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Impact of Obesity on Serum Levels of Neuropeptide –Y in Type 2 Diabetics in Relation to Glycemic Status

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Abstract

Obesity by different mechanisms can contribute not only to the development of type 2 diabetes mellitus (T2DM) but also to make it worse. One of these mechanisms may include the disturbances of neuropeptide Y (NPY) serum levels which is one of the most powerful orexigenic peptides, that's produced in large amounts in the hypothalamus, as well as in peripheral adipose tissue. The present study aimed to assess the impact of obesity in type 2 diabetic patients on serum neuropeptide-Y levels and its impact on fasting serum glucose and insulin levels. Eighty-seven T2DM patients attending the clinic of The National Center of Diabetes Treatment & Research/Baghdad, were included in this study, had been categorized into; Group (1): 45 patients (19 male, 26 female) obese T2DM patients with BMI (30.5- 44) kg/m2 and age range (31-59) years, and Group (2): Non-obese T2DM patients with BMI (18.6-24.9) kg/m2, included 42 patients (20 male, 22 female), with age range of (33-60) years .Fasting blood specimens were utilized to measure serum NPY and glycemic markers. Data analysis revealed that fasting serum glucose, HbA1c, homeostatic model assessment of insulin resistance (HOMA-IR) and neuropeptide Y values were significantly elevated (P<0.001) in group-1 in comparison with group-2, however fasting insulin level and homeostasis model assessment of beta-cell function (HOMA-B) were significantly elevated (P<0.001) in group-2 compared to group-1. Furthermore, neuropeptide-Y was positively correlated with BMI (rho=0.670, P<0.001), fasting serum glucose (rho=0.697, P<0.001), HbA1c% (rho=0.274, P=0.010) and HOMA-IR (rho=0.301, P=0.005), whereas it was negatively correlated with fasting serum insulin (rho=-0.296, P=0.005) and HOMA-B (rho=-0.598, P<0.001).

Conclusion: Elevated serum levels of neuropeptide Y in obese diabetic patient as compared with non-obese diabetic patients suggests that obesity plays a role in serum NYP levels. Furthermore, NPY levels are negatively correlated with serum insulin levels and HOMA-B values; which is indicative of its inhibitory effect on beta cells' ability to secrete insulin in T2DM patients.

Keywords: Neuropeptide Y, obesity, Type 2 diabetes mellitus, HOMA-B, HOMA-IR.

Introduction

Diabetes mellitus (DM) is a universal metabolic challenge [(1)], it is predicted to afflict 10.2% of people in 2030 and 10.9% of people in 2045[(2)].T2DM is a common chronic metabolic disease characterized by a persistent rise in blood glucose levels due to insulin resistance and /or a relative lack of insulin [(3-6)].Long-term hyperglycemia damages and malfunctions many of the body's organs [(7)]. The major risk factor for the development of type 2 diabetes is obesity, which is occur when energy intake exceeds expenditure over an extended period of time [(8)]. Beyond simply being overfed, obesity is strongly linked to a number of illnesses [(9)]. The word "diabesity" was coined due to the significant correlation between diabetes and obesity, implying a pathophysiological causal relationship between both conditions [(10)]. Metabolic problems associated with obesity encompass glucose metabolic disorders, dyslipidemia, hypertension, and dysregulation of numerous biochemical markers, including neuropeptide Y (NPY), that are associated with adiposity and interact with its action [(11)]. NPY is a polypeptide consisting of 36 amino acid residues, it belongs to the neuroendocrine peptide family, which also contains peptide YY (PYY) and pancreatic polypeptide [(12)]. There are six isoforms of NPY: Y1, Y2, Y3, Y4, Y5, and Y6 receptors, by interaction with these receptors NPY produce its actions [(13)].Pancreatic islet cells express the NPY (Y1, Y2, and Y5) receptors, and an NPY autoantibody may be utilized as a Type 1 diabetes diagnostic marker [(14)].One of the strongest orexigenic peptides, NPY, is generated in significant quantities by the hypothalamus and

peripheral adipose tissue. A surplus of it can be released in response to overindulgence, which raises energy intake and sets off a chain reaction of negative consequences that can lead to diabetes, heart disease, and other ailments [11]. The aim of this study is to estimate serum NPY levels in obese T2D patients then to assess the impact of obesity in type 2 diabetic patients on NPY levels and it's correlation to serum glucose and insulin levels.

Materials and Methods

A case control study, which took place at the National Center for Diabetes/College of Medicine Mustansiriya University from October 15, 2023, to January 25, 2024, a total of 87 diabetic patients, aged between 31 and 60, were chosen based on specific criteria from the out-patient clinic. Of these patients, 48 were female and 39 were male, and they were all under the care of an endocrinologist. The American Diabetes Association's diagnostic guidelines were followed while diagnosing diabetic individuals [15]. They were divided into two groups according their Body Mass Index (BMI) ; Group-1: obese T2DM patients with BMI (30.5-44) kg/m2, included 45 patients (19 male, 26 female) age range (31-59) year, Group-2: Non-obese T2DM patients with BMI (18.6-24.9) kg/m2, included 42 patients (20 male, 22 female), age range (33-60) year. The study was approved by The Ethics Committee of the College of Pharmacy, University of Baghdad (No of Ethical approval (22102023)); a verbal consent was taken from each participant after being informed about the purpose of the study and the expected benefits. The patients was selected to have T2DM (diabetes duration > 1 year) for both male and female patients. Aged ≥ 18 years, with BMI range of (18-24.9 kg/m2) for non-obese, and (≥ 30 kg/m2) for the obese .Whilst , those patients having any other endocrinopathy, or those with chronic liver diseases, renal diseases, malignant diseases, or on insulin therapy ,or on drugs that affect serum level of NPY, regnant and lactating women, all were excluded from the study.

Methods

Venous fasting blood samples (6mL) were drawn from each patient. Fresh blood (1mL) was added to EDTA tubes for measuring glycated hemoglobin HbA1c in the blood by boronate affinity assay using the NycoCard Reader II (Sweden). The remaining blood was left at room temperature for 30 min to complete clotting and then to be centrifuged at 4,000 rpm for 10 minutes; serum was separated and transferred into Eppendorf tubes and stored at -20°C until the time of measuring fasting serum insulin and NPY levels by enzyme-linked immuno-sorbent assay (ELISA) specific kits (Cloud-clone crop./ USA and Elabscience /USA for serum insulin and serum NPY respectively), while fasting serum glucose (FSG)), high density lipoprotein cholesterol (HDL-C), total cholesterol (TC), and triglycerides (TG) were measured by colorimetric assay. Low density lipoprotein-cholesterol (LDL) levels is estimated using the Friedewald formula [16].

LDL (mg/dL) = Total cholesterol – (HDL+ TG/5)

Where (TG/5) represents the VLDL in mg/dL.

Insulin resistance was calculated using the homeostasis model assessment of insulin resistance (HOMA-IR); where

HOMA-IR= [(FBG (mg/dL) ×fasting insulin (μU/mL))/404] [17], and Beta-cell function was calculated using the homeostasis Model Assessment of Beta-cell function (HOMA-B); where HOMA-B= [360 × fasting insulin (μU/mL)/ (FBG (mg/dL)-63)] % [18].

Statistical analysis

Statistical analysis was performed by Statistical Package for Social Science (SPSS, version 24, USA) for Windows. The uniformity of data distribution of the variables has been checked via Shapiro-Wilk test. Continuous variables defined as median (interquartile rang (IQR)), and difference between two groups were checked by Mann-Whitney U test, while the categorical variables were expressed as percentages, and difference between groups were checked using Chi-square test. Spearman's correlation coefficient (rho) was run to find out the statistical significant correlations between measured parameters. P< 0.05 values were considered significant.

Results

"Table 1" summarizes participants' demographic and bio-chemical characteristics where the variables defined as median (interquartile rang).

Table 1. Demographic, and Biochemical Characteristics of Participants

Variables		Non-obese N=42	Obese N=45	P-value
Age(years)		52 (21)	50 (13)	0.717
Gender	male	20 (47.62%)	19 (42.22%)	0.615
	female	22 (52.38%)	26 (57.78%)	
Duration(years)		5 (8)	3 (3)	0.097
BMI(Kg/m^2)		23.95 (1.83)	33.2(4.25)	<0.001
HbA1c (%)		6.8(1.38)	8.76(3.07)	<0.001
FSG (mg/dL)		126.49(13.10)	190.74(40.56)	<0.001

Fasting Insulin(µU/ml)	2.911(0.538)	2.148(0.94)	<0.001
HOMA-IR	0.86(0.33)	1.04(0.53)	0.001
HOMA-B	16.38(7.12)	5.86(2.22)	<0.001
Total Cholesterol (mg/dL)	186.5(67)	178(42)	0.347
TG (mg/dL)	164.5(84)	133.5(117)	0.742
HDL (mg/dL)	40.5(17)	46.5(12)	0.403
LDL (mg/dL)	119.5(69)	108(80)	0.527
VLDL (mg/dL)	34(17)	26.5(23)	0.705
NPY pg/ml	116.07(59.32)	167.14(50.90)	<0.001

Where: N, is number of patients BMI, is body mass index; HbA1c, is glycated hemoglobin; FSG, is fasting serum glucose; HOMA-IR, is Homeostatic Model Assessment for Insulin Resistance; HOMA.B, is Homeostatic Model Assessment for b-cell function, TG is triglyceride, HDL is high density lipoprotein, and LDL is low density lipoprotein, VLDL is very low density lipoprotein, NPY is neuropeptide Y and (*) refers to significant difference.

Data analysis for the estimated serum values of NPY of the studied groups indicate a significant difference between them (p<0.001), where the median value (NPY=167.143pg/ml) were higher in group 1 (obese T2DM patients), than the median value (NPY=116.068pg/ml) in group 2 (non-obese T2DM patients "Figure .1".

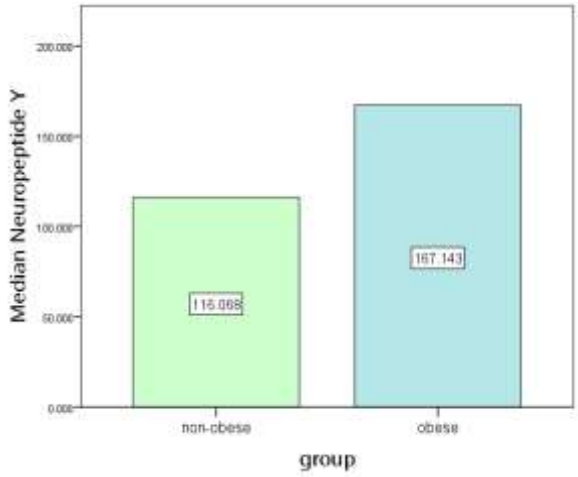

Figure 1. Median values of serum NPY Levels in obese and non-obese groups

As shown in "Figure .2", the median values of FSG, HbA1c and serum insulin of group 1 (obese T2DM patients) and group 2 (non-obese T2DM patients) were significantly different where P value for each biomarker was <0.001, (the median values of FSG=10.597mmol/L, HbA1c=8.76% and serum insulin =2.148µU/ml in group 1, while the median values of FSG=7.027mmol/L, HbA1c=6.8% and serum insulin =2.91µU/ml in group 2).

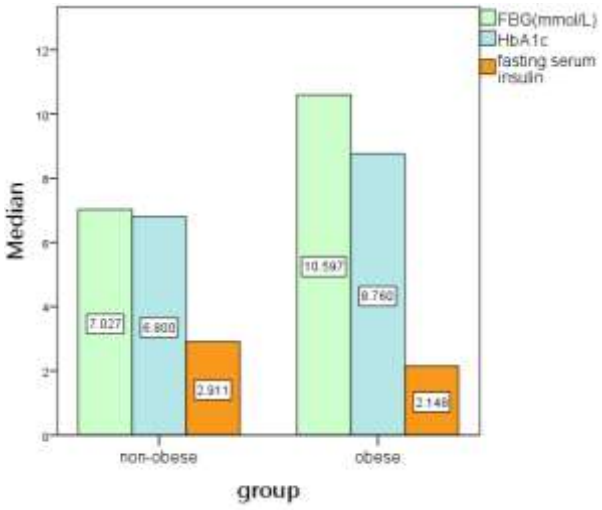

Figure 2. Median values of fasting blood glucose, HbA1c and serum insulin in obese and non-obese groups

Furthermore, the median values of HOMA-IR were significantly different (P=0.001), in group 1 (obese T2DM patients) as compared to that of group 2 (non-obese T2DM patients) where the median values for HOMA-IR were (1.036 and 0.859 in group 1 and group 2 respectively), as shown in "Figure .3".

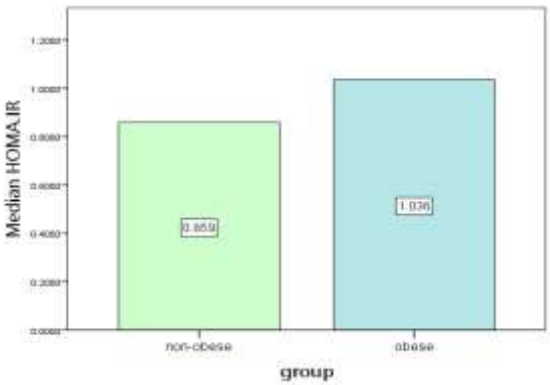

Figure 3. Median values of HOMA-IR in obese and non-obese groups

The median values of HOMA-B were significantly different (where P<0.001) in group 2 (non-obese T2DM patients) as compared to that of group 1 (obese T2DM patients) where the median values for HOMA-B were (16.377 and 5.858 in group 2 and group 1 respectively), as shown in "Figure .4".

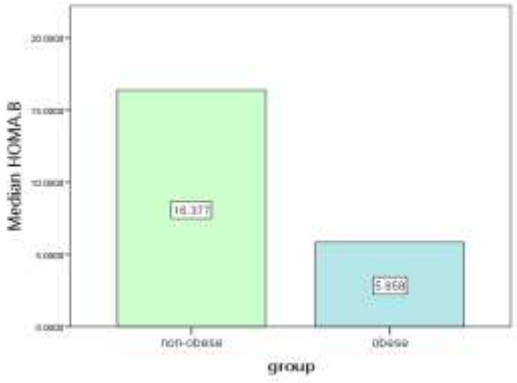

Figure 4. Median values of HOMA-B in obese and non-obese groups respectively.

Table 2. Correlations of serum Neuropeptide Y levels with the studied variables of the total participants.

Variable	NPY (N=87)	
	rho	P value
Age (years)	0.063	0.564
Gender (M/F)	0.167	0.123
Duration (years)	-0.209	0.052
BMI (kg/m^2)	0.670**	<0.001
HbA1c%	0.274**	<0.010
FSG (mg/dL)	0.697**	<0.001
FSI (µU/ml)	-0.296**	0.005
HOMA-IR	0.301**	0.005
HOMA-B	-0.589**	<0.001

Where: N, is number of patients BMI, is body mass index; HbA1c, is glycated hemoglobin; FSG, is fasting Serum glucose; FSI, is fasting serum insulin; HOMA-IR, is Homeostatic Model Assessment for Insulin Resistance; HOMA.B, is Homeostatic Model Assessment for b-cell function, NPY is neuropeptide Y, (**) refers to significant difference and rho is spearman's correlation coefficient.

As shown in "Figure.5" spearman's correlation coefficient values of 0.670 and P value **<0.001** indicating significant positive correlation between NPY and BMI of the total participants.

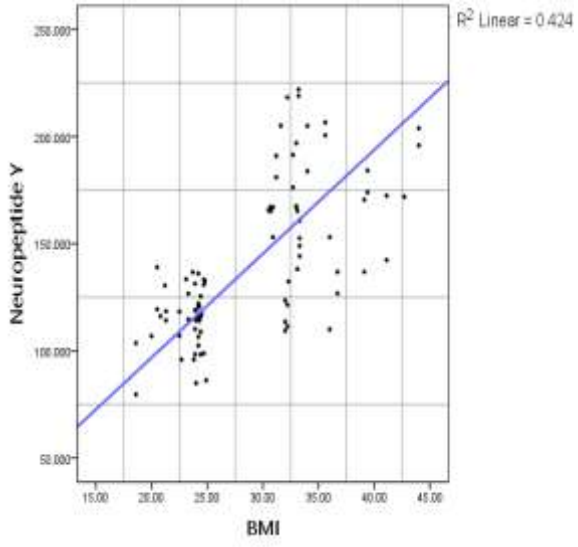

Figure 5. A scatter plot showing the positive Correlation between Neuropeptide Y and BMI

"Figure.6" spearman's correlation coefficient values of 0.301 and P value 0.005 indicating significant positive correlation between NPY and HOMA.IR of the total participants.

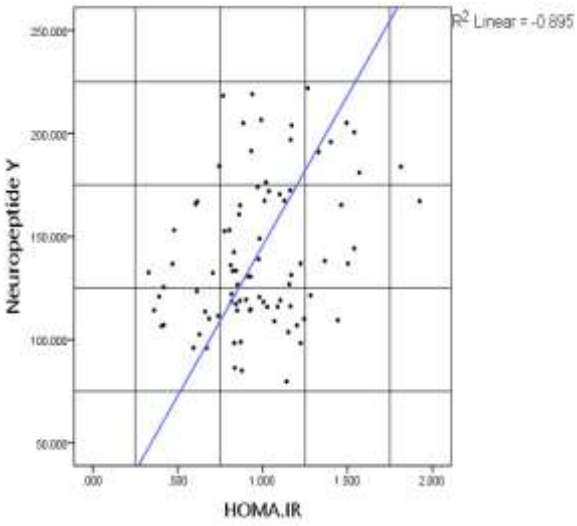

Figure 6. A scatter plot showing the positive Correlation between Neuropeptide Y and HOMA.IR

Whereas in "Figure.7" spearman's correlation coefficient values of -0.296 and P value 0.005 indicating a significant negative correlation between NPY and insulin of the total participants.

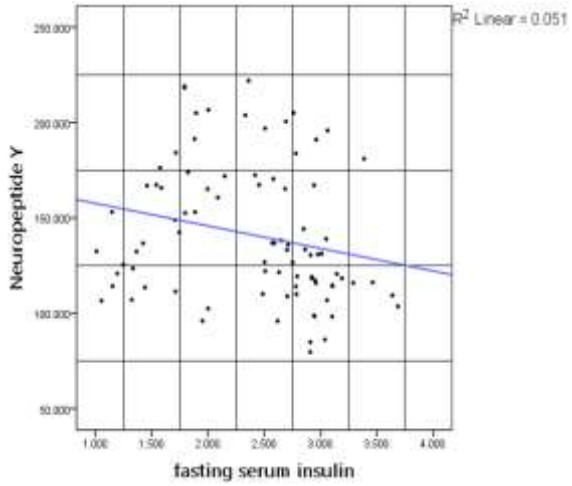

Figure 7. A scatter plot showing the negative Correlation between Neuropeptide Y and serum insulin

Additionally in "Figure.8" spearman's correlation coefficient values of -0.589 and P value <0.001 indicating a significant negative correlation between NPY and HOMA.B of the total participants.

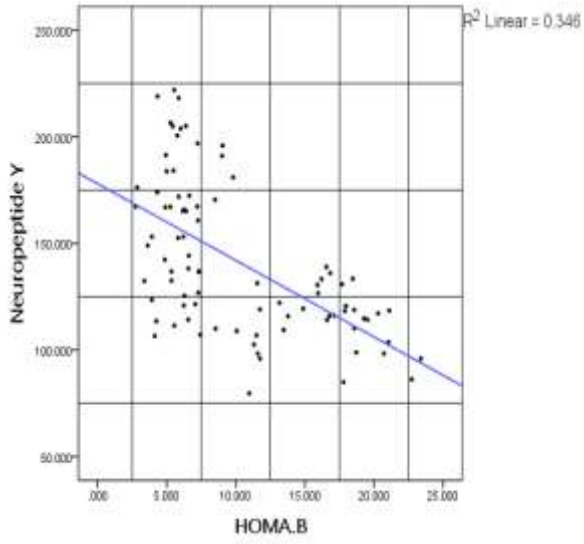

Figure 8. A scatter plot showing the negative Correlation between Neuropeptide Y and HOMA.B

Discussion

According to the criteria used to choose the study's participants, there were no differences in the groups' age, gender or duration of diabetes. This eliminated the possibility that any of these variables might have an impact on the biomarkers the research was looking at.

This study found that serum NPY level was remarkably higher in obese DM patients group than in the non-obese weight patients group as showed in "figure .1", and it has a positive correlation with body mass index "figure .5". Sitticharoon et al. described a higher NPY mRNA expression in both subcutaneous and visceral adipose tissue in obese women compared to normal weight subjects; greater serum NPY levels were also observed [19]. Whereas Tang HN et al. indicate that higher serum NPY levels were found in only obese individuals that have metabolic abnormalities [11].While Guzelkas et al. observe the high NPY levels in both obese and non-obese patients with PCOS and it's not associated with body weight [20]. Obesity correlates with the induction of a chronic state of inflammation that result in alteration in the inflammatory profile of adipose tissue macrophages (ATM), which lead to Physiologic stress signals activation, while there are many neuro-humoral factors associated with stress responses, NPY is a dominant hormone that is elevated in chronic stress and sympathetic nervous system activation [21].The released NPY as response to stress causing by obesity induced inflammatory state act as a potent immune mediator with both pro-inflammatory [22],and anti-inflammatory actions on leukocytes[23]. Many studies support the evidence that NPY has protective functions during chronic stress in the context of anxiolysis [24] and appetite [25]. Some observation indicate that myeloid cells within adipose tissue are a regulated non-neuronal source of NPY production [21], other study indicate that NPY can be secreted by adipocytes located in visceral adipose tissue in obese participants with hyperlipidemia [11].

The data of this study indicate that the fasting serum insulin level "figure .2" and HOMA.B "figure. 4" values were higher in non-obese patients (group 2) than in obese patients (group 1), and these parameters (fasting serum insulin "Figure.7" and HOMA.B "Figure .8" had a significant negative correlation with serum NPY levels. While HOMA.IR "Figure .3" values were lower in non-obese patients (group 2) than in obese patients (group 1), and had a significant positive correlation with serum NPY levels. Yang CH et al identified a more than 2-fold increase in NPY1R and its ligand, NPY mRNA expression in human islets from subjects with T2D, that was significantly associated with reduced insulin secretion, Furthermore, demonstrates that the inhibition of the Y1 receptor by BIBO3304 (Y1 receptor-specific antagonist) represents a potential β-cell-protective therapy for improving functional β-cell mass and glycemic control in T2DM [26]. On the other hand, Siva ZO et al demonstrate that the fasting NPY levels were significantly higher in

migraineurs than in control subjects and it did not show any significant correlation with parameters related to HOMA.IR or HOMA.B (β-cell function) [27]. Insulin resistance and beta cell failure are both involved in the pathogenesis of type 2 diabetes, although there are various theories linking obesity and insulin resistance, the mechanism behind the development of islet failure in obesity is not fully known. Interestingly, NPY, is a peptide that is known to be present in both the brain and the pancreatic islets, it is possible that NPY contributes to islet dysfunction and potentially serves as a link between and obesity diabetes. NPY exerts its effects through interaction with NPY G- protein-coupled receptors (NPYRs 1-6), NPYR Y1 is the most predominant receptor expression on beta cells in addition to Y2 and Y5 NPYRs [14]. Prior research has demonstrated that diabetogenic stress conditions, such as oxidative stress, ER stress, and inflammation, upregulate NPY-Y1 signaling in β cells [26], such these stressful condition also may be caused by the obesity, thus the stress situation that associated with the obesity may result not only in elevation in serum NPY level as mentioned above but also it can lead to upregulation of NPY-Y1 receptors in β cells. NPY By binding to Y1 receptors in β cells directly triggers a signaling cascade, causing the Gi/α subunit of the G-protein complex to be released, resulting in the inhibition of adenylyl cyclase leading to the reduction of cytosolic cAMP level has been proposed to cause the inhibition of glucose-stimulated insulin secretion [28].NPY had also an effect on glucose metabolism by downregulating cell phosphatidylinositol 3-kinase (PI3K) and glycogen synthase kinase-3 phosphorylation of adipose cells [29].study data analysis also indicate that the FBG, HbA1c “Figure. 2” values were higher in obese patients (group 1) than in non-obese patient (group 2), and these parameters had a significant positive correlation with serum NPY levels. Koseci T, et al report that the overweight PCOS group had a higher serum NPY and FBG levels than control group and the elevation of both was a statistically significant [30]. Yang CH et al. demonstrate that the differential expression of NPY and NPY1R between diabetic and control group was not associated with HbA1c [26].

Conclusion

The current research shows a considerable effect of obesity on serum Neuropeptide Y level, which is positively correlated with glycemic markers indicating faster the progression of T2DM complications in obese patients.

Acknowledgment

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Conflicts of Interest

None.

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Ethics Statements

This work was performed according to the Ethics Committee of the College of Pharmacy, University of Baghdad. Before their acceptance to participate in the trial, all participants were told about the study's goal and predicted benefits.

Author Contribution

First author contribution: Collected the data, performed the analysis, statistical analysis and writing of the manuscript. Second author contribution: Have made a substantial contribution to the concept and the design of the article, conceived and designed the analysis, revised it critically and approved the version to be published.

References

1. Khudair FA, Ali SH, Al-nuaimi AA. Study of Association between RAGE Gene Polymorphism rs2070600 (G82S) and Aspirin Resistance in Coronary Artery Disease Iraqi Patients with and without Type 2 Diabetes. Journal of Pharmaceutical Negative Results. 2022 Oct 7; 13(4):170-82.
2. Shaban A, Abbas SA, Abed BA. Estimation of Tenascin-C Levels in Iraqi patients with diabetic nephropathy. Al-Rafidain Journal of Medical Sciences (ISSN 2789-3219). 2023 Nov 1; 5(1S):S8-13.
3. Faris Raheem M, H Ali S, M. A. AL-Nuaimi A, G. Shareef L. Impact of serum vitamin D level on selected bone-related markers in obese- type 2 diabetes patients. F1000Research. 2023 Jan 13; 12:56.
4. Ali IA, Ali SH. Impact of osteocalcin level on vascular calcification in type 2 diabetics in relation to fibroblast growth factor-23 (FGF-23). Iraqi Journal of Pharmaceutical Sciences (P-ISSN 1683-3597 E-ISSN 2521-3512). 2018 Dec 6:42-54.
5. Raheem MF, Ali SH, Shareef LG. Impact of serum levels of vitamin D on lipid profiles, glycemic indices, and insulin resistance in obese type 2 diabetes patients: An observational study. F1000Research. 2022 Sep 6; 11(1002):1002.
6. Shaheed HS, Ali SH. Association of Carnosinase-1 Gene Polymorphism with Serum Carnosine and Carnosinease-1 Isoform Levels in Type 2 Diabetics with Cardiovascular Diseases in Iraq. Al-Rafidain Journal of Medical Sciences (ISSN 2789-3219). 2023 Jun 25; 4:109-17.

7. Jabbar TL, Kasim AA. Association of retinol binding protein-4 (RBP4) with glycemia, dyslipidemia, hypertension, and obesity in type 2 diabetic Iraqi patients. Iraqi Journal of Pharmaceutical Sciences (P-ISSN 1683-3597 E-ISSN 2521-3512). 2020 Dec 30; 29(2):263-70.
8. Jackson SE, Llewellyn CH, Smith L. The obesity epidemic–Nature via nurture: A narrative review of high-income countries. SAGE open medicine. 2020 Apr; 8:2050312120918265.
9. Kasim AA, Ataimish AH. The Pathological Mechanisms of Obesity-Related Glomerulopathy : A review article. Iraqi Journal of Pharmaceutical Sciences (P-ISSN 1683-3597 E-ISSN 2521-3512). 2021 Jun 15; 30(1):22-8.
10. Chadt A, Scherneck S, Joost HG, Al-Hasani H. Molecular links between obesity and diabetes: "diabesity". Endotext [Internet]. 2018 Jan 23.
11. Tang HN, Xiao F, Chen YR, Zhuang SQ, Guo Y, Wu HX, Zhou HD. Higher serum neuropeptide Y levels are associated with metabolically unhealthy obesity in obese chinese adults: A cross-sectional study. Mediators of Inflammation. 2020 Aug 4; 2020.
12. Chen WC, Liu YB, Liu WF, Zhou YY, He HF, Lin S. Neuropeptide Y is an immunomodulatory factor: direct and indirect. Frontiers in immunology. 2020 Oct 6; 11:580378.
13. Diaz-delCastillo M, Woldbye DP, Heegaard AM. Neuropeptide Y and its involvement in chronic pain. Neuroscience. 2018 Sep 1; 387:162-9.
14. Yi M, Li H, Wu Z, Yan J, Liu Q, Ou C, Chen M. A promising therapeutic target for metabolic diseases: neuropeptide Y receptors in humans. Cellular Physiology and Biochemistry. 2018 Dec 22; 45(1):88-107.
15. Sacks DB, Arnold M, Bakris GL, Bruns DE, Horvath AR, Lernmark A, Metzger BE, Nathan DM, Kirkman MS. Guidelines and recommendations for laboratory analysis in the diagnosis and management of diabetes mellitus. Clinical chemistry. 2023 Aug; 69(8):808-68.
16. Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. Clinical Chemistry. 1972; 18(6):499-502.
17. Gayoso-Diz P, Otero-Gonzalez A, Rodriguez-Alvarez MX, Gude F, Cadarso-Suarez C, García F, et al. Insulin resistance index (HOMA-IR) levels in a general adult population: curves percentile by gender and age. The EPIRCE study. Diabetes Res Clin Pract. 2011; 94(1):146-55.
18. Ghasemi A, Tohidi M, Derakhshan A, Hasheminia M, Azizi F, Hadaegh F. Cut-off points of homeostasis model assessment of insulin resistance, beta-cell function, and fasting serum insulin to identify future type 2 diabetes: Tehran Lipid and Glucose Study. Acta diabetologica. 2015 Oct; 52:905-15.
19. Sitticharoon C, Chatree S, Churintaraphan M. Expressions of neuropeptide Y and Y1 receptor in subcutaneous and visceral fat tissues in normal weight and obese humans and their correlations with clinical parameters and peripheral metabolic factors. Regulatory Peptides. 2013 Aug 10; 185:65-72.
20. Guzelkas I, Orbak Z, Doneray H, Ozturk N, Sagsoz N. Serum kisspeptin, leptin, neuropeptide Y, and neurokinin B levels in adolescents with polycystic ovary syndrome. Journal of Pediatric Endocrinology and Metabolism. 2022 Apr 26; 35(4):481-7.
21. Singer K, Morris DL, Oatmen KE, Wang T, DelProposto J, Mergian T, Cho KW, Lumeng CN. Neuropeptide Y is produced by adipose tissue macrophages and regulates obesity-induced inflammation. PloS one. 2013 Mar 5; 8(3):e57929.
22. Kuo LE, Kitlinska JB, Tilan JU, Li L, Baker SB, Johnson MD, Lee EW, Burnett MS, Fricke ST, Kvetnansky R, and Herzog H. Correction: Corrigenda: Neuropeptide Y acts directly in the periphery on fat tissue and mediates stress-induced obesity and metabolic syndrome. Nature Medicine. 2007 Sep; 13(9):1120-.
23. Macia L, Yulyaningsih E, Pangon L, Nguyen AD, Lin S, Shi YC, Zhang L, Bijker M, Grey S, Mackay F, Herzog H. Neuropeptide Y1 receptor in immune cells regulates inflammation and insulin resistance associated with diet-induced obesity. Diabetes. 2012 Dec 1; 61(12):3228-38.
24. Dallman MF, Pecoraro N, Akana SF, La Fleur SE, Gomez F, Houshyar H, Bell ME, Bhatnagar S, Laugero KD, Manalo S. Chronic stress and obesity: a new view of "comfort food". Proceedings of the National Academy of Sciences. 2003 Sep 30; 100(20):11696-701.
25. Rasmusson AM, Schnurr PP, Zukowska Z, Scioli E, Forman DE. Adaptation to extreme stress: post-traumatic stress disorder, neuropeptide Y and metabolic syndrome. Experimental Biology and Medicine. 2010 Oct; 235(10):1150-62.
26. Yang CH, Ann-Onda D, Lin X, Fynch S, Nadarajah S, Pappas EG, Liu X, Scott JW, Oakhill JS, Galic S, Shi Y. Neuropeptide Y1 receptor antagonism protects β-cells and improves glycemic control in type 2 diabetes. Molecular metabolism. 2022 Jan 1; 55:101413.
27. Siva ZO, Uluduz D, Keskin FE, Erenler F, Balci H, Uygunoglu U, Saip S, Goksan B, Siva A. Determinants of glucose metabolism and the role of NPY in progression of insulin resistance in chronic migraine. Cephalalgia. 2018 Oct; 38(11):1773-81.

28. Yang CH, Onda DA, Oakhill JS, Scott JW, Galic S, Loh K, Regulation of pancreatic β-cell function by the NPY system. Endocrinology. 2021 Aug 1; 162(8):bqab070.

29. Sun WW, Zhu P, Shi YC, Zhang CL, Huang XF, Liang SY, Song ZY, Lin S. Current views on neuropeptide Y and diabetes-related atherosclerosis. Diabetes and Vascular Disease Research. 2017 Jul; 14(4):277-84.

30. Koseci T, Omer KA, Haksoyler V, Yildirim DD, Sezer K. Investigation of the relationship between insulin resistance and neuropeptide Y levels in polycystic ovary syndrome. Marmara Medical Journal. 2019 Jan 1; 32(1):1-6.

تأثير السمنة على مستويات النيروبيتيد –Y- في مصل الدم وارتباطه مع مؤشرات نسبة السكر في الدم لدى مرضى السكري من النوع الثاني

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الخلاصة

يمكن أن تساهم السمنة من خلال اليات متعددة ليس فقط في تطور مرض السكري من النوع ٢ (T2DM) ولكن أيضًا في جعله أسوأ، وقد تكون إحدى هذه الآليات هي اضطرابات مستوى مصل الببتيد العصبي Y (NPY) والذي يعد واحدًا من أقوى الببتيدات المولدة للشهية. هذه الببتيدات، التي يتم إنتاجها بكميات كبيرة في منطقة ما تحت المهاد، وكذلك في الأنسجة الدهنية الطرفية. هدفت الدراسة الحالية إلى تقييم تأثير السمنة لدى مرضى السكري من النوع الثاني على مستوى الببتيد العصبي Y وعلاقته بمستويات الجلوكوز والأنسولين في الدم.شملت هذه الدراسة سبعة وثمانون شخصًا، تم اختيارهم من العيادة الخارجية للمركز الوطني لعلاج وأبحاث مرض السكري، وتم تصنيفهم إلى مجموعتين؛ المجموعة.المجموعة (١) مرضى T2DM البدناء الذين لديهم مؤشر كتلة الجسم (٣٠,٥-٤٤) كجم/م٢، شملت ٤٥ مريضًا (١٩ ذكرًا، ٢٦ أنثى) الفئة العمرية (٣١-٥٩) عامًا، والمجموعة (٢) مرضى T2DM ذوي الوزن الطبيعي مع مؤشر كتلة الجسم (١٨,٦-٢٤,٩) كغم/م٢، شملت ٤٢ مريضاً (٢٠ ذكراً، ٢٢ أنثى)، الفئة العمرية (٣٣-٦٠) سنة. يشير تحليل البيانات إلى أن قيم الجلوكوز في الدم الصائم، ونسبة HbA1c، وتقييم نموذج الاستتباب لمقاومة الأنسولين (HOMA.IR) والببتيد العصبي Y كانت مرتفعة بشكل ملحوظ (قيمة الاحتمال < ٠,٠٠١) في المجموعة ١ مقارنة بالمجموعة ٢، ولكن مستوى الأنسولين في مصل الدم الصائم ونموذج تقييم وظيفة خلايا بيتا (HOMA.B) كان مرتفع بشكل ملحوظ (قيمة الاحتمال < ٠,٠٠١) في المجموعة ٢ مقارنة بالمجموعة ١. في حين أن الببتيد العصبي-Y كان مرتبطًا بشكل إيجابي مع مؤشر كتلة الجسم (معامل الارتباط=٠,٦٧٠ / قيمة الاحتمال<٠,٠٠١)، وجلوكوز المصل الصائم(معامل الارتباط=٠,٦٩٧ / قيمة الاحتمال<٠,٠٠١)،(معامل الارتباط=٠,٢٧٤ / قيمة الاحتمال=٠,٠١)وHbA1c%،(معامل الارتباط=٠,٣٠١ / قيمة الاحتمال=٠,٠٠٥) وHOMA.IR ،في حين أنه كان مرتبطا سلبا مع الأنسولين (معامل الارتباط=-٠,٢٩٦/ قيمة الاحتمال=٠,٠٠٥) و(معامل الارتباط=-٠,٥٩٨ / قيمة الاحتمال<٠,٠٠١)HOMA.B ، الاستنتاج: إن ارتفاع مستويات الببتيد العصبي واي عند مرضى السكري المصابين بالسمنة مقارنة بنظرائهم ذوي الوزن الطبيعي يظهر احتمالية ان يكون لارتفاع الوزن تاثير على مستويات هذا الببتيد بالدم, علاوة على ذلك فان الارتباط السلبي بينه وبين مستويات الانسولين في الدم وتقييم وضيفة خلايا بيتا ربما يعكس تاثيره المثبط لقابلية هذه الخلايا على افراز الانسولين لدى هؤلاء المرضى.

الكلمات المفتاحية: الببتيد العصبي واي، السمنة، السكري النوع الثاني، قياس وظيفة خلايا بيتا، مقاومة الانسولين.