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TO DETERMINE THE FREQUENCY OF LOW CALCIUM INTAKE AS A RISK FACTOR FOR DIABETES MELITUS AND METABOLIC SYNDROME

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Abstract:
Objective: To determine the frequency of low calcium intake in Pakistani women as a risk factor for metabolic syndrome and type 2 diabetes.
Study design: A cross-sectional survey.
Place and duration: In the Endocrinology department of Jinnah Hospital, Lahore for one year duration from January 2018 to January 2019.
Methodology: 450 women with type 2 diabetes were enrolled and interviewed for daily calcium intake according to a predetermined questionnaire. The subjects mean calcium intake daily was calculated using daily calcium calculator.
Results: 787 mg / day was the mean daily calcium intake. In 167 (37%) patients, daily calcium intake was below 500 mg, in 173 (38%) 500-999 mg / day, in 40 (9%) 1000-1499 mg / day, 59 (13%). 1500-1999 mg / day, 9 patients (2%) 2000-2499 mg / day, 2 patients 2500-2999 mg / day. 366 (81%) patients had low calcium intake compared to RDA (recommended daily amount) and 84 (18%) patients had normal calcium intake compared to RDA.
Conclusion: Daily average calcium intake is low in type 2 diabetics women compared with BMI and acts as a risk factor for the development of metabolic syndrome and type 2 diabetes mellitus.
Keywords: *Type 2 diabetes; Calcium intake.*

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INTRODUCTION:

Diabetes mellitus is a serious public health problem worldwide. The diabetes prevalence in all age groups globally is supposed to be 2.9% in 2001 and 4.5% in 2030 [1-3]. The total diabetes mellitus affected people is estimated to increase from 172 million in 2002 to 367 million in 2033. The diabetes prevalence is more in males, but in women with BSR levels remains higher than in males. In 1997, 97% of the 124 million people worldwide were diabetic patients with NIDDM [4]. The areas with the highest potential increases are Africa and Asia, where diabetes rates can increase by 3 or 4 times as much today [5]. According to International Diabetes Federation estimates, diabetes affects 7.0 million people and the IDF estimates that this will reached to 11.6 million by 2026 [6]. Diabetes mellitus is the fourth major cause of mortality in the world. Diabetes is a chronic disease that occurs when enough insulin is not secreted from the pancreas, called type 1 diabetes, or when the body is not able to consume the insulin it produces properly, such as type 2 diabetes; amount of glucose concentration in the blood rises [7]. Gestational diabetes is the first recognized hyperglycemia during pregnancy. The main complications of diabetes mellitus include neuropathy, retinopathy, cutaneous complications, arterial hypertension, stroke, hyperosmolar hyperglycemic nonketotic syndrome, diabetic ketoacidosis, gastroparesis, nephropathy, mental health problems, stress and peripheral artery disease [8]. Calcium is an essential mineral and more in the body. It plays a vital role in the maintenance and development of bones and teeth and allows the muscles to contract, including the muscles of the heart [9]. It is also a micronutrient required to help normal blood clotting, adequate delivery of nerve impulses, adequate connective tissue support, and production of lymphatic fluids. 68% of the adult population is inadequate in calcium [10].

Some recent epidemiological and metabolic analysis have shown that milk consumption may have beneficial effects on blood pressure, body weight, cardiovascular health and insulin resistance syndrome (IRS) on metabolic syndrome (both food and supplement) among people with increased calcium intake.

MATERIALS AND METHODS:

This cross-sectional study was held in the Endocrinology department of Jinnah Hospital, Lahore for one year duration from January 2018 to January 2019. 450 type 2 diabetic women coming to indoor and outdoor patient department were selected for the study. Women with known Crohn's disease or chronic kidney disease were excluded. All data, including IDs, were kept confidential. After informed consent, the investigator interviewed all persons who met the inclusion criteria to assess calcium intake. The mean calcium intake daily of a patient was calculated using the calculation of calcium intake. Normal calcium intake was compared with BMI. Statistical analysis SPSS ver 17. The frequency of low calcium intake in women with type 2 diabetes was calculated, the age of diabetes, the level of fasting blood sugar, the sugar level of sugar, the rate of sugar Random blood and daily calcium intake. Low calcium intake was given as frequency and percentage. Since it was a descriptive study, no significance test was applied.

RESULTS:

Four fifty patients who met the inclusion criteria were selected for the study and interviewed for daily calcium intake. The patients mean age was 52 ± 9 years. 337 (75%) postmenopausal and 113 (25%) non-menopausal patients, estrogen therapy was not given to postmenopausal. The mean duration of diabetes was 8 ± 6 years. Of the patients, 241 (54%) had diabetes between 5 and 10 years. In the distribution of hypoglycemic treatment, 432 (96%) patients received hypoglycemic treatment and 18 (4%) patients did not receive hypoglycemic treatment. The mean BSF level was 149 ± 23 mg / dL and the mean BSR level was 218 ± 68 mg / dL. 316 (70%) patients did not receive calcium supplementation and 134 (30%) patients received calcium supplementation. The mean calcium daily intake was 787.22 ± 515.62 mg / day. 366 patients (81%) had a low calcium intake compared to the daily dose recommended, and 84 patients (19%) had normal calcium intake compared to daily dose which was recommended (Table 1).

Table 1: Frequency of low calcium intake according to RDA (n=450)

Calcium Intake according to RDA	Frequency	%age
Low	366	81
Normal	84	19

According to BMI, the average age of patients with normal calcium intake was between 40-49 years old. While 53 and 31 patients had normal calcium intake in comparison to BMI compared to BMI, there was low calcium intake among postmenopausal and non-menopausal patients in 284 and 53 patients (Table 2).

Table 2: Comparison of menopausal status with calcium intake according to RDA (n=450)

Menopausal status	Calcium Intake according to RDA		
	Low	Normal	
Not Postmenopausal	82	31	113
Postmenopausal	284	53	337

According to BMI, 80 patients had a normal status in the comparison of calcium supplemented calcium supplements, and 54 patients had a low calcium intake among those receiving calcium supplements.

Among the patients who did not receive calcium supplementation, normal calcium intake in 04 patients was 312 (Table 3).

Table 3: Comparison of calcium supplements with calcium intake according to RDA (n=450)

Calcium Supplements	Calcium Intake according to RDA		
	Low	Normal	
No	312	4	316
Yes	54	80	134
Total	366	84	450

DISCUSSION:

Diabetes mellitus is a serious public health problem worldwide. In Pakistan, diabetes is on the rise and we are in the middle of the global outbreak of this disease [11]. In 1997, 97% of the 124 million people worldwide were diabetic patients with NIDDM. According to IDF, fourth leading cause of mortality globally is diabetes mellitus. 7.0 million people in Pakistan are diabetics and the IDF estimates that this will rise to 11.6 million by 2026, if no action will be taken to control the disease [12]. Regular physical activity, healthy eating, avoiding tobacco and maintaining normal body weight can delay or prevent the diabetes onset [13]. Calcium is an essential mineral and more in the body. It plays a vital role in the maintenance and development of bones and teeth and allows the muscles to contract, including the muscles of the heart. It is also an important micro nutrient for normal blood clotting, adequate conduction of nerve impulses, adequate connective tissue support, help in the production of lymphatic fluids 10. 68% of the adult population is inadequate in calcium. It has been supposed that Type II diabetes risk decreases to 33% in males and females who

consume vitamin D intake of 800 IU / day with 1,000 milligrams of calcium [14]. Liu S, et al. In the study of 10,866 women aged 45 and over, showed that the highest amount of dietary and complementary calcium intake was significantly and inversely related to the prevalence of metabolic syndrome. Pitas G et al. showed that only 24% of diabetic women had adequate calcium intake (ie 76% had low calcium intake). Females with the highest calcium (> 1,200 mg / day) had a 33% less risk of developing diabetes after a multivariate correction[15]. In another study, Pittas G et al. Showed that EE showed median calcium intake in the diabetic population. U. It decreases with age (51-70 years, 708 mg / day for men and 571 mg / day for women, 70 years, 702 mg / day). for men and 517 mg / day for women 15. In our study, the frequency of calcium intake, pita G et al.

COCNLUSION:

This study showed that the average daily calcium intake was lower in type 2 diabetes mellitus women compared to BMI and therefore served as a risk factor for type 2 diabetes mellitus and metabolic syndrome development. Assessment can make significant inferences for public health, since calcium intake in the diet can be easily and cheaply implemented as a means of preventing diabetes, metabolic syndrome, and weight loss among overweight diabetics.

REFERENCES:

1. Muñoz-Garach, Araceli, Beatriz García-Fontana, and Manuel Muñoz-Torres. "Vitamin D Status, Calcium Intake and Risk of Developing Type 2 Diabetes: An Unresolved Issue." *Nutrients*11, no. 3 (2019): 642.
2. Raj, Jeffrey Pradeep, Dhiraj Ravindran Selvaraj, and John C. Thomas. "Dietary Calcium Intake and Physical Activity Levels Among Urban South Indian Type 2 Diabetic Patients." *Topics in Clinical Nutrition* 34, no. 1 (2019): 39-46.
3. Ha, Kyungho, Hyojee Joung, and YoonJu Song. "Inadequate fat or carbohydrate intake was associated with an increased incidence of type 2 diabetes mellitus in Korean adults: A 12-year community-based prospective cohort study." *Diabetes research and clinical practice* 148 (2019): 254-261.
4. Marquina, C., A. Mousa, R. Scragg, and B. de Courten. "Vitamin D and cardiometabolic disorders: a review of current evidence, genetic determinants and pathomechanisms." *Obesity Reviews* 20, no. 2 (2019): 262-277.
5. AbuZaid, Omar Ibrahim, Bayan Mohammed Al-Dhaif, Fatimah Essa Alqunais, and Mohamed Saleh Ismail. "Impact of metabolic syndrome on

nutrients intakes among Saudi females." *JPMA. The Journal of the Pakistan Medical Association* 69, no. 3 (2019): 330-336.
6. Niroomand, Mahtab, Akbar Fotouhi, Navid Irannejad, and Farhad Hosseinpanah. "Does high-dose vitamin D supplementation impact insulin resistance and risk of development of diabetes in patients with pre-diabetes? A double-blind randomized clinical trial." *Diabetes research and clinical practice* 148 (2019): 1-9.
7. Erkus, Edip, Gulali Aktas, M. Zahid Kocak, Tuba T. Duman, Burcin M. Atak, and Haluk Savli. "Diabetic regulation of subjects with type 2 diabetes mellitus is associated with serum vitamin D levels." *Revista da Associação Médica Brasileira* 65, no. 1 (2019): 51-55.
8. Gateva, Antoaneta, Yavor Assyov, Adelina Tsakova, and Zdravko Kamenov. "Prediabetes is Characterized by Higher FGF23 Levels and Higher Prevalence of Vitamin D Deficiency Compared to Normal Glucose Tolerance Subjects." *Hormone and Metabolic Research* 51, no. 02 (2019): 106-111.
9. Komici, Klara, Grazia Daniela Femminella, Claudio de Lucia, Alessandro Cannavo, Leonardo Bencivenga, Graziamaria Corbi, Dario Leosco, Nicola Ferrara, and Giuseppe Rengo. "Predisposing factors to heart failure in diabetic nephropathy: a look at the sympathetic nervous system hyperactivity." *Aging clinical and experimental research* 31, no. 3 (2019): 321-330.
10. Yao, Zhanxin, Yeqing Gu, Qing Zhang, Li Liu, Ge Meng, Hongmei Wu, Yang Xia et al. "Estimated daily quercetin intake and association with the prevalence of type 2 diabetes mellitus in Chinese adults." *European journal of nutrition* 58, no. 2 (2019): 819-830.
11. Milajerdi, A., Tehrani, H., Haghighatdoost, F., Larijani, B., Surkan, P.J. and Azadbakht, L., 2019. Associations between higher egg consumption during pregnancy with lowered risks of high blood pressure and gestational diabetes mellitus. *International Journal for Vitamin and Nutrition Research*.
12. Liu, G., Guasch-Ferré, M., Hu, Y., Li, Y., Hu, F.B., Rimm, E.B., Manson, J.E., Rexrode, K.M. and Sun, Q., 2019. Nut consumption in relation to cardiovascular disease incidence and mortality among patients with diabetes mellitus. *Circulation research*, *124*(6), pp.920-929.
13. Calogero, Aldo E., Giovanni Burgio, Rosita A. Condorelli, Rossella Cannarella, and Sandro La Vignera. "Epidemiology and risk factors of lower urinary tract symptoms/benign prostatic hyperplasia and erectile dysfunction." *The Aging*

Male 22, no. 1 (2019): 12-19.

14. Sulaiman, Mahaboob Khan. "Diabetic nephropathy: recent advances in pathophysiology and challenges in dietary management." *Diabetology & metabolic syndrome* 11, no. 1 (2019): 7.

15. Yaribeygi, Habib, Alexandra E. Butler, and Amirhossein Sahebkar. "Aerobic exercise can modulate the underlying mechanisms involved in the development of diabetic complications." *Journal of cellular physiology* (2019).