

# Mortality in Diabetes

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## INTRODUCTION

The study of mortality in diabetes is beset with many difficulties. Both long term studies done by many authors are available in literature. A well done statistically evaluated data for our country is few and far between and is sorely required.

Diabetes is a metabolic cum vascular disease with a genetic basis of inheritance. Untreated it causes morbidity and early mortality. The following observations born out of experience regarding natural history of diabetes, may not be out of place in this presentation.

Life expectancy in diabetes is difficult to predict because there are so many variables such as type, severity, age, at onset and lifestyle. In general, a diabetics life expectancy is reduced at all ages to about 60% of his non-diabetic counterpart. In the past diabetic age was taken as chronological age plus duration of the disease. Due to better ways of management and methods of therapy this contention is now modified. The excess mortality is due largely to myocardial, cerebral infarction and renal failure.

### Causes of Mortality

In a search for possible cause or causes of mortality two major events stand uppermost - the macrovascular complication affecting the cardiovascular system, kidney and the brain and the death due to pure metabolic derangement though rather small. In pre-insulin era almost all deaths in IDDM were due to acidosis, coma and infection.

### Metabolic Cause

The basic defect in diabetic ketoacidosis is insulin deficiency. Increased gluconeogenesis and decreased tissue glucose uptake lead to hyperglycaemia, glucosuria, and osmotic diuresis responsible for polyuria that is so characteristic of this condition. Dehydration, one of the most serious problems in patients with ketoacidosis, results from urinary water loss, vomiting, diarrhoea and decreased intake, which occurs when lethargy, somnolence and unconsciousness supervene. Increased lipolysis leads to an elevation of circulating free fatty acids, which are converted into ketoacids by the liver. Acidosis then results. Weight loss, weakness and tiredness are in great part secondary to increased protein

catabolism and muscle wasting. Thus, two serious abnormalities- dehydration and acidosis constitute the major problems in ketoacidosis.

After the advent of insulin and antibiotics these complications have come down considerably and so also have the mortality. Fifty years ago every medical unit in a teaching hospital had atleast one case of coma in a week if not more and hardly there was a case of successful pregnancy in IDDM in the pre-insulin era. Today, due to excellent understanding of the mechanism of metabolic derangement and teh rational treatment available, the position has remarkably improved. This is well exemplified in the following statement in Joslin's Diabetes Mellitus[1].

'Death due to diabetic ketoacidosis during pre-insulin era was almost 100%. During 1932 mortality reduced to 29%. During 1955 and 1960 the mortality was 15% and 5% respectively. Since last eight years the mortality has further reduced to 2.7%'

In our set up the death rate among diabetic ketoacidosis and coma is still on the higher side i.e. 5-10% the main cause for this this increase being due to (a) delay in diagnosis, (sometimes missing the diagnosis) (b) constrains in intensive therapy especially in areas where facilities are not available and (c) associated infection requiring surgical help. The surgeon should not depend on formalities of strict criteria for fitness and intervention. Otherwise mortality will further increase.

### Vascular Cause

Today the main concern of diabetologists world over is on preventing and postponing the chronic complications particularly the cardiovascular and renal. It may also be noted that diabetes does not give immunity from other diseases because other forms of nephropathy could as well occur in a diabetic; so also diabetes and many acute and chronic illnesses may exist together and death can be the end point.

Hence, the other cardiovascular risk factors have to be taken into account . Though many factors have been mentioned in this direction the following are the most important:

1. Age
2. Family History
3. Hyperglycaemia
4. Hypertension
5. Cigarette smoking
6. Obesity
7. Hyperlipidaemia
8. Alcoholism and Stress.

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Involvement of cardiovascular system is the leading cause, next cerebrovascular and finally the kidney involvement. Other complications take the fourth place. A small percentage of cardiomyopathy is now an accepted entity. Autonomic neuropathy is yet another problem and may be the cause for sudden death. Infection as a cause, cannot be altogether excluded.

In the causation of renal impairment, the first sign is microalbuminuria both in IDDM and NIDDM. In both, IDDM and NIDDM, the condition progresses to end-stage renal disease and death.

There appears to be much truth in the affirmation that the severity of diabetes, its duration and the fluctuating nature of the metabolic abnormality contribute in a bigger way towards mortality, so are hypertension and lipoprotein abnormalities. It is our belief that strict control prevents, and postpones complications. Yet, we find in practice a sizeable number of patients landing in complications inspite of strict control. Here, the inherited vulnerable vascular tree looks to be the ultimate answer and hence genetic.

### Literature Survey

West and Marks and Krall have made major reviews of the cause of diabetic patients. The main source of such information was from i) National mortality statistics (ii) Insurance studies and (iii) Cohort studies of diabetes recruited either from a diabetic clinic or a general population survey. In a study of death certificates of diabetic patients attending King's College Hospital, London, diabetes was mentioned in 44(54%) patients out of 82 certificates; the male to female ratio being almost equal. A mortality follow-up study by the British Diabetic Association showed the frequency of death certificate mentioned as 67% with no significant difference between male and female[2]. Our findings also more or less agree with the above, regarding sex distribution.

West has elegantly reviewed the contribution made by E.P. Joslin, and his fellow physicians at the Joslin clinic on studies of diabetic mortality over the last half century. Joslin was the first one to utilise epidemiological approach in collaboration with Dublin and coinvestigators of the Metropolitan life insurance company and department of Public Health. Lombard and Joslin showed that average age at death of Massachusetts diabetics had increased from 52 years in 1900 to 67 years in 1945.

Study of diabetic mortality in Western countries and Japan are unanimous in their findings that cardiovascular and cerebrovascular diseases are

leading causes of death in diabetic patients. Our findings also concur with this observation

Panzram and Pibarek[3], in their review of long term diabetes for survivorship and mortality gave the following findings as cause of death in 129 cases (1984)

#### Causes of Death in 129 Long-Term Diabetics

Causes	No. of Patients	Percent
I Arteriosclerosis		
a. Cardiac	54	41.8
b. Cerebral	29	22.4
c. Gangrene	2	1.7
II Renal Failure	9	7.0
III Infections		
a. Pneumonia	10	7.7
b. Sepsis	4	3.1
IV Diabetic coma	1	0.8
V Cancer	9	7.0
VI Accidents	4	3.1
VII Miscellaneous	7	5.4
Total	129	

#### Our Data

In a study of nearly 300 cases for a period 1980 to 85 of the diabetic clinic patients attending Government Stanley Hospital, Madras, the following were the findings:-

#### Mortality in Diabetes at Government Stanley Medical College/Hospital 1980-1985

Total admissions	:	2500		
Patients with complications	:	274		
Deaths	:	76		
Complications	No. of Patients	Death	Percent	
<b>Cardiovascular</b>				
Myocardial infarction				
IHD / CCF				
Cardiomyopathy	92	30	39.48	
Cerebro vascular strokes	54	24	31.57	
Ketoacidosis	31	5	6.57	
<b>Microvascular</b>				
Nephropathy	40	11	14.48	
Neuropathy	20	--	--	
Retinopathy	17	--	--	
Foot and peripheral vascular	13	2	2.63	
Miscellaneous (accidents, cancer)	7	4	5.26	
Total	274	76		

A comparison regarding cardiovascular, cerebrovascular and renal deaths shows striking similarities between our figures and those of Panzram[3].

It is difficult to assemble large number of diabetics for prevalence or incidence studies so that analyses have often to be made on inadequate samples. For example, the of quoted data of Framingham was based upon little more than 100 diabetics of each sex. Further, final outcome of IDDMs who escaped endstage renal failure and proteinuria have a much reduced risk of premature mortality. Hence the end result must be interpreted with caution.

### Conclusions

1. Prevalence of diabetes is on the increase. This is multifactorial: family history, longevity, obesity, urbanisation, stress and strain, diet, lifestyle.
2. Prompt treatment has considerably reduced the mortality due to ketoacidosis in IDDM.
3. Both micro and macrovascular complications contribute towards mortality in long term NIDDM.

4. Preventive and promotive methods are needed to minimize complications and death. Early diagnosis, strict control and change in diet habits and life style go a long way in attaining this goal.
5. In our study of mortality teh main brunt is on cardiovascular complications followed by strokes and nephropathy.
6. A well planned multicentre study is needed in our country for proper compilation of Indian data on mortality.

### References

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