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BMI-linked correlative changes in plasma concentrations of fasting glucose and triglyceride among older adults

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ABSTRACT

The present study was undertaken on randomly sampled older adults from both the sexes residing in Darbhanga, a commissionary town of North Bihar India (n=360). Body Mass Indices were determined using the standardized formula and plasma concentrations of Fasting glucose and Triglyceride were estimated using the semi-Automated Analyzer.

Higher values of plasma constituents in relatively more vulnerable overweight and obese age groups of older adults were recorded with apparently more pronounced increasing trends in observed values among women subjects. ANOVA indicated highly significant variabilities at 0.01 level of P. Correlation analyses revealed, more or less, significant and positive correlations among the covariates in overweight and obese late age groups.

Conclusively, age and obesity could be thought to serve as potential risks for diabetogenicity and dyslipidemia in older adults.

Figures : 00 References : 12 Tables : 03
KEY WORDS : Age, Ageing, BMI, Dyslipidemia, Glucose, Obesity, Senescence, Triglyceride.

Introduction

Obesity among older adults could be thought to be the inevitable fallout of homeostatic perturbations during post-adulthood senescence. Impairment of glucose and lipid metabolism is believed to raise the risks of diabetes and dyslipidemia manifold and, in turn, jeopardise cardiovascular health of individuals in their late age.

Recent advances in ageing studies suggest onset of marked metabolic upheavals with accompanying homeostatic disturbances during post-adulthood senescence culminating in degenerative age onslaughts. Reported association[2] of age with Cardiovascular Disease(CVD) and mortality rates from CHD was thought to increase with decade[3].Older adults invariably represent highly vulnerable age segment showing greater proneness to obesity-mediated dysfunctions. Overweight and obesity believably serve as causative agents for emerging chronic diseases such as Cardiovascular Disease and Diabetes which, in turn, pose a serious threat to population health[7].

Age increment after forties seems to bring about deteriorative changes in an ageing individual in association with certain modifiable environmental factors such as food habit, diet and physical activity. Failure in maintenance of energy budget at any age leads to catastrophic results. However, it is thought to be more devastating in late age in association with disproportionate weight gain causing obesity. There is raised risk of Diabetes in overweight and obese subjects[4]. Published data also suggest association of BMI with the development of Cardiovascular risk factors *viz.* dyslipidemia, hypertension mellitus and insulin resistance that lead to cardiovascular Diseases like ischemic stroke and Coronary Heart Disease[9,11,12]. BMI is considered to be the best measure of obesity[6]. In consideration of strong relation between BMI and Cardio-metabolic disorders[10], BMI is computed in majority of population-based ageing studies for depiction of obesity pattern. In view of Body Mass Index being an ideal obesity indicator and age-specific variations in circulating levels of glucose and triglyceride,in every likelihood, serving as biomarkers of carbohydrate and lipid metabolism, the present piece of work was contemplated with the sole objective to assess interventional role of age and obesity in inducing diabetogenicity and dyslipidemia in older adults.

Materials and Methods

The study group comprised of randomly sampled older adults from both the sexes inhabiting Darbhanga, a commissionary town of North Bihar, India (n=360) and were categorized into four age groups *viz.* 50-59 yrs.,60-69 yrs.,70-79 yrs. and 80+ yrs. Three BMI-dependent

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TABLE-1: Mean values of Plasma Glucose and Triglyceride concentrations among older adults under chosen age intervals in relation to various obesity groups.

Obesity group	Age range	Sex (% popul.)	Mean Values ± S.D	
			PGlu (mg/dl)	PTri (mg/dl)
Normal weight	50-59	M (11.39)	110.6 ± 37.38	130.5 ± 23.62
		W (4.44)	124.6 ± 57.89	117.5 ± 15.54
	60-69	M (11.94)	127.5 ± 55.57	126.8 ± 47.39
		W (5)	117.1 ± 30.36	137.3 ± 35.13
	70-79	M (4.72)	128.5 ± 62.16	122.7 ± 21.52
		W (2.5)	119.4 ± 34.01	147 ± 44.96
	80+	M (2.22)	103.4 ± 30.14	133.3 ± 11.90
		W (0)	-	-
	All age range	M (30.28)	119.5 ± 49.99	128.04 ± 34.46
		W (11.94)	120.4 ± 43.44	132 ± 34.15
Overweight	50-59	M (5.28)	126.3 ± 27.94	151.05 ± 35.17
		W (2.5)	149.7 ± 81.10	150.7 ± 75.86
	60-69	M (4.17)	132.2 ± 49.84	115.6 ± 27.69
		W (2.78)	131.5 ± 36.00	136.2 ± 23.95
	70-79	M (2.22)	111.1 ± 21.83	124.3 ± 25.24
		W (1.39)	136.6 ± 70.17	124.6 ± 29.72
	80+	M (1.11)	111.2 ± 22.55	133.7 ± 20.62
		W (0.28)	92	153
	All age range	M (12.78)	124.3 ± 36.43	133.3 ± 33.99
		W (6.94)	137.5 ± 63.42	139.7 ± 50.79
Obese	50-59	M (7.22)	127.5 ± 41.53	168.2 ± 72.23
		W (7.78)	151.4 ± 57.76	172.0 ± 44.31
	60-69	M (5.55)	137.5 ± 48.39	152.3 ± 28.84
		W (3.33)	118.5 ± 36.12	166 ± 30.53
	70-79	M (1.67)	119.5 ± 26.50	130.5 ± 28.21
		W (1.39)	123.6 ± 26.58	178.4 ± 29.48
	80+	M (0.56)	89.5 ± 3.5	147 ± 25
		W (0)	-	-
	All age range	M (15)	128.9 ± 43.26	157.4 ± 55.52
		W (12.5)	139.6 ± 52.31	171.1 ± 39.75

N.B:S.D=Standard Deviation, M=Men, W=Women, PGlu=Plasma Glucose, PTri= Plasma Triglycerid

TABLE-2: Correlation Value and Significance level in Chosen Obesity Groups of Older Adults

Obesity group	Age range	Sex	BMI & P Glu(r)	P value	BMI & P Tri(r)	P value	PGlu & P Tri(r)	P value
Normal	50-59	M	0.01435	0.929043	0.05919	0.713169	0.09294	0.563293
weight		W	0.344165	0.191783	-0.33926	0.198619	-0.53418	0.033048*
	60-69	M	-0.19676	0.206005	0.11200	0.474580	0.19028	0.221637
		W	-0.08356	0.741671	0.497645	0.035600*	-0.31716	0.199698
	70-79	M	0.32299	0.206046	0.23330	0.367493	0.45724	0.064991
		W	-0.19043	0.449115	-0.35912	0.1433079	-0.20852	0.590298
	80+	M	0.05168	0.903272	-0.20285	0.629961	-0.46816	0.242027
		W	-	-	-	-	-	-
	All age	M	-0.00615	0.949393	0.08488	0.380192	0.165803	0.084889
	range	W	0.10457	0.50455	0.04880	0.755984	-0.28357	0.065368
Over	50-59	M	0.34159	0.152329	0.38866	0.100069	0.16525	0.498990
weight		W	0.217966	0.573180	0.273535	0.476352	0.13858	0.722166
	60-69	M	-0.18614	0.506550	0.40453	0.134753	0.08777	0.755768
		W	-0.07841	0.829528	-0.36052	0.306119	-0.14779	0.683678
	70-79	M	0.02378	0.955429	-0.65327	0.078990	-0.11958	0.777915
		W	0.90324	0.035601*	0.03438	0.956234	-0.09450	0.879858
	80+	M	0.75828	0.24172	0.88699	0.11301	0.65327	0.34673
		W	-	-	-	-	-	-
	All age	M	0.06696	0.658385	0.31381	0.03369*	0.08917	0.55565
	range	W	0.29121	0.157852	0.00592	0.977595	0.078225	0.710155
Obese	50-59	M	0.09427	0.64690	-0.11096	0.589450	0.20191	0.322592
		W	0.362856	0.057730	0.269477	0.165533	0.253414	0.1932091
	60-69	M	-0.10841	0.649144	0.04297	0.857249	-0.14912	0.530352
		W	0.029	0.9287127	0.37931	0.223968	-0.06829	0.8329831
	70-79	M	0.71717	0.108677	0.39464	0.438770	-0.13696	0.795844
		W	0.20241	0.744054	0.14583	0.814983	0.48603	0.406477
	80+	M	-1	-	-1	-	1	-
		W	-	-	-	-	-	-
	All age	M	0.04786	0.7310979	-0.07931	0.5686307	0.094306	0.497606
	range	W	0.23351	0.122640	0.25512	0.090769	0.2157178	0.154700

*Significant at 0.05 and **Significant at 0.01 level of P.

TABLE-3: ANOVA Value and Significance level in Chosen Obesity Groups of Older Adults

Obesity group	Age range	Sex	BMI & P Glu(F)	P value	BMI & P Tri(F)	P value	PGlu & P Tri(F)	P value
Normal	50-59	M	233.1141	< .00001**	867.16743	< .00001**	8.07013	0.0057**
weight		W	48.32429	< .00001**	577.08796	< .00001**	0.21187	0.648624
	60-69	M	156.1856	< .00001**	212.01082	< .00001**	0.00351	0.952914
		W	171.5348	< .00001**	187.56403	< .00001**	3.22432	0.081444
	70-79	M	48.16474	< .00001**	358.75525	< .00001**	0.12537	0.7256
		W	67.73205	< .00001**	63.37786	< .00001**	1.91113	0.18583
	80+	M	53.51586	< .00001**	631.74226	< .00001**	5.99732	0.028101*
		W	-	-	-	-	-	-
	All age	M	424.8764	< .00001**	1053.017	< .00001**	2.11678	0.147144
	range	W	221.6261	< .00001**	446.275	< .00001**	1.84504	0.177998
Over	50-59	M	240.8062	< .00001**	234.48221	< .00001**	5.45679	0.025179*
weight		W	19.3015	.000453**	22.41631	0.000224**	0.00066	0.979774
	60-69	M	66.45078	< .00001**	154.27957	< .00001**	1.19688	0.283268
		W	80.03059	< .00001**	196.91925	< .00001**	0.10628	0.748178
	70-79	M	111.6592	< .00001**	110.75079	< .00001**	1.09078	0.313997
		W	10.32015	0.012378*	45.89574	.000141**	0.09917	0.09917
	80+	M	45.15393	0.00052**	85.3626	0.00009**	1.626288	0.249368
		W	-	-	-	-	-	-
	All age	M	341.8376	< .00001**	466.5454	< .00001**	1.4773	0.227376
	range	W	77.0032	< .00001**	124.9542	< .00001**	0.0189	0.89105
Obese	50-59	M	145.32316	< .00001**	95.11584	< .00001**	5.96336	0.018186*
		W	122.73486	< .00001**	283.9698	< .00001**	2.16315	0.147158
	60-69	M	98.50048	< .00001**	355.90943	< .00001**	1.31117	0.259343
		W	68.1561	< .00001**	221.44539	< .00001**	11.05292	0.00307**
	70-79	M	59.03064	.000017**	65.45868	.000011**	0.40374	0.539433
		W	52.65577	.000088**	105.2189	< .00001**	7.62154	0.02464*
	80+	M	275.979	0.0036**	23.0836	0.0406*	5.1883	0.15043
		W	-	-	-	-	-	-
	All age	M	291.5029	< .00001**	290.257	< .00001**	8.64356	0.00403
	range	W	199.377	< .00001**	567.6982	< .00001**	10.1486	0.00199**

*Significant at 0.05 and **Significant at 0.01 level of P.

obesity categories for Indian population namely Normal weight (18-22.9), Overweight (23-24.9) and Obese(>25) were incorporated in the present investigation[8]. With prior consent of the subjects, BMI was calculated with known values of height and weight using the formula BMI=Weight(Kg.)/Height(m).Quantitative estimations of Plasma Glucose and Triglyceride were carried out using Semi Automated Analyzer and computation of F ratio and Correlation Coefficient(r) was done for statistical analyses of the recorded data and determination of level of significance at 5% and 1% level of P.

Discussion and Results

Table 1 shows age- and obesity-related observed mean values of Plasma Glucose and Plasma Triglyceride in both the gender groups suggestive of wide variations. Table-2 records computed values of r and shows,more or less, a general trend of significant and positive correlations at 5% and 1% probability levels. Table 3 entails F Ratio computed using principles of ANOVA and appears suggestive of significant variability at 0.05 and 0.01 level of P.

Findings for all ages and in relation to both the sexes, more or less, suggest a rising trend in both the haematologic parameters with increasing age with alarming levels in overweight and obese groups in contrast to normal weight obesity group. Plight of aged women is seemingly more critical contrary to aged men. This might be attributed to more medical attention to men in existing male-dominated society and relatively more sedentary lifestyle with minimal physical activity in women counterpart meted with relatively poor medical facilities as a fall out of prevalent gender bias in emerging societies.

Obesity is, by far, a very important risk factor of Cardiovascular Diseases including hypertension[1] and body weight plays definitive role in morbidity and mortality risk factor among women for Cardiovascular Diseases and arthritis[5].

Conclusively, age and obesity could be thought to serve as potential risks for diabetogenicity and dyslipidemia in older adults. The paper summarily recommends intake of daily dietary regimen strictly in tune with altered metabolic needs and nutritional requirements in old age in order to contain obesity and, in turn, remain protected from one or the other obesity-mediated physiological disabilities symptomatic of cardiovascular diseases and dysfunctions.

References

1. Dilman VM. Atherosclerosis and metabolic immune depression In The Grand Biological Clock, translated from the Russian by Rosenberg, M. and edited by Juswigg, T.Mir Publishers, Moscow. 1989; ISBN 5-03-000769-**5**:163-183.

2. Eisenmann JC, Malina RM. Age-related changes in subcutaneous adipose tissue of adolescents distance runners and association with blood lipoproteins. *Ann Hum Biol.* 2002;29:389–7. [PubMed]

3. Gaziano T, Reddy KS, Paccaud F, Horton, S, Chaturvedi V, Cardiovascular disease. In: Jamison,D.T.; Breman,J.G.; Measham, A.R.; Alleyne,G.; Claeson, M.; Evans D.B.; Jha, P.; Mills.A.; Musgrove.P..(2006) eds. Disease control priorities in developing world. Oxford: Oxford University Press, 645–62.

4. Kannel WB, Wilson PW. Risk factors that attenuate the female coronary disease advantage. *Arch Intern Med*. 1995; **155**: 57–61.

5. Must A, Spandano J, Coakley EH, Field AE, Colditz G, Dietz WZ. The disease burden associated with overweight and obesity. *J.Am.Med. Assoc.* 1999; **282** : 1523-1529.

6. NHLBI Obesity Task Force Clinical guideline on the identification, evaluation and treatment of overweight and obesity in adults—the evidence report. *Obese Res*. 1998; **6** (2): 51S–209S.

7. Njelekela MA, Mpembeni R, Muhihi A, Mligiliche NL, Spiegelman D, Hertzmark E, Liu E, Finkelstein JL, Fawzi WW, Willett WC, Mtabaji J. Gender-related differences in the prevalence of cardiovascular disease risk factors and their correlates in Urban Tanzania. BMC Cardiovascular Disorders. 2009; 9:30. doi: 10.1186/1471-2261-9-30.

8. Patil SP, Sukumaran S, Bhate A, Mukherji A, Chandrakar S. Correlation of blood sugar with waist circumference and body mass index in Indian population, *Global Journal of Pharmacology.* 2012; **6**(1): 08-11, ISSN 1992-0075.

9. Poirier P, Giles TD, Bray GA, Hong Y, Stern JS, Pi-Sunyer FX, Eckel RH. Obesity and cardiovascular disease: pathophysiology, evaluation, and effect of weight loss: an update of the 1997 American Heart Association Scientific Statement on Obesity and Heart Disease from the Obesity Committee of the Council on Nutrition, Physical Activity, and Metabolism. *Circulation*. 2006; **113**:898-918.

10. Volgman AS, Palaniappan LS, Aggarwal NT, Gupta M, Khandelwal A, Krishnan AV, Lichtman JH, Mehta LS, Patel HN, Shah KS, Shah SH, Watson KE. Atherosclerotic Cardiovascular Disease in South Asians in the United States: Epidemiology, Risk Factors, and Treatments. AHA Scientific Statement. *Circulation.* 2018; **138**: 34.

11. Wilkins K, Campbell NR, Joffres MR, McAlister FA, Nichol M, Quach S, Johansen HL, Tremblay MS. Blood pressure in Canadian adults. *Health Rep*. 2010; **21**:37-46.

12. Wormser, D, Kaptoge S, Di Angelantonio E, Wood AM, Pennells L, Thompson A, Sarwar N, Kizer JR, Lawlor DA, Nordestgaard BG, *et al.* Separate and combined associations of body-mass index and abdominal adiposity with cardiovascular disease: collaborative analysis of 58 prospective studies. *Lancet*. 2011 **377**:1085-1095.