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Exploring the relationship of Veg/Non-Veg diet and Type-2 Diabetes: A Prospective Study

Manju Dewan
PG Department of Zoology,DAV College,Sector 10, Chandigarh.
manjudewan72@gmail.com

Abstract
Diet is one of the most important ways of controlling diabetes beside medications and exercises. In the present study, equal prevalence of borderline cases in vegetarians (24.0%) and non-vegetarians (24.1%). Total diabetic subjects were more in the vegetarians (10.1%) than non-vegetarians (7.5%). Statistically non-significant ($p>0.05$) relationship had been found between vegetarians/non-vegetarians and type 2 diabetes. A vegetarian diet can cause diabetes if it contains too many calories and not enough important nutrients. A carefully planned healthful and nutritionally sound vegetarian diet should include essential nutrients which can lower risk of type II diabetes and other health problems like obesity, coronary heart disease, high blood pressure and some forms of cancer than non-vegetarians.

Keywords: Diet, Vegetarian, non-vegetarian, type 2 diabetes.

Introduction

Diet plays a important role in the development of diabetes mellitus. Both vegetarian and non-vegetarian diets can be structured to support the management of type 2 diabetes, but they may have different impacts on blood sugar control and overall health. Vegetarian/non-vegetarian diet is considered as an important factor. Vegetarian diets emphasize plant-based foods such as fruits, vegetables, whole grains, legumes, nuts, and seeds. These foods are typically high in fiber, vitamins, minerals, and antioxidants, which can help improve insulin sensitivity, regulate blood sugar levels, and reduce the risk of cardiovascular complications associated with type 2 diabetes. Non-vegetarian diets often include lean sources of protein such as poultry, fish, and seafood, which can help with satiety and muscle maintenance. Grilling, baking, or steaming meats can help reduce the intake of unhealthy fats and calories commonly found in fried or processed meat products. Red and processed meats, when consumed in excess, have been associated with an increased risk of type 2 diabetes and other chronic diseases. Limiting the intake of these meats and opting for leaner cuts or plant-based protein sources may be beneficial. At present there are few data on vegetarian diets and diabetes. According to Papoz (1996), diabetes seems to affect groups that are subjected to rapid changes in their way of life described as “Westernization”. According Staines *et al*. (1993), a genetic predisposition in diabetes is clearly of great importance. Direct epidemiological evidence from case control studies and indirect epidemiological evidence from migrant studies indicated that environmental agents are also very important.

METHODOLOGY

The present epidemiological and biochemical study was undertaken in the district Sangrur, Punjab, India. This study was planned to assess vegetarian and Non Vegetarian diet of dietary intake using the questionnaire. They were questioned personally, using a questionnaire which is designed for collection of data and also general information regarding various other epidemiological factors. The type of diet was categorized based on a food-frequency questionnaire

Results and Discussion

Approximately 90% of diabetes diagnoses are attributed to type 2 diabetes which is closely linked to lifestyle factors. The etiology of type 2 diabetes mellitus is highly influenced by modifiable factors with diet playing a significant role. Research indicates that certain foods possess properties that can ameliorate the symptoms associated with diabetes (Trapp and Barnard , 2010 and McEvoy et al 201). The

present data revealed equal prevalence of borderline cases in vegetarians (24.0%) and non-vegetarians (24.1%). Total diabetic subjects were more in the vegetarians (10.1%) than non-vegetarians (7.5%) (Table-1). Statistically non-significant ($p>0.05$) relationship had been found between vegetarians/non-vegetarians and borderline, newly detected and known diabetic subjects (Table-2).

Diet is one of the most important ways of controlling diabetes beside medications and exercises. Prevalence of diabetes is more in vegetarians because the carbohydrate intake is more in vegetarians. Ahuja (1987) also found the same observation that diabetes was twice as frequent amongst vegetarians than non-vegetarians. Distribution of vegetarians and non-vegetarians in different religions are given below -

	Hindus	**Sikhs**	**Muslins**
Vegetarians	328 (76.1%)	365 (71.6%)	13 (22.0%)
Non-Vegetarians	103 (23.9%)	145 (28.4%)	46 (77.8%)

Vegetarians were more in Hindu population than Sikh and Muslim population. Diabetes is more prevalent in vegetarians in all religions. In the present study, non-vegetarian subjects were those which were taking non-vegetarian food 2-3 times in a week.

Ensuring adequate amounts of essential nutrients in vegetarian diet is vital and must be properly planned to prevent diabetes. A vegetarian diet can be unhealthy if it contains too many calories and not enough important nutrients. Vegetarian diet which emphasis on low fat, high carbohydrate and high fiber foods has a beneficial effect on carbohydrate metabolism, lowering blood sugar levels. The use of whole-grain or traditionally processed cereals and legumes has been associated with improved glycemic control in both diabetic and insulin-resistant individuals (Jenkins et al 2003).

At present there are few data on vegetarian diets in diabetes that do not in addition have weight loss or exercise components. Long-term cohort studies have indicated that whole-grain consumption reduces the risk of both type 2 diabetes and cardiovascular disease. In addition, nuts (e.g., almonds), viscous fibers (e.g., fibers from oats and barley), soy proteins, and plant sterols, which may be part of the vegetarian diet, reduce serum lipids. In combination, these plant food components may have a very significant impact on cardiovascular disease, one of the major complications of diabetes.

In total Muslim subjects, only 21.7% were taking the non-vegetarian food daily. Animal fats were not only rich source of saturated fat but also contained fair concentration of n-6 fats which raised the risk for diabetes and it should be avoided (Raheja, 1993).

In the present study, due to the less number of purely non-vegetarian subjects, insignificant results have been obtained. Nitrosamines, found in many processed meats, have also been found to be toxic to pancreatic b-cells and to increase the risk of type 1 and type 2 diabetes in animal studies (Portha et al,1980). There are multiple mechanisms that may explain the adverse effects of red meat intake on type 2 diabetes, including total fat, saturated fat, heme iron and nitrosamine content. Meat is often (but not necessarily) a significant source of total and saturated fat, and diets high in saturated fat have been associated with an increased diabetes risk and may increase the risk of overweight and obesity, important risk factors for type 2 diabetes. Red meat is the major source of heme iron in the diet and iron can promote oxidative stress and impair glucose and insulin metabolism (Rajpathak et al 2009).

Interestingly, several studies have found that reducing body iron levels using phlebotomy may improve insulin sensitivity in humans (Rajpathak et al 2009). One trial comparing 30 lacto-ovo vegetarians and 30 meat eaters with a normal body weight (BMI < 23 kg/m^2) and normal glucose tolerance found that the vegetarians were more insulin sensitive than meat eaters and had lower body iron stores (serum ferritin concentrations were half that of meat eaters)(Hua et al,2001). When iron stores were acutely lowered by

phlebotomy in 6 of the male meat eaters to levels similar to that seen in vegetarians, they experienced a 40% increase in insulin sensitivity as indicated by insulin-mediated glucose disposal.

The lower content of saturated fat in a vegetarian diet may also contribute to a reduced risk of type 2 diabetes. High intakes of saturated fat have been associated with reduced insulin sensitivity (Parker et al,1993) whereas subjects with insulin resistance and type 2 diabetes have been found to have changes in the fatty acid pattern in serum cholesterol esters (a marker of dietary fat intake) with a higher proportion of saturated fatty acids and lower proportions of linoleic acid (Wang et al ,2003) An increased risk of developing type 2 diabetes has also been associated with the consumption of higher fat diets. In the Finnish Diabetes Study, subjects with the highest fat intakes were more than twice as likely to develop type 2 diabetes compared with those with the lowest fat intakes, whereas a higher intake of saturated fat increased the risk of developing diabetes 1.7 times (Lindstrom et al, 2006). The mechanisms linking saturated fat intake and diabetes risk are not completely understood but relate to insulin sensitivity. A higher intake of saturated fat in the diet increases the proportion of saturated fatty acids in the cell membranes of skeletal muscle and this is thought to influence insulin action via a number of possible mechanisms, including altering insulin receptor binding or affinity, and affecting transport and cell signaling (Parillo et al, 2004). The prevalence of type 2 diabetes in vegetarians was compared to that in non-vegetarians in 724 people in the Bijapur district of Karnataka in a hospital-based survey. In this study, mean BMI was lowest in vegans (23.9 kg/m^2) and incrementally higher in ovolactovegetarians (25.9 kg/m^2), pescovegetarians (26.4 kg/m^2), semivegetarians (27.36 kg/m^2), and non-vegetarians (29.2 kg/m^2). The prevalence of type 2 diabetes increased from 3.1% in vegans to 8.2% in non-vegetarians (Gaffar et al 2010).
The carbohydrate in vegetarian diets is also likely to have a lower GI than typical Western diets because of a higher content of legumes and intact whole grains. Several large studies show that a low-GI diet, independently of fiber, is associated with reduced risk of type 2 diabetes (Salmeron et al, 1997). Vegetarian diets offer a number of nutritional benefits including lower levels of saturated fat, cholesterol, and animal protein as well as higher levels of carbohydrates, fiber, magnesium, potassium, folate, antioxidants such as vitamins C and E, and phytochemicals (American Dietetic Association,2003). Vegetarian diets have been studied over the past few decades for their preventative and therapeutic effects on diabetes and may be more beneficial than medication for diabetes management Vegetarian diets are inversely associated with risk of developing diabetes independent of the positive association of meat consumption with diabetes development (Melissa and Rachel 2018 and Keren et al 2019). Vegetarian diets are inversely associated with diabetes in Westerners but their impact on Asians—whose pathophysiology differ from Westerners—is unknown (Tina et al 2019).

A carefully planned healthful and nutritionally sound vegetarian diet should include essential nutrients which can lower risk of type II diabetes and other health problems like obesity, coronary heart disease, high blood pressure and some forms of cancer than non-vegetarians. There is therefore an urgent need for further assessments of the effects of vegetarian and non vegetarian diets in diabetes, especially in view of the benefits of such diets in non diabetic subjects and the increasing recognition of the potential benefits of components of vegetarian diets in diabetes.

References

Ahuja, M.M.S. (1987). Learning to live with diabetes. National Book Trust India, New Delhi: 1-3.

American Dietetic Association, Dietitians of Canada. Position of the American Dietetic Association and Dieticians of Canada: Vegetarian diets. *Can J Diet Pract Res.* 2003;64:62–81.

Gaffar Sarwar Zaman, Forhad Akhtar Zaman and Mohammad Arifullah. 2010 Comparative Risk of Type 2 Diabetes Mellitus Among Vegetarians and Non-Vegetarians. Indian J Community Med. 2010 Jul; 35(3): 441–442. doi: 10.4103/0970-0218.69285

Hua NW, Stoohs RA, Facchini FS. 2001 Low iron status and enhanced insulin sensitivity in lacto-ovo vegetarians. *Br J Nutr*. ;86:515–519.

Jenkins DJ, Kendall CW, Marchie A, Jenkins AL, Augustin LS, Ludwig DS, Barnard ND,Anderson 2003 Type 2 Diabetes and the vegetarian dietv J W Am J Clin Nutr. Sep;78(3 Suppl):610S-616S.

Keren Papier, Paul N. Appleby, Georgina K. Fensom, Anika Knuppel,Aurora Perez-Cornago, Julie A. Schmidt, Tammy Y. N. Tong & Timothy J. Key 2019 Vegetarian diets and risk of hospitalisation or death with diabetes in British adults: results from the EPIC-Oxford study*Nutrition & Diabetes* volume 9, Article number: 7

Lindström J, Peltonen M, Eriksson JG, et al. 2006 High-fibre, low-fat diet predicts long-term weight loss and decreased type 2 diabetes risk: the Finnish Diabetes Prevention Study. *Diabetologia*. 2006;49:912–920.

McEvoy CT, Temple N, Woodside JV. Vegetarian diets, low-meat diets and health: a review. *Public Health Nutr.* 2012;15(12):2287–2294. doi: 10.1017/S1368980012000936.

Melissa D. Olfert and Rachel A. Wattickm 2018 Vegetarian Diets and the Risk of DiabetesCurr Diab Rep. 2018; 18(11): 101.

Papoz Laure, Barny Sylvie, Simon Dominique and The CALDIA Study Group.(1996). *Am. J. of Epidemiol.*, 143 (10) : 1018-1025.

Parker DR, Weiss ST, Troisi R, Cassano PA, Vokonas PS, Landsberg L. Study. *Am J Clin Nutr*. 1993;58:129–136.

Parillo F Gargiulo A.M. Fagiol O 2004 Complex Carbohydrates Occurring in the Digestive Apparatus of Umbrina Cirrosa (L.) FryVeterinary Research Communications 28(4):267-78

Portha B, Giroix MH, Cros JC, Picon **L.** Diabetogenic effect of N-nitrosomethylurea and N-nitrosomethylurethane in the adult rat *Ann Nutr Aliment*. 1980;34:1143–1151.

Raheja, B.S., Sadikot, S.M., Phatak, R.B., Rao, M.B. (1993). *Ann. N.Y. Acad. Sci.* 683 : 258-271.

Rajpathak SN, Crandall JP, Wylie-Rosett J, Kabat GC, Rohan TE, Hu FB. 2009. The role of iron in type 2 diabetes in humans *Biochim Biophys Acta*.;1790:671–681

Salmeron J, Manson JE, Stampfer MJ, Colditz GA, Wing AL, Willett WC . 1997. Dietary fiber, glycemic load, and risk of non-insulin-dependent diabetes mellitus in women *JAMA*. 1997; 277:472– 477.

Staines, A., Bodansky, H.J., Lilley, H.E.B., Stephenson, C. McNally, R.J.Q. and Cartwright, R.A. 1993. The epidemiology of diabetes mellitus in United Kingdom. *Diabetologia* 30 : 1282-1287.

Tina H. T. Chiu, Wen-Harn Pan, Ming-Nan Lin & Chin-Lon Lin 2018 Vegetarian diet, change in dietary patterns, and diabetes risk: a prospective study *Nutrition & Diabetes* volume 8, Article number: 12

Trapp CB, Barnard ND. Usefulness of vegetarian and vegan diets for treating type 2 diabetes. *Curr Diab Rep.* 2010;10:152–158. doi: 10.1007/s11892-010-0093-7.
Wang L, Folsom AR, Zheng ZJ, Pankow JS, Eckfeldt JH; ARIC Study Investigators. *Am J Clin Nutr*. 2003;78:91–98.

TABLE 1

Random study on vegeterian and non vegeterian subjects from the general population i.e. Normal, Borderline, Newly detected, known and Hypoglycemic subjects from district Sangrur N = 1000.

Status of subjects		Veg. n=706	Non-Veg. n=294
Normal subjects (653)	n (%)	453 (64.16)	200 (68.02)
	BS (F)	81.52 ± 9.35	81.25 ± 8.78
	BS (R)	116.42 ± 15.26	116.41 ± 13.23
Borderline subjects (241)	n (%)	170 (24.07)	71 (24.14)
	BS (F)	97.98 ± 10.06	95.84 ± 11.58
	BS (R)	161.35 ± 17.63	156.74 ± 16.16
Newly detected diabetic subjects (55)	n (%)	45 (6.37)	10 (3.40)
	BS (F)	140.24 ± 28.68	136.70 ± 31.56
	BS (R)	236.71 ± 46.83	214.70 ± 62.69
Known diabetic subjects (38)	n (%)	26 (3.68)	12 (4.08)
	BS (F)	156.84 ± 37.08	160.16 ± 53.38
	BS (R)	269.46 ± 65.71	246.00 ± 71.64
Hypoglycemic subjects (13)	n (%)	12 (1.69)	1 (0.34)
	BS (F)	51.25 ± 7.08	50.00 ± 0.00
	BS (R)	90.83 ± 19.59	80.00 ± 0.00
Total diabetic subjects ND + K (93)	n (%)	71 (10.05)	22 (7.48)
	BS (F)	146.32 ± 33.00	149.50 ± 46.30
	BS (R)	248.70 ± 56.75	231.77 ± 69.49

TABLE 2

Distribution of number of subjects according to according to Veg./Non-Veg. type of diet in different status of subjects

S.No.	Status of subject	Type of diet				
		Vegetarian		Non-Vegetarian		
		No.	Percentage	No	Percentage	Total
I	Normal	453	69.70	200	30.63	653
II	Borderline	170	70.54	71	29.64	241
III	Newly detected diabetic	45	81.82	10	18.18	55
IV	Known diabetic	26	68.42	12	31.58	38

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V	Hypoglycemic	12	92.31	1	7.69	13
	Total	706	70.6	29429.4	1000	

STATISTICAL ANALYSIS

Status of subjects	**X^2**	**DF**	**p**	**NS/S**
Normal	1.335	1	>005	NS
Borderline	0.042	1	>0.05	NS
Newly detected diabetic	3.355	1	>0.05	NS
Known diabetic	0.048	1	>0.05	NS
Hypoglycemic	4.105	1	<0.05	S