

Impact of Dietary Counseling on Anthropometric Parameters, Antioxidant Nutrient Intake, and Metabolic Syndrome Parameters on Metabolic Syndrome Patients Attending Diet Therapy Clinic: A Pre-Post Non-Randomized Intervention Study

Study Results

Table 1: Sociodemographic characteristics of study participants

Characteristics	Frequency	Percentages (%)
Age (years)		
31- 40	3	3.7
41-50	10	12.2
51-60	29	35.4
61- 70	40	48.8
Mean Age	58	
Gender		
Male	18	22
Female	64	78
Marital Status		
Married	47	57.4
Divorced/Separated	12	14.6
Widowed	23	28.0
Educational Status		
None	16	19.5
Primary	8	9.8
Middle School / JHS	41	50.0
SHS / Vocational Training	10	12.2
Tertiary	7	8.5
Occupational Status		
Employment	47	57.3
Unemployed	35	42.7
Monthly Income		
Less than GHS100	10	12.3
Between GHS100– GHS999	35	42.7
Between GHS1000-GHS2000	3	3.7
Greater than GHS2000	1	1.3

Data are represented as frequencies with their corresponding percentages Senior high school: SHS, Junior high school: JHS

Table 2: Lifestyle practices of study participants

Characteristics	Frequency	Percentage
Smoking		
No	82	100
Ever smoked		
Yes	2	2.4
No	80	97.6
Stopped Smoking		
Years	2	100
Alcohol Intakes		
Yes	4	4.9
No	78	95.1
Alcohol Type		
Beer	4	100
Follow Dietary Modification		
No	82	100

Data are represented as frequencies with their corresponding percentages

Table 3: Anthropometric indicators and blood pressure of study participants

Variables	Total	Baseline		p	Endline		p
		MetS - Control	MetS-Int.		MetS-Control	MetS-Int.	
BMI Kg/m²	N = 82	N= 41	N= 41		N= 32	N= 33	
Underweight	1(1.2)	1(2.4)	0(0.0)	0.301	0(0.0)	0(0.0)	0.934
Normal	4(4.9)	3(7.3)	1(2.4)		3(9.4)	3(9.1)	
Overweight	20(24.4)	12(29.3)	8(19.6)		11(34.4)	10(30.3)	
Obese	57(69.5)	25(61.0)	32(78.0)		18(56.3)	20(60.6)	
WC cm							
Normal	4(4.9)	1(2.4)	3(7.3)	0.616	2(6.3)	3(9.1)	1.000
High	78(95.1)	40(97.6)	38(92.7)		30(93.8)	30(90.9)	
VF							
Normal	15(18.3)	10(24.4)	5(12.2)	0.253	9(28.1)	9(27.3)	1.000
High	67(81.7)	31(75.6)	36(87.8)		23(71.9)	24(72.7)	
BP mmHg							
Normal	29(35.4)	14(34.1)	15(36.6)	1.000	9(28.1)	24(72.7)	<0.001
High	53(64.6)	27(65.9)	26(63.4)		23(71.9)	9(27.3)	

Data are presented as frequency (percentage). BMI = Body mass index, WC = Waist circumference, VF = Visceral fat, BP = Blood pressure. Fisher's exact test performed

Table 4: Metabolic syndrome parameters between study group participants

Parameters	Pre-Control Mean \pm SD	Post-Control Mean \pm SD	p	Pre-Intervention Mean \pm SD	Post-Intervention Mean \pm SD	p	Reference range
Weight (kg)	80.35 \pm 17.54	81.92 \pm 17.63	0.103	83.00 \pm 14.86	81.86 \pm 15.76	0.096	Not Applicable
BMI (kg/m ²)	32.45 \pm 7.76	32.80 \pm 7.66	0.565	33.02 \pm 6.05	32.03 \pm 6.47	0.102	\geq 18.5-24.9 kg/m ²
WC (cm)	108.39 \pm 15.57	104.71 \pm 21.05	0.302	112.21 \pm 13.35	110.80 \pm 13.36	0.006	M:110 cm F:88 cm
FBG (mmol/L)	10.32 \pm 12.66	6.03 \pm 2.44	0.082	5.83 \pm 1.35	5.46 \pm 2.30	0.340	3.3-6.4 mmol/L
HDL (mmol/L)	1.69 \pm 0.21	1.49 \pm 0.20	0.001*	2.21 \pm 1.17	1.62 \pm 0.18	0.008*	M > 1.42 F: > 1.68
Serum TG (mmol/L)	0.93 \pm 0.31	1.29 \pm 1.21	0.115	0.86 \pm 0.37	1.62 \pm 2.61	0.091	< 1.69
Systolic BP (mmHg)	139.41 \pm 15.72	140.91 \pm 17.31	0.595	142.94 \pm 13.37	139.52 \pm 18.17	0.184	< 120
Diastolic BP (mmHg)	90.66 \pm 11.41	92.09 \pm 12.76	0.404	89.03 \pm 10.03	80.45 \pm 14.55	0.002*	< 90

Data presented are means \pm SD (independent t-tests). Mean values were statistically significant at $p \leq 0.05$. The star (*) indicates a significant p-value. Pre indicates at baseline, and Post indicates at endline. M = male, F = female.

Table 5: Impact of dietary counseling on metabolic syndrome parameters of MetS Participants at Endline

Variables	Study groups					Intervention Group				
	Control Group					Intervention Group				
	β	aOR	95% CI		p	β	aOR	95% CI		p
			Lower	Upper				Lower	Upper	
High BP	1.0					1.875	0.2	0.1	0.5	0.001
High BG	1.0					2.707	0.1	0.0	0.6	0.014
High TC	1.0					1.782	0.2	0.1	0.5	0.002
High LDL	1.0					3.068	0.1	0.0	0.4	0.005

CI- confidence interval, TC- total cholesterol, LDL- low-density lipoprotein, BP- blood pressure.
Binary regression analysis performed

Table 6: Impact of dietary counseling on antioxidant nutrients intake of intervention group participants at endline

Antioxidant Nutrient	Dietary Counselling				
	B-coefficient	R ²	F	T-value	P-value
Vitamin C	0.001	0.020	0.629	0.793	0.434
Vitamin E	0.265	0.150	5.747	2.341	0.025*
Vitamin A	0.000	0.056	1.849	1.360	0.184
Zinc	0.028	0.083	2.806	1.675	0.104
Selenium	0.002	0.038	1.214	1.102	0.279

Data represent the impact between dietary counseling on antioxidant nutrients of participants at endline. Data represented by (*) show statistical significance at ($p < 0.05$) with corresponding Beta-coefficient, R-square (R^2), F-values, and T-values. Linear regression was used.

Table 7: Impact of dietary counselling on antioxidant nutrients intake of intervention group participants at endline

Metabolic Syndrome Parameters	Dietary Intakes								
	Calories r (p)	CHO r (p)	Protein r (p)	Fat r (p)	Vit C r (p)	Vit E r (p)	Vit A r (p)	Zinc r (p)	Selenium r (p)
Intervention									
Weight (Kg)	0.110 (0.542)	0.094(0.604)	0.051(0.780)	0.124(0.493)	0.078(0.665)	0.140(0.438)	0.147(0.414)	0.097(0.591)	0.118(0.513)
BMI Kg/m ²	0.186(0.301)	0.190(0.290)	0.129(0.474)	0.134(0.457)	0.042(0.816)	0.142(0.431)	0.83(0.545)	0.192(0.285)	0.286(0.107)
WC (cm)	0.026(0.888)	-0.055(0.760)	0.087(0.629)	0.105(0.562)	-0.163(0.365)	0.013(0.944)	0.000(1.000)	0.107(0.554)	0.147(0.413)
FBS (mmol/L)	-0.139(0.444)	-0.178(0.322)	-0.061(0.735)	0.078(0.666)	-0.195(0.277)	-0.203(0.258)	-0.177(0.326)	-0.083(0.645)	-0.052(0.773)
HDL (mmol/L)	0.210(0.240)	0.138(0.445)	0.247(0.166)	0.251(0.159)	0.308(0.082)	0.301(0.089)	0.284(0.110)	0.001(0.994)	0.180(0.316)
LDL (mmol l/L)	0.113(0.187)	0.170(0.510)	0.213(0.432)	0.291(0.023)	0.138(0.445)	-0.121(0.245)	0.138(0.068)	0.092(0.851)	0.178(0.150)
TG (mmol/L)	0.076(0.673)	0.169(0.348)	-0.077(0.672)	-0.047(0.794)	-0.146(0.416)	-0.106(0.558)	-0.220(0.218)	-0.105(0.561)	0.009(0.959)
SBP (mmHg)	-0.114(0.527)	-0.149(0.408)	-0.115(0.522)	-0.011(0.953)	0.092(0.610)	-0.041(0.823)	0.054(0.766)	-0.001(0.994)	-0.119(0.509)
DBP (mmHg)	0.385(0.027)	0.372(0.033)	0.266(0.135)	0.346(0.049)	0.0351(0.045)	0.502(0.003)	0.313(0.076)	0.286(0.106)	0.351(0.045)
Control									
Weight (Kg)	0.040 (0.828)	0.150(0.411)	0.015(0.937)	-0.122(0.507)	0.002(0.992)	0.138(0.452)	0.053(0.771)	0.061(0.740)	0.323(0.072)
BMI Kg/m ²	-0.039 (0.830)	0.099(0.589)	-0.047(0.799)	-0.228(0.209)	-0.163(0.372)	0.003(0.989)	-0.040(0.829)	0.016(0.930)	0.287(0.111)
WC (cm)	0.039(0.831)	0.061(0.740)	-0.046(0.802)	0.016(0.932)	-0.702(0.000)	-0.015(0.935)	-0.251(0.165)	0.074(0.687)	0.134(0.464)
FBS (mmol/L)	-0.109(0.559)	-0.114(0.541)	-0.202(0.275)	0.004(0.984)	-0.185(0.320)	0.035(0.852)	-0.133(0.474)	0.022(0.905)	-0.333(0.067)
HDL (mmol/L)	0.00(1.000)	-0.038(0.842)	0.062(0.745)	0.034(0.860)	0.089(0.640)	0.071(0.710)	0.120(0.526)	-0.152(0.422)	0.252(0.180)
LDL (mmol/L)	0.011(0.715)	0.127(0.401)	0.139(0.074)	0.129(0.007)	-0.157(0.226)	0.216(0.107)	0.186(0.129)	0.036(0.621)	0.241(0.170)
TG (mmol/L)	-0.021(0.912)	0.050(0.792)	-0.0110(0.562)	-0.097(0.609)	0.008(0.966)	0.072(0.704)	-0.016(0.933)	-0.008(0.968)	-0.081(0.669)
SBP (mmHg)	-0.094(0.607)	-0.203(0.265)	0.063(0.731)	0.074(0.687)	0.218(0.230)	0.073(0.691)	0.040(0.830)	-0.059(0.750)	-0.066(0.720)
DBP (mmHg)	0.100(0.585)	0.056(0.762)	0.127(0.487)	0.121(0.510)	0.259(0.153)	0.258(0.153)	0.140(0.444)	0.001(0.997)	0.137(0.456)

Data represent the association between dietary intakes and MetS parameters of participants at the endline. Pearson correlation test was used. Mean values are statistically significant at p-value < 0.05. Negative correlation is represented by one star (*)