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Effect of counselling on the diabetic patients: A study with reference to Sarangarh Tahsil

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Abstract

Diabetes is now taking the form of most fatal disease in India, with an estimate that every third Indian will be diabetic up to 2020. Although Diabetes is a metabolic disease, but it is the disease where dietary counseling and modification of pattern of life is most effective. Thus a study is conducted to observe the effect of life style related counseling with dietary modifications on the stage of the disease. The effects are observed on physical health along with biochemical parameters that are related with the very disease. A significant positive impact was observed in younger and middle aged age group, but the suggestions were not keenly implemented by the aged group, thus no significantly positive results are observed in them.

Keywords: Diabetic patients, physical health, sedentary life styles

Introduction

According to World Health Organization, at least 170 million people worldwide have Diabetes. This figure has likely to be doubled in 2030 to 57 million. WHO predicts that developing countries will bear the brunt of this epidemic in the 21st century, with 80% of all new cases of Diabetes expected to appear in the developing countries by 2020. Among the developing countries the highest increase in prevalence will be in China, followed by India. However, the greatest increase in numbers will be seen in India, where the number of Diabetics will rise from 19 million in 1995 to 57 million in 2025, heading the list of countries with the greatest numbers of Diabetics. India is thus designated to become the "Diabetic capital of the world". The global increase in diabetics occurs because of population aging and growth, and because of increasing trends towards obesity, unhealthy diets and sedentary life styles.

Estimated & Projected Mortality Rates (Per 100000) By Sex, For Major Causes of Death in India

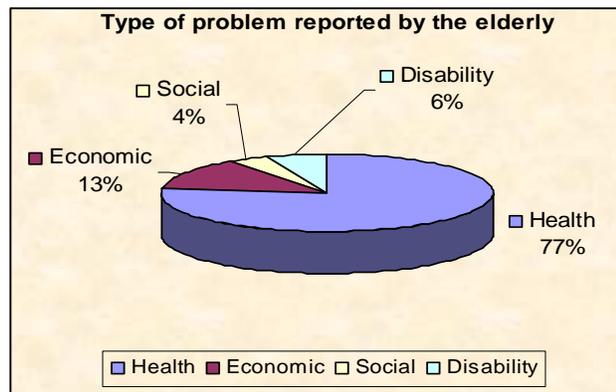
Causes	Years					
	1985		2000		2015	
	M	F	M	F	M	F
All causes	1158	1165	879	879	846	745
Infections	478	476	215	239	152	175
Circulatory	145	156	253	204	295	239
Diabetes	231	239	280	285	311	301
Injury	85	65	82	28	84	29
Neoplasm	43	51	88	74	108	91
Pregnancy	—	22	—	12	—	10
Prenatal	168	132	60	48	40	30
Others	239	293	280	285	167	171

(Source: World Bank Health Sectoral Priorities Review – 2008)

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Diabetes is one of the world's leading chronic diseases and has serious and economic considerations. Billions of dollars are spent every year by the health care system for treating Diabetes and its complications. Direct medical costs included blood tests, insulin and for diabetes related illness such as retinopathy, coronary artery disease etc.

Indirect costs included lost productivity caused by morbidity and premature deaths. Diabetes is one of the major causes of the premature deaths worldwide. In every 10 seconds one person died because of diabetes related causes, mainly from cardiovascular diseases. Diabetes is a silent epidemic that claims as many lives as HIV/AIDS.. In 2007 diabetes caused 3.7 million deaths globally. Also world over diabetes is responsible for over one million amputations each year, a large percentage of cataracts, and at least five percentage of worldwide blindness is due to diabetic retinal diseases. Diabetes is the largest cause of kidney failure in developed countries and is responsible for huge dialysis costs. The risks of heart disease and stroke are significantly higher with people with diabetes. The World bank estimates that diabetes will account for 1,870,000 Disability adjusted life years in India, with a per capita expenditure of \$ 21. Already 3% of the total health budget is spent on diabetes related problems. Bangalore Urban District (BUD) Diabetes study estimated the annual direct cost for routine care in India is 208 dollars for per case of hospitalization. Thus this disease is a severe burden on the already fragile and under resourced health care system of India. As the numbers of elderly are increasing world wide, and diabetes is mostly problem of elderly, thus this disease should be carefully monitored-



Diet and life style are considered to be the cornerstone for treatment of diabetes. The major aims are to reduce weight, improve glycaemic control and to reduce the risk of cardiovascular complications with account for 70% to 80% of deaths among with this type of diabetes. Before starvation and semi starvation diets were proposed, this was replaced by high carbohydrate diet with complex carbohydrates with low glycaemic index, and low fat and protein. The Exchange list was revised in 1976, 1886 and again in 1995, each revision placing an increased emphasis on carbose. In 1887 the American association of Diabetics promoted the concept of individualization of the meal planning approach. The Diabetes Prevention Program [DPP] compared intensive lifestyle intervention (diet & exercise) with Metformin to prevent or delay glucose concentrations and impaired glucose tolerance (IGT). Life style intervention worked well in men and women and in all ethnic groups, reducing their risk of developing diabetes by 57% and 61% in age group above 50 years with NIDDM. The diet and exercise plan significantly reduced the progression of the disease. Indians are used to low fat and high cereal based diet, change in this traditional diet to the energy dense westernized diet-rich in fat and low in cereals and fibers and sedentary life style constituted to the epidemic of Diabetes.

Essential components of diabetic counseling -

Carbohydrates: Simple acarbose are broken down quickly by the body to be used as energy. Thus there is quick rise in serum glucose and precipitates diabetic complications. The acarbose should be in the form of complex carbohydrates and naturally occurring sugars rather than processed or refined sugars. Whole grain products like whole wheat bread, brown rice, oats and barley are rich in fibers, anti-oxidants, vitamins, magnesium and phyto-chemicals.

Fibers: Dietary fibers are the part of food that is not affected by the digestive process in the body. Only a small amount of fiber is metabolized in the stomach and intestine, the rest is passes through the gastrointestinal tract and makes up the part of stool. There is two types of dietary fibers-soluble and insoluble. Soluble fibers retain water and turns to gel during digestion. It also slows digestion and nutrient absorption from the GIT. Soluble fibers are found in foods as oat bran, barley, nuts, lentils, peas, fruits and vegetables. An insoluble fiber appears to be speed the passage of foods through the stomach and intestine and adds bulk to the stool. It is found in foods such as wheat bran, vegetables and whole grains. Also a high fiber food has been shown to improve the glycaemic control and insulin responses. This type of diet also proves to reduce the adverse effects of high acarbose diet on blood lipids. Also there is an inverse relationship between the dietary fibers and coronary heart disease. According to studies conduced in India with each 10 grams rise in fibers there is 20% reduction in the risk of CVD.

Protein: According to national sample survey, organized by Govt of India –the daily intake is 0.7 gms /Kg. Protein consumption should be between 15 and 20% of total calories. If we consider 25cal/kg is required for normal weight person, for Indian population weight range of 65-70 kg, the protein requirement is 60-70 gms/day respectively for 15% level and 80-90gms/day for 20% level. Presently, we Indians consume 0.7gm/kg /day, that is 44-53gms /day. Thus we need 15-20gms more protein /day. There are many trials, which have examined the role of high protein diets in controlling sugar, control of body weight and lipid levels.

The trials have conclusively proven that increased protein in diet, replacing some carbohydrates by protein is useful. The argument against this trial is that long tern follow-ups are required to assess the safety and efficacy. The key point in all these trials talks of around 30% of total calories coming from proteins and take baseline value as 16-18% of the total calories. In all these trials moderate benefits are present even with baseline values. Especially in type-2 diabetes, there is an increased turn over of proteins, Presence of insulin resistance, hyperglycemia, IL6; IGF-1 resistance can lead to accelerated catabolism of proteins and loss of muscle mass. Improving protein intake can help in reducing waist-hip ratio (WHR). This is found beneficial even when nephropathy is eminent. In conclusion we can say that in India protein rich diets are beneficial in management of diabetes. [Diabetic Care 25:425-430, 2008]

Fats: In the general population exchanging saturated fats from acarbose increases LLD and triglycerides as well as HDL, where as exchanging Mono and Poly unsaturated fat for carbohydrates lowers LDL, Triglycerides and increases HDL. In epidemiological studies higher intakes of saturated

fats and Trans fats were associated with an increased risk of CVD and. Also the role of N6 polyunsaturated fat is concerned substituting vegetables oil rich in N6 for saturated fat conforms strong cholesterol lowering effect. There is significant decreased risk of Type-2 Diabetes. Trans fatty acids are manufactured fats created during a process called hydrogenation, which is aimed as stabilizing polyunsaturated fatty acids to prevent them from becoming rancid and to keep them solid at room temperatures. The low rates of Diabetes among Eskimos who have a higher dietary fats rises the possibility that fish oils may be protective against this condition. Nor more than 30% of the total calories should be given from fat.

Calcium: Especially Type-2 Diabetes and related glucose intolerance –patho-physiologically there has to be a link between pancreatic beta cell function-systemic inflammation and hypocalcemia. Along with vit-D, Ca normalizes the extra cellular Ca, thus ensuring normal Ca flux and adequate normal Ca pool. Ca is essential for insulin mediated intracellular processes in insulin responsive tissues like skeletal muscle and adipose tissue. An average of 1000 IU/day of Vit D and up to 400-600 mg /day Ca should be given per day. [Menon L I, 2006-Protective effect of Ca in Diabetes, Nutr Res 20:235-47]. Since diabetes is a chronic complication affecting the diabetic patient at various levels, the counseling should focus on the nature of the disease, lifestyle modifications, medications, and acute and chronic complications.

I. Counseling regarding the disease: The diabetic patients should be explained that the disease is lifelong, progressive and needs necessary modifications in the lifestyle pattern. They should also stress upon the importance of pharmacotherapy, especially the need for strict compliance with the prescribed medication. The patients should be also explained that the disease may affect the quality of life if not well controlled.

II. Counseling regarding lifestyle modifications: While counseling regarding the life style modifications, the pharmacist should focus on the key areas including diet, exercise, smoking and alcohol intake.

B. Exercise and physical activity: Exercise can help to promote weight loss and maintain ideal body weight when combined with restricted caloric intake. In type 2 diabetes, the desired level of exercise is 50% to 80% of maximal uptake of oxygen three to four times a week. In type 1 diabetes, care must be taken to have adequate metabolic control prior to exercise and to monitor blood glucose before and after exercise. Exercise is not recommended if the patient has poorly controlled labile blood glucose level or is at increased risk of diabetic complications. Strenuous exercise is not wise in patients prone to develop hypoglycemia.

A standard recommendation for diabetic patients, (as for no diabetic individuals), is that exercise should include a proper warm-up and cool- down period. A warm up should consist of 5-10 min of aerobic activity (walking, cycling, etc.) at a low intensity level. The warm-up session is to prepare the skeletal muscles, heart, and lungs for progressive increase in exercise intensity. After a short warm- up, muscles should be gently stretched for another 5- 10 min. primarily, the

muscles used during the active exercise session should be stretched, but warming up all muscle groups is optimal. The active warm up can either take place before or after stretching. Following the activity session, a cool-down should be structured similarly to the warm-up. The cool-down should last about 5- 10 min and gradually bring the heart rate down to its pre- exercise level.

C. Alcohol intake: Even if the blood glucose of the patient is well controlled, modest amount of alcohol will significantly alter blood glucose levels. In general, the same guidelines of alcohol use applicable to the general public apply to patients with diabetes.

D. Smoking: People with diabetes, especially those over age 40 years, who smoke and have high blood pressure and cholesterol, are at a higher risk for cardiovascular problems. When the large blood vessels (arteries) are blocked, heart attack and stroke often result. This hardening or blockage may also occur in the small arteries that supply blood to the legs and feet. Smoking can also lead to serious complications like infections, ulcers, gangrene, and even amputations. Pharmacist should counsel patients regarding the evil effects of smoking and educate the patients regarding the various strategies to stop smoking. Emphasis should be laid on the pharmacological measures to stop smoking.

III. Counseling regarding medications: Though lifestyle modifications play an important role in diabetes management, it is well established by landmark studies that the chronic complications can be prevented by strict glycemic control. Hence, the pharmacist has an immense role in counseling diabetic patients regarding the drugs. Counseling should be emphasized for oral anti diabetic agents as well as for insulin.

1. Oral hypoglycemic agents (OHAs): If the patient is diagnosed with Type 2 diabetes, he/ she is more likely to be prescribed OHAs. Some of the commonly prescribed oral hypoglycemic agents and the important counseling points are discussed below.

The patient should be cautioned not to skip meals at any time and to follow regular eating patterns to prevent hypoglycemia. OHAs are comparatively safe drugs. However some patients may develop loss of appetite, nausea and vomiting, abdominal pain, cramps, malaise, diarrhea or weight loss.

2. Insulin: All patients with type 1 diabetes require insulin. Some patients with type 2 diabetes who initially respond to dietary modification and/ or oral anti diabetic medications eventually require insulin therapy. There are a wide variety of insulin preparations available now. These may differ in source, onset of action, time to peak effect, and duration of action. The clinician will prescribe the type of insulin which suits an individual best.

IV. Counseling regarding acute complications: Though rare and not directly linked with the quality of life, the acute complications of diabetes can be morbid if not treated properly. The pharmacist should focus on strategies to prevent the occurrence of the acute complications and if they have occurred the methods to overcome and to manage

the same. Some of the acute complications of diabetes are discussed below.

1. Hypoglycemia: It is a condition caused by abnormally low level of blood glucose. Hypoglycemia is caused by taking too much of certain diabetic medicines, missing a meal or delaying a meal, exercising more than usual, or drinking alcohol. The symptoms can be classified as initial, intermediate and advanced symptoms. Initial symptoms may start with sweating, tremulousness, nausea and vomiting, dizziness, mood change, hunger, weakness and progress to the intermediate symptoms of confusion, poor coordination, headache and double vision. The advanced symptoms are unconsciousness and seizures. The management of hypoglycemia includes taking half a cup of any fruit juice, 2 or 3 glucose tablets, 2 tablespoons raisins, 1 or 2 teaspoons of sugar or honey, half cup of regular soft drink or liquid concentrated glucose. For advanced hypoglycemia, medical intervention is needed with glucagon 1 mg subcutaneously or intramuscularly. Hypoglycemia can largely be prevented by taking ant diabetic medications properly, eating regular meals, and regular checking of blood glucose.

2. Diabetic keto acidosis (DKA): DKA is a serious complications characterized by hyperglycemia, elevated serum ketones, and an anion gap metabolic acidosis. It mainly affects the individuals with type 1 DM but may also affect type 2 diabetes patients in response to acute stress. The risk factors include extremes of age, poor glycemic control, poor socioeconomic status, non-compliance etc. In general, insulin omission or non-compliance is identified as an important contributing factor for development of DKA.²⁵ The pharmacist can counsel the patients regarding the strategies to prevent the occurrence of DKA.

3. Non Ketotic Hyperosmolar Syndrome (NKHS): It is a constellation of severe hyperglycemia, dehydration, and hyper-osmolarity in the absence of severe ketosis. It commonly occurs in elderly patients with type 2 DM. Among the various risk factors for NKHS, advanced age, female gender, acute infection and non-compliance are considered important. Hence counseling regarding the important of compliance can be helpful in reducing the occurrence of NKHS.

V. Counseling regarding chronic complications: Since diabetes is a chronic illness and the chronic complications of diabetes can adversely affect the quality of life, these complications should be emphasized. It is well established that the chronic complications of diabetes can be prevented by strict compliance and suitable lifestyle modifications. Some of the chronic complications and the role of pharmacist in counseling the patients regarding these complications are mentioned below.

Methodology

This study was carried out to assess the influence of general and nutritional counselling provided patient counseling on patients' perception about the disease management and quality of life in type 2 diabetes mellitus patients. The present study was a randomized, prospective controlled study conducted over a period of two months in Sarangarh Tahsil, Chhattisgarh, India. A total of hundred patients, with type 2 diabetes mellitus were enrolled and randomized into test and control groups. Patients in the test group received

patient counseling and patient information leaflets from the nutritionist, where as the control group patients received the counseling and patient information leaflets only at the end of the study. After the baseline, two follow-ups were made with thirty days interval between the follow-ups. During each visit patient's random capillary blood glucose was measured by using a standard Glucometer. Suitably designed and validated knowledge, attitude and practices questionnaire was administered at baseline and final follow up for both test and control group patients to assess the disease management awareness. The nutritional counseling was given in relation to-

- Glycemic Index & use of low Index foods
- To take sufficient Protein in Diet
- To take sufficient Ca & Vit D in diet
- To take polyunsaturated fat up to 30 % of the total calories.
- To do daily exercise and for proper weight management.
- About quality, quantity and frequency of meals.

Observations & Results

Vital Statistics of the Patients

1] Age of the patients

Age Group [years]	No of patients	Percentage
30-40	20	20
40-50	14	14
50-60	15	15
60-70	26	26
70-80	25	25

2] Weight of the patients

Total Patients	underweight	Moderate weight	overweight
30-40	2	8	10
40-50	3	6	5
50-60	--	4	11
60-70	2	13	11
70-80	8	9	8

As in Indians apple shaped obesity that is maximum fat layers around the stomach is one of the strongest precipitating factor of diabetes, it was found true in the victim group.

3] Serum Fasting Glucose before & after counseling

Total Patients	Average before mg%	Average after mg%	t value
30-40	240	198	df-39, 09.21* **
40-50	275	223	df-27, 20.13**
50-60	193	189	df-29, 02.33*,**
60-70	210	202	df-51, 00.69 NS
70-80	218	211	df-49, 0.27 NS

NS = Not Significant *P<0.05 level, **P<0.01 level

Elderly group show3eed insignificant response, because of their rigid attitude and age related non-mobility in their behavior and diet pattern. Younger group was keen to get rid of their health problem, so they follow the counseling tips seriously.

4] Serum P.P. Glucose levels

Total Patients	Average before mg%	Average after mg%	t value
30-40	216	181	df-39,
40-50	201	173	df-27
50-60	245	218	df-29
60-70	289	263	df-51
70-80	293	272	df-49

In counseling sessions foods of low glycaemic indexes are suggested to be included, the amount was also modified along with the frequency of taking meals, it is resulted in corrected PP Glucose values, but elderly group didn't show significant positive results, because they couldn't control them to avoid foods of high glycaemic index.

5] Serum Total Protein Status

Total Patients	Average before g%	Average after g%	t value
30-40	7.1	7.3	df-39,
40-50	5.3	5.9	df-27
50-60	5.2	6.3	df-29
60-70	4.8	5.1	df-51
70-80	4.5	4.9	df-49

As serum protein status is the indication of status of nitrogen balance in body that is disturbed due to sugar in balances during diabetes. The younger age group showed almost normal values before, because they were comparatively newer victims of the very disease, thus that couldn't precipitated serious negative nitrogen imbalances, but the aged group showed better results, they included more 10-12 g /day proteins.

6] Resultant Dis-lipidemia & effect of counselling

Components of lipid profile	Mean+ sd		Change in percentage value	df-130 t value
	N=66 after	N=66 before		
Cholesterol mg/dl	1.25+0.08	1.85+ 0.17	48% ↑	17.63*,**
Triglyceride mg/dl	0.98+0.20	1.49 + 0.36	53% ↑	18.68*,**
HDL mg/dl	0.59+0.18	0.29+ 0.02	51% ↓	24.29*,**
LDL mg/dl	0.54+0.16	1.26+ 0.17	131% ↑	49.00*,**

p<0.05 *level, p<0.01** level, sd values are showed in parenthesis.

7] Serum Ca levels modifications after counseling-

After			Before		
Age in Years	No. of Participants (n = 61)	Mean Serum Calcium Level	Age in Years	No. of Participants (n = 61)	Mean Serum Calcium Level
36-38	4	0.103±0.01	20-22	9	0.101±0.01
39-41	7	0.104±0.01	23-25	9	0.093±0.004
42-44	8	0.105±0.01	26-28	8	0.096±0.004
45-47	5	0.115±0.005	29-31	9	0.086±0.004
48-50	7	0.117±0.026	32-34	9	0.093±0.004
51-53	9	0.123±0.017	35-37	8	0.099±0.004
54-56	5	0.133±0.005	38-40	5	0.093±0.003
57-59	7	0.132±0.004	41-43	2	0.098±0.008
60-62	9	0.136±0.004	44-46	2	0.100±0.003

(Values expressed as x mg.ml⁻¹ serum and are presented as Mean value ± Standard Deviation).

8] C-Peptide: levels after Ca level modifications- As pro-insulin is broken in to insulin and C-peptide, thus quantitative analysis of C-peptide levels is just equal to the amount of insulin produced.

Before nmol/L	After nmol/L	T VALUES
1.17-1.19 nmol/L	2.44 nmol/L	9.28 **

[mean-0.25-0.6 nmol/L, normal -2.35+ 0.30]

Summery & Conclusion

Diabetes is a chronic illness that requires a combination of pharmacological and non-pharmacological measures for better control. Patient adherence to medication and lifestyle modifications plays an important role in diabetes management. Pharmacists being an important member of the healthcare system have an immense responsibility in counseling these patients. To be an effective counselor, the pharmacist should update his knowledge regarding the latest developments and should possess adequate verbal and non-verbal communication skills. This study was carried out to assess the influence of nutritional counselling provided patient counseling on patients' perception about the disease

management and quality of life in type 2 diabetes mellitus patients. The present study was a randomized, prospective controlled study conducted over a period of two months in Sarangarh Tahsil, Chhattisgarh, India. A total of hundred patients, with type 2 diabetes mellitus were enrolled and randomized into test and control groups. Patients in the test group received patient counseling and patient information leaflets from the nutritionist, where as the control group patients received the counseling and patient information leaflets only at the end of the study. After the baseline, two follow-ups were made with thirty days interval between the follow-ups. During each visit patient's random capillary blood glucose was measured by using a standard Glucometer. Suitably designed and validated knowledge, attitude and practices questionnaire was administered at baseline and final follow up for both test and control group patients to assess the disease management awareness. Audit of diabetes-dependent quality of life questionnaire was administered to measure the quality of life in both control and test group patients at each follow up. At the end of the study, knowledge, attitude and practices scores found

markedly improved in test group patients. Mean capillary blood glucose levels were decreased in test group ($P < 0.05$) and an improvement in mean quality of life scores ($P < 0.05$) was observed. Where as a reduction of quality of life score ($P < 0.05$) and a non-significant increase of capillary blood glucose levels ($P > 0.05$) was observed in the control group patients. The correlation between the capillary blood glucose levels and quality of life scores were also found to be highly significant in the test group ($r = 0.955$). The results of the study suggests that, nutritional counselling provided patient counseling has an impact in improving the perception about disease, diet and life style changes and in turn on glycemic control and overall quality of life in diabetic patients.

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