



Original Research Article

Prevalence of Myopathy in Type 2 Diabetes Mellitus

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ABSTRACT

Background: Type 2 diabetes accounts for about 90% cases of diabetes and is expected to affect almost 8% of the world population by 2030. The incidence of Type 2 Diabetes is on the rise in developing countries. Type 2 Diabetes is associated with both microvascular and macrovascular complications. Diabetic skeletal muscle disease or myopathy, a much less studied complication of poorly controlled diabetes, is also a common clinical condition characterised by a lower muscle mass and an overall reduced physical activity. Hence this study was undertaken to determine the affection of muscle in Type 2 Diabetes.

Objectives

1. To find out the prevalence of myopathy in type 2 diabetes
2. To find out the association of Myopathy with the duration of diabetes as well as the type of treatment.

Materials and Methods: 150 patients with type 2 diabetes was taken up for the study. They were assessed for the presence of Myopathy based on history, clinical examination and lab investigations.

Results: The prevalence of myopathy was found to be 17.3%. 60.9% of diabetic patients with myopathy were having duration more than 20 years. 83.3% of Diabetic patients with Myopathy were on oral hypoglycemics. Among the muscle groups the proximal muscles of the lower limb were maximally involved followed by distal muscles of the lower limb

Conclusions: From our study the prevalence of Myopathy was 17.3%. There was a significant association of myopathy with Duration of Diabetes more than 20yrs. In addition there was a significant association of Myopathy with Oral Hypoglycemic Agents. Proximal muscles of the lower limb was the predominant muscle group involved.

Introduction

Type 2 diabetes accounts for about 90% of diabetes¹ and is expected to affect almost 8% of the world Population by 2030.² Type 2 diabetes is associated with numerous pathological complications, such as macrovascular disease, neuropathy, nephropathy and retinopathy³. Diabetic skeletal

muscle disease or Myopathy, is a much less studied complication of poorly controlled Diabetes.

It is a common clinical condition characterised by a lower muscle mass, weakness, and an overall reduced physical activity.

The preservation of skeletal muscle function is crucial for maintaining an independent lifestyle and performing the activities of daily living. Generally it is the result of a balance between protein synthesis and degradation. Any disruption in this careful balance of protein synthesis and degradation can have serious consequences. Previous studies have stressed the role of metabolism in the progression of muscle wasting and weakness particularly in relation to Diabetes and obesity.⁴ Previous studies have shown that uncontrolled Diabetic environment is unfavourable for skeletal muscle growth and regeneration^{5,6,7}.

The significant loss of muscle mass in Type 2 diabetes can be attributed to many factors like hyperglycemia, hypoinsulinemia and alteration in key hormones like glucocorticoids. Diabetic myopathy, characterised by reduced physical capacity, strength and muscle mass is a relatively understudied complication of Diabetes^{8,9,10}. This is believed to directly influence the development of co morbidities. Stenholm et al¹¹ in their study has shown that Diabetes is one of the factors associated with accelerated hand grip strength decline with ageing

Diabetic Myopathy refers to the broad spectrum of pathophysiological alterations in skeletal muscle in response to the Diabetic biochemical, hormonal and cellular environment. Like other long term complications Diabetic myopathy is believed to be secondary to a microvascular pathological process eliciting inflammation, ischemia and infarction of the affected muscles¹².

Thus as a distinctly under estimated complication of diabetes preventing or treating specifically for Diabetic myopathy may be essential in reducing particularly the morbidity associated with diabetes. Hence this study was undertaken to determine the affection of muscle in type 2 Diabetes

Materials and Methods

This was a hospital based cross sectional study conducted in the department of Medicine,

Government .Medical College, Trivandrum. The study period was 1year from 24/03/2014. The sample size was 150 and was estimated using the formula $4Xpq/12$.

Inclusion Criteria

- 1) Diagnosed Type 2 diabetics with duration more than 10 years
- 2) Age above 25 years

Exclusion Criteria

Type 2 diabetics with duration < 10 years
 Patients on drugs which cause muscle injury or increase CK eg. Statins, Amiodarone, Fibrin acid derivatives, Zidovudine
 Patients with recent traumatic injury
 Patients with diagnosed muscular disorders or Rheumatoid arthritis
 Patients with clinical and echocardiographic evidence of cardiomyopathy and Ankle Brachial index >1.1 and <.9
 All the patients who satisfy who satisfy the inclusion criteria were evaluated in terms of history, clinical examination, anthropometry and BMI.

Laboratory investigations included CPK(46-171U/L) in males and(34-145U/L) in females
 CK is the single most useful investigation for the evaluation of a patient with Myopathy (1)S, Myoglobin>120microgram/Litre, when muscles are damaged myoglobin is released into the blood stream

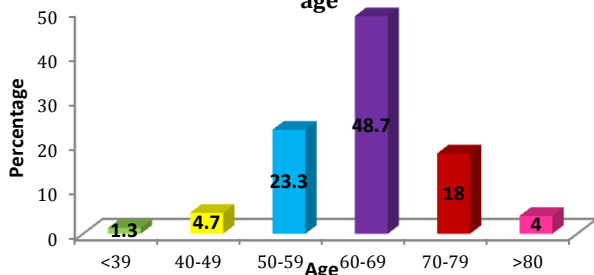
EMG was done after eliciting history and examination of a particular muscle. NCS was done to rule out peripheral neuropathy The diagnosis of Myopathy was made based on clinical features like progressive muscle weakness, muscle tenderness and muscle atrophy and supported by investigations

- 1) increased CK/Myoglobin and
- 2) Abnormal EMG. The data analysis was done in SPSS soft ware.

Results

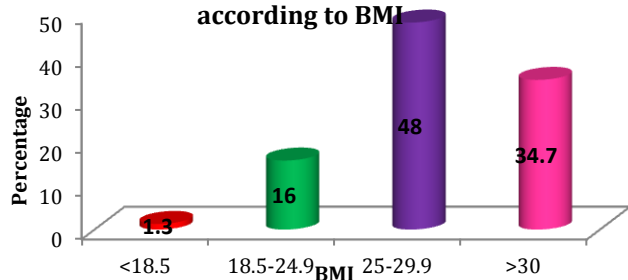
In our study of 150 patients 70% were males (N=105) and the rest females. 48.7% (n=73) were in the age group 60-69 years (Figure 1).

Figure 1
Percentage distribution of sample according to age



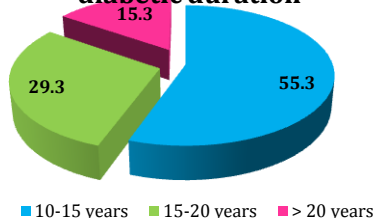
When BMI was compared majority of the patient had a BMI in the range(25-29.9)48% (n=72).(Fig 2)

Figure 2
Percentage distribution of sample according to BMI



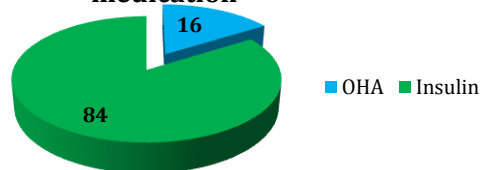
Regarding the duration of diabetes 55.3% (n=83) were in the duration of 10 -15 years, 29.3% in the 15-25 years and 15.3% above 20 years. (Fig 3)

Figure 3
Percentage distribution according to diabetic duration



Regarding the type of medication 84% (n=126) of patients were on Insulin and the rest were on OHA. (Fig 4)

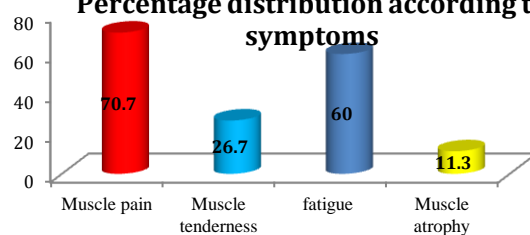
Figure 4
Percentage distribution according to medication



Most of the patients had muscle pain as a clinical symptom (70,7% n =106),Muscle tenderness in

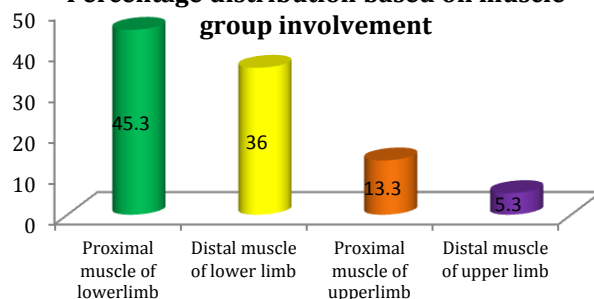
26.7%, Fatigue was seen in 60 % (n=90) and muscle atrophy in11.3% (n=17).(Fig 5)

Figure 5
Percentage distribution according to symptoms



Most of the patients had involvement of proximal muscles of the lower limb 45.3% *n=68),followed by distal muscles of the lower limb 36% (n=54).(Fig 6)

Figure 6
Percentage distribution based on muscle group involvement



Among muscle enzymes CK was increased in 20% (N=30) (Fig 7) and serum Myoglobin was elevated in 22% (n=33).(Fig 8)

Figure 7
Percentage distribution according to serum creatine kinase

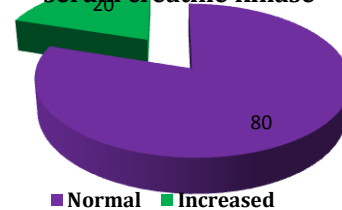
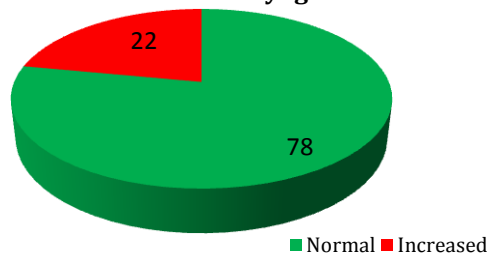
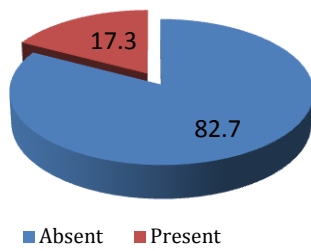


Figure 8
Percentage distribution according to serum myoglobin



19.3%(n=29) had an abnormal EMG . From the above the prevalence of Myopathy was 17.3% (n=26)(Fig 10).

Figure 9
Percentage distribution based on myopathy



60.9% of Diabetic patients with Myopathy had a duration more than 20 years ($p < .001$). 83.3% of Diabetic patients with Myopathy were on oral hypoglycaemic agents Regarding muscle groups the proximal muscles of the lower limb were maximally involved(32.4%),this was followed by the distal muscles of the lower limb(7.4%) (Table1)

Table 1 Association of myopathy with background variables

Background variables		Myopathy				α^2	p
		Absent		Present			
		Count	Percent	Count	Percent		
Age	<39	1	50	1	50	5.74	.332
	40-49	6	85.7	1	14.3		
	50-59	27	77.1	8	22.9		
	60-69	65	89	8	11		
	70-79	20	74.1	7	25.9		
	>80	5	83.3	1	16.7		
Sex	Male	84	80	21	20	1.74	.188
	Female	40	88.9	5	11.1		
BMI	<18.5	1	50	1	50	2.24	.524
	18.5-24.9	21	87.5	3	12.5		
	25-29.9	58	80.6	14	19.4		
	>30	44	44	84.6	8		
Diabetic duration	10yr-15yr	81	97.6	2	2.4	44.22	0.000
	15-20yr	34	77.3	10	22.7		
	>20yr	9	39.1	14	60.9		
Type of medication	OHA	4	16.7	20	83.3	86.86	0.000
	Insulin	120	95.2	6	4.8		
Muscle group involvement	Proximal muscle of lowerlimb	46	67.6	22	32.4	20.29	0.000
	Distal muscle of lower limb	50	92.6	4	7.4		
	Proximal muscle of upperlimb	20	100	0	0.0		
	Distal muscle of upper limb	8	100	0	0.0		

There is also a significant association of Myopathy with symptoms, muscle tenderness 55% ($P < .001$), muscle atrophy 82.4% ($p < .001$) (Table 2).

Table 2 Association of myopathy with symptoms

Symptoms		Myopathy				α^2	p
		Absent		Present			
		Count	Percent	Count	Percent		
Progressive muscle weakness duration	1-5yrs	89	98.9	1	1.1	41.32	0.000
	>5yrs	35	58.3	25	41.7		
Muscle pain	Absent	39	88.6	5	11.4	1.55	.213
	Present	85	80.2	21	19.8		
Muscle tenderness	Absent	106	96.4	4	3.6	54.01	0.000
	Present	18	45	22	55		
Fatigue	Absent	50	83.3	10	16.7	.03	.860
	Present	74	82.2	16	17.8		
Muscle atrophy	Absent	121	91	12	9	56.57	0.000
	Present	3	17.6	14	82.4		

Discussion

Type 2 Diabetes is a disease defined by its complications as much as its central pathology, one such complication, Diabetic Myopathy has received more attention in recent years as it has become clear that by maintaining a healthy skeletal muscle mass Diabetic individuals are more likely to maintain metabolic control avoid the health consequences associated with hyperglycemia.

In our study of 150 patients the prevalence of myopathy was 17.3%. This is consistent with the observations of the First medical department Danube University, Krems¹³ They observed creatine kinase elevation in 9% of patients and the majority of them were taking OHA. In our study also, Myopathy was common with Oral hypoglycaemic agents, 83.3%.

Regarding the distribution of Myopathy, majority of our patients had proximal muscle involvement of the lower limbs, 32.4%, followed by distal muscles of the lower limb, 7.4%. Brady et al¹⁴ in their study of diabetic myopathy have observed that anterior compartment of the thigh was involved in all the patients with Myopathy, and the posterior compartment in 90% of patients.

Regarding the development of Myopathy in relation to the duration of diabetes our study showed that there was a significant association of myopathy with duration of diabetes more than 20 years ($p < .001$)

Regarding the association of Myopathy and clinical features most of the patients had Muscle atrophy {82.4%} followed by muscle tenderness 55%

Conclusions

Our study revealed that myopathy is highly prevalent in type 2 diabetes. There was a significant association of myopathy with duration of diabetes more than 20 years. In addition there was a significant association of myopathy with oral hypoglycaemic agents. Lower limb muscles particularly the proximal muscle groups are maximally involved. As a distinctly

underestimated complication of Diabetes treating physicians should keep this in mind like other complications. Thus preventing and treating Diabetic Myopathy will help a long way in reducing the morbidity associated with Diabetes

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