

## Factors Associated with Deterioration of Life Expectancy in Diabetic Patients with Chronic Renal Failure: A Review

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### ABSTRACT

Diabetes mellitus is a chronic disease, linked with elevated levels of blood glucose. When diabetes goes uncontrolled, complications such as, coronary heart disease, neuropathy, retinopathy and nephropathy may develop. This will reduce life quality and expectancy. Proper management of the disease by knowing the factors that may alter body homeostasis will play a major role in improving life quality, overcome complication and reduces expenses at a national level. As the prevalence of diabetes in Oman increases and more that 14% of the population are affected. It is important to emphasize more research on diabetes complication associated with renal problems and how to improve life quality. The objective of this review is to draw attention to the major factors associated which deterioration in life expectancy in diabetes patients which chronic renal failure. It was found out that most of complications among the groups were due to lake of awareness and neglect of the consequences of not following the diet therapy and/or medical description. These problems are specially found in elder patients who are diabetics for more than 10 years. There is still a need for an appropriate intervention intensive health education to support this high risk group.

**Keywords:** *Life Expectancy, Diabetes Mellitus, Chronic Renal Failure.*

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### INTRODUCTION

Diabetes mellitus is a chronic illness which can potentially lead to multiple complications such as blindness from retinopathy, cataract and glaucoma; renal failure, neuropathy, ischemic heart disease, peripheral vascular disease and cerebrovascular disease (1). After prolonged periods of diagnose, diabetes patient will develop a lot of complications one of

them is nephropathy (2). A life treating complication associated with a sudden decline in glomerular filtration rate  $< 15 \text{ ml/minute/1.73 m}^2$  (3). When this situation goes uncontrolled it might be associated with uremia and death in most of the cases (4). Worldwide the prevalence of chronic renal failure among diabetes has been increased, and many studies indicated that diabetes is the leading cause of end stage renal failure with prevalence of 30% in Bahrain, 14.5% in Oman, and 60% in Saudi Arabia (5). Another complication among diabetic patient with renal problems is anemia, erythropoietin is frequently used in patients receiving dialysis (100-180 IU/Kg) three doses weekly (6). Hemoglobin and hematocrit blood levels must be measured every two weeks to indicate any abnormalities. Appropriate dialysis and dietary regime will help in maintaining iron stores (6).

Renal problems are classified in two stages, microalbuminuria, in which albumin levels are normal. This stage occurs during the early stage of diagnoses. The second stage is known as macroalbuminuria. This stage appears when further deterioration in renal function occurs across the years. It is well documented by high levels of albumin been wasted in the urine, more than 30 mg/ g Creatinine. The hypothesis of this review is that, a proper understanding and management of the factors associated with lowering life expectancy will lead to better life for diabetic patients and will reduce cost effect on medical services. Other factors contributing in lowering life quality in patients with diabetes are educational level and the level of awareness of potential factors for improving the rates of survival following treatment. In order to have a better management; diabetic patients should have an access to health care services on time. The quality of care also plays a major role in this. Other barriers such as health literacy and acculturation are well documented as factors contributing in lowering life expectancy in diabetes patients (7).

There are several factors coupled with diabetes complication that may leads to deterioration in life expectancy. Most common factors are due to improper dialysis method and management. The second factor is related to poor dietary regime. The third factor is associated with unexplained reasons which may lead to sudden deterioration in body function and in most of the cases to death. Also it can be called; secondary factors associated to chronic renal failure. In the other hand they will lead to further complication, if went unmanaged. Those factors can be classified as acute or chronic depending on the onset of progress. Acute complications are hyperglycemia, diabetic ketoacidosis, diabetic hyperosmolar and others. Chronic complications are retinopathy, neuropathy, nephropathy and cardiovascular diseases.

#### *Functional Iron Deficiency*

Anemia is defined as hemoglobin (Hb) levels below 11g/dl. Functional anemia appears when there is inadequate iron supply to the bone marrow in the presence of storage iron in reticuloendothelial cells. Mostly found in patients with renal failure who requires parenteral iron therapy to respond to administered erythropoietin in order to correct anemia. Other than that iron deficiency will arise. The relationship between end stage

renal failure and anemia in predialysis is not well understood, so as part of the therapy it is suggested to correct iron deficiency anemia by administration of intravenous iron gluconate (8).

#### *Ketoacidosis*

Is common among type 1 diabetes and the onset is lower with adult population. It is defined as accumulation of ketone bodies in the body. It is combined with accumulation of sodium and potassium. This may lead to decreased in plasma circulation, and eventually causes of death in most of the cases (9).

#### *Hyperosmolar*

Hyperosmolar non-ketosis diabetes occurs most in patient who are over 60 years, and who has other complication such as, renal problem, or cardiovascular disease. An increased glucose level may exceed 50 mmol/litre is highly noted in this case (9).

#### *Hypertension*

One of the risk factors which may lead to kidney problems in diabetes patients. Elevated blood pressure more than 130/80 mmHg is not recommended. A better controlled of blood pressure will help reducing the onset of kidneys complication. And due to hyperlipidemia, hypertension, hyperinsulinemia, and hyperglycemia this will lead to macrovascular disease. Changes in blood vessels will appear and complications such as arteriosclerosis obliterans, a blockage of the artery a common cause of heart diseases too. As most of the studies indicated that hypertension is associated with end-stage organ damage. Intervention methods including weight reduction programs, sodium reduction, and physical activity will help preventing this complication (6-9).

#### *Body protein wastage*

Due to metabolic alteration in renal failure disease, body protein wastage is an observable fact. Excessive protein catabolism may occurs due to many reasons, such as progressive deterioration of renal function, dialysis related loss of nutrients and many other problems. These have a direct effect on the homeostasis of amino acid pool. Most remarkable protein lost during dialysis is albumin, and if the diet is poor in protein body muscle will break down to spear the needs. To correct this situation, patient who goes under continuous renal placement therapy must provided with 1.5 g amino acid/kg body weight/day to minimize nitrogen loss. And safe method must be administrated to improve nutritional intervention among these groups (10). It is also recommended that protein intake for protein on dialysis should be 1.3 g protein/ kg body weigh per day specially casein and whey protein which contain most of the essential amino acids (10).

#### *Retinopathy*

Retinopathy is one complication of diabetes mellitus which may lead if unmanaged to lose sight. Several studies found that hemoglobin HbA1c and fasting plasma glucose, both are associated with retinopathy in diabetes patents. Any increase in HgA1c >5.5% or

fasting blood sugar >5.8 mmol/liter will increase the prevalence of retinopathy, and this complication affects almost 80% of the diabetes patient (11, 12).

### *Neuropathy*

Deterioration of the nervous tissue is noticed in diabetic patients, which may lead to gangrene. To prevent neuropathy thiamin and vitamin B12 are given to diabetes patients.

### *Cardiovascular Diseases*

A major complication in diabetes patient occurs due to poor circulation of blood in the legs and feet. If this goes uncontrolled it may lead to elevated blood pressure, stroke and heart attacks. Diabetics have an increased cardiovascular mortality as well as overall mortality than those without.

### *Other Complications*

Necrotizing fasciitis is a crucial condition in diabetic patients. Managing and saving the patient is a difficult challenge. Diabetes mellitus is one of the serious conditions associated with necrotizing fasciitis. It is a disorder that primarily affects the microvascular circulation. And it is an extremely serious infectious process affecting subcutaneous soft tissue with skin gangrene and vascular thromboses. The mortality and morbidity rate associated with necrotizing diabetes can be decreased by clinical awareness, early diagnosis, effective surgical debridement, and intensive supportive care (13). Other complications like hyperkalemia occur due to potassium supplementation or usage of beta blocker. Other complications are prone to infections and delayed wound healing. One of the most common problems is diabetic foot, especially in inpatients or patients with chronic kidney disease (11-13).

### *Monitoring and Management Actions*

Solid strategies must be taken under consideration to overcome these complications. The primary and secondary prevention of diabetic complications by glycemic control will result in a mean 7.7 additional years of sight, 5.8 additional years free from end-stage renal disease, 5.6 additional years free from lower-extremity amputation, and 15.3 additional years free from onset of substantial microvascular or neurological complications.

Secondary prevention of diabetic nephropathies through other measures—strict blood pressure control, use of angiotensin-converting enzyme inhibition in both incipient and overt diabetic nephropathies, normalization of hyperlipidemia, and the recent findings of angiotensin II receptor antagonists in renoprotective effects in diabetes mellitus, were all effective in reducing the progression to nephropathy or renal failure. Prevention of cardiovascular complications in diabetic patients showed that diabetes is an independent risk factor of symptomatic *de-novo* ischemic heart disease in dialysis patients, with an adjusted relative risk of 3.97. The excessive cardiac morbidity and mortality of diabetic patients on dialysis therapy seem to be mediated via ischemic disease, rather than progression of cardiomyopathy.

There is a whole list of risk factors for cardio-vascular disease in dialysis, which includes genetics-, inflammation, and malnutrition. Several strategies in treating and preventing cardiovascular diseases with diabetes mellitus encompass blood pressure control, lipid control, careful use of aspirin, and cessation of smoking, moderate level of physical activity for 30 minutes per day in most days of the week, as well as management of left ventricular hypertrophy and hypoalbuminemia (14, 15).

## CONCLUSION

To conclude, two main factors are directly associated to major complication of diabetes nephropathy. High blood glucose levels and high blood pressure both if were uncontrolled and closely unmonitored, defiantly they will lead to further complications. Building up complications, will lead to poor health status this will lead to deterioration in life expectancy in patient with diabetes militias. As a result this will have a direct effect in the nation's life quality and productivity, exestuation of health care resource and causing financial stress. "Prevention is better than cure" is the best intervention in this case, and it can be implemented by strong intervention and educational strategies to improve health status and spread awareness among diabetes patient. Other strategy is to do frequent checkups to screen nephropathy.

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