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A NON-RANDOMIZED CONTROLLED RESEARCH ON THE DAIRY PRODUCTS (CA2 +) AND ITS BI-PRODUCTS (CA2 +) EFFECTS ON BLOOD CHEMISTRY, BODY FAT PERCENTAGE AND LOSS OF WEIGHT ON OBESE AND PRE- MENOPAUSAL WOMEN ATTENDING THE NUTRITIONAL OR DIET CLINICS

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Abstract:
Objectives: *Research aim was the determination of the dairy effects on the body changes in terms of body fat and mass because of the dairy calcium in the obese women about the weight loss diet.*
Methods: *Research was a non-randomized controlled research study held at a government hospital of Turkey in the time of June – September, 2016. Obese women were made the part of research who consulted clinics of diet and nutrition. Participants were divided into groups on the basis of use of dairy products, three groups were such as dairy products group (control), high and low dairy groups. We also measured BP and anthropometry, blood chemistry analysis was also carried out before any intervention.*
Results: *Research sample had selected sixty-five women with a mean age of (33.10 ± 6.18) years. Control group had 20 cases (30.7%), high dairy group included 22 cases (33.8%) and 23 cases (35.3%) were included in low dairy group. After the completion of the research body weight, waist, body mass index (BMI), hip circumferences, hip / waist ratio, percentage of body fat, fat mass decreased significantly with a statically significant p-value of (< 0.001); whereas, we observed no difference among the three groups. Levels of plasma total cholesterol was lowered (p-value < 0.05, p-value < 0.001) and levels of high-density lipoprotein cholesterol were elevated (p-value < 0.05) in 2 interventional groups. There was a negative association of the systolic BP with dairy calcium (p-value = 0.460, p-value < 0.05).*
Conclusions: *All the women involved in the weight loss program we observed non-effectiveness of the dairy products for obtaining loss in weight in comparison to the restriction of the calorie.*
Keywords: *Anthropometry, Blood pressure, Blood chemistry, Dairy products and Caloric restriction*

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INTRODUCTION:

In the last decade it has been learnt that in the favor of a diet program for the reduction of weight in relation with the dairy products and dietary calcium (Ca2 +) [1 – 4]. The anti-obesity proposed mechanisms in the effect of dairy products and Ca2+ can be stated in short as: (a) Dietary Ca2+ moderates the calcitriol circulation (1, 25 – dihydroxy vitamin – D) (1, 25 (OH) 2-D) level that resultantly regulates an intra-cellular Ca2+ (i [Ca2+]) affecting the human adipocytes fat metabolism. Calcitriol suppression with high levels of diets of Ca2+ may reduce adipocytes I [Ca2+], activate lipolysis and impede fatty acid synthase(FAS), thus exerting an anti-obesity result [1]. (b) an enhanced Ca2+ diet seems to bind additional fatty acids in colon which as a result inhibits fat absorption [2]. (c) high diets of Ca2+ can also affect partitioning of energy by suppressing the levels of calcitriol, which also permits the increase in the adipocyte separation of protein – 2 (UCP – 2) appearance and it may mediate UCP – 2 with transport of fatty acid and oxidation [5] as shown in figure.

It is claimed through various research studies that Ca2+ as a dairy product may be effective for the obesity against Ca2+ because of the dairy products elements such as conjugated linoleic acid, branched chain amino acids and whey proteins [2, 3]. However, in the current meta-analysis, narrowed and systematic scale reviews also indicate the dairy product association with the anthropometric variables, specifically controversial is the loss of the weight in body [2, 4, 6, 7]. Available clinical data also supports printed clinical assessments and also favors the dairy products and Ca2+ claim in the favor of the fat loss and weight [4, 8, 9 – 12]. Contrarily, numerous effects of either dairy product or Ca2+ utilization in order to lose fat and reduce weight as observed in the previous research trials [6, 13 – 15]. In addition, there are conflicting outcomes related to the dairy products protective effects in the parameters like BP and lipid profiles having a direct link with the cardiometabolic disturbances as reported with inconsistent outcomes specifically related to the serum cholesterol which indicates no increase or effects, these outcomes may also lead to the further probes for the detailed elucidation of the dairy products [15, 16, 17]. Available outcomes are also contradictory and conflicting, the benefit of the milk and associated bi-products are effective and beneficial in few of the segments of the population [2].

Our research is unique in its subject as there no planned effort has been made in this aspect about the dairy product and milk consumption with restrictive calorie on blood variables and loss of weight. Research was planned for the determination of the consumption of dairy items with the restriction of calorie for BP, weight loss and serum lipids in the obese women who volunteered themselves for the research.

SUBJECTS AND METHODS:

Research was a non-randomized controlled research study held at a government hospital of Turkey in the time of January – March, 2010. Obese women were made the part of research who consulted clinics of diet and nutrition. Participants were divided into groups on the basis of use of dairy products, three groups were such as dairy products group (control), high and low dairy groups. We also measured BP and anthropometry, blood chemistry analysis was also carried out before any intervention. Size of the sample was calculated through WHO guidelines and in consideration with the previous data [10].

Through face to face interview sessions socio-demographic and physical routine information was collected, questionnaire having a total of ten items relating to the history of family and status of health was observed in reference with the previous program of loss of weight in obese women. Additionally, dietary intake such as dairy products used by the participants were determined in the time span of twenty-four-hour consumption routine before the commencement of the research.

We included those women who were in pre-menopausal stage having age in the range of 18 – 49 years, BMI as 30 – 39.9 kg / m^2, not using mineral supplements and vitamin also never attended any program of loss of weight in the last 3 months. We did not include all the cases having oral intake of insulin and anti-diabetic agents, endocrine history, renal disease and hepatic disease or malabsorption syndrome, pregnant, irregular menstruation, smoking or lactating.

No dairy product was given to controls except 30 grams of white cheese (low-fat), whereas, HD and LD groups used 30 grams white cheese (low-fat) with a glass (200 ml) and 3 glasses (600 ml) of semi-skimmed milk per day respectively.

In the light of dietary guidelines adjustment of the weight loss diets was made (1000 k cal / day) [21]. A software was used for the routine intake of diet names BeBIS – 7.0. Base line levels of the caffeine and physical activity of all the participants was also maintained. Weekly visit of the clinics was made and diet control was ensured through telephonic contact.

Research was started after informed consent of the

participants and ethical approval of the hospital. Body weights, fat percentage, fat mass, total body water, lean body mass was also calculated through a device names as bioelectrical impedance analysis (BIA) and measurement of height was carried out with the help of stadiometer. Mid exhalation waist circumference was measured. Circumference of the hip was taken on the wider part. BMI and hip to waist ratio was also measured.

We also calculated intake of calorie in the guidelines of WHO. Fasting blood samples were taken for overnight fasting and centrifuged. Analysis of the plasma fasting glucose was carried out through glucose oxidase method, measurement of the triglycerides (TG) was carried out through method of end point colorimetric and through commercial kits total cholesterol, high and low-density lipoprotein cholesterol were also measured. Brachial artery BP was calculated in the interval of twenty minutes using stethoscope and aneroid sphygmomanometer and shown in the shape of mean values. All measurements were carried out in the beginning and end of the research.

Data analysis was made through SPSS-16 (statistical analysis), Sigma Stat V – 3.5, Shapiro-Wilk test (routine distribution), Chi-Square test (Socio-demographic comparison), ANOVA (group differences), Wilcoxon t-test (over time variable comparison), Kruskal-Wallis test (group differences) and Dunn's test (multiple comparison).

Spearman's correlation analysis helped in the variables comparison. Median value was used for the presentation of the data (25^{th} / 75^{th} percentiles), SD and mean as well as percentage and frequencies as and when required at significant p-value (< 0.05).

RESULTS:

Research sample was 65 obese women with a mean age of (33.10 ± 6.18) years, we observed a significant variation in the intervention and control group with p-value as (< 0.05).

We also observed no significant variation among groups of blood and anthropometric chemistry variables, calorie intake and physical energy expenditure before the commencement of research p-value as (> 0.05). Every group was observed with a significant weight loss p-value as (< 0.001) without any significant variation in the groups as p-value (> 0.05). HD and LD group women lost respectively up to 11.5% & 10% weight of the body as shown in Table – I. A significant decrease was also observed in the BMI, HC, WC, WHR, body fat percentage and fat mass as p-value was (< 0.001 each).

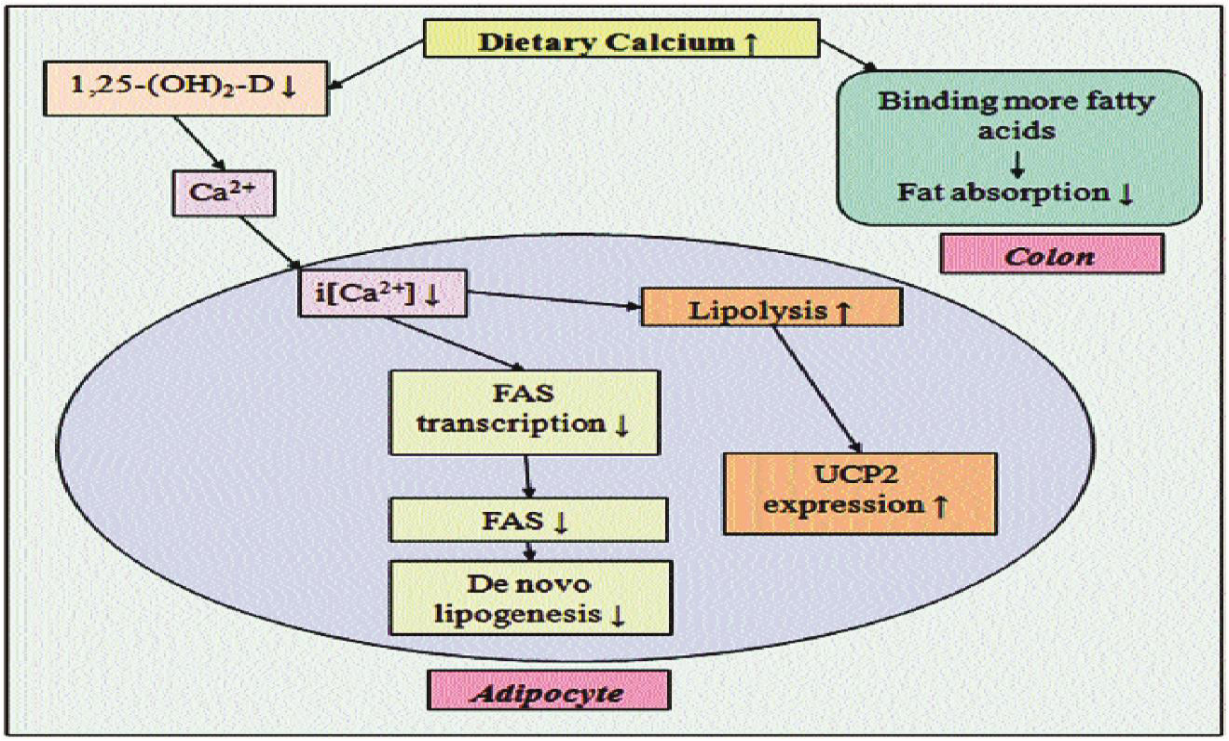

Figure: The effects of dietary calcium on 1,25-(OH)2-D, I [Ca2+] and its mechanism in adipocytes and colon

No significant variation was observed in the LD and control group regarding systolic BP; whereas, significant

decrease was observed in HD group for SBP (p-value < 0.001). SBP decrease was significantly high in HD group in comparison to the others (p-value < 0.001).

Diastolic BP decreased significantly in every groups (p-value < 0.05); whereas a decrease in the DBP was not observed as significant in the groups (p-value > 0.05) as shown in Table – II. No significant association was observed in the regular dairy foods and calcium and anthropometric variables of blood chemistry. Systolic and diastolic (r = -0.492; p-value < 0.001) & (r = 0.272; p-value < 0.05) respectively, negative association was observed in the BP and quantity of calcium derived dairy foods. However, there was a negative correlation between daily intake of calcium (r = -0.460; p-value < 0.001) as shown in Table – III.

Table – 1: Socio-demographic and anthropometric variables of subjects

Variables		Control group (n=20) Median (25th q/75thq)	LD group (n=22) Median (25th q/75thq)	HD group (n=23) Median (25th q/75thq)	P-value
Age (years)Δ		36.20 ± 6.31a	31.54 ± 5.31	31.91 ± 6.09	0.024
Education (%)	Illiterate	20	9.1	4.3	
	Primary	60	59.1	47.9	
	Secondary	5	18.2	17.4	
	University	5	9.1	26.1	
	Other	10	4.5	4.3	
Weight (kg)	Week Zero	87.70 (83.30/91.10)	85.60 (76.90/96.10)	86.90 (83.00/96.42)	0.84
	Week Twelve	78.15 (72.60/82.05)	76.05 (69.10/86.10)	76.30 (73.35/85.30)	0.898
	Week 12 - Week 0	-8.40 (-10.10/-7.15)	-8.65 (-10.40/-7.10)	-9.90 (-12.42/-7.55)	0.397
	P-Value	<0.001	<0.001	<0.001	
BMI (kg/m2)	Week Zero	35.45 (32.75/38.35)	34.65 (31.50/37.20)	35.30 (32.87/36.57)	0.779
	Week Twelve	31.40 (28.75/34.15)	31.25 (28.10/33.90)	30.50 (29.22/32.75)	0.714
	Week 12 - Week 0	-3.30 (-4.00/-2.80)	-3.50 (-4.20/-2.60)	-3.70 (-4.85/-3.07)	0.331
	P-Value	<0.001	<0.001	<0.001	
WC (cm)	Week Zero	106.25 (96.25/118.50)	100.90 (95.00/112.00)	103.50 (100.00/110.70)	0.613
	Week Twelve	98.60 (92.75/109.25)	93.30 (88.50/109.50)	95.50 (89.62/99.25)	0.224
	Week 12 - Week 0	-5.45 (-7.75/-4.50)	-6.70 (-7.80/-5.50)	-7.00 (-10.45/-5.12)	0.228
	P-Value	<0.001	<0.001	<0.001	
HC (cm)	Week Zero	122.00 (115.50/125.00)	122.00 (113.00/128.00)	119.00 (116.05/122.12)	1.808
	Week Twelve	118.00 (112.75/120.50)	118.75 (112.00/124.00)	114.80 (110.45/119.12)	2.967
	Week 12 - Week 0	-3.10 (-4.30/-2.25)	-3.50 (-4.80/-2.50)	-4.00 (-6.00/-2.62)	3.058
	P-Value	<0.001	<0.001	<0.001	
WHR	Week Zero	0.86 (0.84/0.91)	0.86 (0.82/0.90)	0.88 (0.84/0.92)	1.324
	Week Twelve	0.82 (0.81/0.90)	0.84 (0.78/0.88)	0.82 (0.80/0.87)	0.858
	Week 12 - Week 0	-0.03 (-0.03/-0.02)	-0.03 (-0.04/-0.02)	-0.03 (-0.06/-0.02)	2.027
	P-Value	<0.001	<0.001	<0.001	
Fat mass (kg)	Week Zero	37.10 (32.90/41.00)	35.30 (30.10/40.70)	36.00 (33.65/39.97)	0.68
	Week Twelve	29.65 (25.40/35.25)	27.40 (24.40/35.60)	27.70 (24.90/30.62)	0.556
	Week 12 - Week 0	-6.15 (-9.95/-4.95)	-5.80 (-8.70/-3.90)	-8.20 (-10.90/-5.07)	0.106
	P-Value	<0.001	<0.001	<0.001	
Fat (%)	Week Zero	41.95 (40.55/45.20)	41.45 (38.10/43.60)	41.70 (38.65/43.02)	0.315
	Week Twelve	38.05 (33.55/40.05)	36.50 (31.30/39.00)	35.30 (33.55/38.40)	0.501
	Week 12 - Week 0	-5.10 (-7.50/-3.10)	-4.70 (-6.80/-1.60)	-4.90 (-7.17/-2.45)	0.568
	P-Value	<0.001	<0.001	<0.001	
LBM (kg)	Week Zero	49.25 (47.00/53.05)	50.90 (46.80/55.60)	52.00 (48.75/55.32)	0.418
	Week Twelve	48.85 (46.30/50.65)	48.50 (46.00/52.50)	49.00 (47.20/54.00)	0.751
	Week 12 - Week 0	-0.35 (-3.55/1.05)	-1.95 (-4.80/0.40)	-1.80 (-3.25/0.10)	0.565
	P-Value	0.227	0.005	0.005	
TBW (kg)	Week Zero	36.05 (34.40/38.85)	37.25 (34.30/40.70)	38.10 (35.97/40.55)	0.284

	Week Twelve	35.75 (33.90/37.05)	35.50 (33.20/38.40)	35.90 (34.60/39.52)	0.712
	Week 12 - Week 0	-0.30 (-2.60/0.80)	-1.75 (-3.60/0.30)	-1.40 (-2.50/-0.22)	0.472
	P-Value	0.229	0.003	0.002	

Table – 2: Comparison of blood chemistry and blood pressure variables at week 0 and week 12

Variables		Control group (n=20) Median (25th q/75thq)	LD group (n=22) Median (25th q/75thq)	HD group (n=23) Median (25th q/75thq)	P-value
Plasma glucose (mg/dl)	Week Zero	89.10 (84.30/99.20)	90.15 (83.60/96.50)	92.60 (78.50/98.37)	0.959
	Week Twelve	88.55 (84.85/90.00)	89.85 (80.00/95.00)	86.70 (77.10/91.97)	0.388
	Week 12 - Week 0	-3.10 (-6.60/0.95)	-1.75 (-7.60/3.80)	-5.70 (-10.65/-0.10)	0.307
	P-Value	0.043	0.325	0.003	
TG (mg/dl)	Week Zero	160.50 (88.00/184.00)	106.90 (85.00/137.00)	96.00 (78.75/186.12)	0.571
	Week Twelve	103.40 (73.00/187.50)	104.50 (73.00/142.00)	97.00 (81.12/143.25)	0.803
	Week 12 - Week 0	0.10 (-19.50/6.20)	5.50 (-2.80/14.00)	-0.20 (-13.52/6.87)	0.22
	P-Value	0.504	0.154	0.506	
TC (mg/dl)	Week Zero	186.00 (177.30/210.00)	196.50 (158.00/221.00)	179.00 (162.50/205.00)	0.442
	Week Twelve	187.00 (174.60/196.10)	191.00 (166.00/205.00)	164.20 (149.20/190.05)	0.054
	Week 12 - Week 0	-7.90 (-15.00/3.00)	-9.00 (-18.00/1.00)	-13.00 (-27.85/-5.55)	0.231
	P-Value	0.068	0.014	<0.001	
HDL-C (mg/dl)	Week Zero	38.80 (34.10/46.05)	39.50 (29.50/49.00)	38.30 (30.75/44.00)	0.616
	Week Twelve	40.60 (34.35/49.40)	42.70 (33.60/54.60)	41.40 (33.05/44.75)	0.65
	Week 12 - Week 0	1.30 (-2.80/3.75)	2.85 (0.90/7.50)	2.80 (0.40/5.80)	0.356
	P-Value	0.404	0.010	0.012	
LDL-C (mg/dl)	Week Zero	121.80 (112.70/139.35)	131.65 (98.19/160.60)	121.10 (104.47/139.25)	0.429
	Week Twelve	116.60 (109.50/134.44)	120.70 (90.60/148.00)	104.00 (97.90/137.95)	0.816
	Week 12 - Week 0	-1.75 (-6.15/2.25)	-5.45 (-17.60/-2.10)	-3.50 (-12.59/3.18)	0.137
	P-Value	0.277	0.001	0.098	
VLDL-C (mg/dl)	Week Zero	32.39 (18.40/39.90)	25.60 (9.42/34.20)	19.79 (15.00/34.47)	0.279
	Week Twelve	28.80 (18.40/43.50)	21.10 (12.60/30.80)	20.81 (15.10/28.82)	0.266
	Week 12 - Week 0	-1.19 (-4.20/1.90)	-1.51 (-6.48/1.20)	-0.20 (-1.60/2.73)	0.366
	P-Value	0.436	0.105	0.899	
SBP (mmHg)	Week Zero	120.00 (115.00/130.00)	120.00 (110.00/130.00)	120.00 (120.00/130.00)	0.36
	Week Twelve	120.00 (110.00/130.00)	120.00 (110.00/120.00)	110.00 (100.00/120.00)#	0.035
	Week 12 - Week 0	0.00 (-2.50/10.00)	0.00 (-10.00/0.00)	-10.00 (-20.00/-2.50)#	<0.001
	P-Value	0.59	0.125	<0.001	
DBP(mmHg)	Week Zero	80.00 (70.00/80.00)	80.00 (70.00/80.00)	70.00 (70.00/80.00)	0.403
	Week Twelve	70.00 (60.00/80.00)	70.00 (60.00/70.00)	60.00 (60.00/70.00)	0.084
	Week 12 - Week 0	0.00 (-10.00/0.00)	-10.00 (-10.00/0.00)	-10.00 (-20.00/0.00)	0.079
	P-Value	0.016	<0.001	<0.001	

Table – 3: Correlation between daily intake of total calcium and calcium derived from dairy foods and blood pressure

Total calcium intake (mg)	p	**P-value**
SBP (mm/Hg)	-0.46	<0.001
DBP (mm/Hg)	-0.224	0.072
Calcium derived from dairy foods (mg)	p	**P-value**
SBP (mm/Hg)	-0.492	<0.001
DBP (mm/Hg)	-0.272	0.029

DISCUSSION:

Our selected mean age was 33.10 years, young participants were the part of HD and LD groups than the control group (p-value < 0.05) observed as consistent in terms of age wise distribution when compared to another research [10]. No significant difference was observed in various groups regarding illiteracy among LD and HD respectively 9.1% and 4.3%. In three groups there were 51 housewives (78.5%), 8 civil servants (12.3%) and 6 workers (9.2%). No difference was observed in terms of occupational status and educational status respectively (p-value > 0.05) and (p-value > 0.05).

At initiation of the intervention, no significant variation was observed in blood chemistry and anthropometric variables, calorie intake and physical energy expenditure with an exception of age. No significant weight loss difference was observed but all groups participants had a significant loss of weight subject to their diet (p-value < 0.001), that is because of the additional intake of thirty grams white cheese (low-fat) plus either 200ml semi skimmed milk or 600ml semi-skimmed milk which did not promote fat loss and weight at the intervention of twelve weeks. These results also support the previous randomized research outcomes [15, 16]. A research held on the obese adults in the condition of normal energy and with restricted energy observed no difference between high and low dairy groups for the change in the category of weight [16]. Whereas, in another research it is recommended that dairy group (above three servings per day) showed huge oxidation of fat and it was also able to consume huge energy amounts without more weight-gain than LD group (less than one serving per day). There was no association between our research in terms of daily total calcium or calcium bi-products and variables of anthropometric [22].

In the same way, in the light of few previous research studies [7, 23], we observed less effective dairy products on fat loss and body weight that may be a possibility as indicated in the meta-analysis [6], as the dairy consumption increased benefits on fat loss and body weight that needs no calorie or long-term restriction.

CVD has a direct link with the blood lipids alterations. Inconsistent results have been reported by various research studies relating to the milk and its bi-products impact [7, 15, 17]. Another research also states no association between TGs and diet of HD, total cholesterol and LDL cholesterol same as we observed in this research [17].

Blood pressure is the result of an inadequate dairy products intake or calcium intake [24]. We observed that high level intake of dairy products decreased the SBP (p-value < 0.001); whereas, LD products were not observed with the same. All groups were observed with a decrease in the DBP. HD group was also observed with a decrease in the SBP. We observed that there was a negative association in the daily intake of calcium and SBP and DBP in comparison to the derived dairy calcium. We observed a protective effect in terms of the blood pressure with the dairy products [10, 25]. Contrarily, few research studies also observed that dairy products did not affect the SBP or DBP [7, 12, 15, 22]. It was observed in the literature consolations that blood pressure improvement was linked with the intake of dairy products, speculations about the BP were as that it is responsible for the change in the arterial wall extracellular matrix which is improved because of the angiotensin-converting enzyme inhibition through bioactive peptides which release during dairy protein digestion [9]. In addition, these improvements may be the result of dairy product macro-mineral content including potassium, sodium, phosphorous and magnesium [17].

There were few limitations in this research along with few strengths. Research was controlled intervention and focused on the awareness and follow-up about dairy intake comparisons in obese women. However, record collection about the consumption of the dairy items can be a research limitation. Long term affects were not observed as the duration of the research was not long. Research small sample size was also one of its limitations.

CONCLUSION:

No effect was observed in terms of increased use of dairy products and bi-products in the improvement of the fat loss and weight loss as well as in the blood lipids with restricted energy intake, on the other hand there was a positive influence on BP in pre-menopausal of obese women.

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