Original Article

Evaluation of Folate and Its Effect on the Patients.

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Abstract

Background: "Diabetes therapy mainly in use from decades is based on the diet, insulin and oral hypoglycemic agents. The quest of searching out new methodologies, therapy and drugs worth the effort In the given research work, the levels of folate and homocysteine specific to human diabetes mellitus in the premises of the University of Punjab, Lahore, Pakistan using modern-technology have been estimated and characterized"

Method: "A total of 200 samples, 100 diabetic study group and 100 same age and sex matched control group, were collected from Diabetic Clinic, Health Centre, University of the Punjab. Biochemical parameters, total serum folate (vitamin B9) level was analyzed by Liquid Chromatography–Tandem Mass Spectrometry"

Results: All the samples were then analyzed by the standard referred protocols and molecular advance technologies. The significantly low level of folate was reported in diabetic patients in reference to control group.

Conclusion: Findings of varied folate level might help in the early diagnosis and characterization of risk factors for this ailment. Therapy should be given to raise the levels of folate consequently decreasing the homocysteine levels. Variation in the folate-Homocysteine levels has also been implicated in other pathological conditions.

Keywords: Diabetes, folic acid, Vitamin B9, homocysteine, Pakistan

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Introductions

"Diabetes or diabetes mellitus (DM) is one of the most lethal diseases. It is ranked 4th deadliest malady, and the rate of prevalence is increasing sharply (**1**). Hyperglycemia, increase of glucose in the blood, serves as the risk of micro-vascular defects such as

retinopathy, neuropathy and nephropathy and others (**2**).

Folates (Figure 1) are the heterocyclic organic compounds group composed of the 4 4-[(2-amino-4-oxo-1,4-dihydropteridin-6-yl) methylamino]benzoic acid, pteroic acid, that is linked with single or multiple L-glutamate monomers (3). Folic acid and naturally existing reduced folate forms are vitamin B9 based compounds. Food derived folates are usually composed of a mixture of reduced folic acids. Folic acid is an essential nutrient and its derivates are important component of DNA production and erythrocyte synthesis.

DNA cycle interruption leads to reduce the production of DNA and consequently reducing cell proliferation. While the faulty methylation cycle will result in elevation of Homocysteine (Hcy) in plasma (4). The defective folate metabolism can affect both the cycles causing numerous complications (5). Proposed DNA and Methylation cycles are elicited in (Figure 2)

Deficiency of folate and vitamin B12 is reported as a serious health problem in all age groups which is associated with diseases such as anemia, neurological abnormalities and birth defects (6). Folate deficiency can adversely affect DNA hypo-methylation, that can treated with dietary folate intake (5).

Folate deficiency is rare in developed part of the world, but deficiency of this vitamin is observed in some of the developing countries. No, study in Pakistan is yet known which analyzed the folate level in diabetic patients of any university before this study. In addition homocysteine levels will also be analyzed in future. There can be number of reason of folate deficiency such as poor diet, erroneous metabolism of vitamins (7). Governments in many countries have enforced the folate fortified food programs. Flour is mostly used for fortification (8). The level of folate found in a study to be decreased in the diabetic patients as compared with that of normal person (9)"
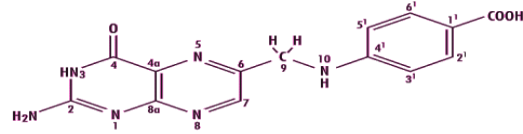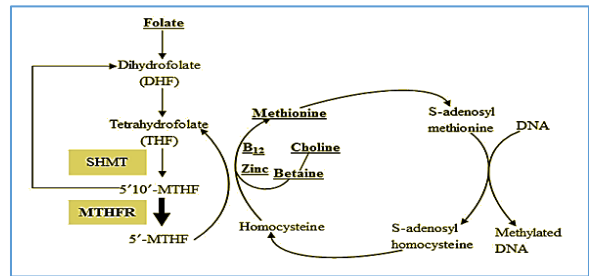

Fig 1: Folate Structural Formula

PARAMETERS	CONTROL N=100	FEMALE N=50	MALE N=50
Age (Years)	44.2±2.623	52.222±1.587	59.1667±3.659
Weight (Kg)	61±2.391	54.444±1.351	61.5833±3.432
Height (Foot)	5.36±0.046	5.333±0.044	5.5667±0.048
Sugar (mg/dl)	96.147±25.523	***217.666±30.654	**198.75±20.391
Cholesterol (mg/dl)	152.791±12.868	190.553±17.799	165.5±7.938
Triglycerides (mg/dl)	140.244±21.293	229.666±35.486	137.4167±16.099
HDL (mg/dl)	43.487±0.626	41.111±0.753	40.5±0.5
LDL (mg/dl)	110.232±8.608	113.000±10.392	96.6667±6.825
Bilirubin (mg/dl)	0.438±0.026	0.533±0.037	0.5083±0.0148
Creatinine (mg/dl)	0.388±0.03	0.5±0.03	0.5±0.03
ALT (U/L)	30.700±5.518	30.888±4.908	33.6667±6.129
ALP (U/L)	88.917±6.836	180.112±6.496	186.75±7.175
MAU (mg/24hrs)	6.076±1.381	15.332±1.301	15.75±1.462
HbAs1c (%)	5.262±0.396	**9.113±0.562	*7.9083±0.231
Folic Acid (ng/dl)	20.076±1.961	8.756±0.522	10.2942±0.0654

Fig 2: Folic acid, homocysteine one-carbon metabolism

Methods

Sampling: Samples were collected from Health Centre Diabetic Clinic, University of the Punjab, Lahore during March 2015 to August 2015.

Sampling Criteria: Samples were taken from same number of men and women aged 40 to 79 years diabetic patients fulfilling the criteria that patients having at least 4 years of insulin uptake, non pregnant and non lactating women, non smokers, not having any other serious ailment. Smokers, pregnant lactating women, people with hypertension and cardiovascular diseases were excluded in this study. **Parameters:** Age weight and height of the patients were recorded in the table, separately of diabetic patients and of controls. With the help of age and weight BMI of the patients were calculated . Biochemistry tests were done by "Selectra Junior" analyzer using standard Merck Kits for each test. Biuret test was used for the estimation of protein in serum. Folate levels estimated by Liquid Chromatography–Tandem Mass Spectrometry.

Conflict of interest: None

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