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PROCESSED FOOD AND BLOOD PRESSURE VALUES IN WOMEN WITH METABOLIC SYNDROME RISK FACTORS:

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Abstract:

Diet plays a major role in development of Metabolic Syndrome.

Objective: We aimed to evaluate the association of Less processed and ready to eat foods on Blood pressure values in women with Metabolic Syndrome risk factors.

Design: This study was conducted as a part of Ph.d Study. General dietary intake was analyzed in a study of 207 women aged 20-70 years. Attending diagnostic centre for their general check up. Interested 80 women participants were screened for further intervention after signing concern form from each participant. Anthropometric and blood pressure measurements were performed and other bio chemical parameters were analysed. The metabolic syndrome was defined according to International Diabetic Federation (IDF).

Result: Out of 80 participants, 70 participants completed the 6 week nutritional intervention program. They were grouped in to control group and experimental group. And the experimental group had shown significant change in Systolic blood pressure (Baseline 127.3±9.324) after 6 week: 118.11±8.445) at p=0.05 level. And also Diastolic blood pressure ((Baseline 85.14±7.311) after 6 week: 78.38±6.877) at p=0.05 level.

They were also showing significant change in Body weight, BMI, and WC.

Conclusion:

Dietary changes from processed foods/Ready to eat convenient foods to whole grain base diet consumption significantly associates with Metabolic Syndrome Risk factors.

Introduction:

Metabolic syndrome have researched pandemic proportions in India. According to epidemiological studies in India, from the last three decades have shown greater than 30% prevalence rate of Metabolic syndrome.(1)

According to research studies (2&3), from the last few years, there was a great change in human life style and eating patterns. High Blood Pressure is the number one risk factor for death globally (4), It causes aneurysms, heart attacks, Heart failure, kidney failure and stroke. The American Heart Association defines normal blood pressure as a systolic pressure under 120 and a diastolic pressure under 80. (120/80)(5). Increased blood pressure damage the sensitive blood vessels in eyes, Kidney and brain and increase the risk of heart

disease and strokes. According to International Diabetic Federation(IDF) definition of MS, presence of any two factors such as elevated triglycerides, reduced HDL cholesterol level, elevated blood pressure ≥130/80 mm of Hg and elevated fasting glucose ≥100mgdl along with central obesity (↑ed waist circumference) as primary screening tool(6).

The metabolic syndrome is a cluster of CVD risk factors which include: glucose intolerance impaired fasting glucose level in diabetes, dyslipidaemia, hypertension, central obesity (insulin resistance). The causative factors of syndrome is unknown, insulin resistance is one of the cause, and complex interaction of genetic, metabolic and diet factors also plays a major role.(4-6). Life style changes –diet, weight loss, minimum physical activity are the first line treatment for Metabolic syndrome. (7). from recent observational studies, a greater diet quality is associated with (less frequent) less metabolic syndrome incidence and decreased mortality rates due to CVD,(8-10). Diet rich in whole grain compare to processed /Ready to eat or convenient food which are refined and high dense calories are refined and high dense calories , consumption positively associated with CVD risk factors, such as body weight central obesity and insulin resistance (11-13).

The aim of the study was to determine reduced intake of processed foods/Ready to eat/convenient foods for 6 weeks from the diet enhances blood pressure values and improves the metabolic syndrome risk factors in women.

Subjects and Methods: A random sample of eighty women, aged between 20-70 yrs with central obesity were recruited to participate. IDF criteria for Metabolic Syndrome was used for screening. The recruited participated were already on medication for diabetes or Hypertension or Thyroid and other general issues. And participates who were pregnant, lactating, suffering with chronic diseases, cancer, kidney issues, on insulin shots, triple vessel diseases were excluded for the study.

All the participants gave written consent. The study was conducted in accord with the guide lines of the Institutional Review board.

We used a food frequency questionnaire (Exclusively Designed for the study) to know the dietary pattern of the participants. After analyzing the dietary pattern, participants were grouped into two groups, one control group and other experimental group. The experimental group received dietary advice to avoid refined/Processed foods/Ready to eat/ convenient foods for 6 weeks and include whole foods for 6 weeks.

The researcher met individually with each participant at baseline to discuss the dietary intervention and also provided education materials to facilitate the understanding of Metabolic Syndrome and diet . Researcher reviewed the 7-day diet record with each participant and discussed the diet analysis with them at the next bi weekly visit till 6 weeks.

Anthropometric Clinical Measurements:

At base line and after 6 weeks waist circumference was measured by using non stretchable tape at iliac crest. Weight was measured by using electronic scale without shoe. (OMRON) Body Mass Index was calculated by using formula: Wt/ht^2 in mts. Blood pressure was measured using Spigmomano meter by taking two readings for average in relaxed comfortable sitting position. Blood samples were collected after 12 hours fasting and analyzed for fasting blood sugar levels and lipid profile .

Statistical Analysis: Statistical parameters used for this presentation of the results are arithmetic average (mean) and standard deviation (SD), paired T-Test have been used to determine differences between baseline and after intervention. Probability level was expressed by $P<0.05$.

Results: In the table: 1 , presented basic statistical parameters at baseline and after 6 weeks nutritional intervention. Average of weight in experimental group prior to intervention was 76.786kgs; while the standard deviation of arithmetic mean value was 10.194. After 6 weeks of nutritional intervention, weight mean value dropped to 74.668kgs, while standard deviation was 10.086. Differences in arithmetic mean values of weight at baseline and after 6 weeks of nutrition intervention indicate that there is a significant statistical difference at 5% level. In control group the difference was very slight and it was not statistically significant at 5% level.

Average of BMI in experimental group prior to intervention was 31.524; while the standard deviation of arithmetic mean value was 3.226. After 6 weeks of nutritional intervention, BMI mean value dropped to 30.651, while standard deviation was 3.208. Differences in arithmetic mean values of BMI at baseline and after 6 weeks of nutrition intervention indicate that there is a significant statistical difference at 5% level. In control group the difference was very slight and it was not statistically significant at 5% level.

Average of waist circumference in experimental group prior to intervention was 107.57cm; while the standard deviation of arithmetic mean value was 6.449. After 6 weeks of nutritional intervention, weight mean value dropped to 102.86cm, while standard deviation was 6.378. Differences in arithmetic mean values of waist circumference at baseline and after 6 weeks of nutrition intervention

indicate that there is a significant statistical difference at 5% level. In control group the difference was very slight and it was not statistically significant at 5% level.

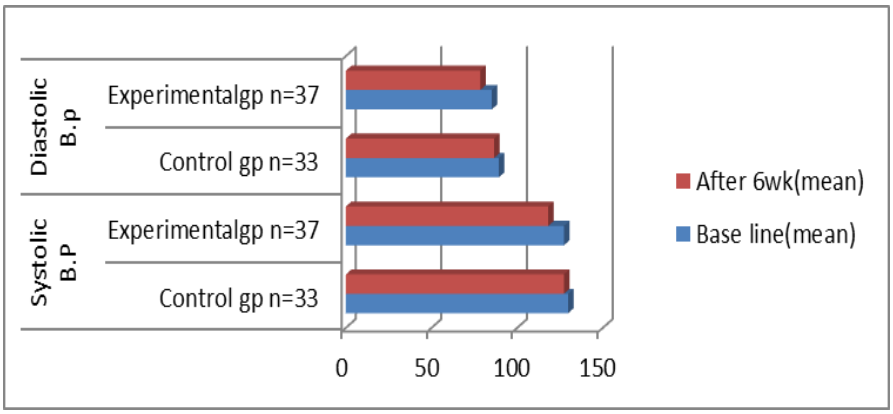
Average of Systolic blood pressure in experimental group prior to intervention was 127.3 mm of hg; while the standard deviation of arithmetic mean value was 9.324. After 6 weeks of nutritional intervention, Systolic blood pressure mean value dropped to 118.11 mm of hg, while standard deviation was 8.445. Differences in arithmetic mean values of Systolic blood pressure at baseline and after 6 weeks of nutrition intervention indicate that there is a significant statistical difference at 5% level. In control group the difference was very slight and it was not statistically significant at 5% level.

Average of Diastolic blood pressure in experimental group prior to intervention was 85.14mm of hg; while the standard deviation of arithmetic mean value was 7.311. After 6 weeks of nutritional intervention, Diastolic blood pressure mean value dropped to 78.38 mm of hg, while standard deviation was 6.877. Differences in arithmetic mean values of Diastolic blood pressure at baseline and after 6 weeks of nutrition intervention indicate that there is a significant statistical difference at 5% level. In control group the difference was very slight and it was not statistically significant at 5% level.

Table: 1

Changes in the Symptoms of Metabolic Syndrome at Baseline and after 6 weeks Intervention:

Variable	Group	Baseline		After 6 weeks		T Value	Sig
		Mean	SD	Mean	SD		
Weight	**Control**	68.867	7.928	68.582	7.897	4.296	0.000
	EXP	76.786	10.194	74.668	10.086	12.602	0.000
BMI	**Control**	29.906	3.082	29.606	3.036	3.127	0.004
	EXP	31.524	3.226	30.651	3.208	11.997	0.000
Waist Circumference	**Control**	103.45	6.746	102.39	6.046	3.763	0.000
	EXP	107.57	6.449	102.86	6.378	13.022	0.000
Systolic B.P	**Control N=33**	129.7	11.588	127.27	8.394	2.101	0.044
	EXP N= 37	127.3	9.324	118.11	8.445	7.03	0.000
Diastolic B.P	**Control**	89.24	8.303	86.52	6.787	3.032	0.006
	EXP	85.14	7.311	78.38	6.877	6.565	0.000



Graph-1 Showing mean values of Subjects before and after 6 weeks of Nutritional intervention:

Discussion: During the twentieth century, the consumption of processed foods has increased and the consumption of fresh produce and whole foods reduced. The result in consuming more white flour, refined products, sugar, salt, oil, animal protein and animal fats, the diets were more in calories, less in fiber and plant derived phyto chemicals by the growth of the processed food industry and the fortification of foods with synthetic vitamins, artificial nutrients and colors, preservatives, the incidences of Obesity, heart disease, diabetes, auto immune diseases and cancer have increased.

According to Chobanian et al the seventh report of the Joint National Committee on prevention , detection , evaluation and treatment of high blood pressure – "Hyper tension is core component of the metabolic syndrome and important risk factor for heart diseases, stroke and renal disease". The effects of diet on blood pressure have been examined in different trials. A study by Burk et al suggested that a

diet containing minimally processed grain, fruit and vegetables significantly decreased the hypertensive medication and improved the blood pressure. Similar results were observed by Li et al in type 2 diabetic rats. These studies suggest that diet high in minimally processed food in rich fibre and phyto chemicals decreases blood pressure (11, 12).

According to Ferrannini et al, insulin resistance and hyper insulinemia have been major underlying pathogentic mechanisms for the development of hypertension. The effectiveness of minimally processed food, rich in fibers is reducing insulin resistance and insulin levels in both diabetic and healthy individuals are also helping in treating as preventing hypertension in other studies (14,15,16).

According to Devaraj et al consuming fast food diet which is low in micronutrients and phyto chemicals results in inflammation , Oxidative stress and more free radical formation, To support this Fortana (2007)et al conducted a research on a group of people who eat the standard American Diet(SAD) and maintaining their thin body by resuming Forty-eight miles per week for twenty one year. Then researcher compared these people with two groups sedentary vegans who ate mostly unprocessed, un cooked plant foods. The results showed that athletes on SAD diet had a better blood pressure 122/72 than sedentary meat eaters 132/79. But the sedentary vegans averaged much better blood pressure 104/62 than athletes eating on SAD diet.

Processed convenience foods, commercial drinks, preserved meats, cheese, breakfast cereals, sandwiches , bread & rolls made with white flour, burgers , Pizza, Noodles, Ice cream, doughnuts, cookies, fortified fruit juices and candies. Research from university of Minnesota school of Public health evaluated heart disease risk in fifty thousand individuals eating western style fast food and found that " Eating Fast Food 2 (or) 3 times per week elevated the risk coronary artery disease by 50 percent. More risk was found when participants ate fast food 4 (or) more times per week. (Nearly 80 percent CAD risk). Even eating once a week increased the risk of heart problem by 20 percent"(15). Fast Food/Processed convenience food is loaded with sugars, salts, sweetening agents, artificial flavoring agents, synthetic nutrients, preservatives , high fructose corn syrup and refined white flours. According to the American Heart Association , the maximum add sugar intake poer day is 25 grams (or) 100 calories. But a 64-*ounce soda contains as much more 200gms of sugar.

As found in other studies , In the current study we also found similar results i. e the healthy dietary pattern is associated with reduced risk of Metabolic risk factors in women.

This whole food pattern constitute of whole grains, fruits, vegetables, legumes, dried beans etc which are rich in fiber, vitamin-E, Folates, B-Vitamins and micro minerals. (20-23) their glycemic Index is low and they digest slowly and reduce the insulin resistance and improve the metabolic syndrome risk factors such as body weight , Blood pressure , fasting glucose levels &control obesity.(24-25).

Researches studies also observed that healthy food pattern have a proactive association with metabolic syndrome and unhealthy pattern have adverse effect on metabolic syndrome risk factors.

Having in mind all these, facts the results obtained from blood pressure. Systolic blood pressure and diastolic blood pressure in women with Metabolic Syndrome risk factors indicate that after 6 weeks of Nutritional intervention these measures were reduced. Reduction in systolic blood pressure in Experimental group 1 by 9 mm of Hg and diastolic blood pressure by 6 mm of Hg. And in Experimental group 2 by 8mm of Hg of systolic blood pressure and diastolic pressure by 6 mm of Hg respectively. This clearly indicates the positive impact of minimally processed food in reduction of blood pressure. There is no doubt that diet and lifestyle changes impact in (curing) management of metabolic syndrome risk factors.

Limitations:

There are few limitations to the results presented in this study. Sample selected for this study us very small to represent whole population. We need to repeat in big sample to represent the population (As this study was conducted as a part of Ph.D research with limited founds of researcher). And the diet was assessed using a 24-hr dietary recall which is an important limitation for not capture individual food intake. Generally over weight individuals are more likely to under report their (energy) food intake.

Conclusion:

This study concludes that metabolic syndrome is highly prevalent in the community (because of globalization) screening in individuals in the community at the earliest and modifying their diets and life styles (modifications) can helpful in prevention and management of this syndrome. Significant definition of MS by ATP-III and IDF criteria suggests possible use of IDF which restricts the blood investigations only of central obesity is present as a major criterion. IDF definition is more feasible practical and cost effective approach.

Note: Further research is needed , has this study was done as a part of Ph.d study with limited funds and period.

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