Evaluation of Inflammatory Status with Procalcitonin and Neopterin in Healthy Overweight And Obese Adults According to Waist Hip Ratio and Body Mass Index

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Obesity

- Common health problem

- that has a worldwide prevalence,

- Especially in developed countries.

- tripled between 1975 and 2016.

- World Health Organization (WHO)

- **"global epidemic disorder"**

Obesity defination

- a chronic energy metabolism disorder

- excessive fat storage in the body,

- physical and mental problems

- must be treated

Obesity

- Abnormal and excessive fat accumulation

- a chronic energy metabolism disorder

- different cell types
  - monocyte-derived macrophages and
  - dendritic cells in adipose tissue.

- Adipose tissue has
  - autocrine
  - paracrine
  - endocrine

- Has been accepted as an active endocrine organ

Obesity

- The distribution of body fat effects the risk that is assocated with obesity

- Anthropometric measurements
  - Body Mass Index (BMI) and
  - Waist Hip Ratio (WHR)

- BMI does not have the ability to differentiate fatness as central or visceral

- WHR has been shown to be more reflective of visceral fat and central adiposity, as well as a better predictor of obesity related disorders

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Obesity

- Acting like an endocrine tissue,

- A source of various proinflammatorycytokines chemokines growth factors

- the chronic low-grade inflammation of White fat tissue

- Disorders associated with obesity
  - insulin resistance,
  - impaired glucose tolerance, and even
  - diabetes
 - cardiovascular diseases (CVD
  - myocardial infarction (MI)
  - stroke

Obesity

Adipose Tissue

- an important source of pro-inflammatory mediators.

- C-reactive protein (CRP)

  the liver, tumor necrosis factor-alfa (TNF-α), interleukin–1 (IL–1), and interleukin–6 (IL–6)

- Neopterin (NP)

  - human monocyte-derived macrophages, Th1-type cytokine, interferon γ (INF-γ), NP concentrations reflect oxidative stress levels caused by immune system activation

- Procalcitonin

  - Altough known as an indicator for early diagnosiis of sepsis

  - Expressed and produced from activated macrophages

 - A potential marker for the evaluation of obesity.
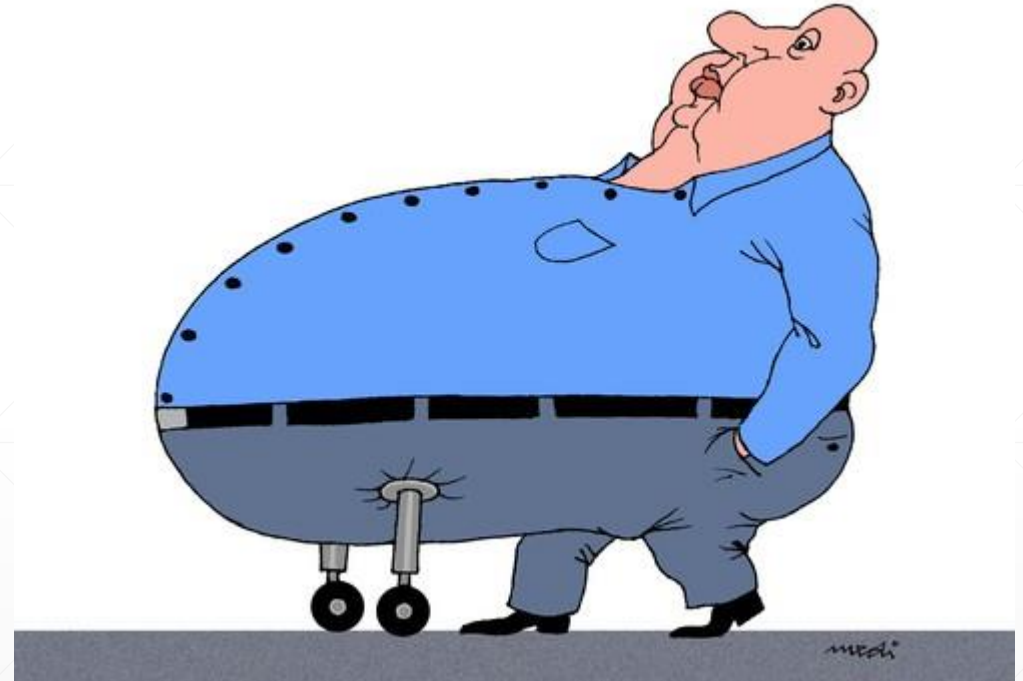
Obesity and Inflamatory markers

- evaluate the predictive role of the

- Hs-CRP, NP, PCT levels

- obese, overweight and normal-weight healthy individuals

- BMI and WHR.
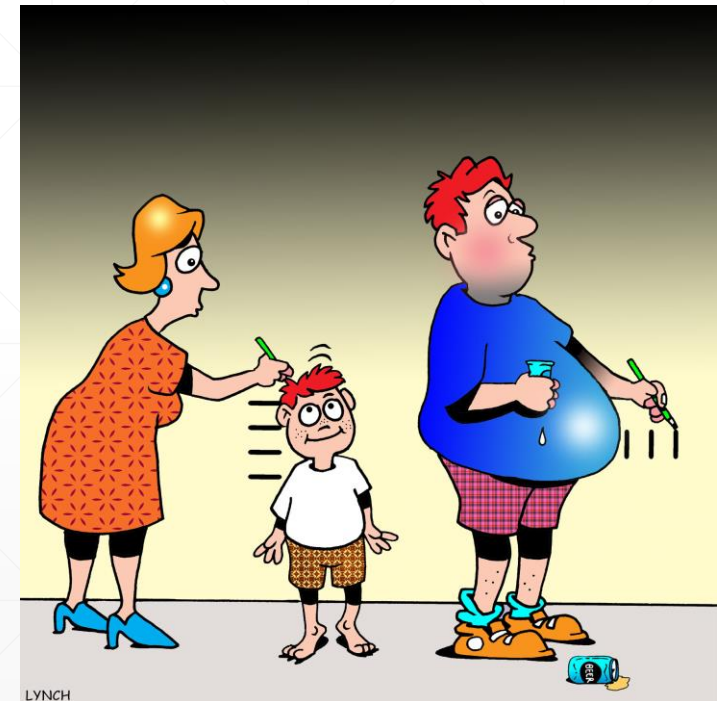
Materiel and methods

- Abant İzzet Baysal University Faculty of Medicine Education and Research Hospital Clinical Chemistry Laboratory.

- 67 participants

- mean age of 41.1 ± 10 years

- 24 Female 43 Male

- A written informed consent was obtained from each participant before entering the study. Normal weights were taken as the control group.
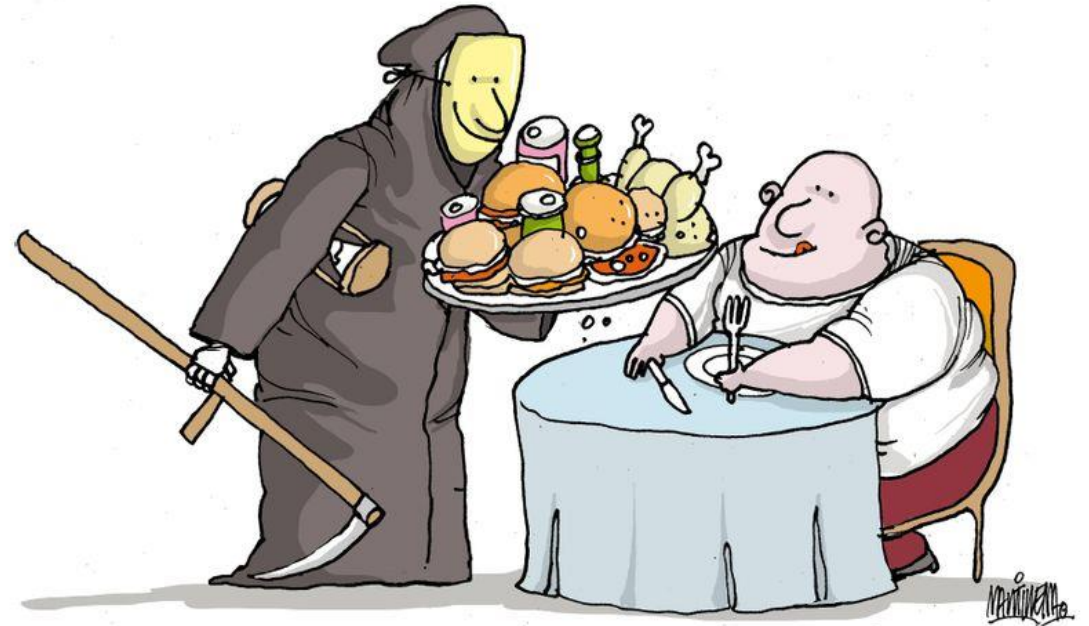
Anthropometric Measurements

- Height, weight, waist and hip circumference measurements

- the same trained person

- in a standardized manner.

- Patient were grouped according to their WHR.
  - WHR <0.90, Group A(n= 31)
  - WHR ≥ 0.90, Group B (n= 36).

- Patient were grouped according to BMI (kg/m^2)
  - BMI ≥ 30 kg/m^2 (obese, Group 3, n=24)
  - BMI = 25–29.9 kg/m^2 (overweight, Group 2, n=22)
  - İn group I BMI < 25 kg/m^2 (control, Group 1, n= 21).

Biochemical Analysis

- Venous blood samples

- 30 min of rest

- 7:30 and 9:30 am and after

- a 12 overnight fast.

- Glucose and lipid parameters - Abbott C8000

- High sensitivity-CRP (hs-CRP) - BN prospec,

- PCT - the Kryptor

- NP -DRG neopterin ELISA kit

- White Blood Cell (WBC) -Cell-Dyn 3700 cell counter

- ESR - Sed Rate Screener 100
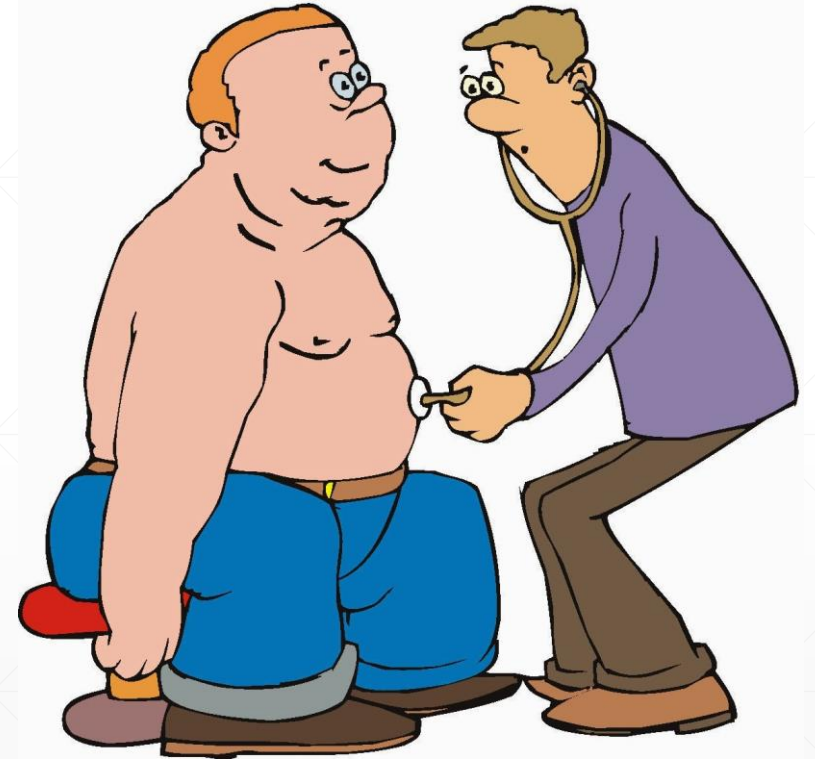
Statistical analysis

▪ Demografic statistic

  ▪ mean ± standard deviation.

▪ Distributions of all parameters - Shapiro-Wilk test.

▪ Comparison between Group A - Group B (according to WHR)

  ▪ T-test - parametric distribution

  ▪ Mann-Whitney U test -the nonparametric distribution.

▪ Comparison between Group 1-2-3 (according to BMI)

▪ One-way ANOVA test and then Post-Hoc test -for parametric distributions

▪ Kruskal Wallis test -nonparametric distribution.

▪ There was no difference between these tests, so the results were given with the One- Way ANOVA test.

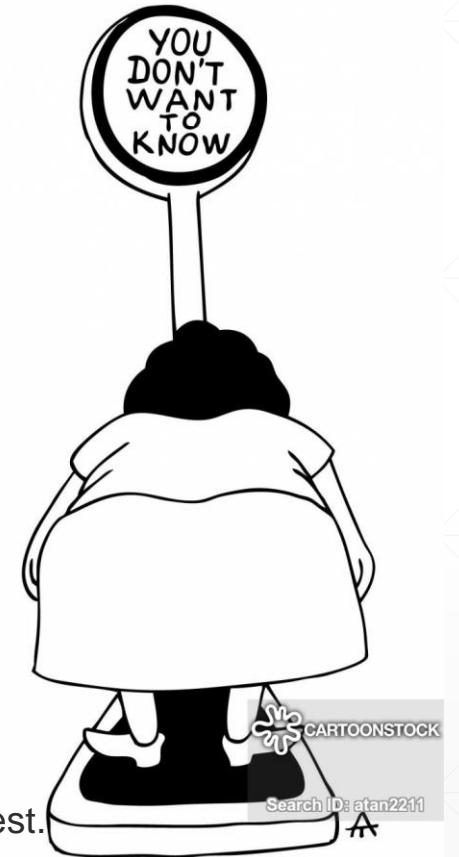▪ SPSS 15. 0 program was used for statistics. Statistical significance was accepted as p <0.05.

Table 1. Demographic data of the study group according to BMI

	TOTAL	GROUP 1	GROUP 2	GROUP 3	P
Age (Year)	41.1 ± 10	38.5 ± 10.4	42.3 ± 9.4	42.1 ±10.3	0.381
WHR	0.88 ± 0.8	0.82 ± 0.08	0.92 ± 0.04	0.90 ± 0.09	<0.001
Glucose (mg/dl)	93.3 ± 8.5	92.2 ± 10.7	92.8 ± 6.8	94.7 ±7.8	0.605
T. Chol. (mg/dl)	193 ± 32.8	179.2± 29.4	205.9 ± 33.3	193.4 ± 28.1	0.026
TG (mg/dl)	144.4 ± 90.1	87.4 ± 29.4	167.2±102.5	173.3 ± 93	0.01
HDL (mg/dl)	44.7 ± 9.8	51.8 ± 12	43.2 ± 6.9	40.0 ± 6.0	<0.01
VLDL (mg/dl)	28.9 ± 18	17.5 ± 5.9	33.45 ±20.4	34.6 ±18.6	0.01
WBC(*1000)	6.6 ± 1.3	6.3 ± 1.2	6.58 ± 1.1	6.9 ± 1.4	0.292
ESR (mm/h)	8 ± 6.9	4.6 ± 3.1	7.0 ± 5.3	12.0 ± 1.4	0.01
Male/Female (n)	43/24	16/5	17/5	10/14	-
HS-CRP (mg/dl)	3.1 ± 3.57	1.4 ± 1.9	2.8± 0.6	4.8 ± 4.0	0.005
NP (nmol/l)	1.8± 0.48	1.7 ± 0.5	1.9±0.5	1.8 ± 0.5	0.650
PCT (ng/ml)	0.27± 0.18	0.18± 0.14	0.3± 0.20	0.30 ± 0.18	0.011

Table 2. Demographic data of the study group according to WHR

	TOTAL	GROUP A	GROUP B	P
Age (year)	41.1 ±10	38.9 ± 9.2	43.4 ± 10.6	0.108
WHR	0.88 ± 0.8	0.81 ± 0.06	0.94 ± 0.04	<0.001
Glucose (mg/dl)	93.3 ± 8.5	93.1 ± 6.9	93.9 ± 9.9	0.395
T. CHOL. (mg/dl)	193 ± 32.8	186.6 ± 34.1	200.0 ± 31.2	0.139
TG (mg/dl)	144.4 ± 90.1	109.4 ± 68.6	171.1 ± 95.3	<0.001
HDL (mg/dl)	44.7 ± 9.8	48.5 ± 11.0	42.0 ± 7.0	0.004
VLDL (mg/dl)	28.9 ± 18	21.9 ± 13.7	34.2 ± 19.0	<0.001
WBC(*1000)	6.6 ± 1.3	6.5 ± 1.2	6.7 ± 1.3	0.605
ESR (mm/h)	8.0 ± 6.9	9.3 ± 7.6	6.88 ± 6.2	0.083
Male/Female (N)	43/24	12/19	29/5	-
HS-CRP (mg/l)	3.1 ± 3.57	2.6 ± 3.2	3.5 ± 3.9	0.251
NP (nmol/l)	1.8± 0.48	1.7 ± 0.5	1.9 ± 0.4	0.073
PCT (ng/ml)	0.27± 0.18	0.3 ± 0.2	0.3 ± 0.16	0.419

Conclusion

- the increase in total fat mass in the body may lead to an increase in inflammation markers.

- the increase in inflammation markers such as CRP and PCT could be considered as a possible stimulant in the evaluation of obesity for the predictive effect of clinical conditions such as insulin resistance, CVD

- The correlation of BMI with the ınflamation parameters was found more predictive than WHR in our study results.

Thank you for your attention