

MECHANISMS ASSOCIATED WITH CARBOHYDRATE METABOLISM AND PROGNOSIS OF DEGENERATIVE DISEASES IN RURAL AND URBAN FEMALE POPULATIONS OF FAISALABAD DISTRICT

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ABSTRACT

Degenerative diseases are the major non infectious diseases causing sever effects on human lives. These diseases are occurred due to the mismanagement in daily routine of life, malnutrition, and starving, impaired metabolism and carelessness practices. Two hundred healthy female subjects were selected from three towns of District Faisalabad. General characteristics of the population according to their nutritional habits including, age, body mass index (BMI), systolic blood pressure, diastolic blood pressure and glycemia were studied and similarities and differences among thesis parameters were compared statistically. The average age in the rural and urban subjects was 34.38 ± 0.97 and 38.47 ± 1.48 years. The average trend of weight was almost the same in comparing populations. Systolic and diastolic blood pressure values in both populations were observed in close ranges however, the systolic blood pressure was slightly higher in urban population. On the basis of the values of expression of a particular parameter, sub populations were created to observe the correlations in each ethnic group. In the subjects of rural population increasing age was correlated with an increase in diastolic blood pressure ($p=0.01$), systolic blood pressure ($p=0.02$) and BMI ($p=0.004$). Similarly in subjects of urban population age was correlated with an increase in systolic blood pressure ($p=0.006$) diastolic blood pressure ($p=0.009$) and BMI ($p=0.001$). Systolic blood pressure above 125 mmHg is associated with the higher BMI group. In conclusion, there were similarities in the expression of few characteristics; however, there were some distinct variations too in both comparing populations.

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INTRODUCTION

Faisalabad is the second largest city in Punjab and 3rdmost inhabitant's city in Pakistan, it contains various ethnic groups such as urban and rural populations. Their lifestyle having their own traditional diets and habits. The inhabitants have diverse genetic makeup, which had adapted to local environmental circumstances, as well as dietary routines and habits of activity. Physiological and biochemical features of a person and group of individuals with parallel background that indicate the significance of the interaction among genetic makeup (genotype/phenotype) and environmental factor such as dietary routine, physical activities and behavior⁽¹⁾. The biochemical and physiological response are associated to the nutrient metabolism including lipid, protein and carbohydrates. The morphological features and biochemical profile that continued the normal state of healthy volunteers are

results of the metabolic process of lipid and carbohydrate macro molecules.

Investigation of metabolism of carbohydrates, on the basis of ethnicity, might specify that a variation in a distinct type of lifestyle affects the health conditions.

Degenerative diseases or non-infectious diseases might be preventing via healthy nutrition; a few believe they are regularly increasing due to the reason of junk diet intake. It has been known worthy that the nutritional factor plays an essential role towards the progression of degenerative diseases specifically cardiac disease⁽²⁾.

More than 17 million individuals each year expired from CVD, diabetes and high blood pressure are the major leading cause for these deaths⁽¹⁾. The increased level of blood pressure and hyperglycemia is the increasing incidence of fatness and flabbiness

associated with undernourishment, malnourished and infectious diseases, for the duration of the last few decades, as major health tribulations that threatening developing world⁽³⁾. Impaired glucose tolerance (IGT) frequently results in developing diabetes (Type 2). Coronary heart disease (CHD) is also associated with type 1 diabetes⁽⁴⁾. Patients with abnormal carbohydrate metabolism particularly children and youngsters, with diabetes (Type 1) may consequence in the antagonistic effect on body mass index and lipid profile, mostly if there is be a necessarily increase in fat ingestion⁽⁵⁾. Also modification in the body measurements just like circumference of waist and body mass index is directly connected by the metabolic diseases e.g., type 2 diabetes, hyper-insulinemia, and hyper-triglyceridemia. In both relating inhabitants, there should be alterations in expression; however, they would have distinct variations as well^(6,7).

METHODOLOGY

1. Sampling:

Sample collection and randomized survey was conducted in Faisalabad city and 3 towns of Faisalabad District (Khurrianwala, NalkaKohala and Awaget). Two hundred (200) healthy female volunteers from these areas, urban (n=100) rural (n=100), were selected by systematic simple random sampling. The individuals were interviewed by a medicinal physician, data were collected through predesigned questioner which covers the history life style, their age, family system, marital-status, socio-economic condition, literacy, physical work, history of blood pressure and glycemia.

Data and blood samples of the subjects under study were obtained via visit them on their job places e.g. offices, colleges, universities and schools in Faisalabad city. And in rural areas, by visiting their homes and fields.

Subjects under investigation were questioned for filling a performa to collect data based on several parameters. Two hundred samples from both groups (rural and urban subjects) were enrolled in this study.

2. Physical examinations:

i. Index of Body mass (BMI)

Index of body mass was noted by acquired weight of the individuals in kilo gram while height in meter. Every individual was weighed on calibrated weighing scale (Wisdom, Germany) having a highest range of 140 Kg with sensitivity of 0.25 Kg. Height of the subjects was documented in inches. Body mass index table was used for the authentic calculation of BMI by obtaining from www.consumer.gov/weightloss/

bmi.htm.

ii. Blood pressure

Manual mercurial sphygmomanometer was used to measure the blood pressure (Yamasu, Japan) following a described protocol. Both diastolic and systolic blood pressure was noted. High blood pressure was recorded as systolic blood pressure as > 120 mm of Hg whereas diastolic blood pressure < 80 mm of Hg.

3. Random blood sugar (RBS) assessment:

The Gluco-Monitoring System of iHealth® Smart company was used to check glucose level of each individual. First of all, the fingertip was sterilized by alcohol prep pad/alcohol swabs, fingertip was punched by the use of disposable sterile strike lancet using extra soft baton holder and drop of blood was taken on the finger-tip. The strip having gout of blood was entered in the glucometer according to the instructions of manufacturer. The result of RBS displayed in milligram glucose / deciliter, on the screen of glucometer within few seconds, the result was noted on the performa.

4. Statistical analysis:

The collected data was shifted on excel sheet for explanatory statistics. The statistical packages of SPSS simple independent t test were used to determine the variations among the values of selected parameters of two populations under investigation. P value was fixed at equal or < 0.05 for comparing dissimilarities between two populations. No substantial difference among the comparable groups was observed statistically significant.

RESULTS & DISCUSSION

The general characteristics of sample subject from urban and rural population comprises; body mass index (BMI), systolic BP, diastolic BP, age and random blood sugar (RBS) were evaluated (Table 1).

The rural and urban ethnic populations in Faisalabad district have distinct way of life with different dietary habits and customs. These populations also had diverse genetic set ups, which had adapted to the local environmental circumstances including the dietary practice, activity habits and habitats.

The major features of physiological and biochemical expressions are associated to nutrient metabolism. Carbohydrate is one of the main components of nutrients metabolism. Morphologic characteristics and biochemical profiles maintaining normal status of the subjects are the result of carbohydrate and lipid metabolism. Study of these

components of nutrient metabolism will indicate how they have adapted in each kind of ethnic population. Common models applied to different populations in various parts of the world are not delivering in the management of physiological based health issues. Hence some characteristics linked with carbohydrate and lipid metabolism in rural and urban populations will elucidate the nature of the adaptations in these diverse ethnic groups. In the present study, sampling of the subjects in each ethnic population was random. When different groups were compared for particular targets, it was taken into account that other factors will not differ to an extent that comparison of the targets is affected.

Despite random sampling, the general characteristics of the subjects were noted and analyzed to assess this aspect along with biochemical parameters. The average age in the rural and urban subjects was 34.38 ± 0.97 and 38.47 ± 1.48 years, respectively and these differences were not statistically significant (Table 1). The significant variation in age will affect the other comparisons as the prevalence of degenerative diseases with diverse metabolic profiles increases in aged populations (8, 9). The average trend of weight was almost the same in both populations. Weight and height are the key parameters used to calculate BMI, thus BMI was almost the same in rural and urban subjects. A significant variation of BMI in comparing populations would affect the genetic comparisons of other targets as an increase in BMI is associated with obesity which further contributes in the development of degenerative diseases (10, 11). Thus the general characteristics of the comparing populations were in satisfactory ranges to elucidate the status of other targets effectively. Systolic and diastolic blood pressures are indications of the status of cardiovascular complications and well correlated to carbohydrate metabolism. Systolic and diastolic blood pressure values in both of the populations were observed in close ranges (Table 1). The systolic blood pressure was slightly higher in urban comparing rural

population. Blood pressure is an indicator of vascular health also correlated with carbohydrate as well as with lipid metabolism (12, 13). On the basis of the values of expression of a particular parameter, sub populations were created to observe the correlations in each ethnic group. In the subjects of rural population increasing age was correlated with an increase in diastolic blood pressure ($p=0.01$), systolic blood pressure ($p=0.02$) and BMI ($p=0.004$). Similarly in subjects of urban population age was correlated with an increase in systolic blood pressure ($p=0.006$) diastolic blood pressure ($p=0.009$) and BMI ($p=0.001$). Systolic blood pressure above 125 mmHg is associated with the higher BMI group.

The higher diastolic blood pressure was also associated with increase weight in Baloch population. In glycemia, as mentioned earlier, although non-significant, was greater in rural than urban subjects. These results expound that the rural population was indisposed to greater health risks compared to the urban population. This result points to a difference in the nutritive profile and the interactions of the genetic setup in both comparing populations. The contrasting relationship between the two comparing populations was also pointed out. Age and weight were correlated in the urban population and diastolic and weight were correlated in the rural population subjects only. Height and systolic blood pressure were correlated only in the subjects of urban population. Glycemia was correlated with weight, BMI and systolic blood pressure in rural subjects. The comparisons of various parameters associated with metabolism of carbohydrate reflect the contrasting characters in the expression of molecular mechanism. Changes in lifestyle that lead to weight loss, eating habits and physical work etc. reduce the incidence of degenerative diseases. But preventing hypertension, diabetes and obesity will require fundamental political and social changes.

Table-1: Common trends in comparing inhabitants; Rural, Urban and Both, P value = or <0.05 *=significant, **= non-significant

Parameters	Unit	Rural (n=100)	Urban (n=100)	Both (n=200)	Statistical Significances
Age of Subject	Year	34.38 ± 0.97	38.47 ± 1.48	36.42 ± 1.23	**
Body Weight	Kg	63.45 ± 0.97	63.52 ± 1.25	63.49 ± 1.12	**
BMI	Kg/m ²	22.84 ± 0.35	22.58 ± 0.35	22.71 ± 0.35	**
BP Systolic	mmHg	122.24 ± 1.48	124.64 ± 1.81	123.46 ± 1.64	**
BP Diastolic	mmHg	82.63 ± 0.99	82.31 ± 1.46	82.47 ± 1.23	**
RBS	mg/dl	115.26 ± 4.23	109.31 ± 4.85	112.29 ± 4.54	**

Table-2: Statistical correlation of various parameters (Significant) within Rural inhabitants.
P value = or <0.05

Parameters	Unit	Variables	P values
Age of Subjects	Year	BP (Systolic)	0.02
		BP (Diastolic)	0.01
		BMI	0.004
Body Weight	Kg	BMI	0.000
		RBS	0.034
Index of Body Mass	Kg/m ²	RBS	0.005
BP (Systolic)	mmHg	BP (Diastolic)	0.000
		Weight	0.002
		BMI	0.0001
		RBS	0.035
BP (Systolic)	mmHg	Body Weight	0.003
		BMI	0.000

P value = or <0.05

The mean age, systolic BP, diastolic BP, BMI, and blood glycemia (RBS) of all subjects in both populations were U=39.40; R=40.53 years, U=123.60; R=128.33 mmHg, U=83.33; R=84.13 mmHg, U=23.67; R=24.40 kg/m² and U=120.60; R=123.06 mg/dl respectively. Although the P values of all parameters of both inhabitants (urban and rural) are given in Table 2 and 3

Table-3: Statistical correlation of various parameters (Significant) within Rural inhabitants

Parameters	Unit	Variables	P values
Age of Subjects	Year	BP (Systolic)	0.006
		BP (Diastolic)	0.009
		BMI	0.001
Body Weight	Kg	Height	0.0001
		BMI	0.000
BP (Systolic)	mmHg	Body Weight	0.01
		BMI	0.0008
		BP (Diastolic)	0.000
BP (Diastolic)	mmHg	BMI	0.001

P value = or <0.05

CONCLUSION

In both comparing populations there were similarities in the expression of few characteristics, however, there were some distinct variations too. The variations need to be investigated further on a molecular scale. The present study could be used as a model for investigating on larger scale populations.

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