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Effects of Fiber-Enriched Special Diet on the Patients of Hypertension

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Abstract:
Hypertension. Hyperlipidemia, hypercholoesieroleniia and obesity are known risk factors for cardiovascular diseases in human. Fiber in food has a remarkable influence in controlling different types of health hazards. A study \s as conducted' among 50 male subjects into five groups (30 to 50 years old) Wthin the body max indext (BMI) range (20 to 25) to receive 100gm high fiber enriched special diet for four wcks each. Mixed fiber enriched special diet supplenientation showed an ctfect on both diastolic blood pressure wid systolic blood pressure. The mean diastolic pressure diet supplementation showed an effect on both diastolie blood pressure and systolic blood pressure. The mean diastolic pressure came down from 86.2+11.5 mmHg to 79.1 ± 10.1 mmHg and systolic blood pressure from 119.7+15.5mmHg to 108+9.6mmHg these effects suggest use of mixed fiber enriched special diet as an effective znd well-tolerated item of a diet in the control of hypertension.hypcicholesterolemia or hyperlipidemia.

Key words: Dietary fiber, skimmed milk powder, cocoa powder. Special diet and blood Pressore.

Introduction:

In western countries various special diets have ali'early been Formulated. Standardized and commercial manufactured for pahients suffering from diseases such as Alkaptonuria, Cystathionuria, Cystinuria and Glycinuria connected with the inborn metabolic disorders. No specific tailored diet is available for patients of cardiovascular diseases. It is necessary to develop such diets for reducing incidence of heart diseases. Reports on the effects of these fibers after they had been processed into consumable foods are very few [1-2] Dietary therapy may be considered important in the treatment of hypet'cholesterolemia[13]' . This study was designed to test the effect of incorporating fibers into the special dtet on diastolic and systolic blood pressure. Differei age group judged acceptability of special diet.

MATERIALS AND METHODS

The active ingredients used for the special diet were germitiated heat (Triticum aesovum) powder, germinated green gram (Phaseolti.s atiretia) powder, yelloss carrot (Doucus carota) powder, ripe papaya (Carica payapaya) mass. Pui leaves (Basella rubra bacellace) powder. Supplementary ingredients for preparation of special diets were purchased from markets: fresh cow milk (Milkvita, Bangladesh), refined sugar (Bangladesh), lactose (Holland). palm kernel oil (Malaysia), cocoa powder (China), pectin (England), guar gum (India), gum acacia (Bratil), gum arabic (Brazil), beta-carotene (E—Merck, German), selenium (E-Merck, German,). and flavour (Birthwich, UK).
All food ingredients except vitamins and additives were broughl together in Melangeur machine (Carley

Montainary, Italy Spa) to produce a homogeneous mixture. During loading the Melangeur was heated to 6OC for a period of 25 minutes. Rel'intng involves the crushing, ebrasion, attrition and shearing of Prehomogentzed mixture to produce a product which had the desired particle size during refining (Refiner, Carley Montatnary, Italy Spa). Drying machine (DE VOS Bull and h Proefstn, Surinam 1956, 73) was used to reduce moisture content from retined mix. The mix was heatcd in the rotary dryer at 90C for about I hour. The dried mix was cooled in air-conditioned room where the relative humidity was .56%. The dried mix was fortified with vitamins. The powdered special diet was packed in moisture proof package and stoied.

Formulation of special diet with amounts

Name of the Ingredients	Percentage (%)
Germinated wheat flour (whole)	22.73
Germinated whole green gram	9.09
Skimmed milk powder	11.31
Carrot powder	1.14
Green basilla	1.14
Ripe papaya	1 .70
Icing sugar	19.9
Maiz starch	5.60
Lactose	6.80
I .iqcncl cow milk	4.42 in liter)
Cocoa powder	1.14
Lecithin	0.23
Gum Arabic	2.27
Pectin	2.84
CMC	2.28
Guargum	1.14
Gum acacia	1.14
Total	100.0

Proximate analyses: Determination of calonc was done by using the method of Galleiikarnp Adiabatic Bomb calorimeter; moisture, ash and fat were determined by the methods of AOAC[5.6] Protein content by Kjeldal technique Minerals were estimated by using atomic absorption spectrophotometer7 and dietary fiber by rapid gravirnetric methods of AOAC[6] and vitamins by using the method in AOAC[7]. Microbiological analysis was carried out by solid culture according to of USP XXIII.

Sensory evaluation. Sensory evaluation was done to judging the qualimy of food by a panel of judges. Sensory evaluation was designed to reflect common preterence, to maintain the quality of food for a given standard, for the assessment of process variation, cost reduction, product improvement, new market development and market analysis.

Feeding trial: A baseline history of study group was recorded and then spxial diet was given to volunteers for 4 weeks fulfilling their enrollment criteria. A pre-dcsigned questionnaire was fillec in from the interview of the volunteers. Volunteers were given to taste the study diet and they were instructed to the

use method of taking the diet. Volunteers were given 100g special diet. Body weight and heigh were measured before and after feeding trial of study diet.

Sample: From a total of 250 volunteers who were working as employee in Mimi Chocolate Ltd., at Tegaon Dhaka; 50 male subjects were randomly selected for feeding trial those who had BMI range between 18 and 25.

Statistical analysis: Prevalence was given in percentage. Student's t-tests were used for comparison of variables between volunteers and blood pressure (Mean±SD). The confounding variables were included into the variable interaction analysis in different combination. In each test the significant level was accepted p<0.OOl. Confidence intervals (95% CI) were also estimated for significance in some analyses. For all these analyses SPSS/PC+ was used.

Measurement of blood pressure: Both diastolic and systolic blood pressure were measured in mm/Hg. Blood pl'essul'e of the volunteers were recorded everyday at 8-9 a.m. using Sphygmomano meter (King, Japan).

RESULTS:

Proximate analysis and calorie: Each component is made up a substances having some properties in common but rTiay include smaller amounts of substances that arc unrelated chemically. The resulted moisture, ash, fat, protein, fiber and carbohydrate content of processed special diet were 2.3%, 2.7%, 8.2%, 86%, 11.28°% and 63.66/ respectively The physiologic energy value cI special diet was calculated to 365.58 Kcal per l00g special diet (Tablc I).

Table 1: Composition of the Speciai diet supplements per 100g

Energy (Kcal)	365.58
Moisture (%)	2.3
Ash (%)	2.7
Protein (g)	11.86
Fat (g)	8.20
Dietary fiber (g)	11 .28
Carbohydrate (g)	63.38
Beta-Carotene (rng)	6
Vitamin E (l U.)	11.4

Microbial analysis: Total count of special diet was observed >47 cpu/gm and total Coliform, Faccal coliform and Sigella were absent.

Body mass index (BMI): Figure-I shows the body mass index of the study participants. Anthropometric variables and their ratios (height, weight and calculatcl BMI) were classified into lower and higher valucs taking the measn as a cut, off point. The undernourished (BMI<20) and over-nourished individuals (BMI >25) were not included in the study, so all the participants were selected having normal BMI. The mean BMI of the volunteers were 22.6±2.4 at the base level and 22.4±2.4 alter intervention.

Diastolic blood pressure: Figure-2 shows the distribution of the volunteers according to their diastolic blood pressure. It also shows that 40% of the volunteers had diastolic blood pressure within the normal range (up to 89 mml-Ig). After the intervention the proportion of participants having normal (liastolic blood Pressure increased to 70%. The mean diastolic blood pressure lowred from 86.2±11.5 mmHg to 79.1±10.1 mmHg during the intervention. The correlation coefficient is. -0.756. So, a strong negative association Between fiber enriched diet intake and diastolic blood pressure level were found. The 2-tail probability of the difference (p = 0.00) is also highly significant.

Systolic blood pressure: Figure-3 shows that 36% of the volutecrs before inlersention have systolic pressure in the range of 90-I 10 mmHg. After the feeding trials prcportion of people having normal systolic blood pressure (90-110 mmHg) has increased from 36% to 68%) During the intervention the mean systolic blood pressure lowered from 119.7 ± 15.5 mrnHg to 108 ± 9.6 mmHg. The correlation of the systolic blood pressure and fiber enriched special diet is -0.623. So a strong negative association between fiber rich diet intake and the systolic blood pressure were found. The 2-tail probability of difference (p=0.000) was also highly significant.

Product a.eptance: Figure-4 shows comparative acceptability of specially processed diet and commercially available products as judged by different' age groi ip. Participants of 40-45 year age-group

Ftguie 4: shows the product acceptability levels 0f the volunteers.
80
MeanIAFT
Range of blood pressue(mn'IKg)
MmOIBFr
USeVAFT
Revge of Need Pesuo,.lnwVHgl
100%
25%
120%
Age ss)
Flee,

Extremely liked the product (73%. p<0.005) for physical appearance 30-44 year age group extremely liked the product (83%. p<O.OO1 for flavour and 45+ year age group extremely liked the product (78%, p<O.O02) for organolaptic taste. Most of the participants evaluated the special ct very close to natural cocoa taste.

Discussion:
The study diet was formulated containing calorie, protein, carbohydrate, fat and micronutrients. Results of the present study also showed the similar effect. This finding suggests that the mixed dietary fiber rich special diet rarely different from this previous report with respect at least to these biochemical characteristics. For them, the blood pressure measurement had a strong negative association between special diet; both blood systolic and diastolic pressure. Mixed fiber enriched special diet: both blood systolic and diastolic pressure. Mixed fiber enriched special diet supplementation showed an effect in both systolic and diastolic blood pressure (Figure 2 and 3) and also suggested that the subjects of age>40 years

old had reduced blood pressure. However, the pivalence of blood pressure of both systolic and diastolic was significantly lowered in the participants. There has been no previous study for comparison regarding mixed fiber enriched diet. In this study, mean (SD) BMI of Me participants was decreased after intervention. Many other studies reported that their usual intake of fiber sas decreased in both systolic and diastolic blood pressure. The variables are compared with previous study. Systolic and diastolic blood pressure were also reported as higher in the previous study i.e., special diet showed significant lowering effect on both blood pressure in the participants. The feasibility and tfficacy of soluble fibers incorporated into ready to eart special diet when used as part of an additional diet.

Conclusion:

The resLilt of our study confirmed that regular consumption of fiber rich special diet could reduce the incidence of CHD. In Bangladesh malnutrition is one of the main problems. However, recently degenerative diseases like CHD are also becoming important. Very f w attentions have been given on this issue. A few researches conducted revealed the prevalence rate in between 6%-11% of the rural population suffering from CHD. In such a situation it is expected that the farmulated special diet will play an important role in managing the CHD cases as regular consumption of it could improve the serum lipid profile.

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