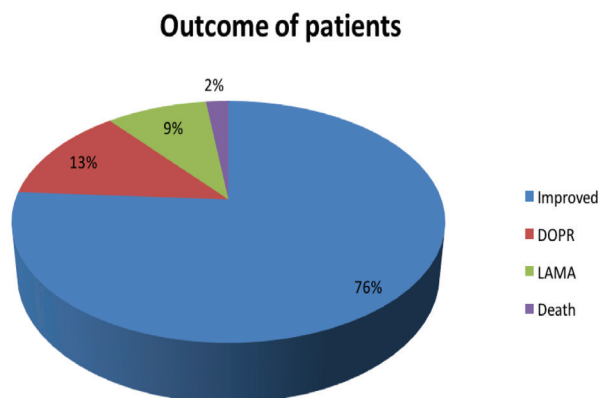


Figure 2: Outcome of the patient (n=200)

Among the study population, the mean duration of hospital stay was 6.2 ± 3.8 days. Majority (76%) of the patients improved at the time of discharge, 13%

were discharged on request, 9% left against medical advice, 2% died at the hospital. Out of the 4 deaths (2%), 2 patients died due to End stage Renal disease, 1 patient had acute Coronary Syndrome and 1 patient died due to sepsis secondary to pneumonia.

DISCUSSION

The mean age of diabetic patients presenting to the hospital with complications or symptoms was 52 years and majority of the patients (56%) were more than 50 years of age which is consistent with previous studies ^{6, 7, 8}. Our study shows relatively high rate of diabetes mellitus in male (53%) compared to female (47%), which was similar to results shown in studies conducted in Nepal ^{8, 9} but a study conducted in Europe showed an increased prevalence in females¹⁰. This difference may be related to more health seeking behavior of male in our society.

Though Type 2 Diabetes Mellitus has a strong genetic component^{11,12,13,14} and 39% of patients with type 2 diabetes have at least one parent with the disease ¹⁵ only 9% patients in our study had family history of diabetes in at least one of parents. This difference could be attributed to lack of diagnostic ability due to limited health resources in the preceding decades.

Hypertension was the most common co-morbidity associated with diabetes in this study which was present only in 25% of patients which is not consistent with previous studies which showed that prevalence of hypertension is 40-70% in diabetic patients ^{16, 17, 18}. This difference could be due to the fact that majority of patients included presented with hyperglycemic emergency and sepsis which resulted in lower blood pressure measurements.

In this study 43% patients were smokers and as smoking aggravates the micro- and macro-vascular complications of diabetes mellitus and is associated with insulin resistance^{19,20} smoking cessation can have greater public health implications for the reduction of morbidity and mortality due to complications of diabetes especially in our

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population. Also increased prevalence of smoking could be one of the contributing factors majorities of patients presented with hyperglycemic emergency owing its effect on insulin resistance.

Majority of the cases accounting for the Diabetic admissions were related to hyperglycemic emergency (51%) which included Diabetic ketoacidosis (DKA) and hyperglycemic hyper osmolar state (HHS) which was followed by sepsis (30%), cardiovascular disease (6%), and hypoglycemia (2%). The frequency of hyperglycemic emergency is far more than that obtained from a study conducted at Malaysia²¹. This might be due to lack of proper awareness about glycemic control in our society and increased frequency of smoking in our study population. Also hypoglycemia was seen to be a common cause of hospitalization in this study probably because of high percentage of alcohol consumer (58%) in our study population.

This study shows prevalence of micro-vascular complications- retinopathy to be 30%, neuropathy 30% and nephropathy 47% and prevalence of macro-vascular complications-Cardiovascular Disease 23% and Peripheral Vascular Disease 7% which are consistent with the international trends ^{22,23,24}. In comparisons regarding the prevalence of diabetic micro vascular complications, the study shows that the prevalence of diabetic nephropathy is more than neuropathy and retinopathy. This may be because the patients in the current study have hypertension which is related to renal complications. In addition, the population in this study is Asian, where the prevalence of nephropathy is more than the other people ²⁵.

The mean duration of hospital stay in our study population was 6.2 days which was similar to a study conducted in Pakistan 6. Out of the 200 patients admitted (76%) of the patients improved at the time of discharge, 13% were discharged on request, 9% left against medical advice, 2% died at the hospital. End Stage Renal disease and Cardio-vascular disease were the most common cause of

mortality in our study which is consistent with worldwide trends^{26, 27}.

Our study had several limitations. First it was a retrospective hospital based study which is subjected to numerous biases. Also the duration of diabetes and occurrence of diabetic complications were not co-related.

CONCLUSIONS

Diabetes Mellitus is a significant cause for medical admission at BPKIHS. Majority of the diabetic patients who were admitted at medicine ward had symptoms related to complications of Diabetes (both acute and chronic). The lack of proper diabetic care and the lack of awareness about diabetes and its complications might have contributed to this. Based on this study we recommend frequent screening for micro-vascular and macro-vascular complications of diabetes and frequent blood glucose monitoring to prevent hyperglycemic emergency.

Conflict of interest

None

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Knowledge Regarding Self-Administration of Insulin Among the Diabetic Patient Attending the Diabetic Clinic of Tertiary Care Center of Eastern Nepal

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Abstract

Background: Diabetes Mellitus(DM), usually called diabetes or sugar is the condition that occurs when one's body does not produced enough insulin or body is unable to use normal amount of insulin properly. Objectives: The objectives of this study were to assess the Knowledge and Practice Regarding Self-administration of insulin among the diabetic patient attending the diabetic clinic of BPKIHS, to find out the association between knowledge and Practice with their selected socio-demographic variables and to find out association between knowledge and practice regarding self-administration of insulin.

Methods: A descriptive cross-sectional study design was used to conduct the study among the Diabetic patient attending the diabetic clinic of BPKIHS. Data were collected using the self structured questionnaire.

Results: The findings revealed that mean knowledge of the participants was 57.55% and practice was 73.98%. Among them 54%(27) of participants has inadequate knowledge, remaining 46%(23) has adequate knowledge. Similarly, 48%(24) of participants has inadequate practice, and remaining 52%(26) has adequate practice. There was significant association of educational status with knowledge regarding self administration of insulin with pvalue 0.03 and there was significant association with occupation with knowledge regarding self administration of insulin with pvalue 0.047. There was also association between knowledge and practice regarding self administration of insulin with pvalue 0.049

Conclusion: Educational and ccupational status has influence on knowledge regarding self administration of insulin. Thus it is essential to focus on improving the patient's knowledge on the related topic so that the participants can enhance their practice as well. Diabetes & Insulin Self Administration education must be imparted by physicians by counselling patients at each follow up visit.

Key Words: Knowledge, Practice, Diabetes Mellitus and Self administration of insulin

Introduction:

Diabetes is a serious, chronic disease that occurs either when the pancreas does not produce enough insulin (a hormone that regulates blood glucose), or when the body cannot effect ively use the insulin it produces¹.

Lifestyle modification i.e. nutritional management, exercise, monitoring blood glucose level, education, etc. plays a vital role in the management of diabetes².

With the advancement in medical science and technology, pharmacological therapy i.e. oral anti-diabetic agents and insulin therapy has an important role in maintaining the blood glucose level among diabetic patients¹. Successful self management in Diabetes helps the patient feel better. Education is an important aspect of self-management, teaching the client on self administration of insulin helps the patient helps to build self confidence and pride of contribution in their management³. Insulin therapy

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has been proven to be effective in controlling blood glucose level among the diabetic patients. Insulin is used to treat a number of diseases including diabetes and its acute complications such as diabetic ketoacidosis and hyperosmolar hyperglycemic states. It is also used along with glucose to treat high blood potassium levels¹.

The objectives of this study were to assess the Knowledge and Practice Regarding Self-administration of insulin among the diabetic patient attending the diabetic clinic of BPKIHS, to find out the association between knowledge and Practice with their selected socio-demographic variables and to find out association between knowledge and practice regarding self-administration of insulin.

Methods

This study was descriptive cross-sectional study design done in Diabetic Clinic of Medical OPD of BPKIHS, Dharan. Patient who are clinically diagnosed by certified physician with diabetes mellitus and are under self-administration of insulin were taken for the study. This study considers 95% confidence interval and 80.5 power to estimate the sample size. For this purpose, study considers 52.5% of prevalence of knowledge regarding self-administration of insulin among the diabetic patient. Using The formula the sample were 50. Non Probability Purposive Sampling technique was used.

The Exclusion Criteria Patient who were unable to communicate and patients who takes assistance from others in administration of insulin.

A pre-tested self prepared interview questionnaire was developed on the basis of objectives, review

of literature and the opinion from the experts to assess the Knowledge and Practice Regarding Self-Administration of Insulin among the Diabetic Patients Attending the Diabetic Clinic of BPKIHS. This tools were used to collect data from each study subject in the study settings. It was divided into 2 parts.

Part I consist socio-demographic data of the study subject like address, age, sex, marital status, religion, educational status, occupation, economical status, duration of illness and family history. Part II consist of self structured interview questionnaire related to Knowledge Regarding Self-Administration of Insulin among the Diabetic Patient Attending Diabetic Clinic of BPKIHS. It consists total of 23 questions. Section C: It consist of self structured interview questionnaire related to Practice Regarding Self-Administration of Insulin Among The Diabetic Patient Attending Diabetic Clinic Of BPKIHS. It consists total of 18 questions.

The written permission was obtained from the Institutional Review Committee of College Of Nursing. Informed consent was taken from the clients.

Data was entered in MS-Excel 2011 and converted into SPSS version 11.5 for statistical analysis. Descriptive Statistics such as Percentage, mean, median, interquartile range, and standard deviation was used for analyzing the data. Appropriate inferential statistics was used as per need. The findings were presented in the form of tables or graphs as applicable.

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Results:

Table 1: Socio – Demographic Characteristics of The Participants (n=50)

Characteristic	Category	No.of sample	Percentage
Age	<30 years	2	4.0
	30-50 years	9	18.0
	50-70 years	32	64.0
	>70 years	7	14.0
Mean Age± SD (Min- Max)		57.30±12.156 (14-75)	
Sex	Male	29	58.0
	Female	21	42.0
Marital status	Unmarried	2	4.0
	Married	44	88.0
	Divorced	1	2.0
	Widow / Widower	3	6.0
Religion	Hindu	42	84.0
	Buddhist	5	10.0
	Christian	3	6.0
Educational status	Primary level	29	58.0
	Secondary level	14	28.0
	Higher secondary & above	7	14.0
Occupational status	Homemaker	18	36.0
	Agriculture/ Labour	7	14.0
	Business	8	16.0
	Service	7	14.0
	Others	10	20.0
Economical status	<10,000	4	8.0
	10,000 - 20,000	22	44.0
	20,000 – 30,000	20	40.0
	>30,000	4	8.0
Family h/o DM	No	37	74.0
	Yes	13	26.0
Relationship with diabetic person	First degree relative	12	92.3
	Second degree relative	1	7.7
Duration of DM	< 1 years	3	6.0
	1-10 years	16	32.0
	10-20 years	23	46.0
	>20 years	8	16.0
Mean Age ± SD(Min-Max)		11.172 ± 8.6522 (0.5-43.0)	
Characteristic	Category	No. of sample	Percentage
Duration of insulin	3 months-1 year	24	48.0
	1-5 years	17	34.0
	>5 years	9	18.0
Mean Age ± SD(Min-Max)		2.964 ± 4.3752 (0.3-21.0)	
Device used	Pen injector	41	82.0
	Insulin syringe	6	12.0
	Both	3	6.0
Information about DM	Yes	25	50.0
	No	25	50.0
means of information	Mass media	6	24.0
	Health personnel	1	4.0
	Relatives	12	48.0
	Mass media & relatives	2	8.0
	Health personnel & realtive	1	4.0
	mass media, health personal & realtives	3	12.0

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Table 2: Knowledge & Practice Regarding Self Administration Of Insulin(n=50)

Characteristics	Category	No.of sample	Percentage (%)
Knowledge	Inadequate	28	56
	Adequate	22	44
Practice	Inadequate	24	48
	Adequate	26	52

Table 3: Knowledge Regarding Storage of Insulin (n=50)

Storage of Insulin	Correct Responses		Incorrect response	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Appropriate place for storage of insulin at home	45	90	5	10
Temperature of refrigerator for Insulin Storage	25	50	25	50
Room Temperature for insulin storage	3	6	47	94
Appropriate technique for insulin storage	24	48	26	52
Rationale storing insulin in cool & dry place	19	38	31	62
Duration for the usage of single insulin vial	40	80	10	20
Duration for the usage of single insulin syringe	50	100	0	0

The above table depicts that 90% of the participants had knowledge regarding the appropriate place for the storage of insulin. Only half of the participants i.e. 50% had knowledge regarding the required temperature of the refrigerator for storage of insulin whereas only 6% of the participants knew about the required room temperature for the storage of insulin.

Table 4: Knowledge Regarding Techniques Of Insulin Administration(n=50)

Techniques Of Insulin Administration	Correct Responses		Incorrect response	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Appropriate time for administration of insulin	39	78	11	22
Rolling the vial of insulin in between hands before administration	25	50	25	50
Sites of administration of insulin				
Abdomen	47	94	3	6
Thigh	45	90	5	10
Upper arm	16	32	34	69
Buttocks	12	24	38	76
Insulin can be administered in the site of swelling/ tenderness/scars/lipodystrophy	50	100	0	0
Technique to dry the alcohol wipe sites before administration of insulin	28	56	22	44
Correct angle for the administration of insulin	23	46	27	54
Distance to be considered for the rotation of insulin administration	20	40	30	60
Ways to reduce pain during insulin administration	28	56	22	44
Rationale for the rotation of insulin administration site				
To reduce pain	37	74	13	26
To prevent from lipodystrophy	8	16	42	84

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Table 5: Knowledge Regarding Complication of Insulin Therapy (n=50)

Complication of Insulin Therapy	Correct Responses		Incorrect response	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Complications of Insulin therapy				
Low Blood Sugar	15	30	35	70
Lipodystrophy	8	16	42	84
Insulin Allergy/Resistance	7	14	43	86

The above table depicts that only 30% of the participants had knowledge regarding low blood sugar as a complication of insulin therapy followed by lipodystrophy 16% and insulin allergy/resistance 14%.

Table 6: Practice Regarding Self Administration of Insulin (n=50)

S.N	Insulin self administration technique	Always		Sometime		Never	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
38.	Handwashing .	44	88	2	4	4	8
39.	Check the blood glucose level before and after administration of insulin.	3	6	22	44	25	50
40.	Observe the insulin characteristics.	48	96	1	1	1	1
41.	Use insulin without shaking it.	38	76	12	24	0	0
42.	Check whether insulin device is broken/damaged.	50	100	0	0	0	0
43.	For Insulin Syringe						
a.	Wipe the rubber top of insulin with alcohol at 70%.	2	4	0	0	7	14
b.	Inject air into insulin bottle.	2	4	0	0	7	14
c.	Draw up the quantity of insulin necessary to complete the prescribed dose.	9	18	0	0	0	0
d.	Remove the bubble from syringe	8	16	0	0	1	2
44.	For Pen Injector						
a.	Clean the air from needle	16	32	7	14	21	42
b.	Set up the dial at zero after removing air from needle.	19	38	5	10	20	40
c.	Fix the unit/dose of insulin as prescribed.	44	88	0	0	0	0
45.	Recap the needle upto the moment of administration.	47	94	2	4	1	2
46.	Cleanse the skin with alcohol at 70% and allows it to dry.	21	42	19	38	10	20
47.	Pinch a fold of skin.	41	82	1	2	8	16
48.	Inject the needle at 45°/90° angle.	1	2	2	4	47	94
49.	Aspirate the fluid back into the syringe to check for the blood return, if insulin syringe.	2	4	2	4	5	10
50.	Wait 5 second to withdraw the needle.	39	78	4	8	7	14
51.	Compress the skin without massaging it.	33	66	5	10	12	24
52.	Dispose the syringe after single use safely.	50	100	0	0	0	0
53.	Do you have the habit of skipping/ adjusting the dose without your doctor concern?	50	100	0	0	0	0
54.	Regular examination of blood glucose level and examination as advised by doctor.	50	100	0	0	0	0
55.	Do you have habit of doing exercise as advicee by your doctor?	22	44	20	40	8	16

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Table 7: Correlation between Knowledge & Practice regarding Self Administration of Insulin (n=50)

	Mean \pm Sd. Deviation	Correlation value	P value
Knowledge total score	23.02 \pm 5.200	0.28	0.049
Practise_total _score	29.54 \pm 3.072		

DISCUSSION

A similar study was conducted by a Surendranath on October 2011 to assess the knowledge and practice of insulin self administration among patient with diabetic mellitus, knowledge assessment on self insulin administration revealed that 41 (68%) of the subjects had inadequate knowledge; and remaining 19 (32%) of them had moderately adequate knowledge. None of them had adequate knowledge. Assessment of the practice revealed that 43 (72%) of the subjects had poor practice; 17 (28%) of them had fair practice, and none of them had good practice. There was a statistically significant positive correlation between knowledge and practice on is a ($p < 0.05$)⁴. In a study conducted by Hadeagu Grensea et al 2015, the mean knowledge score of study subjects was 7.07 with a maximum possible score of 13. Only 18 (13.07%) of participants had good knowledge, 78 (55%) participants had average knowledge and 45 (31.8%) had poor knowledge regarding diabetes and insulin self administration⁵. In a similar study conducted by Manish C Gholap et al 2016, the mean knowledge score was 7.225 \pm 1.405 and practice score was 6.000 \pm 1.519. Out of 40 samples, 21(52.5%) were having good knowledge, 19(47.5%) were having average knowledge; none of them were having poor knowledge. Out of 40 samples 1 (2.5%) having poor practice, 33 (82.5%) having average practice, and 6 (15%) having good practices⁶. Our study revealed that mean knowledge of the participants was 57.55% and practice was 73.98%. Among them 54%(27) of participants has inadequate knowledge, remaining 46% (23) has adequate knowledge. Similarly, 48%(24) of participants has

inadequate practice, and remaining 52%(26) has adequate practice. There was significant association of educational status with knowledge regarding self administration of insulin with pvalue 0.03 and there was significant association with occupation with knowledge regarding self administration of insulin with pvalue 0.047. There was also association between knowledge and practice regarding self administration of insulin with pvalue 0.049.

In our study, the majority 58% of the participants had studied upto primary level whereas in the similar study conducted by Manish C Gholap et al⁶ 2016 majority 42.5% of the participants had attended primary education and in a similar study conducted by Hadgu Grensea et al⁵ majority 47.5% had attended primary education.

In our study majority 74% of the participants didn't had family history of DM whereas in a similar study conducted by Manish Gholap et al 2016, similar result i.e majority 80% of the participants & 73.5% in a study conducted by Hadgu Grensae et al 2015 didn't had family history of DM^{5,6}.

In our study majority 48% of the participants were under insulin therapy since 3months -1 year whereas in a similar study conducted by Manish Gholap et al 2016, majority 50% of the participants were under insulin therapy for less than 1 year and % in a study conducted by Hadgu Grensae et al 2015, majority of the participants were under insulin therapy for 1-3 years^{5,6}.

In our study majority 90% of the participant had knowledge that insulin should be stored in the refrigerator but only 50 m% of the participants knew about the temperature to be maintained in refrigerator for the storage of insulin, only 6 %/ knew about the room temperature to be maintained for the storage of insulin and only 48% knew about the technique for storage of insulin incase the refrigerator is not available whereas in a study conducted by Hadgu Grensea et al⁵ 68.7 % of the participants had knowledge that insulin should be stored in a refrigerator or cool & dry place.

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In our study majority, 78% of the participants had appropriate knowledge regarding the time for insulin administration whereas in a similar study conducted by Hadgu Grensea et al⁵. 82.9% of the participants had knowledge regarding time for administration of insulin.

In our study, among various sites abdomen (94%) was most known sites of administration to the participants followed by thigh (90%), upper arm (32%) & buttocks (24%). In a study conducted by Hadgu Grensea et al⁵ 39% of the participants had knowledge about the sites of administration of insulin.

In our study, only 46% of the participants had knowledge on correct angle for the administration of insulin whereas in a similar study conducted by Hadgu Grensea et al⁵ only 16.3% of the participants had knowledge on correct angle for the administration of insulin.

In our study, 56% of the participants had knowledge regarding ways to control pain during ISA whereas the study conducted by Hadgu Grensea et al⁵ only 21% of the participants had knowledge regarding self administration of insulin.

In our study, among the various complication of insulin therapy low blood sugar (30%) is the most known complication to the participants followed by lipodystrophy (16%) & insulin resistance/allergy (14%), similarly in a study conducted by Hadgu Grensea et al⁵ only 10.14% of the participants had knowledge regarding complication of insulin therapy.

In our study only 42 % of the participants always wipes the skin with alcohol whereas 38% wipes sometimes only & 20% never wipes the skin with alcohol before administration of insulin whereas in the study conducted by sarungbam et al⁷ majority of patients (72.42%) didn't clean the injection site.

In our study, only 22.22 % of the participants withdraws syringe partly to check the blood, 22.22%

of the participants withdraw the syringe sometimes & 55.55% of the participants never withdraw the syringe to check the blood during administration of insulin whereas in a similar study conducted by sarungbam et al⁷ none of them withdrew syringe partly to check for presence of blood.

In our study, only 6% of the participants always check their blood glucose level before the administration of insulin while 44% of them checks sometime and 50% never checks their blood glucose level before administration of insulin, similarly in a study conducted by various other authors none of them checked their blood glucose level before administration of insulin while majority of patients checked their blood sugar levels infrequently at 3-4 months interval⁸⁻¹⁰.

In our study, all the participants (100%) didn't self-adjust dose of insulin without consulting physician whereas in a study conducted by sarungbam et al⁷ most of the patients 51(91.07%) didn't self-adjust dose of insulin without consulting physician.

Conclusions

knowledge and practice has a significant association with each other. Thus it is essential to focus on improving the patient's knowledge on the related topic so that the participants can enhance their practice as well. Diabetes & Insulin Self Administration education must be imparted by physicians by counselling patients at each follow up visit while physicians, nurses & other health care provider themselves should be enriched with more knowledge through CME/ CNE and other programmes. Other sources of information like articles, newspapers, television, NGOs (Non-Government Organisations) can play vital role in imparting knowledge regarding diabetes and insulin use in the community.

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“Knowledge, Attitude and Practice of Type 2 Diabetic Patients Visiting Diabetic OPD of TUTH and Non Diabetic Population of Kathmandu”

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Abstract

Introduction: Diabetes Mellitus is a major lifestyle disorder disease which is further expanded due to ignorance and lack of knowledge. This study was carried out to assess the Knowledge(K), Attitude (A) and Practice (P)-KAP among diabetic patients visiting diabetic OPD of Tribhuvan University Teaching Hospital (TUTH) and nondiabetic population residing in Kathmandu, Nepal and compare KAP with each other's.

Methods: A cross-sectional survey design was used to assess KAP of both 90 diabetic and 90 non-diabetic population and associated factors via interview administered Questionnaire.

Results: Among diabetic population, it was found that, the mean \pm SD Knowledge, Attitude and Practice score was 12.97 \pm 5.682, 3.28 \pm 1.805 and 11.87 \pm 4.604 respectively. 60%, 70% and 47.8% of diabetic participants had good knowledge, attitude and practice scores respectively. A significant association was found between KAP score and education level of the patient and with Physical Activity level of the patient. No significant association was found between KAP score and Age group and with genetic history of the patient. Among non-diabetic population, it was found that, the mean \pm SD Knowledge, Attitude and Practice score was 10.89 \pm 4.496, 3.31 \pm 1.605 and 7.46 \pm 3.098 respectively. 40%, 73.3% and 51.1% of the non-diabetic participants had good knowledge, attitude and practice scores respectively. Significant difference between the mean knowledge score of diabetic and non-diabetic group ($P < 0.05$, $P = 0.007$) was found but no significant difference between the mean attitude score of diabetic and non-diabetic group ($P > 0.05$, $P = 0.896$) was found.

Conclusions: Overall, this study revealed good knowledge, good attitude but poor practice among diabetic group. In contrary poor knowledge but good attitude and poor lifestyle practices was found among non-diabetic group. Therefore, need based awareness programs and educational interventions targeting both diabetic and non-diabetic population should be developed and launched.

Key Words: Attitude ;Diabetes Mellitus; Disorder; Knowledge; Lifestyle; Practice

Introduction

The prevalence of diabetes is increasing worldwide due to change in life style and growing number of aging population. It is clear that diabetes imposes a heavy disease burden in both developed and developing countries with the consumption of

energy dense diet and inactive lifestyle.¹

The problem is further expanded due to ignorance and lack of knowledge. Regarding the level of awareness, obtaining information about diabetes in a population is the prior step in formulating a prevention program for diabetes. A very few hospital based studies have been done on knowledge regarding diabetes mellitus among diabetic patients in Nepal. This study is expected to reveal the gap

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of knowledge that needs to be reinforced, thereby providing data for formulating prevention programs for diabetes. If the characteristic of the patients in terms of knowledge, their attitude and practices about diabetes is known, education is likely to be effective.

The general objective of the study is to investigate the knowledge, attitude and practice of Type 2 diabetic patients visiting diabetic OPD of TUTH and non-diabetic population of Kathmandu.

The specific objectives are:

- a) To assess knowledge, attitude and practices of the Type 2 diabetic patients visiting diabetic OPD of TUTH, Kathmandu.
- b) To assess knowledge, attitude and practices of the non-diabetic population of Kathmandu.
- c) To compare the knowledge and attitude of Type 2 diabetic patients with the knowledge and attitude of non-diabetic population.

Methods

A cross-sectional descriptive study was conducted among the diabetic patients attending the diabetic outpatient department (OPD) of Tribhuvan University Teaching Hospital (TUTH), Maharajgunj and among the non-diabetic population of different places of Kathmandu to assess the information on knowledge, attitude and practices on Type 2 Diabetes Mellitus. The study population was Type 2 Diabetic patients visiting the diabetic OPD of TUTH and also the general population not having diabetes mellitus, from various places of Kathmandu who were the usual resident of the Kathmandu valley at the time of study. Inclusion Criteria includes Type 2 Diabetic patients (physician diagnosed case) and General population not having diabetes mellitus. Exclusion Criteria includes Type 1 diabetes mellitus (physician, diagnosed case), Gestational diabetes patients (physician, diagnosed case) and participants who did not consent to participate in the study.

The study variables were classified into two categories: Dependent variable: Knowledge, Attitude and Practice (KAP) score of diabetic

patient. It is defined by Poor KAP score <28 and Good KAP score ≥ 28 . Independent variable: Education level of diabetic patient, Age of diabetic patient, Physical activity level of diabetic patient, Genetic history of diabetic patient.

The samples of respondents were selected by purposive and convenient sampling method. All the diabetic patients visiting diabetic OPD of TUTH during the period of one and half month from April 4 to May 14, 2017 were selected using the purposive sampling method and enrolled in this study. For the population with no diabetes, samples were taken by convenient sampling method.² Five different places of Kathmandu were selected using convenient sampling method and samples of non-diabetic participants were selected by convenient method from those different places.

The sample size was determined by using formula assuming the prevalence rate of type 2 diabetes is to be 25 % in the urban area, 95% confidence interval, 9% margin of error (D). The sample size was calculated to be $89 \approx 90$. For the comparison, equal number of samples were taken for non-diabetic population i.e 90. So the total number of samples taken was 180.

The KAP Questionnaire was adapted from the questionnaire prepared by ASTHA Nepal and modified as requirement. (ASTHA Nepal is an NGO working for diabetes. It has used a questionnaire to assess KAP of diabetic patients as a part of awareness program)

The processed data was then entered and analyzed by using the Microsoft Excel and SPSS version 20. Data interpretation was done with descriptive statistics. Percentage, frequency, mean and standard deviation was used to describe the demographic variables, level of knowledge, attitude towards the disease and their practices. Chi-square test was used to find the association between knowledge, attitude and practice score with age, physical activity level, education level and family history. Test of significance were performed using independent

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sample t-test to compare means among groups of different variables. All significance tests were two tailed, $P < 0.05$ was considered statistically significant.

Results

Socio-demographic characteristics of the participants were determined. Among the 90 type 2 diabetic patients who were enrolled in the study, majority of the patients were from age group 50-59. The minimum age of the patient was 27 whereas the maximum age of the patient was 82. The mean \pm std. deviation age of the diabetic patients was found to be 51.69 ± 12.356 .

Among the 90 non-diabetic population who were enrolled in the study, majority of them were from age group 30-39. The minimum age of the person was 27 whereas the maximum age of the patient was 67. The mean \pm std. deviation age of the diabetic patients was found to be 41.09 ± 9.309 . Among 90 diabetic population, majority of the participants in the study were female i.e. 46(51.1%) as compared to male 44(48.9%). Similarly for non-diabetic population, 50% male and 50% female were taken. Among 90 diabetic population 18(21.1%) were illiterate that is never gone to school and cannot read and write. For non-diabetic population, 6(6.7%) were illiterate.

The Knowledge, attitude and practice of participants were assessed. 60% (majority), 70% (majority) and 47.8% (minority) of the diabetic participants had good knowledge, attitude and practice scores respectively.

A significant relationship existed between total KAP score and education level of the patient and with Physical Activity level of the patient. No significant relationship existed between total KAP score and Age group and with genetic history of the patient. 40%(minority), 73.3%(majority) and 51.1%(majority) of the non-diabetic participants had good knowledge, attitude and practice scores respectively. From diabetic population, what we found was, the mean \pm SD Knowledge, Attitude and Practice score was 12.97 ± 5.682 , 3.28 ± 1.805 and 11.87 ± 4.604 respectively. From non-diabetic population, we found, the mean \pm SD Knowledge, Attitude and Practice score was 10.89 ± 4.496 , 3.31 ± 1.605 and 7.46 ± 3.098 respectively. There was significant difference between the mean knowledge score of diabetic and non-diabetic group ($P < 0.05$, $P = 0.007$). There was no any significant difference between the mean attitude score of diabetic and nondiabetic group ($P > 0.05$, $P = 0.896$). Table 1.shows the comparison of knowledge and attitude scores among two groups.

Study group	Mean Knowledge Score	Std. deviation	P Value	Mean attitude Score	Std. deviation	P Value
Diabetic group	12.97	5.682	0.007*	3.28	1.605	0.896
Non-diabetic group	10.89	4.496		3.31	1.805	

Statistically significant: P value < 0.05 *

Table 1: Comparison of mean scores of both groups

There was significant difference between the mean knowledge score of diabetic and non-diabetic group ($P < 0.05$, $P = 0.007$) There was no any significant difference between the mean attitude score of diabetic and non-diabetic group ($P > 0.05$, $P = 0.896$). Factors associated with

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KAP score was assessed which is shown in Table2:

		KAP		χ^2	P
		KAP <28	KAP ≥28		
				Value	value
Age	25-59(Adult)	29(32.2%)	38(42.2%)	0.143	0.705
	60 or greater(Aged)	11(12.2%)	12(13.3%)		
Physical Activity level(PAL)	Poor PAL	32(35.6%)	16(17.8%)	20.571	0.000006*
	Good PAL	8(8.9%)	34(37.8%)		
Genetic History	No	24(26.7%)	20(22.2%)	3.557	0.059
	Yes	16(17.8%)	30(33.3%)		
Education level	Illiterate	16(17.8%)	3(3.3%)	15.425	0.000086*
	Literate	24(26.7%)	47(52.2%)		

Statistically significant: P value<0.05*

Table 2: Factors associated with KAP score of diabetic patient

Discussion

Here, our study revealed a good level of knowledge and attitude but poor level of practice score in diabetic population. Similarly, a poor level of knowledge and practice score but a good level of attitude score of non-diabetic population was explored. Some studies reported that diabetic patients had

good level of diabetes related knowledge which supports our study. Similar studies conducted in Andhra Pradesh (India), Sri Lanka and Malaysia also showed satisfactory diabetes knowledge in diabetic patients, 3 4. Result similar to what our study revealed, was shown by another KAP study done at Jammu, India where knowledge of diabetic

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patients was good but attitude and practices needed improvement.⁵

Our study finding showed the good level of attitude, which is supported by other studies from urban area of South India and UAE, reported the findings that there is positive and good level of attitude among diabetic patients.⁶ The poor level of practice was shown by our study which is further supported by another similar study conducted in Pakistan.² Here, we found that diabetic patients had good attitude score. Thus, we can say that their good knowledge level might have affected their attitude level and say there is some association between knowledge and attitude of the patient which is proved in other studies.⁷ Improving knowledge of the people can improve their attitude towards diabetes and in the long run change their practices to embrace healthier lifestyles such as eating healthy foods, and engaging in physical activity.⁸

Since in this study, diabetic patients have good knowledge and good attitude about care of diabetes but lack of proper practice towards its implementation. So, we can conclude that factors beyond knowledge and attitude contribute to disease management. Plausible factors could be poor self-management, lack of motivation, inadequate social support or lack of resources that are necessary for sustained life style modification or behavior change.⁹ Cultural influences also have interfered with successful diabetes self-management.¹⁰ The poor perceptions might have reinforced unhealthy dietary habits even though people are aware of the relationship between these practices and chronic diseases such as diabetes.¹¹ A patient/self-empowerment approach to diabetes care may enhance the efficiency of DM prevention and control programs in countries like Nepal that experience DM as a major public health problem.¹² This gap between knowledge and practice could be due to lack of motivation to apply the knowledge into action or practice and conservative thoughts with over confidence.¹³

Similarly, what we found is that the poor knowledge and practice among non-diabetic population, so Diabetic mellitus health education should put greater emphasis on prevention of diabetes mellitus among the healthy adults as well. Poor practice or habits indicates that the healthy population of today have risk of becoming diabetic in future. One possible reason for not performing well in knowledge section by non-diabetic population is might be due to lack of emphasis on explanation of basic pathogenesis of diabetes mellitus to the non-diabetic or it might be because on-going public health promotion activity and awareness program about diabetes has not reached the general community.

One of the interesting fact that is revealed from this study is that, despite of the poor mean practice score, when we see in overall, majority percentage of the non-diabetic population i.e more than 50% of the population had good practice scores. The plausible justification can be that, in our study, majority of the non-diabetics belonged to service holders thus we can say, the service holders i.e government and private employees are better educated and have greater contact with education materials.

Tham et al compared the knowledge of patients with and without diabetes in an emergency department and found that the knowledge was not statistically significantly different in these two groups (68.1% and 65.9% respectively).¹⁴ Our study in contrast showed that patients with diabetes outperformed significantly ($p < 0.05$) patients without diabetes, 51.88% versus 43.56% (12.97 versus 10.89 (Mean knowledge score). Our result is supported by another comparative study done in Malaysia where Patients with diabetes had higher overall knowledge scores than those without diabetes (81.8% vs 64%, $p < 0.001$).¹⁵

One possible explanation was that many of our patients with diabetes were actually having some of the micro vascular and macro vascular complications and received regular counselling organized by the diabetic counseling OPD and also

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bi-weekly diabetic health education organized by the TUTH, Department of Endocrinology. Another important fact that has been revealed from this study is that, majority of the diabetics are from education level 6-slc and among non-diabetics, majority belonged to masters level. In spite of this fact, what we found that there is significant difference between the mean knowledge score among two groups. The probable reason might be that the diabetic population were receiving regular bi-weekly diabetic health education organized in the hospital.

Our study explored the relation between KAP and PAL. There was significant correlation between the KAP and Physical activity level of the patient ($P < 0.05$). This is supported by another study which showed that the relative probability of having a highly satisfactory level of knowledge was 7.53 times higher among those who did physical activities than those who did not do physical activities. Similarly it showed that the relative probability of having a highly satisfactory level of practice was 3.74 times higher among those who did physical activities than those who did not do physical activities.¹³ Similarly significant correlation was found between education level of the patient and KAP of the patient. There is common assumption that education level of the people would have adequate KAP score for control of DM and our study is supporting this. Significant association in level of knowledge to age, education and family history of diabetes was reported in one study conducted in Nepal.¹³ Similar study conducted in Kathmandu also supports this as it showed significant relationship between knowledge of the patient and education level of the patient⁴. But in case of relation with age and family history, we have got contradictory findings. There was found no any significant relationship between age of the patient and KAP of the patient. Thus we can say KAP of person does not depend upon his/age or age does not effect on KAP of patient.

No significant correlation was there between Genetic history of the patient and KAP ($P > 0.05$) and similar study conducted in Kathmandu had

given contradictory findings⁴. Thus we can thus say that if a person has diabetic family history it does not necessarily mean that he/she should have good knowledge, attitude and practice about diabetes. Other factors might have been contributing on this. Most studies on the knowledge, attitude and practices of diabetes done in Nepal and elsewhere target patients with diabetes. Unlike these, this study targeted the general population also. We therefore lack adequate comparative data for community and our discussions are mostly based on knowledge, attitude and practices of people with diabetes who in most cases have better exposure to diabetes education. Similarly, there is difficulty in comparing our findings with studies from other countries as there is disparity between the characteristics of the study population and study tools used in other studies.

Conclusions

Factors beyond knowledge and attitude contribute to disease management. Plausible factors could be poor self-management, lack of motivation, inadequate social support or lack of resources that are necessary for sustained life style modification or behavior change. Cultural influences also have interfered with successful diabetes self-management. A patient/self-empowerment approach to diabetes care may enhance the efficiency of DM prevention and control programs in countries like Nepal that experience DM as a major public health problem. Poor practice or habits indicates that the healthy population of today have risk of becoming diabetic in future.

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Conflict of Interest

Not any

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Depression In Type 2 Diabetes Mellitus : A Cross-Sectional Study In Tertiary Care Teaching Hospital In India.

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Abstract

Introduction: In our country, number of patients of diabetes is increasing every year, so of depression. The emotional consequences of diabetes have been scrutinized in a number of studies and varying results about the association of depression with type 2 diabetes mellitus have been found. While depression may contribute to poor diabetes-related outcomes, diabetes and its complications may also contribute to poor depression outcomes. Both conditions may have common underlying biological and behavioural mechanisms, such as genetic susceptibility and common pathophysiological mechanism.

AIM-To assess the prevalence and the factors associated with depression among the patients with type II diabetes mellitus.

Materials and Methods: Single centre, descriptive, cross-sectional study conducted in tertiary care teaching hospital in india for a period of 8 months. 586 type II diabetes patients aged between 30 and 70 years were included. Patients taking mood elevator drugs ,suffering from mental illness, gestational diabetes and type 1 diabetes were excluded from the study. Physicians Health Questionnaire-9 (PHQ-9) with a score of ≥ 5 was used to make the diagnosis of depression.

RESULTS- Prevalence of depression among the diabetic patients found to be 49.48%. Many factors have been found to be associated with increased prevalence of depression among diabetic patients such as age, female gender, house wife, high BMI, diabetes duration, diabetes related complications, comorbid conditions and poor glycaemic control with poor follow-up.

Conclusion: By managing both depression and diabetes concurrently, better outcome in patients and increase in overall quality of life can be achieved. Early detection and treatment of depression by effectively screening all diabetic patients for depression would help to bring down the severity of depression among these patients.

Key Words: Type 2 diabetes mellitus,depression, quality of life .

INTRODUCTION

According to the International Diabetes Federation “diabetes is one of the largest global health emergencies of the 21st century”¹. The World Health Organization (WHO) predicts that more than 360 million people worldwide will have diabetes by 2030².Diabetes is increasing in every country, but eighty percent of people with diabetes live in low income and around half of those are undiagnosed³. Depression is a common and very serious medical disease with a lifetime prevalence ranging from approximately 11% in low-income countries to

15% in high-income countries⁴. On the other hand, depression may increase the risk of developing type 2 diabetes with 60%^{5,6}.

There has been increased attention given to how psychological issues affecting Diabetes Mellitus (DM) self-management, as well as the psychological consequences of having the diabetes. Being diagnosed with diabetes is a major life stress. It requires a large number of physical and mental accommodations. The individual must learn about a complex system of dietary and medical

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interventions with lifestyle modification. This can consume a lot of energy of individual. As a result of this they go through the typical stages of mourning which include denial, anger, depression and acceptance⁷.

It seems that there is a bidirectional association between diabetes and depression, a complex relation that might share biological mechanisms, whose understanding could provide a better treatment and improve the outcomes for these pathologies^{7,8}. The aim of this study is to determine the prevalence of depression and the factors associated with it among patient with diabetes mellitus.

The objectives are to determine the prevalence of depression among patient with diabetes mellitus and to identify factors associated with depression among patients with type 2 diabetes mellitus.

METHODS

This was an Institution based cross-sectional study design was used to assess associated factors of depression among type 2 diabetic outpatients. The study was conducted from July, 2016 to march 2017. Patients -All type 2 diabetes out-patients on

follow up treatment in diabetes clinic.

Subjects and Selection-T2 DM patients aged between 30 and 70 years were included in our study. We chose a structured questionnaire PHQ-9. The Inclusion Criteria were Individuals diagnosed as Type-2 Diabetes Mellitus and Age between 30 to 70 years. The exclusion criteria were Individuals with type 1 diabetes mellitus, Patients taking mood elevator drugs ,suffering from mental illness,gestational diabetes and type 1 diabetes, All data was entered and analyzed using Statistical Programfor Social Sciences (SPSS) version 12. 0 (SPSS Inc.2003).

RESULTS

In our study the prevalence of depression among the diabetic patients was 49.48% .

Among the various clinical parameters we found a significant association ($p < .01$) for patients with gender, occupation, income, BMI, duration of diabetes, complication of diabetes, uncontrolled blood sugar of more than 200 mgs/dl.

Table -1 below enumerates all the above factors and the level of depression among the patient.

Further Figures1.1 to 1.10 are graphical depiction of above data

TABLE-1 SHOWING FACTORS AND THE LEVEL OF DEPRESSION AMONG THE PATIENT

Demographic factors	DEPRESSIO N PRESENT	DEPRESSION- ABSENT	CHI-SQUARE VALUE	P- VALUE
	290	296		
Gender				
Male(n=310)	133(42.90%)	177(57.09%)	11.4168	0.000728
Female(n=276)	157(56.88%)	119(43.11%)		
Age				
30-40yrs(n=226)	106(46.90%)	120(53.09%)	0.9837	0.32128
41-70yrs(n=360)	184(51.11%)	176(48.88%)		
Religion				
Hindu(n=270)	133(49.25%)	137(50.74%)	16.4118	0.000934
Muslim (n=216)	102(47.22%)	114(52.77%)		
Christian(n=24)	5(20.83%)	19(79.16%)		
Sikhs/sindhi (n=76)	50(65.78%)	26(34.21%)		
Education				
Illiterate(n=230)	104(45.21%)	126(54.78%)	2.7623	0.96509
Educated(n=356)	186(52.24%)	170(47.75%)		

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Occupation Service(n=170) Private job(n=110) Farmer(n=154) Bussiness(n=152)	102(60%) 60(54.54%) 46(29.87%) 82(53.94%)	68(40%) 50(45.45%) 108(70.12%) 70(46.05%)	33.5596	0.00001
Income <10000rs(n=350) >10000rs(n=236)	203(58.0%) 87(36.86%)	147(42.0%) 149(63.13%)	25.1893	0.00001
Body mass index <25 (n=240) > 25 (n=346)	91(37.91%) 199(57.51%)	149(62.08%) 147(42.48%)	21.7725	0.00001
Diabetes duration <5 years (n=223) 5 to 10yrs(n=199) > 10 yrs(n=164)	136(60.98%) 68(34.17%) 86(52.43%)	87(39.01%) 131(65.82%) 78(47.56%)	31.0436	0.00001
Co-morbid illness present(n=310) absent(n=276)	167(53.83%) 123(44.56%)	143(46.12%) 153(55.43%)	5.058	0.024512
Diabetic complications present(n=138) absent(n=448)	97(70.28%) 193(43.08%)	41(29.71%) 255(56.91%)	31.2468	0.00001
Controlled diabetes yes(n=370) no(n=216)	140(37.83%) 150(69.44%)	230(62.16%) 66(30.55%)	54.5028	0.00001

In our study the prevalence of depression among the diabetic patients was 49.5% and based on scores we graded them no depression (50.51%), mild to moderate depression(42.32%) and severe depression (7.16%).

TABLE 2- DISTRIBUTION OF THE PATIENTS BASED ON THEIR LEVELS OF DEPRESSION

Level of depression	FREQUENCY N=586	PERCENTAGE %
No depression (0 – 10)	296	50.51%
Mild to moderate depression (5 – 19)	248	42.32 %
Severe depression (20 – 27)	42	7.16 %
Total	586	100%

DISCUSSION

Depression being one of the major psychiatric disorders would have a negative effects towards the quality of life, treatment outcome and medication adherence of patients with diabetes In our study the prevalence of depression in diabetic patient was 49.48%. The result of our study is higher than study done by Ali et al (27.05%)⁹, Jameel Nasser et

al (33.3%)¹⁰, Al Ghamdi AA (34%)¹¹, Waleed M Sweileh et al(40%)¹²,Subhash Das et al(41%)¹³. In a study done by in a Ranjan Das et al in urban areas of Kolkata, 46.15% met criteria for depression¹⁴.

The depression prevalence in different studies could be due to difference in sociodemographic characteristics, ethnicity, geographical area and

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life style of individuals. In our study depression was associated was females, lower income, BMI, presence of complications, duration of diabetes, uncontrolled blood sugar and similar findings were observed by Amit Raval et al¹⁴, Waleed M Sweileh et al¹² and Jameel Nasser et al¹⁰. We found a significant correlation between earning. Individuals with low earning face the twin burdens of paying for health care, which in india is largely out-of-pocket, and meeting the needs of their children. In our study statistically significant association was found between fasting blood sugar levels and depression. Increasing FBS levels were observed in depressed individuals when compared with non-depressed individuals. Similar findings were observed in a study done by Bajaj et al¹⁶. About 43.5% of the study participants experienced somewhat difficulty in carrying out daily activities as per the PHQ-9 questionnaire. This could have led to poor compliance to medication which could have led to poor outcome of the disease. Similar findings were observed in study done by Habtewold et al in Ethiopia⁹. Diabetic complications were found to be strongly associated with increasing depression severity. Similar findings were observed in a study done by Joseph et al in Mangalore³⁰. DM is a chronic physical disorder that requires lifestyle alterations and medication adherence for its successful treatment and better quality of life.

CONCLUSION

The prevalence of depression among the study patient was found to be 49.48%. Depression was found to be higher in female gender, higher age, and lower socioeconomic status. Presence of complications, duration of treatment was found to be significantly associated with depression. Although majority of depressed patients were unrecognized and untreated. Better outcome in patients overall care and quality of life will be achieved by managing both the depression and diabetes concurrently. Regular assessment of Diabetics for depression is required for wellbeing of diabetic patients. Integrated approach by physician and psychiatrists for effective management of diabetes and counselling of patients will help in preventing the depression.

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Prevalence of Hypertension and diabetes mellitus in rural hilly regions of Uttarakhand state

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Abstract

Introduction: Among the most common chronic non-communicable diseases worldwide, hypertension (HT) and Type 2 Diabetes mellitus (DM) are increasingly becoming a matter of public health importance. Limited studies on the prevalence of HT and DM have been performed in rural hilly regions of Uttarakhand state.

Objectives: To estimate the prevalence of HT and DM and their association with some selected risk factors among adults in rural hilly areas of Uttarakhand.

Methods: This cross-sectional study was carried out from August 2015 to October 2016 with a randomly selected sample of 401 adults in hilly region of Tehri Gharwal and Uttarkashi Districts of Uttarakhand. Demographic, anthropometric measures and lifestyle factors were obtained for all participants with the help of predesigned and pretested interview schedule. A subject with recorded systolic blood pressure of ≥ 140 mmHg or diastolic blood pressure of ≥ 90 mmHg was considered hypertensive. Screening for DM was based on the following World Health Organization (WHO) criteria. Bivariate analysis was used to identify the association.

Results: The mean age of the study population was $46.6 \text{ years} \pm 16.1$ years. Mean BMI of the participants was 22.7 ± 4.8 . It was found that 27.7 per cent of the subjects were current tobacco users while 24.7 per cent were current alcoholic. The overall prevalence of HT and DM were 31.4% and 4.7% respectively. About 2.5% of the study subjects were suffering from both HT and DM. The risk factors for HT in this study included age, BMI, vegetarian diet and increase salt intake. Age was found to be a significant risk factor for DM in the present study.

Conclusions: A high prevalence of HT and DM in rural hilly areas of Uttarakhand need community outreach campaigns regularly for their early detection & proper health education.

Key Words: Hypertension, Diabetes, Prevalence, Risk factors, Adult.

INTRODUCTION

Hypertension and Diabetes have become a major cause of morbidity and mortality world wide. A total of 56 million deaths occurred worldwide during 2012. Of these, 38 million were due to Non-Communicable Diseases (NCDs)¹. Cardiovascular diseases, chronic obstructive pulmonary disease, cancer and diabetes mellitus (DM) were responsible for premature deaths in developed countries and the seventh in developing countries^{2,3}. In India, the

review of epidemiological studies suggests that the prevalence of HT has increased in both urban and rural subjects and presently is 25% in urban adults and 10-15% among rural adults⁴.

WHO estimated the prevalence of DM in India in 2014 is 7.8%¹. The prevalence of type 2 DM has risen from 1.2% to 11% over last three decades⁵. This growing prevalence is of great concern because of high morbidity and mortality and the cost associated with the treatment of the complications of diabetes⁶. Four common risk factors for NCDs

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include alcohol, physical inactivity, tobacco and unhealthy diet. Limited studies have been conducted to explore the extent of HT and DM as well as their risk factors in hilly rural areas of Uttarakhand.

This study was done in Tehri Gharwal and Uttarkashi district of Uttarakhand. The objective of the study is to estimate the prevalence of HT and DM and their association with some selected risk factors among adults in rural hilly areas of Uttarakhand.

METHODS

This cross-sectional study was carried out from August 2015 to October 2016 in hilly region of Tehri Gharwal and Uttarkashi Districts of Uttarakhand. In first stage, a list of 15 blocks, 9 from Tehri Gharwal and 6 from Uttarkashi district was prepared.

Three blocks were selected randomly from each district. In the second stage one village was selected from each block by simple random sampling. In selected villages subjects were randomly selected after line-listing of persons aged 18 years and above through lottery method. Sample size was calculated to be 401 taking the prevalence of diabetes as 20 per cent based on the previous study in hilly area,⁷ relative precision as 20% and considering sample wastage of 5%. So, within each selected village, we randomly selected study subjects. The participants were explained the objective of the study and an informed verbal consent was taken from each of the participants. Socio - demographic characteristics, lifestyle factors and other relevant information related to HT and DM like age, sex, pattern of salt intake, physical activity (30 min for more than three times per week), tobacco, alcohol, vegetable and fruits were obtained from the study subjects by interviewing them with the help of predesigned and pretested interview schedule. A subject with recorded systolic blood pressure of ≥ 140 mmHg or diastolic blood pressure of ≥ 90 mmHg was considered hypertensive. The blood pressure for each participant was measured using the auscultatory method with a standardized calibrated mercury column type sphygmomanometer in sitting position. Following a standardized protocol, two separate measurements were taken and the

average of the two measurements was recorded after proper rest.⁸ Screening for DM was conducted using capillary blood glucose measurement using glucometers, glucose strips and lancets. The first blood drop was discarded and the second drop was collected on the test strips and analyzed. Screening for DM was based on the following World Health Organization (WHO) criteria: A fasting blood sugar level 126 mg/dl or above and a random blood sugar level of 200mg/dl or above was considered diabetic.⁶ Obesity was categorised according to Body Mass Index (BMI) criteria for Asian taking BMI criteria for Asian taking BMI .

A non-tobacco user was defined as one who had never consumed it in his lifetime or one who had left it at least one year back. Similarly a current alcoholic was defined as a subject who consumed any amount of alcohol at least once in a week and/or one who had left alcohol consumption less than one year back. On the other hand, a non-alcoholic was defined as one who had never consumed alcohol in his lifetime or one who had left alcohol consumption at least one year back. The salt intake was calculated by asking for the average monthly consumption of salt by the whole family and dividing it by the number of persons in the family and then dividing it by 30 to calculate the average daily intake in g/person/day.¹⁰ The JNC-7 has recommended a daily intake of salt of no more than 100 mEq/L, which is equivalent to 6 g/day of sodium chloride or 2.4 g/day of sodium.¹¹ Salt intake was thus classified into two groups, normal ≤ 6 g/day and increased >6 g/day. SPSS version 22 was used to analyse the data. The results were presented in form of frequency and proportion. Bivariate analysis was used to identify the significant association between the characteristics and normal blood pressure, hypertension, nondiabetic and diabetic. The study was approved by the Ethics Committees of SGRR Medical College, Dehradun.

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RESULTS

Table 1 : Characteristics of the study subjects (n=401)

Characteristics	Mean	S.D.
Age (years)	46.6	16.1
Weight (Kg)	57.4	12.3
Height (cm)	158.5	12
Body Mass Index (BMI)	22.7	4.8
Systolic blood pressure (mmHg)	126.6	20.6
Diastolic blood pressure (mmHg)	79.8	12.2
	Number	Percent
Sex		
Male	201	50.1
Female	200	49.9
Current tobacco users		
No	290	72.3
Yes	111	27.7
Current alcohol drinking		
No	302	75.3
Yes	99	24.7
Physical activity		
No	261	65.1
Yes	140	34.9
Food habit		
Mixed	233	58.1
Vegetarian	168	41.9
Fruit intake		
Dailt	56	14.0
Occasionally	345	86.0
Salt intake per day		
Normal	241	60.1
Increased	160	39.9
Body Mass Index for Assians		
Underweight (<18.5)	78	19.5
Normal (18.5 to 22.9)	145	36.2
Overweight (23 to 24.9)	55	13.7
Obese (≥ 25)	123	30.7
Blood pressure		
Normal	275	68.6
Hypertension	126	31.4
Blood glucose		
Normal	382	95.3
Diabetic	19	4.7
Prevalence of combined hypertension & diabetes mellitus	10	2.5

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Table 1 shows the demographic, anthropometric measures, lifestyle factors and morbidity of the study participants. The mean age of the study population was 46.6 years with a standard deviation of 16.1 years. Mean BMI of the participants was 22.7 ± 4.8 . The mean systolic and diastolic pressures of the respondents were found to be 126 ± 20.6 and 79.8 ± 12.2 respectively. Males and females constituted almost equal proportion. It was found that 27.7 per cent of the subjects were current tobacco users while 24.7 per cent were current alcoholics. 140 Participants (34.9%) had reported that they were doing regular exercise. Almost 40% of the subjects had salt consumption $> 6\text{gm/day}$. It was found that about 42% of the subjects were strict vegetarian while rest 58% were consuming mixed food. Only 14% of the respondents were consuming fruits daily. Participants with normal BMI constituted only 36.2% of the total sample while participants with underweight, overweight and obese constituted 19.5%, 13.7%, and 30.7% respectively. The overall prevalence of HT and DM were 31.4% and 4.7% respectively. About 2.5% of the study subjects were suffering from both HT and DM. Out of 19 diabetic subjects, 10 (52.6%) were hypertensive while of 126 hypertensive participants, 10 (7.9%) were diabetic and this was found to be statistically significant.

Table 2: Bivariate analysis of risk factors of hypertension

Characteristics	Hypertension Present		OR (95% CI)	P Value
	No (n=275)	Yes (n=126)		
	No (%)	No (%)		
Age (years)			10.4 (1.02 to 1.05)	0.001
Body Mass Index (BMI)			10.2 (1.12 to 1.18)	0.0011
Sex				
Male	133 (66.2)	68 (33.8)	1.2 (0.8 to 1.9)	0.29
Female	142 (71.0)	31 (27.9)	1	
Current tobacco users				
No	195 (67.9)	97 (32.1)	1	
Yes	80 (72.7)	29 (29.3)	0.8 (0.5 to 1.2)	0.3
Current alcohol drinking				
No	205 (67.9)	97 (32.1)	1	
Yes	70 (70.7)	29 (29.3)	0.8 (0.5 to 1.4)	0.5
Physical activity				
No	174 (66.7)	87 (33.3)	0.7 (0.5 to 1.2)	0.2
Yes	101 (72.1)	39 (27.9)	1	
Food habit				
Mixed	170 (73.0)	63 (27.0)	1	
Vegetarian	105 (62.5)	63 (37.5)	1.6 (1.05 to 2.4)	0.02
Fruit intake				
Daily	41 (73.2)	15 (26.8)	1	
Occasionally	324 (67.8)	111 (32.2)	1.2 (0.6 to 2.4)	0.4
Salt intake per day				
Normal	179 (74.3)	62 (25.7)	1	
Increased	96 (60.0)	64 (40.0)	1.9 (1.2 to 2.9)	0.003

In Table 2, findings show that age and BMI were significantly associated with hypertension ($p=0.001$). The bivariate analysis shows that, females were less hypertensive than male which was found insignificant ($p=0.2$). The Odds of consuming tobacco and alcohol amongst hypertensive participants were 0.8 (0.5-1.2) and 0.8 (0.5-1.4) respectively as compared to normotensive. Hypertension was found to be more prevalent in vegetarian ($p=0.02$) and among those who consumed fruits occasionally ($p=0.4$). Those who consumed increase salt intake were 1.9 (1.2 to 2.9) times more likely to be hypertensive as compared to those who consumed normal salt.

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Table 2: Bivariate analysis of risk factors of diabetes

Characteristics	Hypertension Present		OR (95% CI)	P Value
	No (n=382) No (%)	Yes (n=19) No (%)		
Age (years)			1.05 (1.02 to 1.08)	0.001
Body Mass Index (BMI)			1.08 (0.9 to 1.1)	0.06
Sex				
Male	195 (97.0)	06 (3.0)	0.4 (0.2 to 1.1)	0.1
Female	187 (93.5)	13 (6.5)	1	
Current tobacco users				
No	275 (94.8)	15 (5.2)	1	
Yes	107 (96.4)	04 (3.6)	0.6 (0.2 to 2.1)	0.5
Current alcohol drinking				
No	284 (94.0)	18 (6.0)	1	
Yes	98 (99.0)	1 (1.0)	0.6 (0.02 to 1.2)	0.07
Physical activity				
No	246 (94.3)	15 (5.7)	0.4 (0.15 to 1.4)	0.4
Yes	136 (97.1)	04 (2.9)	1	
Food habit				
Mixed	223 (95.7)	10 (4.3)	1	
Vegetarian	159 (94.6)	09 (5.4)	1.2 (0.5 to 3.1)	0.6
Fruit intake				
Daily	55 (98.2)	01 (1.8)	1	
Occasionally	327 (94.8)	18 (5.2)	3.2 (0.3 to 23.0)	0.2
Salt intake per day				
Normal	229 (95.0)	12 (5.0)	1	
Increased	153 (95.6)	07 (4.4)	0.8 (0.3 to 2.2)	0.7

Table 3 shows that the age was significantly associated with diabetes ($p=0.001$). BMI showed the marginal association with diabetes ($p=0.06$). Current alcohol consumption ($p=0.07$), current tobacco use ($p=0.5$), physical activity ($p=0.4$) and increase salt intake (0.7) were negatively associated with diabetes and all were found statistically insignificant. The Odds of consuming vegetarian food and occasional fruits amongst diabetic participants were 1.2 (0.5-3.1) and 3.2 (0.3- 23.0) respectively as compared to nondiabetic.

DISCUSSION

Our results indicate that the prevalence of HT (31.4%) is high in a rural hilly area of Tehri Gharwal and Uttarkashi district of Uttarakhand. Males show higher prevalence of HT 33.8% against 29% in females. The extent of problem of HT has been increasing in India. The findings concur this increasing trend with earlier studies. According to the WHO 214 estimates, the prevalence of raised

BP in Indians was 22.9% (23.4.2% in men and 22.3% in women)¹². A study conducted at Jabalpur district of India, found the prevalence of HT as 14.8% in rural area¹³. In various studies conducted in rural areas of India the prevalence of HT found to be 38.5%, 33% and 19%¹⁴⁻¹⁶.

In the present study the prevalence of DM was found to be 4.7% with higher proportion in female (6.5%) as compared to male (3%). A study in Arunachal Pradesh revealed 19.78% prevalence of diabetes among the study participants⁷. According to the WHO 214 estimates, the prevalence of raised blood sugar in Indians was 7.8% (7.8% in men and 7.8% in women)¹².

Men and women were almost equally affected with DM in other study⁷. Higher prevalence of DM among female in the present study might be due to increase in psychosocial stress among them. Overall prevalence of DM was found lower in

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comparison to the other parts of India. This might be due to more physical activity in the hilly regions as people need to move up and down the hills for their daily activities.

The risk factors for HT in this study included age, BMI, vegetarian diet and increase salt intake. Risk factors like tobacco, alcohol, physical activity and fruit intake are known to contribute to HT were found to be insignificant in our study subjects (Table 2). Age and BMI were significantly associated with HT. Most of the studies agree with the fact that prevalence of HT increased with age and BMI^{14,17,18}. High consumption of salt was found to be significantly associated with HT as was found in the present study¹⁹. Tobacco consumption was found to be significantly associated with HT in other studies. This was also revealed in the other studies^{14,20-22}.

Study conducted among Muslim populations of Manipur also did not find smoking, alcohol use and gender difference any risk predictor of HT¹⁷. Alcohol consumption was not found to be significantly associated with high blood pressure in another study also¹⁴.

Age was found to be a significant risk factor for DM in the present study. BMI and alcohol consumption was also found marginally significant in our study sample (Table 3). In a study of rural population of Haryana, smoking and alcohol use were not found to be a risk predictor of DM²³. Significantly higher blood pressure was observed in diabetics compared to non-diabetic participants in the present study. The prevalence of HT among diabetic participants was almost twice that of non-diabetic participants, which is similar to previous studies^{7,22,24}. Small sample size is the limitation of the study as many risk factors known to contribute to HT and DM were found to be insignificant.

CONCLUSIONS

A high prevalence of HT and DM in rural hilly area of Uttarakhand need immediate action by the Government and health planners to prevent the rising trend of these Non-communicable diseases in

the state. Community outreach campaigns should be conducted regularly for early detection of HT and DM and for proper health education about the HT and DM and their complications.

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MEDICAL NUTRITION THERAPY

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INTRODUCTION

Diabetes can lead to devastating expensive complications such as eye blindness, heart disease, stroke, leg amputation etc. To prevent such complications of diabetes it is really important that health care workers including patients understand the ways of improving or reducing the chances of developing such complications. It has been proven that proper management of diabetes early on can reduce such expensive and painful complications¹.

Proper management comprises of lifestyle modifications that include proper exercise, balanced nutritious diet, taking pills on regular basis, getting regular check-ups and keeping different parameters of the health in recommended range.

Lifestyle modification is an integral part of diabetes management. It comprises of regular exercise and proper nutrition. Proper nutrition is very important in diabetes care. When nutrition education is given and applied on a day to day, basis, with the intention of improving disease care and improving longevity and quality of life, it is called medical nutrition therapy.

Nutrition

Nutrition is an assortment of different quantity and quality of nourishing elements that are found in food. People eat food to obtain nourishing essential elements for sustaining life, to satisfy their taste buds and also for social reasons. If people are not empowered by appropriate knowledge they may end up eating wrong quality and quantity of food that may be negatively impacting their diabetic care. Medical nutrition therapy helps the patients get empowered and learn to make the right choices. When they chose the right quality and quantity of food their sugar and cholesterol level can be maintained in desired range. They can go on about

their lives with happiness and joy and at the same time help prevent devastating complications of diabetes.

Types of nutrients obtained from human diet

There are various kinds of essential elements that we get from food. We totally depend on our food for energy source but if the energy source is too much or too little it can negatively impact our health. The macronutrients called fat, protein and carbohydrate are the main sources of energy from human diet. We also get vitamins and minerals that are essential for different reactions occurring in the body. Before understanding medical nutrition therapy and their roles in diabetes we need to understand what type of nutrients we get from the food we eat.

We mainly get two types of nutrients from our food; macronutrients and micronutrients:

Macronutrients

Macronutrients are the main backbone of our nutrition and they provide the bulk of our energy. Macro nutrients are carbohydrate, protein and fat. They are the main sources of energy from human diet.

Micronutrients

Micronutrients are nutrients that are necessary in minute quantities. Still they are essential for our overall health. Examples are vitamins and minerals.

Fiber and Water

In addition to macronutrients and micronutrients we get essential elements from our food such as fiber and water. Our body is made up of two third water and water is essential for our existence.

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Units of energy:

Unit of energy is expressed in kilo calories or in kilo joules. Energy density of food or diet is metabolizable energy per unit per weight of food². Fat is a high energy density food because one-gram fat gives nine kilo calories whereas one gram of protein or carbohydrate source gives four kilo calories. There are other fruits and vegetable which may be having low energy density. For example, cucumber has a lot of water in it. Cucumber has minimal amount of carbohydrate and protein and no fat at all. Thus it is a low density food. It is important to understand the energy density of food so that we can incorporate this information in the medical nutrition therapy.

Carbohydrate

Carbohydrate is the most common source of stable food in many parts of the world. Carbohydrate is generally obtained from cereals and to a lesser degree from pulses and fruits. The basic unit of carbohydrate is a simple sugar. Examples of simple sugars are fructose, galactose and glucose. If one simple sugar is combined with another simple sugar it is called disaccharide such as sucrose and lactose. When there is a big polymer of multitude of simple sugar it is called polysaccharides. There are two types of polysaccharides i.e. starch and non-starch polysaccharides. Nonstarch polysaccharides are generally soluble plant carbohydrates and they are mostly considered fiber. They pass through the gut without absorption and they are considered important to form the bulk of the stool and also cause slow absorption of other carbohydrates.

Protein

Protein is one important nutrient that we get from our food. It is nitrogen containing component of diet. It is made up of various amino acids. Protein is obtained from both animal and plant source. It is broken down into amino acid by gut enzymes and absorbed in the system. It is essential to synthesize various compounds in the body. We need continuous replacement of protein for wear and tear so our food should have certain amount of protein in the diet.

Fat

Fat is an essential nutrient in our food. We get fat from both animal and plant sources. But fat from plant source is considered better, except for few exceptions such as palm oil, coconut oil and hydrogenated vegetable oils. Fat is also called lipid and it is insoluble in water. Fat or lipid is essential for the integrity of cell wall and essential for transportation of vitamins such as A, D, E and K. The smallest unit of fats or lipids is called fatty acid. There are various types of fatty acids obtained from food i.e. saturated fatty acids, polyunsaturated fatty acids and mono-un-saturated fatty acids. Saturated fatty are those fatty acids which have all the available bonds of carbon occupied. Mono unsaturated fatty acids have a single point of unsaturation. Example of mono saturated fatty acid is oleic acid. Poly unsaturated fatty acids have many double bonds in carbon chain the example of which is eicosapenta ionic acids. Saturated fatty acids are considered to be more harmful than mono-un-saturated fatty acid and poly unsaturated fatty acids.

Trans fatty acids

When unsaturated fatty acid is converted to saturated fatty acid with the help of reaction with hydrogen the process is called hydrogenation. Fatty acids, which are hydrogenated, are called Trans fatty acids. Trans fatty acids are harmful to the body.

Animal fat have more saturated fatty acids. Plant based oils such as soya oil, mustard oil, olive and sunflower oil have high amount of poly unsaturated fatty acids. Fish oil is also a source of unsaturated fatty acid and they have eicosapenta ionic acid and DHA. Those fatty acids which have unsaturated bonds are considered to be healthy for human diet. As fat is high in energy, altering the quality and quantity of fat can improve your energy intake. Fat is a high energy density of food, as it can give a large amount of energy, the recommendation is to eat low fat diet.

Definition of Medical nutrition therapy

Medical Nutrition Therapy is defined as nutritional,

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diagnostic, therapeutic and counseling services for the purpose of disease management which is provided by registered dietitian or nutritional professional or physician³. Medical nutritional therapy is a legal term that is mainly used in the United States. Nutritional therapy' is the term that is used in various studies that have been done outside of the US. Thus it will be more inclusive of the broad spectrum of recommendations that fall under dietary education and management offered to patients to manage diabetes. Nutrition therapy is very important for patients with diabetes and pre-diabetes. Dietary intervention in diabetes has proven that the hemoglobin A1C can be reduced with the help of nutrition therapy⁴.

Nutrition therapy provided by a registered dietitian has been found to be associated with decrease of hemoglobin A1C of 0.3-1% of people with type 1 diabetes (4) and 0.5%-2% for people with type 2 diabetes⁵.

Important components of Medical Nutrition Therapy or Nutrition Therapy are⁶

1. Nutrition Assessment
2. Nutrition Diagnosis
3. Nutrition Interventions
4. Nutrition Monitoring and Evaluation with ongoing follow up to support long term lifestyle changes
5. Evaluation of Outcomes and Modify interventions as needed.

Providing Nutrition Therapy to individuals is challenging in resource poor countries. Even in more developed countries it is an under utilized tool of diabetes management. One study showed that only 9% people interviewed and one diet visit in the last one year⁷.

The goals of nutrition therapy⁸

The goal of nutrition therapy is to:

1. To promote and support healthful eating pattern
2. Maintain healthy weight and various parameters of diabetes care in the desired range such as fasting, pp (post prandial) blood sugar, hemoglobin A1C,

cholesterol, blood pressure and waist circumference

3. Maintain pleasure of eating by providing positive messages about food choices

4. Delay or prevent the devastating complications of diabetes.

5. Provide individuals with practical tools for day to day meal planning rather than focusing in individual micro-nutrient or single food.

6. Uplift the feeling of wellbeing and carry the daily activities.

7. Avoiding unhealthy intake of harmful substances like smoking and alcohol

Macro nutrient percentage:

People have widely differing energy intake and proportional energy contribution from carbohydrate, protein and fat sources.

One study showed that in the US, people with type 1 and type 2 diabetes report and obtaining about 45% of total energy from carbohydrate, 35-40% from fat and 16-18% energy intake from protein⁹. There is no ideal percentage of total energy derived from one particular type of macronutrient. There is no evidence to suggest clearly that, sticking to strict percentage of calories from carbohydrate, protein and fat for all person of diabetic is helpful⁸. Macronutrient distribution should be based on individualized assessment of current eating patterns, preferences and metabolic goals⁸.

Energy Intake (Energy Balance)

Various studies have shown that intensive lifestyle modification in patients with impaired glucose tolerance or diabetes can lead to weight loss, which in turn leads to better sugar control and better lipid panel^{10,11,12}. Weight loss has been shown to reduce hemoglobin A1C and blood sugar profile. In the Look AHEAD trial, intensive lifestyle intervention was associated with weight loss of 6% at the end of intervention. The study population had to be seen 3-4 times monthly over a year and 1-2 times each month for the remainder of the trial. The total trial was of the period of 9.6 years¹³. Look AHEAD calorie goals were 1200-1500 Kcal/day for weights less than 114kg group and 1500-

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1800kcal /day for more than 114kg group and they were provided with less than 30% fat¹⁴. In resource poor developing countries, with lack of health professionals and dietitians, this type of intensive consultation will definitely be challenging and out of reach for many people.

Weight loss diet and outcome in Diabetes Mellitus type 2

In type 2 patient who has obesity or central obesity, modest weight loss defined as weight loss of more than 5% is needed to produce desired outcome in glycemic control. Weight loss can be obtained with lifestyle program that leads to 500-750kg/calories negative energy balance or provide about 1200-1500 kcal/day for women and 1500-1800 kcal for men¹⁵.

Carbohydrate

As carbohydrate containing food are the ones contributing to the post meal blood sugar level, it is very important to know which food contains carbohydrate.

Carbohydrate counting and diabetes management

For individuals who take secretagogues or insulin, to reduced risk of hypoglycemia, it is recommended to eat source of carbohydrate at every meal. Skipping meal is not recommended. As physical activity can lower the blood sugar abruptly, it is recommended for them to carry carbohydrate with them all the time to reduce the risk of hypoglycemia.

For individuals with type-1 diabetes, it is recommended to count carbohydrate and match it at the meal time insulin. Meals need to be consumed at similar times every day and insulin needs to be taken before the meal. It is recommended to eat similar amount of carbohydrate everyday to match the set dose of insulin.

When type 1 patients are taught about carbohydrate counting and matching the carbohydrate intake with short acting insulin, their HbA1c has been found

to be lower¹⁶. In places with poor socioeconomic condition, lower education level and understanding this type of education may be difficult. Alternative simpler way of teaching them portion sizes has been found to be effective. It may be better especially for elderly individuals and those with cognitive dysfunction.

Example of simple ways of educating people about diabetes nutrition amount and portion size may be plate method or Zimbabwean hand jive model as proposed by Dr.K Mawji. In Zimbabwean hand jive model, starches or carbohydrate containing food to be taken in one meal is the amount that can hold in 2 fists. The amount covering the palm of one hand is for protein containing foods. And green non-starch vegetables, will be as much as can be held by 2 hands. Oil is to be taken less than equivalent to tip of the thumb.

In plate method, non-starchy vegetables fill up the half of a 9 inches' plate. Of the remaining half, one quarter of the plate has to be filled by grains and starchy food, which are actually the main source of carbohydrate. The remaining quarter is for protein containing foods such as meat and dairy. One can add healthy fat such as vegetable oil, nuts in small amount. Add a serving of fruit and a non caloric drink such as water, tea or coffee.

Glycemic index

According to ADA review, the association of glycemic index and glycemic loads with diabetic is complex (7). The concept of glycemic index improving the diabetic management has not been substantiated. A meta-analysis showed that some studies exhibit that intake of lower glycemic intake carbohydrate can cause reduction of hemoglobin A1C of -0.2% to -0.5%, though in these studies, there was no consistent definition of low glycemic index food¹⁷.

Dietary fiber and whole grain

A systemic review of data did not show a significant improvement of glycemic control with high fiber diet¹⁸. High dietary fiber showed a modest lowering

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of pre-prandial glucose and hemoglobin A1c (-0.2to-0.3%) with more than 50gm fiber /day¹⁹. ADA position statement on nutrition suggests that based on existing research, acquiring fiber intake of 50gm/day is unrealistic. Dietary fiber is associated with lower all cause mortality, thus people with diabetes are advised to consume at least the amount of fiber and whole grains recommended for general public, i.e. 14 gm fiber per 1000kal per day⁸.

Fructose

Fructose is obtained from fruit is called free fructose'. Free fructose is naturally occurring and obtained from fruits. As long as its intake is not excessive, it is not detrimental. But fructose present in corn syrup that are added in factory made food such as sugary drinks have, should not be consumed to avoid excessive calories intake. High fructose syrup containing diet has been associated with dyslipidemia ²⁰.

Protein intake

Research has not shown clearly the ideal amount of protein intake for optimized glycemic control ¹⁵. Protein improves satiety and should be part of the diet. However intake goal should be individualized. 15-20% of total energy intake from protein is recommended to patients with diabetes as it is to general population ¹⁵.

People who already have diabetic kidney disease are not recommended complete restriction of protein. Protein intake should be maintained at 0.8 gram/kg per body weight per day. Protein restriction below 0.8gram/kg per body weight per day is not recommended¹⁵.

Protein enhances insulin secretion in type 2 diabetes patients, high protein containing carbohydrate source food should not be used to treat hypoglycemia ¹⁵.

Fat intake and Diabetes

Diabetes organizations in various countries recommend optimal diet for patients with diabetes that has less than 30% of energy intake from fat with moderate polyunsaturated fat and restriction

of saturated and unsaturated fat²¹.

The supplementation of omega-3 fatty acid is not recommended whereas obtaining polyunsaturated fatty acids and monounsaturated fatty acids instead of saturated fatty acids and trans-fatty acids from food sources is recommended⁸. Systemic review about dietary supplement with omega 3 fatty acids did not show improvement of glycemic control in type 2 diabetic¹⁷.

Various dietary approaches in diabetes

People in different countries and various socio-cultural situations have different food combinations and eating patterns. When people eat combinations of food, they will be getting different combinations of micro and macro nutrients. Various studies have been done with the hope of finding best diet combination for patients with diabetes.

Different types of diet combinations studied in Diabetes

Mediterranean diet includes plant foods, minimally processed, locally grown food, fresh fruits, limited concentrated sugar, olive oil as main source of dietary lipid. It has low to moderate amount of dairy products such as cheese and yogurt, less than four eggs per week, red meat in low frequency and amount. According to one meta-analysis, Mediterranean diet compared to other diet improved glycemic control by reducing hemoglobin A1c of about -0.47%²¹.

Low fat diet consists of vegetables, fruit and starches. Protein and low fat dairy products²². Total fat intake is less than 30% of total energy intake and saturated fat intake is less than 10%.²³. Low fat diet can be beneficial when overall energy intake is reduced and the weight loss happens.

Low carbohydrate diet has high protein intake such as meat, fish, chicken, egg, cheese, nuts and seeds, fats from oil, butter, olive and vegetables low in carbohydrate such as greens. Sugar containing food and grain products such as pasta, rice and bread are avoided. In research studies, the definition of

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very low carbohydrate diet is the one that has 21-70 gram per day of carbohydrate and moderately low carbohydrate one that has 30-40% of calories contribution from carbohydrate²⁴.

A meta-analysis of low carbohydrate diet compared with other diet showed a decrease in hemoglobin A1c of about -0.12%²¹.

High protein diet has 30% energy intake from protein, 40% from carbohydrate, 30% from fat with 20 gm protein after 2 months. A high protein, low carbohydrate, diet showed about -0.28%²⁵.

Mediterranean diet has been shown to improve cardiovascular risk factors such as lipid pattern, blood pressure in patients with diabetes. Vegetarian and low fat vegetarian diet did not consistently improve glycemic control or cardiovascular disease. There is no ideal eating pattern that can benefit all diabetes patients. There is no one size fits for all. Thus medical nutrition therapy has to be individualized.

In DASH (The Dietary Approaches to Stop Hypertension) diet you eat fruits, vegetables and low fat dairy products and reduced in sodium level.²⁶

Micronutrients

Micronutrients are essential for us. They are best obtained from natural sources rather than from supplements. Supplementation with anti oxidants, vitamin C, etc is non advised due to lack of evidence of efficacy. Supplementation of micronutrients such as chromium, magnesium and vitamin D, show conflicting and confounding results and thus they are not recommended¹⁵.

Rather than taking processed food, we recommend high fiber nutrient dense carbohydrate containing food, which provide vitamin and minerals and fiber and lower calories.

Consumption of sugar sweetened beverages, processed foods that are marketed as low fat or non fat food product but that have a high amount of fine grain added sugar should be strongly discouraged¹⁵.

Sodium

The recommended daily intake of sodium consumption is less than 2300 milligram per day. Low sodium intake less than 1500 milligram per day is not recommended as it may affect the palatability and it is challenging to achieve that in a nutritionally adequate diet¹⁵.

Conclusion

Individualized meal planning to obtain proper percentage of macronutrients is important in nutrition therapy. The food pattern or eating pattern should be chosen according to the patient's taste and cultural habits and palatability. It should be tailored to the patients' need with focus on proper energy balance and also matching with the medication therapy that the patient is taking. Patients should be encouraged to take their meals in scheduled time. They are advised not to skip meals as it can lead to hypoglycemia especially while taking insulin or insulin secreting medication.

Comprehensive nutrition therapy should be an integral part of management of diabetes in all the patients. Due to lack of resources and lack of awareness amongst patients, doctors, policy makers and society as a whole, providing such therapy to all the patients with diabetes may be challenging. It is recommended that the policy makers realize the importance of nutrition therapy and put resources in training and developing registered dietitians, so that as a part of lifestyle modification therapy, it can be offered to the patient. This approach can in turn reduce the burden of diabetes related complications.

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CASE REPORT



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Isthmic Agnesis and Thyroid Hemiagenesis Associated with Thyroiditis: A Case Report

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Abstract

Congenital thyroid anomalies are rare. Developmental anomalies may be in the form of unilateral or bilateral hypoplasia or agenesis of one or both lobes of thyroid with or without isthmic agenesis. Most of the times when they are detected incidentally already have associated thyroid diseases. We report a 36-year-old female presented with right thyroid hemiagenesis and isthmic agenesis associated with thyroiditis in left lobe of thyroid.

Key Words: Agenesis, congenital, ultrasound, thyroid

Introduction

Hemiagenesis of thyroid lobe is a rare embryological disorder which results from failure of one lobe of thyroid development. Most of the time they are detected either by clinical symptoms with associated thyroid diseases or by incidental findings on imaging or by obvious anatomical variations. Embryological development of the thyroid gland starts in the primitive pharynx in form of an invagination of the endoderm which grows ventrally while remaining attached to the pharyngeal floor. This rudiment will then migrate to its actual anatomical position that is anterior to the pharynx and after that it begins to grow laterally to create the bilobed thyroid gland¹.

Congenital anomalies of thyroid may be either by abnormal descent of the gland or by incomplete genesis of a lobe; however the exact etiopathologies of the hemiagenesis is still unclear². Most of the

cases are sporadic, a few may be familial and there may be a genetic predisposition. These patients may depict normal thyroid lobe with euthyroidism³, and both hypothyroidism⁴ and hyperthyroidism^{5,6}. Hemiagenesis of thyroid was first reported in the year of 1852 by Handsfield Jones⁷. Left sided hemiagenesis is quite common than the right with a ratio of 4:1 and female predominance with a ratio of 3:1⁸. Very few literatures have been published in scientific journal about this rare developmental anomaly from our country. Herein we report an uncommon case of 36-year-old female with right sided hemiagenesis of thyroid with isthmic agenesis associated with Thyroiditis.

Case Report

A 36-year-old woman gravid 3, para 2 came to our centre for regular body check up. She had a complain of throat pain with whole body muscular pain. She was a regular patient for a renowned hospital in Kathmandu. She had a medication history of taking 75mcg thyronorm per day. This time she came to our centre as convenient to her. Her body weight was 63kg, height, 150cm, Body Mass Index was 28, and Blood pressure as recorded

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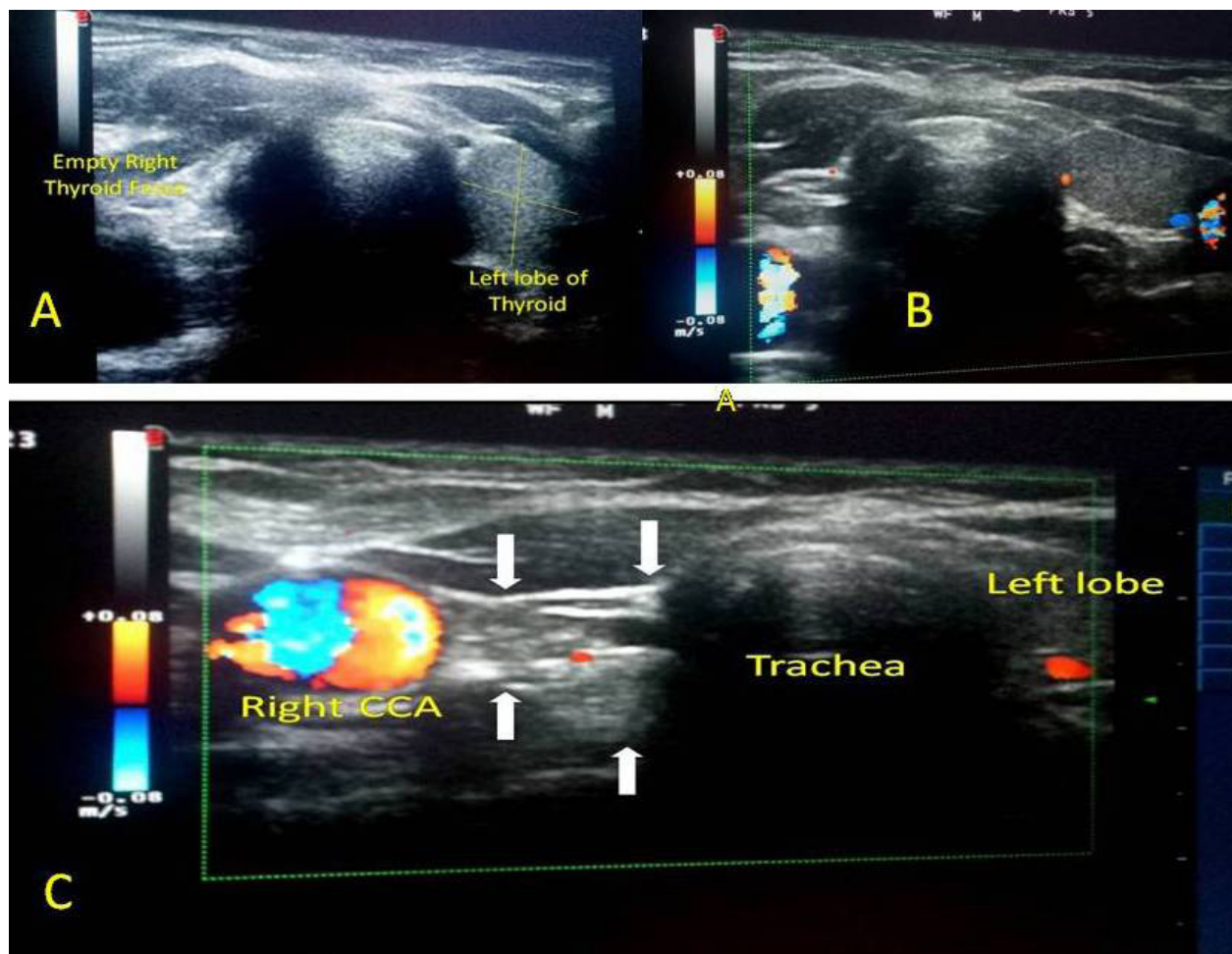


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was 120/90mmof Hg. She had undergone cesarean section for her second child 6 years ago. On physical examination the thyroid gland was nonpalpable on the left side. Serum thyroid hormones were mild-moderately low; serum free T3 was 1.9 pg/ml (normal range: 2.3-4.2 pg/ml) and free T4 was 0.65 ng/ml (normal range: 0.89-1.8 ng/ml) and TSH 26.00. (3rd Generation Ultrasensitive TSH; Normal range 0.35_5.29). Antithyroglobulin and anti – thyroperoxidase autoantibodies were negative.

Ultrasound was performed by Esaote My Lab 40 machine equipped with 12.5 MHz linear transducer. Grey Scale US revealed no thyroid

tissue on the right side (white arrow heads in panel C) with partial or absence of isthmus (Figure 1, panel A). Left lobe of thyroid revealed slightly heterogenous and coarse parenchymal echotexture with no increased in parenchymal vascularity in color Doppler imaging (Figure 1; Panel B and C). With the diagnosis of hemiagenesis of right lobe of thyroid and agenesis of isthmus with features of thyroiditis in left lobe ultrasound report was dispatched. She was managed by medicine with 100 mcg dose of thyronum follow up after three months revealed normal level TSH and no abnormal lymphnodes with no complaint.



CASE REPORT



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Discussion

Thyroid hemiagenesis is a rare congenital anomaly with absence of a lobe or a lobe along with the isthmus. Embryologically it develops in the midline from the pharyngeal floor at the foramen caecum.⁹ The true prevalence of thyroid hemiagenesis is yet unknown, however few study revealed that estimated prevalence rate to be ranged between 0.05 and 0.2%¹⁰ with the female predominance with the commonest site being the left lobe as in our case. A study conducted by Ruchala et al in 2010¹¹ concluded that hemiagenesis of thyroid were more likely to develop thyroid pathology. The most frequent associated thyroid disorders according to Ruchala et al. were thyroid nodules and autoimmune thyroid diseases. Simple goiter and nonautoimmune subclinical hypothyroidism were less often observed. In our case features of thyroiditis were reported on grey scale and color doppler sonograms. Ultrasound as being the firstline modality to image the thyroid gland; is feasible, convenient and cheaper than MRI or scintigraphy. As in our case agenesis of right lobe of thyroid and isthmus was established by ultrasound. Thyroid hemiagenesis though is a rare abnormality, routine exams or screening on ultrasound would be a great helpful for the endocrinologist and other physician to rule out associated thyroid nodules or other thyroid diseases.

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