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A review on life style changes in the prevention of type 2 diabetes mellitus

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Abstract

Diabetes mellitus is endocrine disorder characterized by deficiency secretion of insulin, inadequate secretion of insulin from beta cells of pancreas in human body. Microvasucalr complications are diabetic retinopathy, diabetic nephropathy, diabetic neuropathy. In macro vascular complications such as cardiac disease and cerebral vascular disease like haemorrhage, infract and mental confession. Diabetes mellitus can be manage with regular exercise and diet intake.

Keywords: Diabetes mellitus, exercise, diet

Introduction

Diabetes mellitus (DM) comprises a group of common metabolic disorders that share the phenotype of hyperglycemia. Several distinct types of Diabetes mellitus exist and are caused by a complex interaction of genetics, environmental factors, and life style choices [1-5]. Diabetic mellitus occurs Genetic, chromosomal abnormalities, obesity, lack of exercise and excessive glucose intake. Irregular hyperglycaemic result formation of micro and macro vascular complications. Microvasucalr complications are diabetic retinopathy, diabetic nephropathy, diabetic neuropathy. In macro vascular complications such as cardiomyopathy includes disease and cerebral vascular disease like haemorrhage, infract and mental confession. One of the most complications of diabetes mellitus is hypoglycaemia. Hyper and hypoglycaemia occur do to pathophysiology of diabetes. Diabetes mellitus was estimated to be 0.19% in people 20 years old and 8.6% in people 20 years old. In individuals 65 years the prevalence of diabetes mellitus was 20.1%. The prevalence is similar in men and women throughout most age ranges but is slightly greater in men 60 years. Pathophysiology of type 2 diabetes mellitus is characterized by three pathophysiologic abnormalities: impaired insulin secretion, peripheral insulin resistance, and excessive hepatic glucose production. Obesity, particularly visceral or central (as evidenced by the hip waist ratio), is very common in type 2 diabetes mellitus. Adipocytes secrete a number of biologic products (leptin, TNF free fatty acids, resistin, and adiponectin) that modulate insulin secretion, insulin action, and body weight and may contribute to the insulin resistance [6].

The clinical features of the two main types of diabetes mellitus are thirst, polyuria, nocturia and rapid weight loss are prominent in type 1 diabetes mellitus, but are often absent in patients with type 2 diabetes mellitus, many of whom are asymptomatic or have non specific complaints such as chronic fatigue and malaise. Uncontrolled diabetes is associated with an increased susceptibility to infection and patients may present with skin sepsis and genital candidiasis and complain of pruritus vulvae or balanitis. Physical signs in patients with type 2 diabetes mellitus at diagnosis depend on the mode of presentation. More than 70% are overweight and obesity may be central. Hypertension is present in 50% of patients with type 2 diabetes mellitus. Although hyperlipidaemia also common, skin lesions such as xanthelasma and eruptive xanthomata are relatively rare. Sometimes patients present with one or more of the long terms complications of diabetes mellitus. Patients may complain of paraesthesia, pain and muscle weakness in the legs with signs of peripheral neuropathy foot ulceration. Signs of macrovascular disease are common and may include diminished or impalpable pulses in the feet, bruits over the carotid or femoral arteries and ischaemic toes.

The reduction of cardiovascular events is not the only reason that clinicians suggest lifestyle modifications [7]. An equally important reason is to prevent end stage renal disease, which is linked to obesity, hypertension and type 2 diabetes [8, 9] and has not been addressed in the Look AHEAD study. Evidence demonstrates a link between a decrease in glomerular filtration rate and atherosclerosis.

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Given that decreased renal function is a risk factor for atherosclerosis and also linked to type 2 diabetes and obesity, 3, 4 its neglect in the Look AHEAD study2 implies that not all risk factors have been controlled for. Investigators in future studies will need to incorporate renal function to judge whether a link exists between weight loss and cardio vascular events in patients with type 2 diabetes and obesity. The aim of lifestyle modifications, however, is to prevent premature onset of atherosclerosis, as this preventive step is likely to reduce the incidence of cardio vascular events. Therefore, starting lifestyle modifications at a much earlier stage than in the Look AHEAD study2 (where the youngest participants were aged 45 years, and the mean age was slightly >58 years) is vital. Modifications should optimally happen before diabetes and obesity develop. Healthy lifestyles could be encouraged at the community level, in schools, and by local health centres, with a focus on children and adolescents that is, long before people are referred to a cardiologist for treatment.

Lifestyle variables include meal habits, exercise state, drinking state and smoking state. Modification in these factors would result in improved compliance towards hypoglycaemic agents [10]. Hu *et al.* [11] indicated in their study that decreased physical activity (i.e., watching TV for 2 hr/day) increases the risk of diabetes by as much as 14%, while brisk walking at least 1hr/day decreases the risk of diabetes by 34%. Clearly emphasizes the need to increase physical activity as a sedentary lifestyle increases the risk of diabetes. This assertion is also supported by another study which revealed that by increasing every 500 K cal energy expenditure, the risk of type II diabetes mellitus can be reduced by 6% [12]. Similarly in India, obesity is among the major causes of diabetes mellitus and the major reasons of obesity are high energy intake and sedentary lifestyle [13]. Moreover, WHO has recognized the importance of dietary control in diabetes mellitus and has given its recommendation regarding the distribution of nutrients in diabetic patients [14]. This is summarized in Table 1.

Table 1: Recommended distribution of nutrients for diabetic subjects.

Nutrients	Percentage (%)
Carbohydrates	45*
Total fat	35
Mono unsaturated fatty acids	20
Poly unsaturated fatty acids	< 8
Saturated and trans fatty acids	< 7
Protein	15-20
Cholesterol	< 20 mg/day

* In taken can be depend up on individual.

A general concept regarding alcohol intake is that it further deteriorates the condition; but interestingly, a Meta-analysis with 12 years of follow up showed that the controlled intake of alcohol (1-2 drinks/day) decreases the risk of diabetes by 30- 40% as compared to substantial drinkers [15]. It was concluded that moderate amounts of alcohol not only increase the sensitivity of insulin, but also increase HDL cholesterol levels while heavy intake of alcohol increases the triglyceride levels and impair carbohydrate and glucose metabolism. Ahmed *et al.* also studied the relationship between alcohol consumption and glycemic control and concluded that the relationship is inversely proportional; thus diabetic complications can be minimized by the

restricting alcohol consumption [16]. Smoking is also highly associated with the increased risk of diabetes mellitus. In their study, Willey *et al.* found that frequent smokers (≥20 cigarettes/day) were at increased risk of developing diabetes mellitus (relative risk = 1.61) compared to occasional smokers (relative risk = 1.29) [17]. The risk was further decreased to 1.23 for ex-smokers compared with active smokers.

Diabetes mellitus is one of the most prevalent problems facing our modern civilisation, resulting in numerous complications, 171 Oman Medical Specialty Board Oman Medical Journal (2012) Vol. 27, No. 2: 170-171 which can be effectively controlled by simple means, such as lifestyle modifications. Pharmacological interventions are not always necessary to control diabetes, but emphasis should also be given to non-pharmacological management. Evidence has clearly shown that lifestyle variables are highly associated in determining the relative risk of diabetes mellitus. Hence, by controlling these factors, one can effectively halt the progression of this highly penetrating disease. This can be achieved through the involvement of a multi-disciplinary team, particularly a health provider who can counsel the patient regarding the risk factors associated with diabetes; public health policies can be designed to achieve the desired results and self confidence should also be developed among the patients to improve medication adherence [18]. Lifestyle is an important determinant of glycemic control in diabetic type 1 and 2 patients. The treatment of diabetes mellitus interferes in the lifestyle, is complicated, painful, depends on self discipline and is essential to the patient’s survival [19]. The therapeutic approach involves various levels of action, such as insulin therapy, dietary guidance, acquisition of knowledge about the disease, the ability to self apply insulin, and self monitoring of glycemia, maintenance of regular physical activity and psychosocial support [20]. Due to the many beneficial effects, regular physical activity is indicated for patients with diabetes mellitus, because it improves metabolic control and diminishes cardiovascular risk, in addition to adding an important effect on preventing the chronic complications of this pathology [21]. Nevertheless, individuals with diabetes mellitus do not follow the recommendation of practicing physical activity for a minimum period of 30 minutes, five times per week, or aerobic physical activity of vigorous intensity for a minimum period of 20 minutes on three days each week [22]. This fact would favor the continuity of an active lifestyle throughout life. In diabetes mellitus, the important of following a balanced diet, adopting knowledge about the correct consumption of carbohydrates, proteins and fats. Observation of the quantities and qualities required of each food group enables glycemic control and prevention of complications; and adherence to treatment is the key to attaining the objectives desired [23]. Since diabetes demands intense control to prevent complication, the emotional aspect will have significant influence on this control, bearing in mind that this pathology is capable of causing various negative feelings. Thus, group or individual psychological follow-up is frequently necessary to improve the quality of life [24]. The aim of this systematic review was to relate the outcomes lifestyle, physical activity, psychological aspects and socioeconomic conditions in individuals with diabetes mellitus. The second objective was to relate the lifestyle to glycemic control. Research has shown that Diabetes self-management education programs

for patients with diabetes type 2 can be beneficial. A meta analysis including studies investigating the effects of self-care management interventions (both in groups and individually) showed improvement of glycemic control [25]. In a systematic review of group education programs, both blood sugar measurements and knowledge was improved at 6 months, 12 months, and two years after the program [26]. Self management skills and empowerment/self efficacy was improved at 6 months. According to an Australian study diabetes education leads to a range of outcomes: knowledge and understanding, self management, self determination, psychological adjustment, clinical outcomes, and cost effectiveness [27]. The participants reported however a ranking where they considered knowledge and understanding as being most influenced from education, and cost effectiveness less influenced. Although diabetes education is vital, research indicates that lifestyle changes and biomedical results might be difficult to maintain [25, 26]. Education is often not sufficient for patients to sustain a lifetime of diabetes self care [28]. Many diabetes patients struggle to follow the advice they receive and their commitment to self management decreases over time [29]. Support from diabetes specialist nurses, other patients, and family members is necessary to manage diabetes [30, 31]. Studies have also shown that goal setting becomes challenging when the supportive group environment disappears after the course [31]. Further knowledge about the process of making and maintaining lifestyle changes is lacking. Knowledge about the period after participating in group based Diabetes self management education, and how changes are made and maintained, would be helpful in designing future educational courses and intervention research, as well as in work on public health. The aim of this study was therefore to investigate how participants make and maintain lifestyle

changes after participating in group based type 2 diabetes self management education courses [32].

Management

Diabetes mellitus (type 2) can be managed with diet and exercise.

Exercise

More than 2000 years back, Charak in his Charak samhita advocated the use of exercise in treating diabetes mellitus. In fact, the use of exercise in the treatment of diabetes mellitus was prescribed as early as 600 BC by the Indian physician Sushruta and was widely recommended by physician of the 18th century. Elliott Joslin, often called the Father of modern diabetes, identified exercise along with dietary management and insulin administration as one of the three components of good therapy in the 1920’s. It could be argued that in the absence of any other forms of treatment, the older day physicians had no choice but to fall back on diet and exercise. Later, with the wide availability of oral hypoglycemic agents and insulin, the relative importance of exercise as a treatment for diabetes mellitus seemed to go in to a decline from which it is just emerging. With the long term safety and efficacy of some of the oral agents being called in to question and with reports that ill advised insulin therapy leading to high blood insulin levels can be a factor in leading to many disorders such as high blood pressure, lipid disorders and even atherosclerosis, attention is being again given to diet and exercise as the dominant treatment modalities, as far as possible. If a diabetic can be managed with the use of diet and exercise alone, or if the addition of exercise can lead to a substantial decrease in the dose of the oral medicines, can there be any justification for not prescribing exercise to the diabetic.

Table 2: Guidelines for Insulin adjustment for exercising

Intensity of Exercise*	Duration of Exercise (minutes)	% to decrease peaking Insulin**
Low to High	Less than 30	0
Low	30 - 60	5
Moderate	30 - 60	10
Moderate	60 or more	20
High	30 - 60	20
high	60 or more	30

* Low = not in target heart rate zone ** If Regular insulin – 2-4 hours after injecting, Moderate = Low end of heart rate zone. If NPH/Lente – 6-12 hours after injecting, High +=high end of heart rate zone.

Diet

Before diet plan has to do sum up: Measure your weight and height, estimate your optimal body weight, decide what changes in your weight you will need to make, calculate the

calorie intake needed to maintain your present weight with the diet you eat and your activity levels, estimate the calorie requirement to gradually reach optimal weight.

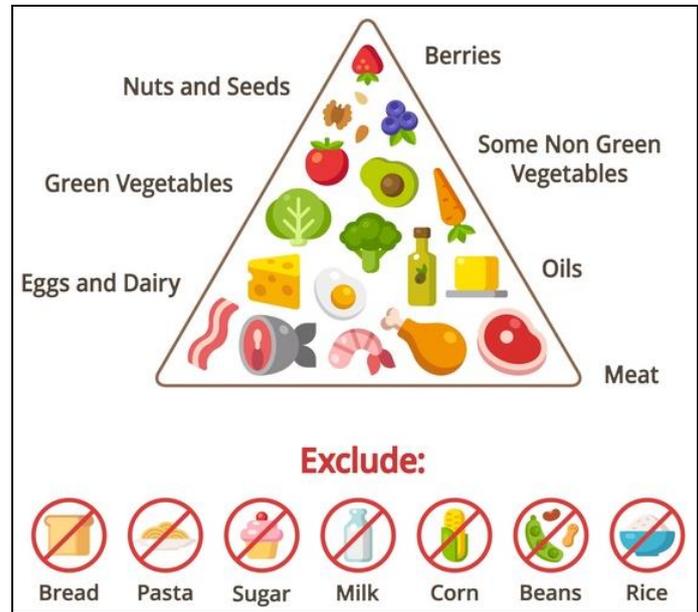


Fig 1: Diet plan for diabetes mellitus

Diet Excluded

Rice, Chapatti, sweets, Raw Banana, Fruits, Beet root, Potatoes, Refined oils, sugar, milk, corn, bread, elephant yam, sweet potato, tapioca, green peas, colocasia, sweet corn, ice creams, fast foods, cold drinks, carrots, carbohydrate contain vegetables, panner, tomatoes and onion (more than 2), turmeric.

Diet Included

Coconut oil (lauric acid), Cow Ghee, Buff Ghee, Cheese, Butter, olive oil, six eggs, capsicum, crystal salt, 250 – 300 grams chicken/mutton/fish/prawns, cauliflower, cabbage, Keera, walnuts, seeds (Almond, pista, accurate, pumpkin seeds, water melon seeds, sun flour seeds, flax seeds, sesame seeds), drum stick leaves, sorrel leaves, fenugreek, spinach, amaranth, Malabar spinach, coriander leaves.

Table 3: Flow chart for diabetes mellitus *

Timings	Diabetic Diet
6 AM	Warm water with lemon juice (one).
7:00 AM	Green Tea /Black Tea
7:30 AM	60 – 80 grams coconut oil has to consume.
8:00 AM	2 boiled eggs/ 2 omelets
10:00 AM	Warm water with lemon juice (one).
11:00 AM	Seeds /Mutton soup/ vegetable soup/ nuts.
12:30 PM	250 grams Vegetable curry/chicken/mutton/fish/prawn.
3:30 PM	Warm water with lemon juice (one).
5 PM	Green Tea/Black Tea.
6 PM	Bottle Gourd juice / Vegetable salad/ mutton soup.
7 PM	250 grams -Vegetable curry/ Non veg curry.

* Result can be depending up on individual.

Diet program can be continue up to ten days (similar to day 1)*. During this diet program cannot take any refined oil, only has to use butter, coconut oil, cow ghee, cheese, olive oil only. Has to take per day four to five litters of water, six eggs and three lemons should be utilize during this diet program. Daily can be consume nov veg 250 – 300 grams of chicken/mutton/fish/prawn/vegetable curry (males are 300 grams, females are 250 grams). Each individual can be taken every day hundred grams of panner. All non veg persons are must consume vegetables daily to avoid constipation problems. Tender coconut water and coconut must not be consumed but can be used coconut powder. Vegetables soup can be taken except those earlier informed. Vegetable soup preparation is cut all the vegetables and put it in a cooker and add one litter of water, then cook for seven to eight whistles, then remove all the pulp, now in this liquid soup add whatever you want and make it delicious. This soup can be consumed as many times as you desire.

Non veg soup preparation is add two litters of water and cook there mutton bones in a large cooer with twelve whistles, then transfer this to another big bowl and add four litter of water, now further cook with small flame for approximate seven hour. After seven hours if you required you can add vegetables and cook further more forty five minutes. Take out all the pulp and drink only soup, it can be stored in the fridge and consume little quantity when ever required (don't keep in fridge more than two days). I will strongly advice that drink warm water on empty stomach in the early morning, avoid water consumption while standing and warm water after lunch and dinner.

2. Conclusion

Type 2 diabetes mellitus can be preventive with help of regular exercise and diet management. Prevention is better than cure, so can be avoid macro and micro vascular complication with control of type 2 diabetes mellitus.

Prevention of type 2 diabetes mellitus can be leads to increase of quality of life.

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