

OBEZİTE VE METABOLİK SENDROM

Sertaç ERARSLAN¹

Giriş

Obezite vücut yağ dokusu miktarının artışı ve buna bağlı kilo fazlalığı olarak tanımlanmaktadır. Modern toplumlarda gittikçe artan sıklıkla görülmektedir. Patogenezinde birçok faktör rol alsada,

beslenme hastalığı olarak değerlendirilmektedir. Klavuzlar obezite tanımı, tanısı ve derecelendirilmesi için Beden Kütle İndeksi (BKI) 'inin kullanılmasını önermektedir¹. BKI 'ne göre vücut ağırlığının değerlendirilmesi tablo 1'de verilmiştir.

Tablo 1: BKI 'ne göre vücut ağırlığının klasifikasyonu

	Obezite sınıfı	BKI (kg/m ²)
Düşük		< 18.5
Normal		18.5-24.9
Fazla kilo	Owerweight	25-29.9
Obezite	I	30-34.9
Obezite	II	35-39.9
Morbid obezite	III	≥ 40

Son 50 yıl içerisinde dünya genelinde en önemli halk sağlığı problemi haline gelen obezite, yaşam kalitesini düşürmenin yanında birçok hastalık için risk oluşturmakta ve sağlık harca-

malarında belirgin artışa neden olmaktadır². Bununla birlikte abdominal obezitenin metabolik ve kardiyovasküler komplikasyonlar ile daha çok ilişkili olduğu gösterilmiştir. Bu sebepten dolayı

¹ Dr Öğretim Üyesi, Kütahya Sağlık Bilimleri Üniversitesi Tıp Fakültesi, sertac_eraslan@hotmail.com

Kaynaklar

1. Jensen, M. (2020). Obesity. Lee Goldman (Ed.), Goldman-Cecil Medicine (1418-27). Philadelphia: Elsevier.
2. Bray G, Frühbeck G, Ryan D, et al. Management of Obesity. *Lancet* 2016; 387: 1947-56.
3. Jerhan JR, Moore SC, Jacobs EJ, et al. A pooled analysis of waist circumference and mortality in 650.000 adults. *Mayo Clin Proc* 2014; 89: 335-45.
4. Kylin E. Studien"über das Hypertonie-Hyperglykaemie-hyperurikaemie syndrom. *Zentralbl Inn Med* 1923; 44: 105-27.
5. Vague J. La differenciation sexuelle, facteur determinant des formes de l'obesite. *Presse Med* 1947; 53: 339-40.
6. Avogaro P, Crepaldi G. Essential hyperlipidemia, obesity and diapedes. *Diabetologia* 1965; 1: 37-8.
7. Haller H. Epidemiologie und assoziierte risikofaktoren der hyperlipoproteinämie(epidemiology and associated risk factors of hyperlipoproteinaemia) *Z Gesamte Inn Med* 1977; 32: 124-28.
8. Reaven GM. Banting Lecture 1988. Role of insulin resistance in human disease. *Diabetes* 1988; 37: 1595-607.
9. Kaplan NM. The deadly quartet. Upper-body obesity, glucose intolerance, hypertriglyceridemia, and hypertension. *Arch Intern Med* 1989; 149: 1514-20.
10. DeFronzo RA. İnsulin resistance: a multifacted syndrom responsible for NIDDM, obesity, hypertension, dyslipidemia and atherosclerosis. *Neth J Med* 1997; 50: 191-97.
11. Hijerman I. The Metabolic cardiovascular syndrom: syndrom X, Reaven's syndrom, İnsulin resistance syndrom, Atherothrombogenic syndrom. *J Cardiovasc Pharmacol* 1992;20: 5-10.
12. Alberti KG, Zimmet PZ. Definition, diagnosis and classifications1. Diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. *Diabet Med* 1998; 15: 539-53.
13. Balkau B, Charles MA. Comment on the provisional report from the WHO consultation. European Group for the study of Insülin Resistance(EGİR). *Diabet Med* 1999; 16: 442-3.
14. Executive Summary of the Third Report of National Cholesterol Education Program (NCEP). Expert panel on detection, evaluation and treatment of heigh blood cholesterol in adults (Adult Treatment Panel III). *JAMA* 2001; 285: 2486-97.
15. Alberti G, Zimmet P, Shaw J et al. Worldwide definition of the metabolic syndrom. *International Diabetes Federation Lancet* 2005; 366: 1059-62.
16. Saklayen MG. The Global Epidemic of the Metabolic Syndrom. *Curr Hypertens Rep* 2018; 20:12.
17. 2015 Obesity collaborators GBD. Health effects of overweight and obesity in 195 countries over 25 years. *N Engl J Med*. 2017 Jul 6;377(1):13-27.
18. Ford ES, Giles WH, Dietz WH. Prevalance of the metabolic syndrom among US adults: findings from the third National Health and Nutrition Examination Survey. *JAMA* 2002; 287: 356-9.
19. National Center for Health Statistics, Division of Health Interview Statistics. Crude and age-adjusted percentage of civilian, noninstitutionalized adults with diagnosed diabetes, United States, 1980- 2010. National Center for Chronic Disease Prevention and Health Promotion, Ed. Atlanta, GA, Centers for Disease Control and Prevention, Division of Diabetes Translation, 2012.
20. Palaniappan LP, Wong EC, Shin JJ, et al. Asian Americans have greater prevalence of metabolic syndrom despite lower body mass index. *In J Obe*. 2017;35:393-400.
21. Wang Y, Mi J, Shan X, et al. Is China facing an obesity epidemic and the consequences? The trends in obesity and chronic disease in China. *Int J Obesity*. 2007;31:177-88.
22. First nationwide study of the prevalence of the metabolic syndrom and optimal cutoff points of waist circumference in the Middle East: the national survey of risk factors for noncommunicable diseases of Iran. *Diabetes Care* 2009 Jun; 32(6):1092-7.
23. Onat A, Sansoy V. Halkımızda koroner hastalığın baş suçlusu metabolik sendrom: sıklığı, unsurları, koroner risk ile ilişkisi ve yüksek risk kriterleri. *Türk Kardiyoloji Dern Arş* 2002; 30: 8-15.
24. Kozan Ö, Oğuz A, Abacı A, Erol Ç, Öngen Z, Temizhan A, Çelik Ş. Prevalance of the metabolic syndrom amond Turkish adults. *Eur J Clin Nutrition* 2007; 61: 548-53.
25. Eckel RH, Grundy SM, Zimmet PZ. Metabolik sendrom. *Lancet* 2005; 365: 1415.
26. Roberts CK, Hevener AL, Barnard RJ. Metabolic syndrom and insulin resistance: Underlying causes and modification by exercise training. *Compr Physiol*. 2013;3:1-58.
27. Hollenbeck C, Reaven GM. Variations in insulin stimulated glucose uptake in healthy individuals with normal glucose tolerance. *J Clin Endorinol Metab* 1987; 64: 1169-73.
28. Semple RK, Savage DB, Cochran EK, et al. Genetic syndromes of severe insulin resistance. *Endocr Rev* 2011; 32:498.
29. Thies R, Molina JM, Ciavaldi TP, Friendenberg GR, Olefsky JM. İnsulin receptor autophosphorylation and endogenous substrate phophorylation in human adipocytes from control, obese and NIDDM subjects. *Diabetes* 1990; 39: 250-8.

30. Cusi K, Maezono K, Osman A et al. Insulin resistance differentially affects the PI-3 kinase and MAP kinase mediated signaling in human muscle. *J Clin Invest* 2000; 105: 311-20.
31. Shepherd PR, Kahn BB. Glucose transporters and insulin action: Implications for insulin resistance and diabetes mellitus. *N Eng J Med* 1999; 341: 28-257.
32. Eriksson J, Franssila-Kallnunki A, Ekstrand A et al. Early metabolic defects in persons at increased risk for non-insulin dependent diabetes. *N Engl J Med* 1989; 321: 337-43.
33. McCracken E, Monaghan M, Sreenivasan S. Pathophysiology of the metabolic syndrome. *Clinics in Dermatology* (2018) 36, 14–20.
34. Eckel RH. Lipoprotein lipase. A multifunctional enzyme relevant to common metabolic diseases. *N Engl J Med* 1989; 320: 1060–68.
35. Eckel RH. Obesity: mechanisms and clinical management. Philadelphia (PA): Lippincott Williams & Wilkins, 2003.
36. Kim YB, Shulman GI, Kahn BB. Fatty acid infusion selectively impairs insulin action on Akt1 and protein kinase C lambda/zeta but not on glycogen synthase kinase-3. *J Biol Chem* 2002; 277: 32915–22.
37. Boden G, Shulman GI. Free fatty acids in obesity and type 2 diabetes: defining their role in the development of insulin resistance and beta-cell dysfunction. *Eur J Clin Invest* 2002; 32 (suppl 3): 14–23.
38. Kelley DE, He J, Menshikova EV, Ritov VB. Dysfunction of mitochondria in human skeletal muscle in type 2 diabetes. *Diabetes* 2002; 51: 2944–50.
39. Petersen KF, Dufour S, Befroy D, Garcia R, Shulman GI. Impaired mitochondrial activity in the insulin-resistant offspring of patients with type 2 diabetes. *N Engl J Med* 2004; 350: 664–71.
40. Petersen KF, Befroy D, Dufour S, et al. Mitochondrial dysfunction in the elderly: possible role in insulin resistance. *Science* 2003; 300: 1140–42.
41. Bergman RN, Kim SP, Hsu IR, et al. Abdominal obesity: metabolik hastalık ve kardiyovasküler riskin patofizyolojisiindeki rolü. *Am J Med* 2007; 120: S3.
42. Klop B, Elte JW, Cabezas MC. Obezitede dislipidemi: mekanizmalar ve potansiyel hedefler. *Nutrients* 2013; 5: 1218.
43. Grundy SM. What is the contribution of obesity to the metabolic syndrome? *Endocrinol Metab Clin N Am* 2004; 33: 267-82.
44. Dandona P, Weinstock R, Thusu K, Abdel-Rahman E, Aljada A, Wadden T. Tumor necrosis factor- α sera of obese patients: fall with weight loss. *J Clin Endocrinol Metab* 1998; 83: 2907-10.
45. Likuni N, Kwan Lam Q, Lu L, Matarese G, Cava A. 2008. Leptin and inflammation. *Curr. Immunol. Rev.* 4, 70–79.
46. Perry RJ, Peng L, Abulizi A, Kennedy L, Cline GW, Shulman GI. 2017. Mechanism for leptin's acute insulin-independent effect to reverse diabetic ketoacidosis. *J. Clin. Invest.* 127, 657–669.
47. Steppan CM, Bailey ST, Bhat S, Brown EJ, Banerjee RR, Wright CM, Patel HR, Ahima RS, Lazar MA. 2001. The hormone resistin links obesity to diabetes. *Nature* 409, 307–312.
48. Yamauchi T, Kamon J, Ito Y, et al. 2003. Cloning of adiponectin receptors that mediate antidiabetic metabolic effects. *Nature* 423, 762–769.
49. Dandona P, Aljada A, Mohanty P. Insulin inhibits intranuclear nuclear factor kappaB and stimulates I κ B in mononuclear cells in obese subjects: evidence for an anti-inflammatory effect? *J Clin Endocrinol Metab* 2001; 86: 3257-65.
50. Bjorntorp P. Portal adipose tissue as a generator of risk factors for cardiovascular disease and diabetes. *Arteriosclerosis* 1990; 10: 493-6.
51. Hanson RL, Imperatore G, Bennett PH, Knowler WC. Components of the "metabolic syndrome" and incidence of type 2 diabetes. *Diabetes* 2002; 51:3120.
52. Resnick HE, Jones K, Ruotolo G, et al. Insulin resistance, the metabolic syndrome, and risk of incident cardiovascular disease in nondiabetic American Indians: the Strong Heart Study. *Diabetes Care* 2003; 26:861.
53. Klein BE, Klein R, Lee KE. Components of the metabolic syndrome and risk of cardiovascular disease and diabetes in Beaver Dam. *Diabetes Care* 2002; 25:1790.
54. Sattar N, Gaw A, Scherbakova O, et al. Metabolic syndrome with and without C-reactive protein as a predictor of coronary heart disease and diabetes in the West of Scotland Coronary Prevention Study. *Circulation* 2003; 108:414.
55. Sattar N, McConnachie A, Shaper AG, et al. Can metabolic syndrome usefully predict cardiovascular disease and diabetes? Outcome data from two prospective studies. *Lancet* 2008; 371:1927.
56. Ford ES, Li C, Sattar N. Metabolic syndrome and incident diabetes: current state of the evidence. *Diabetes Care* 2008; 31:1898.
57. Ford ES, Schulze MB, Pischon T, et al. Metabolic syndrome and risk of incident diabetes: findings from the European Prospective Investigation into Cancer and Nutrition-Potsdam Study. *Cardiovasc Diabetol* 2008; 7:35.
58. Kahn R. Metabolic syndrome: is it a syndrome? Does it matter? *Circulation* 2007; 115:1806.
59. Samson SL, Garber AJ. Metabolic syndrome. *Endocrinol Metab Clin North Am* 2014; 43:1.

60. Ford ES. Risks for all-cause mortality, cardiovascular disease, and diabetes associated with the metabolic syndrome: a summary of the evidence. *Diabetes Care* 2005; 28:1769.
61. Galassi A, Reynolds K, He J. Metabolic syndrome and risk of cardiovascular disease: a meta-analysis. *Am J Med* 2006; 119:812.
62. Gami AS, Witt BJ, Howard DE, et al. Metabolic syndrome and risk of incident cardiovascular events and death: a systematic review and meta-analysis of longitudinal studies. *J Am Coll Cardiol* 2007; 49:403.
63. Meigs JB, Wilson PW, Fox CS, et al. Body mass index, metabolic syndrome, and risk of type 2 diabetes or cardiovascular disease. *J Clin Endocrinol Metab* 2006; 91:2906.
64. Saely CH, Koch L, Schmid F, et al. Adult Treatment Panel III 2001 but not International Diabetes Federation 2005 criteria of the metabolic syndrome predict clinical cardiovascular events in subjects who underwent coronary angiography. *Diabetes Care* 2006; 29:901.
65. Krawczyk M, Bonfrate L, Portincasa P. Nonalcoholic fatty liver disease. *Best Pract Res Clin Gastroenterol* 2010; 24:695.
66. Yki-Järvinen H. Non-alcoholic fatty liver disease as a cause and a consequence of metabolic syndrome. *Lancet Diabetes Endocrinol* 2014; 2:901.
67. Smits MM, Ioannou GN, Boyko EJ, Utzschneider KM. Non-alcoholic fatty liver disease as an independent manifestation of the metabolic syndrome: results of a US national survey in three ethnic groups. *J Gastroenterol Hepatol* 2013; 28:664.
68. Neuroschwander-Tetri BA. Fatty liver and the metabolic syndrome. *Curr Opin Gastroenterol* 2007; 23: 193-8.
69. Magkos F, Yannakoulia M, Chan JL, Mantzoros CS. Management of the metabolic syndrome and type 2 diabetes through lifestyle modification. *Annu Rev Nutr* 2009; 29:223.
70. Bassi N, Karagodin I, Wang S, et al. Lifestyle modification for metabolic syndrome: a systematic review. *Am J Med* 2014; 127:1242.e1.
71. Bozkurt B, Aguilar D, Deswal A, et al. Contributory Risk and Management of Comorbidities of Hypertension, Obesity, Diabetes Mellitus, Hyperlipidemia, and Metabolic Syndrome in Chronic Heart Failure: A Scientific Statement From the American Heart Association. *Circulation* 2016; 134:e535.
72. Kastorini CM, Milionis HJ, Esposito K, et al. The effect of Mediterranean diet on metabolic syndrome and its components: a meta-analysis of 50 studies and 534,906 individuals. *J Am Coll Cardiol* 2011; 57:1299.
73. Azadbakht L, Mirmiran P, Esmailzadeh A, et al. Beneficial effects of a Dietary Approaches to Stop Hypertension eating plan on features of the metabolic syndrome. *Diabetes Care* 2005; 28:2823.
74. Brand-Miller J, Hayne S, Petocz P, Colagiuri S. Low-glycemic index diets in the management of diabetes: a meta-analysis of randomized controlled trials. *Diabetes Care* 2003; 26:2261.
75. Ma Y, Olendzki BC, Wang J, et al. Single-component versus multicomponent dietary goals for the metabolic syndrome: a randomized trial. *Ann Intern Med* 2015; 162:248.
76. Després JP, Pouliot MC, Moorjani S, et al. Loss of abdominal fat and metabolic response to exercise training in obese women. *Am J Physiol* 1991; 261:E159.
77. Klein S, Fontana L, Young VL, et al. Absence of an effect of liposuction on insulin action and risk factors for coronary heart disease. *N Engl J Med* 2004; 350:2549.
78. Lindstrom J, Ilanne-Parikka P, Peltonen M et al. Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. *Lancet* 2006; 368: 1673-9
79. Knowler WC, Barrett-Conner E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002; 346: 393-403.
80. Nathan DM, Buse JB, Davidson MB, et al. Management of hyperglycemia in type 2 diabetes: A consensus algorithm for the initiation and adjustment of therapy: a consensus statement from the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care* 2006; 29:1963.
81. Pearson TA, Blair SN, Daniels SR, et al. AHA Guidelines for Primary Prevention of Cardiovascular Disease and Stroke: 2002 Update: Consensus Panel Guide to Comprehensive Risk Reduction for Adult Patients Without Coronary or Other Atherosclerotic Vascular Diseases. American Heart Association Science Advisory and Coordinating Committee. *Circulation* 2002; 106:388.
82. Bosch J, Yusuf S, et al. Effect of ramipril on the incidence of diabetes. *N Engl J Med* 2006; 355:1551.
83. McMurray JJ, Holman RR, et al. Effect of valsartan on the incidence of diabetes and cardiovascular events. *N Engl J Med* 2010; 362:1477.