

Implications of Type II Diabetes Mellitus for the Quality of Life

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Abstract – Diabetic complications, comorbidities, and cost of treatment affect the quality of life (QoL) of an individual. The QoL assessment is considered an important measure of outcome in chronic disease management. Diabetes is a chronic disease, and it could affect both health and quality of life (QOL). A lot of studies have reported some predictors of QOL of type 2 diabetes patients. While their results were not completely consistent. So the aim of our study was finding out the related factors (including characteristics related to the disease, life styles and mental health factors) of QOL of type 2 diabetes patients. Quality of life (QoL) is an important outcome measure to assess the diabetic care and is increasingly replacing the traditional indicators of health. Most frequently affected life domain was the freedom to eat. A positive correlation was observed between QoL and gender, age, domicile, education status, occupation, family structure, duration of type 2 DM, HbA1c, insulin treatment, and the presence of comorbidities. The study highlights the impact of type 2 DM on QoL. Improving QoL of type 2 diabetic patients is important and knowledge of these preventable risk factors help to implement strategies to better management of type 2 DM and ultimately improve therapeutic outcome.

Keywords: Type 2 Diabetes, Quality of Life, Related Factors, Meta-Analysis, Diabetes Mellitus

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INTRODUCTION

Type II diabetes mellitus is a condition whereby, the body does not generate a sufficient amount of insulin, or the body cells pay no heed to the insulin. Thus, individuals with type II diabetes mellitus, have sugar or glucose accumulation in their blood at significantly high levels¹. Consequently, the surplus glucose can affix to proteins within the blood vessels, and as a result varying their standard structure plus function. One consequence of this condition is that the blood vessels turn out to be thicker along with being less elastic, and this makes it difficult for blood to press through them. Some studies even indicate that it is escalating worldwide, and relates with elevated levels of morbidity, as well as mortality due to cardiovascular disease.

The aim of this paper is to elaborate on the implications of type II diabetes mellitus for the patient quality of life. This involves looking at accumulation of sugar/glucose in the blood, thickening of blood vessels, kidney disease, and damage and blockage of blood vessels. Moreover, the paper assesses the type II diabetes impaired circulation of blood, amputations of lower limbs, nerve disease, diabetic

eye disease, stroke, and happenings at molecular level.

ACCUMULATION OF SUGAR/GLUCOSE IN THE BLOOD

Type II diabetes mellitus is a set of metabolic diseases categorized by hyperglycaemia, or high levels of sugar in the blood. Type II diabetes mellitus is a non insulin dependent diabetes, since the body insulin levels are normal, or even in some extent higher. But, the target cells do not act in response to the hormone as they ought to, and as a result the blood sugar levels remain abnormally high. The symptoms of Type II diabetes mellitus normally initialize during the middle ages, when the insulin manufacture has declined. Type II diabetes mellitus makes the fat, liver, and muscle cells not to correctly act in response to insulin, or become insulin resistance. Accordingly, the sugar in the blood does not move into these cells, in order to be stored as intended for energy. Moreover, when sugar is not able to enter the cells, there is the build-up and accumulation of sugar in the blood or d hyperglycaemia².

¹ Kagan, Andrew. *Type 2 diabetes : social and scientific origins, medical complications and implications for patients and others*. Jefferson, N.C: McFarland & Co, 2010.p 93

² Ibid

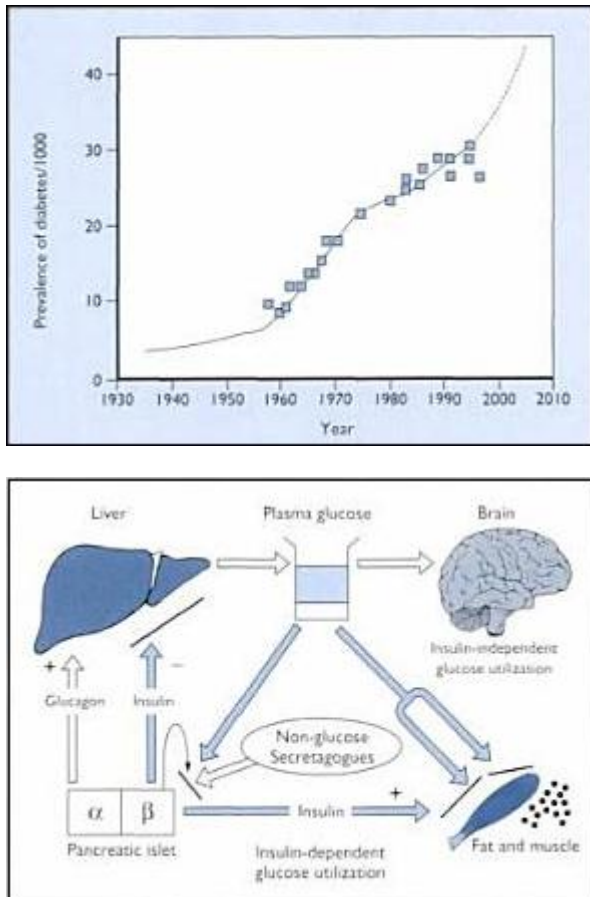


Figure 1: ³ Pathogenesis of Type II Diabetes

This table shows the commonness of type II diabetes from the year 1930 till 2011. The figure on the right illustrates what causes Type II diabetes and how it affects the human body.

However, the type 2 diabetes typically takes place gradually over time. Hence, most individuals with the disease are overweight at the time of being diagnosed. For that reason, the augmented fat makes it harder for these people's body to make use of insulin in a proper manner the correct way. Nevertheless, it can also occur in individuals who are thin and most often occurs in the elderly. Notably, family past account, in addition to genes take part in a bigger role in the occurrence of type 2 diabetes. Moreover, the diminished activity level, coupled with poor diet, and surplus body weight in the region of the waist also increase the risk of getting Type II diabetes.

THICKENING OF BLOOD VESSELS

Additionally, Type II diabetes causes acceleration in the thickening of blood vessels. This is known in scientific circles, as arterial occlusive disease is the cause of additional diabetic complications. Consequently, it results in the kidney disease, heart attack, diabetic foot issues and failure of vision. In addition since thickening of the blood vessels cuts off

oxygen supply to the sensory nerves, as well as their sheath, and it results in the neuropathy⁴.

The Hyperglycaemia condition induces augmented polyol pathway movement, or dyslipidaemia formation of highly developed glycation final product, in addition to augmented protein kinase activity. Furthermore, this results in mounting oxidative stress as well as endothelial dysfunction. Consequently, these occurrences have an effect on impaired blood flow plus endoneurial hypoxia that are acknowledged to take part in a foremost role, in resulting of diabetic neuropathy in human. They also add to the inflammatory fibro proliferative reaction, which harms the endothelium, as well as smooth muscle within the arterial wall, such as the instigation of atherosclerotic procedure.

A key feature of Type II diabetes mellitus is its elevated intensity of low-density cholesterol, or hypercholesterolemia. Hence, in this condition the arteries of the person with this type of diabetes go through two processes simultaneously. Firstly, there is the solidification of the artery wall by means of calcium, and as a result there is the plugging of the lumen with atheroma or otherwise the plaque. The plaque is composed of lipoproteins, triglycerides and cholesterol, but the LDL cholesterol is harmful, since it acts like saturated fat, hence it builds up on the inner surface of the blood vessel walls⁵.

Various studies have indicated that the thickening of the cellular membrane in endoneurial capillaries in nerves, from diabetic subjects, is as a result, of the reduplication of the basal lamina. Consequently, these alterations add to the overall diffusion expanse for oxygen as well as nutrients to axons plus Schwann cells. Hence, this results in endothelial cell hyperplasia, along with swelling in the direction of the lumen, which is adequate to lead to occlusion plus thrombosis. What is clear though is that the site of the first physiological assault, takes place in the epineurial and transperineurial arterioles, which control endoneurial flow resulting in impaired perfusion followed by structural modifications⁶.

DAMAGE AND BLOCKAGE OF BLOOD VESSELS

High blood glucose levels caused due to type II diabetes mellitus over time can result in an augmented accumulation of fatty materials on the entrails of blood vessel walls. Consequently, such deposits may have a negative effect on blood flow, along with increasing the possibility of clogging plus hardening of the blood vessels. This condition is referred to as atherosclerosis, and individuals with type II diabetes mellitus have an elevated danger

³ S.g. Korenman and Ronald Kahn, *Atlas of clinical endocrinology* (Location: Wiley-Blackwell, 2000), Volume 2, p 81.

⁴ Kagan, Andrew. p 95

⁵ Ibid. pg 94

⁶ Ibid. pg 95

of developing particular troubles in their heart and blood vessels, or cardiovascular diseases⁷.

These problems brought about by type II diabetes mellitus, damage and blockage of blood vessels comprises heart attack, because of obstruction of blood vessels bringing in blood to the heart. Moreover, individuals with type II diabetes mellitus, have high blood triglyceride levels, and this aid in making HDL cholesterol that is considered helpful in diminished levels. As a result, it makes them vulnerable to atherosclerosis, and since obese individuals run short of standard fat storage room, the triglyceride molecules overrun tissues in which fat does not fit in and this obstructs with usual organ function⁸.

IMPAIRED CIRCULATION OF BLOOD

The blood vessel in Type II diabetics has been shown by various studies, to have uncharacteristic vascular reactivity. Thus, insulin induced vasodilatation of interior carotid artery is distinctly impaired inside patients with type II diabetes. Moreover, the vasodilatory reaction of the interior carotid artery to insulin is also impaired, and this indicates that there is the impairment of the cerebral circulation to counteract vasodilatory stimuli. The endothelium dependent, along with independent blood circulation course, becomes worse in patients with type II diabetes mellitus⁹.

KIDNEY DISEASE

Even though the risk factors associated with the sequence of constant kidney disease within type II diabetes mellitus has not been made completely clear, the type II diabetes mellitus is also responsible for Kidney damage. Thus, type II diabetes mellitus is for the most part the reason for the occurrence of *End-Stage Kidney Disease*¹⁰. Under this condition, the diminutive blood vessels in the kidney come into harm, and as a result, the kidney is not able to clean the blood, as it should be. Consequently, the body retains extra water plus salt than it has to, which then leads to a weight gain along with ankle swelling. Moreover, these patients have protein in their urine, and the waste matters accumulate in their blood.

Since, type II diabetes mellitus can lead to damage of the nerves this in turn leads to complicatedness in some of these patients when emptying their bladder. Therefore, the pressure ensuing from the packed bladder can blow up, and as a result damage the kidneys. In addition, if urine stays in the bladder for an extended period, the patient's body begin to build

up an infection initiating the fast growth of bacteria in urine, and which has an elevated sugar level. For that reason, the initial sign of type II diabetes mellitus kidney disease is the augmented seepage of albumin within the urine, and the blood pressure becomes too high.

As the kidneys functioning collapse, the *Blood Urea Nitrogen* or BUN intensity will go up simultaneously with the point of creatinine found in blood¹¹. The patient may also undergo nausea, loss of appetite, muscle cramp mainly in legs and increasing fatigue. Furthermore, the patient is likely to experience vomiting, itching, and anaemia.

LOWER LIMB AMPUTATION

Lower levels amputations are more common in patients with Type II diabetes, this is more so in their toe, foot and ankle. According to a study across several states in the US, a number of type II diabetic patients experience ipsilateral or subsequent leg contralateral amputation, especially after a separate hospitalization within the twelve months after the amputation. In addition, individuals with type II Diabetes are 12-18 times with additional chances of undergoing a lower limb amputation than those individuals without diabetes¹².

The reason for this outcome is that *Atherosclerotic Peripheral Arterial Disease*, commonly known as PAD along with diabetic peripheral neuropathy turn out to be grave complications arising from diabetes and can sometimes results in lower limb complications. Consequently, the messed up sensation, which increases the risk of trauma, and the severe, Type II diabetes can result in stroke, which is due to the obstruction of blood vessels leading to the brain. Thirdly, there is the obstruction of blood vessels within the legs plus feet, and which results in foot ulcers, contagions, in addition to loss of the diabetic patient toe, foot, and even lower leg¹³.

Consequently, this weakness to injury as well as deprived wound healing can result in ulceration, and if not taken care of punctually, the foot ulcers can then be infected for the most part when diabetes management is poor. Soft tissue infection may progress to involve the underlying bone. These entrenched infections are more often than not very hard to treat and mostly require amputation. In the same way, when the extremities of the body are deprive of oxygen due to *atherosclerotic Peripheral Arterial Disease*, then the *tissue demise* may take place, resulting in

⁷ Ibid

⁸ Ibid

⁹ Ibid. pg 94

¹⁰ Leehey, David J, Tarek M Daoud, Holly J Kramer, and Maninder P Chatha. "Progression of kidney disease in type 2 diabetes – beyond blood pressure control: an observational study." *BMC Nephrology* (licensee BioMed Central Ltd.) 6, no. 8 (2005). para 4

¹¹ National Kidney Foundation. *Diabetes and Kidney Disease*. 2011. <http://www.kidney.org/atoz/content/diabetes.cfm> (accessed November 15, 2011). Para 6

¹² Aubert, Ronald. *Diabetes in America*. Nih, 1995. P 409

¹³ Ibid

ulceration and gangrene¹⁴. Notably, when revascularization turns out to not to be achievable, coupled with the development gangrene, then amputation becomes necessary. However, the type II diabetes patient can avoid ulcers and the subsequent amputations when they practice proper foot care, and undergo timely treatment of ulcers during their initial stage.

In another study, the occurrence of foot ulcerations, as well as lower limb amputation in type II diabetics has shown to be lower. Nevertheless, the reoccurring levels of ulceration plus danger of amputation is elevated, with soaring mortality¹⁵.

DIABETES AND NERVE DISEASES

When an individual with type II diabetes blood sugar are relatively high for an extended period, they develop a state identified as diabetic neuropathy, or nerve disease. The reason for this condition is that, the cells, which comprise the nerves, are amend in reaction to elevated blood sugar. Consequently, different sets of nerves are affected by the high levels of sugar in the blood. In addition, diabetic autonomic neuropathy is set up in relation with distal symmetrical polyneuropathy. It can be detected using, indirect cardiovascular reflex tests that assess the integrity of complex reflex arcs, and the clinical manifestation of diabetic peripheral neuropathy ranges from an imperceptible reduction in temperature perception in the feet to sudden cardiac death¹⁶.

	Without neuropathy n = 201	With neuropathy n = 93	P-value
Male (%)	73	71	NS
Age (years)	57 ± 9	64 ± 7	<0.0001
Duration (years)	7 ± 7	13 ± 8	<0.0001
BMI (kg/m ²)	25.9 ± 3.0	26.5 ± 4.0	NS
HbA _{1c} (%)	6.5 ± 0.8	6.8 ± 1.1	<0.05
SBP (mmHg)	122 ± 12	126 ± 14	<0.01
DBP (mmHg)	68 ± 10	64 ± 10	<0.01
PP (mmHg)	54 ± 10	62 ± 12	<0.0001
Hypertension (%)	57	75	<0.05
Hyperlipidemia (%)	28	30	NS
Retinopathy (%)	87/10/3	64/24/12	<0.0001
(no/simple/proliferative)			
History of stroke/MI (%)	5.5	15.1	<0.05
AER (mg/g creatinine)	12.8	16.9	<0.0001
(8.1–22.7)		(9.4–58.2)	
Nephropathy (%)	82/15/3	64/25/11	<0.001
Normo/micro/macro			
PWV (cm/s)	1551 ± 231	1766 ± 314	<0.0001
IMT (mm)	0.78 ± 0.19	0.85 ± 0.19	<0.0001
Smoking (%)	33/33/34	39/32/29	NS
(never/past/current)			

Figure 2¹⁷ : Comparison table

¹⁴ Muller, Ilona Statius, Wim J C de Grauw, Willem H E M van Gerwen, and Marie Louise Bartelink. "Foot Ulceration and Lower Limb Amputation in Type 2 Diabetic Patients in Dutch Primary Health Care." *Diabetes Care* (American Diabetes Association), 2002: p 574.

¹⁵ Muller, Ilona Statius, Wim J C de Grauw, Willem H E M van Gerwen, and Marie Louise Bartelink. "Foot Ulceration and Lower Limb Amputation in Type 2 Diabetic Patients in Dutch Primary Health Care." *Diabetes Care* (American Diabetes Association), 2002: p 574.

¹⁶ Abela, George S. *Peripheral vascular disease: basic diagnostic and therapeutic approaches*. Philadelphia, Pa.: Lippincott Williams & Wilkins, 2004.

¹⁷ Yokoyama, et al. 2007

This figure shows the clinical comparison of Patients with type II diabetes with neuropathy and those without the disease.

Type II diabetes diminishes or disfigures the nerve role, resulting in a state referred to as neuropathy. Neuropathies, which are a set of disorders that have an effect on the nerves, thus, individuals with type II diabetes have damaged nerves, which are responsible for sensing temperature, heaviness, or pain on the skin. Moreover, they mostly have an effect on the feet plus lower legs and this result in symptoms, such as numbness, otherwise tingling, prickling sensation, cramps and intense feeling to touch. This is referred to as peripheral neuropathy, and it damages the nerves within the upper plus lower body extremities. Diabetic neuropathy can also directly influence the microcirculation by the destruction of the nerve axon spontaneous effect¹⁸.

Type II diabetic peripheral neuropathy also results in muscle weaknesses, along with the loss of reflexes, notably at the ankles. This results to shifts in gait, foot deformities like hammertoes, and even in extreme cases the fall down of mid foot. Furthermore, the initial region, as well as the number of nuclei in epineurial arteries will be augmenting in nerves in patients with neuropathic diabetic.

What's more, the distribution of nerves energy of epineurial, plus transperineurial arterioles are diminished, especially for smaller vessels involved in influencing vascular resistance. Therefore, this denervation of blood vessels contribute to both the reduced endoneurial blood flow, as well as the increased epineurial arteriovenous thrusting as observed in diabetic neuropathy patients¹⁹.

DIABETIC EYE DISEASE

The resulting chronic hyperglycemia takes part in a larger function, in the progression of six out of the seven categories of diabetic eye disease. These eye illnesses caused by type II diabetes comprises, cataract, glaucoma, and keratopathy. There is also the ischemic optic neuropathy, cranial neuropathy and retinopathy. For instance, studies done by the "United Kingdom prospective diabetes" or UKPDS, indicate the progression of retinopathy in patients with type 2 diabetes, there is a strong link with baseline glycaemia, as well as glycaemic exposure, and this development is associated with hyperglycaemia²⁰.

Majority of patients with type II diabetes are initially diagnose with diabetes eye diseases, without

¹⁸ Andersen, Henning, and F Arnold Gries. *Textbook of diabetic neuropathy : 93 tables. Chapter 2*; Stuttgart: Thieme, 2003.

¹⁹ Ibid

²⁰ Scanlon, Peter, Charles Wilkinson, and Stephen Aldingto. *A Practical Manual of Diabetic Retinopathy Management*. Chichester: Wiley-Blackwell, 2009. P 29

having realized that they have diabetes. In this condition, the blood vessels circulating within the retina begin to get worse, resulting in bleeding or hemorrhage, commonly referred to as microaneurysms. In addition, there is the seepage of water, as well as proteins into the middle of the retina, or macula resulting in a condition known as macula edema, and which leads to vision loss, even though it could be temporary. However, without treatment, additional permanent vision loss takes place²¹.

Accordingly, type II diabetes can lead to proliferative eye disease, or fresh blood vessel growth, and the retina begins to grow new blood vessels with an intention of replacing the damaged ones under a process known as neovascularization. However, the issue with this process is that these fresh blood vessels, are burdened with holes, and thus they are prone to abrupt bleeding with severe damage to the retina without warning, since they are deformed.

Secondly, these new blood vessels in the retina can cause scar tissue inside the retina, along with retinal detachments, plus glaucoma. Therefore, this largely adds to the risk of permissible blindness. Additionally, type II diabetes can also lead to cataract, or clouding of the lens contained by the eye, and which subsequently blurs the vision. Hence, majority of the diabetic eye diseases blindness occurs in individuals who are over 60 years of age, and affects 90-95% of individuals with type 2 diabetes²².

TYPE II DIABETES AND STROKE

Stroke, or cerebrovascular accident, occurs in people with type 2 diabetes, due to the hindrance of the artery that provides the receptive brain cells. Given that individuals with type 2 diabetes have high blood pressure, then they are vulnerable to stroke. The reason being that, people with type 2 diabetes mellitus have clogged up carotid arteries, and the diabetic's propensity towards high blood cholesterol, as well as extreme lipid levels, coupled with high blood pressures, leads to arteriolar blockage, resulting in strokes. Hence, individuals with type 2 diabetes are 2-3 times more likely to undergo stroke than those without, mainly due to the obstruction of the artery found in the neck or brain. This is referred to as ischemic stroke, and some of type 2 diabetics will develop stroke, due to the bursting of the blood vessel in the brain, which results in bleeding into or around the brain²³.

²¹ Scheiman, Mitchell, Maxine Scheiman, and Steven Whittak. *Low vision rehabilitation: a practical guide for occupational therapists*. Thorofare, NJ: SLACK Inc, 2007. P 267

²² Ibid

²³ Kothari, V, Al Adler, I M Stratton, S E Manley, HA Neil, and RR Holman. "UKPDS 60: risk of stroke in type 2 diabetes estimated by the UK Prospective Diabetes Study risk engine." *Pubmed* 33, no. 7 (2002): 1777

Majority of the ischemic strokes that occur in type II diabetic patients, are because of occlusion of diminutive paramedial piercing arteries. Therefore, the occlusions lead to minute infarcts inside the white material of the brain. In addition, *diabetic autonomic neuropathy* may possibly add to the occurrence of cerebrovascular disease in individuals with type II diabetes²⁴.

TYPE II DIABETES MELLITUS AND HEART DISEASE

The type 2 diabetes mellitus also relates with a noticeable boost in the threat of coronary heart disease. Furthermore, patients with type II diabetes are more likely to have congenital heart failure than people without due to high levels of hyperglycaemia, increased blood pressure in addition to obesity²⁵. Additionally, Type II diabetes is link to other risk factors for heart diseases, like hypertension, uncharacteristic blood fats, as well as the increased fat in the region of the waist.

MOLECULAR LEVEL

Notably, the Type II diabetes mellitus is symptom of a fundamental cellular breakdown, which is improper metabolism of Glucose. Hence, every cell in the body becomes incapable when it comes to transporting glucose originating from blood stream towards their interior. Consequently, the glucose is left over in the blood stream, or in some instances amassed as body fat, or else released in the Urine. When insulin attaches with a membrane receptor, it kicks off a complex flow of biochemical reactions within the cell. Thus, one of these responses, results in Glucose transporters, or GLUT4 molecules to depart their storing region in the cell and journey to the interior surface of the cell plasma membrane. Type 2 diabetics, due to its high regular insulin levels, characteristically have merely 1200 insulin receptors, and even lesser for every cell membrane, which is around half of the standard²⁶.

Then there is the glycation, where sugar molecules react with proteins in the human body to create non- purposeful structures, and this is a major feature of type II diabetes complications. The reason is that it interrupts proteins all the way through the body and is related to nerve injury, heart attack, in addition to blindness. Additionally, the oxidative stress turns out to be a major damage resulting from type II diabetes. Such individual's go

²⁴ Ibid

²⁵ Nichols, Gregory A, Christina M Gullion, Carol E Koro, Sarah A Ephross, and Brown Jonathan. "The Incidence of Congestive Heart Failure in Type 2 Diabetes." *Diabetes Care* (American Diabetes Association) 27, no. 8 (2004): p 1879

²⁶ Petersen, Kitt Falk, Sylvie Dufour, Douglas Befroy, Rina Garcia, and Gerald I Shulman. "Impaired Mitochondrial Activity in the Insulin-Resistant Offspring of Patients with Type 2 Diabetes." *New England Journal Of Medicine* (NIH) 350, no. 7 (2004): p 665.

through elevated intensity of free radicals, and which destroy the arteries, beginning in the eyes right to the heart.

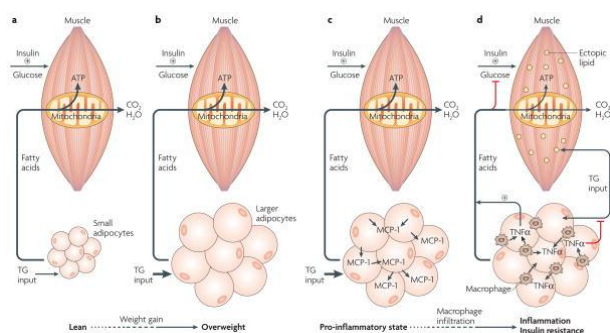


Figure 3²⁷: Sugar Molecules Reaction with muscle

This figure shows how glucose reacts with muscle in the human body to create non- purposeful structures causing in type II diabetes.

For the most part, measurement of blood glucose levels is the widespread clinical tests applied in diagnosing diabetes. Accordingly, the general fasting glucose examination measures the quantity of glucose within the blood normally after fasting. Consequently, pre-diabetes is ascertained, if the level of glucose in the blood during the period of fasting ranges in the region of 100 to 125 mg/dL. As a result, diabetes is identified when the level of glucose within the fasting blood goes up to around 126 mg/dL or greater than that²⁸.

CONCLUSION

Based on the above research paper, type II diabetes Mellitus diabetes has quickly developed as the foremost cause in the increase of heart disease across the western nations, along with being the principal reason for non-accident amputation as well as blindness amongst adults. The most obvious and general symptoms associated with type II diabetes mellitus comprises, augmented levels of thirst plus urination. In addition, the individual experiences abnormal weight alterations, tetchiness, fatigue, as well as blurry vision.

The clinical abnormalities of type II diabetes comprise hyperglycemia plus glucose contained in the urine. Moreover, the individual develops some form of breath, which remarkably may well smell sweet, possibly due to presence of ketones in the patient's blood, or ketosis. Some individuals with type II diabetes also start to have dark outgrowths in their skin, or commonly referred to as skin tags. For these reason, the cost of uninhibited type II diabetes mellitus are harsh. For instance, some of the patients become blind others develop kidney failure, with

greater than before danger of heart disease, and agonizing marginal nerve destruction.

At present, majority of the practitioner's centre of attention in the treatment of type II diabetes is restricted to blood sugar management, and which is largely concerned with blood sugar control. Despite the fact that, diabetes is distinguish by surplus blood glucose, this cut down approach by practitioners for controlling blood sugar levels, can really speed up the progression of II diabetes, given that it does not deal with the critical aspect of addressing the harm it causes. Therefore, it is crucial that type II diabetics patients, as well as those predisposed to it, realize the methods in which the abnormal levels of glucose in the blood results in damage, and undertake vigorous measures in order to interrupt these processes.

For instance, instead of individuals with type II diabetes taking drugs that additionally boost the intensity of insulin inside the blood; they should be made to use therapies, which add to the sensitivity of body insulin receptors within the cell membranes. Nevertheless, the best measures against type II diabetes is improved diet along with exercise. Even though, this type of diabetes has a genetic aspect, many of the research have indicated that diet plus exercise can thwart it.

SUMMARY

Diabetes is a very intricate disease. The only way to manage it successfully is by taking the full precautionary measures. A person with diabetes will be requiring a complete team of skilled professionals that may guide him to living a complete and healthy lifestyle.

Diabetes Type II Mellitus is not dependant on insulin because it causes the blood to have rather higher levels of glucose. There are many complications associated with Diabetes Type II Mellitus which have been discussed in great detail above. This disease may be controlled by proper drug intake and a healthy lifestyle.

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²⁷ Guilherme, et al. 2008

²⁸ Life Extension Newsweekly. *Diabetes*. 2011. http://www.lef.org/protocols/metabolic_health/diabetes_01.htm (accessed November 17, 2011). Para 12

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